TOWARD A THEORY OF THE EVOLUTION OF BUSINESS ECOSYSTEMS: Enterprise Architectures, Competitive Dynamics, Firm Performance & Industrial Co-Evolution

by

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Submitted to the Engineering Systems Division on September 16, 2009 in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Engineering Systems.

Abstract

This dissertation contributes toward the building of a theory of the evolution of business ecosystems. In the process, it addresses a question that has been posed by evolutionary theorists in the economics and sociology literatures for decades: "Why do firms in the same industry vary *systematically* in performance *over time*?" Seeking a *systematic* explanation of a *longitudinal* phenomenon inevitably requires characterizing the evolution of the industrial ecosystem, as both the organization (firm) and its environment (industry, markets and institutions) are co-evolving.

This question is therefore explored via a theoretical sample in three industrial ecosystems covering manufacturing and service sectors, with competitors from the US, Europe and Japan: commercial airplanes, motor vehicles and airlines. The research is based primarily on an indepth seven-year, multi-level, multi-method, field-based case study of both firms in the large commercial airplanes industry *mixed* duopoly as well as the key stakeholders in their extended enterprises (i.e. customers, suppliers, investors and employees). This field work is supplemented with historical comparative analysis in all three industries, as well as nonlinear dynamic simulation models developed to capture the essential mechanisms governing the evolution of business ecosystems.

A theoretical framework is developed which endogenously traces the co-evolution of firms and their industrial environments using their highest-level system properties of *form, function* and *fitness* (as reflected in the system sciences of *morphology, physiology* and *ecology*), and which embraces the evolutionary processes of *variation, selection* and *retention*. The framework captures the path-dependent evolution of heterogeneous populations of enterprise architectures engaged in *symbiotic inter-species competition* and posits the evolution of *dominant designs* in enterprise architectures that oscillate deterministically and chaotically between *modular* and *integral* states throughout an industry's life-cycle. Architectural innovation – at the extended enterprise level – is demonstrated to contribute to the failure of established firms, with causal mechanisms developed to explain tipping points.

Thesis Supervisor: Dr. Charles H. Fine, Professor of Management & Engineering Systems Thesis Member: Dr. Deborah J. Nightingale, Professor of the Practice of Engineering Systems Thesis Member: Dr. Yossi Sheffi, Professor of Engineering Systems, Director of ESD Thesis Member: Carolyn Corvi, Vice President/General Manager, *Boeing Commercial Airplanes* To Sophie and Garry

Acknowledgements

At one of the first public presentations of this research in 2003, I received a public critique from the late Dr. Michael Hammer, MIT professor, best-selling international author and management "guru". He colorfully exclaimed, "*This is either the work of a madman or a genius, and at this moment I am inclined to think that it is the latter.*" I would like to acknowledge at this point that if the ideas presented herein appear strange, unconvincing, illogical, or simply wrong, then I take full blame as the "madman" responsible for this work. However, if these insights – while unconventional – do seem to uncover some truths, then I must acknowledge the sources of any "genius" that may exist.

My thesis supervisor, Charlie Fine acknowledged in his book, *Clockspeed*, "if I have seen farther, it is by standing on the shoulders of giants". My "giants" are numerous in space and time, ranging from Charles Darwin to senior executives at *Boeing*, to my MIT classmates. I have merely served as a questioner, listener and integrator of their knowledge and points of view. I would therefore like to thank those whose contributions made this thesis possible. While I have faithfully tried to acknowledge the intellectual sources of this work through the traditional and formal process of citations, including over 1,000 footnotes and 600 references, the following acknowledgements are equally important as they inspired and enabled this research.

Academic Influences:

As I look back over the past seven years of this project, it becomes more and more clear that this work would simply have been impossible without the continued guidance and support from the exceptional people at exceptional institutions who served as my masters and doctoral thesis supervisors, my doctoral committee members, as well as my professional and personal mentors. They are equal peers with complementary talents. I have become convinced that if I had selected any other academics to lead me through this research, this project would simply not have been permitted to get off the ground. It is through their personal ambitions and extraordinary capabilities to solve the most complex socio-technical problems while simultaneously balancing the academic rigor – professional relevance tradeoff, that this work has been enabled.

- Professor Charles Fine, *MIT Sloan School of Management* and *Engineering Systems Division* and Director of the *International Motor Vehicle Program*, the original "business geneticist", who in *Clockspeed* taught me the power of Three-Dimensional Concurrent Engineering (of products, production systems, and global extended enterprises) and encouraged me to extract simple patterns amidst the dynamic complexity of value chains, industries, firms and technologies.
- Professor Deborah Nightingale, *MIT School of Engineering* and Director of the *MIT Lean Advancement Initiative (LAI)*, taught me the power of enterprise thinking, the complexity of multiple stakeholder integration and gave me the tools and encouragement to understand how such enterprises are architected and to begin to participate in the process of their architecting.

- Professor Yossi Sheffi, *MIT Engineering Systems* and *Civil & Environmental Engineering* and Director of the *MIT Engineering Systems Division (ESD)*, whose bold vision and leadership of an *integral* academic enterprise gives us the courage to take the intellectual risks to ask the big, complex unanswered questions. He has enabled, supported and challenged those of us who were foolish enough to aim high.
- Carolyn Corvi, MIT *Sloan Fellow* and VP and GM of Airplane Programs at *Boeing Commercial Airplanes*¹, an outstanding business leader² and enterprise architect, who taught me not only how modular and integral enterprises function, but crucially the challenging process of transforming modular to integral, a journey she began over 20 years ago, which she researched and documented in her MIT Sloan Fellows thesis.

In addition to my doctoral committee members associated with MIT, I would like to acknowledge and thank those how have supported and challenged me during my productive stay at the University of Oxford, and in particular:

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- MIT Lean Aerospace Initiative / Lean Advancement Initiative (LAI)
- MIT Sloan School of Management System Dynamics Group (SDG)
- MIT Engineering Systems Division (ESD).³
- University of Oxford, Saïd Business School Masters in Management Research program
- University of Oxford, Saïd Business School Oxford Executive Education
- University of Oxford, *Templeton College*

¹ Carolyn retired from *Boeing* just before the end of this research project at the end of 2008, after 34 years of service.

² Fortune magazine's "50 Most Powerful Women in Business" (2005); Wall Street Journal's "50 Women to Watch" (2008).

³ ESD graduate students who have used their thesis work to further build and test the theory developed herein include: Sgourids (PhD) and Akshat Mathur (SDM).

Teaching Influences

In addition, my teaching of the material presented in this thesis over the years has had a significant impact on my own learning and the development of the thesis itself. I am grateful for the opportunities that I have been given to have presented, discussed and developed this material in academic and professional forums around the world in North America, South America and Europe (see below), as well as to the students and executives who asked thoughtful questions and gave me rich feedback and critiques.

- MIT Sloan School of Management graduate courses:
 - o 15.795 Technology Roadmapping (Fall, 2002)
 - o 15.769 Operations Strategy (Spring, 2003)
 - o 15.769 Operations Strategy (Spring, 2008)
 - o 15.769 Operations Strategy (Fall, 2008)
- MIT Engineering Systems Division graduate courses:
 - ESD.61J Integrating the Lean Enterprise (Fall, 2004)
 - o ESD.38J Enterprise Architecting, 2 sessions (Spring, 2006)
 - ESD.61J Integrating the Lean Enterprise (Fall, 2006)
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 - System Dynamics doctoral seminar (Fall, 2003)
 - Operations Management research seminar (Fall, 2004)
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 Fall, 2008
- MIT Lean Aerospace Initiative / Lean Advancement Initiative (LAI):
 - Fall, 2002 research seminar
 - Fall, 2003 research seminar
 - Fall, 2004 research seminar
 - o Spring, 2005 Executive Board, Dana Point, CA
 - Summer, 2005 research meeting presentation
 - Spring, 2006 research seminar
 - Fall, 2006 research seminar
 - Fall, 2007 research seminar
 - Fall, 2008 research seminar
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- o March, 2007
- October, 2007
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 - Board of Directors meeting in Williamsburg, Virginia on 7 September 2008.
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 - Tim Meskill, Director, Business Strategy
 - Adam Kohorn, Director, Business Strategy
 - Rasheed El-Moslimany, strategy analyst
 - Rachel Portillo, strategy analyst
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- MIT Leaders for Manufacturing (LFM) / Leaders for Global Operations (LGO)
- MIT Lean Aerospace Initiative / Lean Advancement Initiative (LAI)
- MIT Communication Futures Program
- University of Oxford, Said Business School, Executive Education

While this funding has enabled the research, the contents of this thesis do not necessarily reflect the views of the above organizations, and any errors or omissions are the responsibility of the author.

Disclaimers:

In order to preserve an impartial and unbiased standing as an objective researcher, I make the following disclosures:

- I am a dual citizen of both home nations of the primary case study upon which this research is partially based: the US (*The Boeing Company*) and the Netherlands (*EADS*, parent of *Airbus*).
- I have never in the past owned, do not currently own, nor will I own shares of either companies in the primary case study upon which this research is partially based: *The Boeing Company* and *EADS* (parent of *Airbus*).

Personal Influences:

Finally, I would like to acknowledge the sources of my personal strength and inspiration: my precious wife, Sophie, our extraordinary son, Garry Georges, and our wonderful parents, Garry & Janice and Georges & Micheline.

"Papa, who is winning today – Blue or Red?"⁴

⁴ On June 11th 2003, the day our son Garry Georges Piepenbrock was born, I graduated from my masters program at MIT and embarked on my doctorate. My PhD journey concluded on Garry's 6th birthday. During those six wonderful years, we watched a beautiful baby grow into an extraordinary boy – the privilege of a lifetime. My work grew with Garry, who is both my greatest student (asking me the above question nearly every day) as well as my greatest teacher. This work – our work – is dedicated to those "over the rainbow".

Biographical Note

Ted Piepenbrock is an international lecturer in executive education and consultant in strategic leadership and macro-organizational change to corporate leaders in global *Fortune 100* companies. Throughout his career, he has traveled over one million miles, worked in over twenty countries, lectured on management and engineering in many of the world's leading universities (e.g. MIT, Harvard, Berkeley, Stanford, Princeton, Oxford, Cambridge, Imperial College, UCL, Tokyo Institute of Technology) and has appeared in various international news media (e.g. *CNN-TV, BBC-TV, ITV, SKY-TV, The Learning Channel, The Discovery Channel*).

He received a B.Sc. in engineering/humanities as a *Da Vinci scholar*, an M.Eng. in nonlinear structural dynamics from the University of California at Berkeley, and a dual M.B.A./M.Sc. from the Massachusetts Institute of Technology as a *Leaders for Global Operations* Fellow and researcher with the *Center for Technology*, *Policy and Industrial Development*. He went on to pursue an interdisciplinary doctorate in strategy, organization and system architecting at MIT's *Engineering Systems Division*, where his research focuses on inter-species competition and the development of a theory of the evolution of business ecosystems.

He spent the early part of his career designing high-rise buildings and long-span bridges as a director of *Ove Arup & Partners* in London, Tokyo and San Francisco. He then moved from "the business of building" to "the building of business" where he was a strategy consultant at *McKinsey & Company*. He currently teaches strategic leadership and macro-level organizational change in executive education programs and graduate courses at MIT's *Sloan School of Management*, the *Engineering Systems Division* and at the University of Oxford's *Saïd Business School*. He is a citizen of the USA and the Netherlands and currently resides in Oxford with his wife and son.







General Outline

Executive Summary

Expanded Executive Summary

Main Document:

Part I: RESEARCH DESIGN

Chapter 1: Introduction Chapter 2: Research Methodology

Part II: THEORETICAL CONSTRUCTS & PROPOSITIONS

Chapter 3: Firm Performance

Chapter 4: Enterprise Architectures

Chapter 5: Competitive Dynamics

Chapter 6: Industrial Co-evolution

Part III: INTEGRATING THE THEORY

Chapter 7: Mathematical Model Chapter 8: Summary & Conclusions

Part IV: APPENDICES

This dissertation is presented three successive times in a "telescoped structure", each re-telling representing approximately one order of magnitude more detail and richness than the previous.

First, I present a very brief, *high*-level executive summary of approximately 10 pages, which is intended to rapidly familiarize the reader with the theory developed herein. This is followed by a more detailed, *mid*-level expanded executive summary of approximately 100 pages, which is intended to communicate the research in a format and length suitable for academic journal publication. Finally, I present a more detailed, *low*-level dissertation document of approximately 1,000 pages, which serves as an extended outline that summarizes the empirical data and its analysis as well as the theoretical underpinnings and basis for the theory developed herein.

Whatever stage the reader chooses to engage this work, thoughtful and critical comments continue to be welcomed as this dissertation document (with all of its errors, omissions and inconsistensies) does not represent the end of my research journey, but merely the end of the beginning...

Table of Contents

Acknowledgements 6 Biographical Note 12 General Outline 13 Table of Contents 14 List of Figures 33 List of Tables 43 Executive Summary 45 Executive Summary 58 Part I: RESEARCH DESIGN 126 Chapter 1 Introduction 127 1.1 Research Abstract 127 1.1 Research Abstract 126 Chapter 1 Introduction 127 1.1 Research Abstract 127 1.1.2 Rhetorical Style 128 1.1.3 International Academic Collaboration 129 1.4 Doctoral Committee 130 1.2.1 Informal Committee 130 1.2.1 Informal Committee 132 1.2.1.1 Informal Committee 132 1.2.1.2 Mid-level question 132 1.2.1.3 Low-level question 132 1.2.1.1 High-level question 132 1.2.2.1 Debates in Economics 138 <th>Abstract</th> <th></th>	Abstract	
Biographical Note 12 General Outline 13 Table of Contents 14 List of Figures 33 List of Tables 43 Executive Summary 45 Expanded Executive Summary 58 Part I: RESEARCH DESIGN 126 Chapter 1 Introduction 127 1.1 Setting 127 1.1 Research Abstract 127 1.1.1 Research Abstract 127 1.1.2 Rhetorical Style 128 1.1.3 International Academic Collaboration 129 1.1.4 Doctoral Committee 130 1.2 Research Questions 132 1.2.1 Primary Research Questions 132 1.2.1 Primary Research Question 136 1.2.2.2 Debates in Sociology 138 1.2.2.1 Debates in Sociology 139 1.2.2.2 Debates in Organizational Theory 139 1.2.2.1.3 Low-level question 138 1.2.2.1 Debates in Organizational Theory 139 <		
General Outline. 13 Table of Contents. 14 List of Figures. 33 List of Tables 33 Executive Summary 45 Expanded Executive Summary 58 Part I: RESEARCH DESIGN. 126 Chapter 1 Introduction. 127 1.1 Setting 127 1.1.1 Research Abstract 127 1.1.2 Rhetorical Style. 128 1.1.3 International Academic Collaboration. 129 1.1.4 Doctoral Committee. 130 1.1.5.1 110 1.1.6 Primary Research Questions 131 1.2.1 Primary Research Questions 132 1.2.1 High-level question 132 1.2.1.1 High-level question 135 1.2.1.2 Mid-level question 136 1.2.2.1 Debates in Economics 138 1.2.2.1.1 Markets vs. Hierarchies 138 1.2.2.1.2 Debates in Organizational Theory 139 1.2.2.1.3 Low-level questions 138 1.2.2.1.4 Markets vs. Hierarchies 138 1.2.2.1.5 Nocial Determinism vs. Human Choice 140 1.2.2.2.1.6 Mate in Organizationa	Biographical Note	12
List of Figures 33 List of Tables 43 Executive Summary 45 Expanded Executive Summary 58 Part I: RESEARCH DESIGN 126 Chapter 1 Introduction 127 1.1 Research Abstract 127 1.1.1 Research Abstract 127 1.1.2 Rhetorical Style 128 1.1.3 International Academic Collaboration 128 1.1.4 Doctoral Committee 130 1.1.4 Doctoral Committee 130 1.2.1 Primary Research Questions 131 1.2.1 Primary Research Questions 132 1.2.1.1 High-level question 135 1.2.1.2 Mid-level question 136 1.2.1.2 Mid-level question 136 1.2.1.2 Lima Research Questions 137 1.2.2.1 Debates in Economics 138 1.2.2.1 Debates in Sociology 139 1.2.2.1.2 Firm Boundaries and Minimization of Transaction Costs 138 1.2.2.2.1 Macro-Industry vs. Micro-firm 140	General Outline	13
List of Tables 43 Executive Summary 45 Expanded Executive Summary 58 Part I: RESEARCH DESIGN 126 Chapter 1 Introduction 127 1.1 Setting 127 1.1 Research Abstract 127 1.1.1 Research Abstract 127 1.1.2 Rhetorical Style 128 1.1.3 International Academic Collaboration 129 1.1.4 Doctoral Committee 130 1.2 Research Questions 131 1.2.1 Primary Research Questions 132 1.2.1.1 High-level question 132 1.2.1.2 Mid-level question 135 1.2.1.3 Low-level question 136 1.2.2 Secondary Research Questions 137 1.2.2.1 Debates in Economics 138 1.2.2.1 Debates in Economics 138 1.2.2.1.1 Boundaries and Minimization of Transaction Costs 138 1.2.2.1.1 Social Determinism vs. Human Choice 140 1.2.2.2.1.1 Debates in Organizational Theor	Table of Contents	14
List of Tables 43 Executive Summary 45 Expanded Executive Summary 58 Part I: RESEARCH DESIGN 126 Chapter 1 Introduction 127 1.1 Setting 127 1.1 Research Abstract 127 1.1.1 Research Abstract 127 1.1.2 Rhetorical Style 128 1.1.3 International Academic Collaboration 129 1.1.4 Doctoral Committee 130 1.2 Research Questions 131 1.2.1 Primary Research Questions 132 1.2.1.1 High-level question 132 1.2.1.2 Mid-level question 135 1.2.1.3 Low-level question 136 1.2.2 Secondary Research Questions 137 1.2.2.1 Debates in Economics 138 1.2.2.1 Debates in Economics 138 1.2.2.1.1 Boundaries and Minimization of Transaction Costs 138 1.2.2.1.1 Social Determinism vs. Human Choice 140 1.2.2.2.1.1 Debates in Organizational Theor	List of Figures	33
Expanded Executive Summary 58 Part I: RESEARCH DESIGN 126 Chapter 1 Introduction 127 1.1 Setting 127 1.1 Research Abstract 127 1.1.1 Research Abstract 127 1.1.2 Rhetorical Style 128 1.1.3 International Academic Collaboration 129 1.1.4 Doctoral Committee 130 1.1.1 Informal Committee 130 1.2.1 Primary Research Questions 132 1.2.1 Primary Research Questions 132 1.2.1.2 Mid-level question 135 1.2.1.3 Low-level question 136 1.2.2.1 Debates in Economics 138 1.2.2.1 Debates in Economics 138 1.2.2.1 Debates in Organizational Theory 139 1.2.2.2 Debates in Organizational Theory 139 1.2.2.1.3 Low-level question vs. Integration 140 1.2.2.2 Debates in Population vs. Integration 141 1.2.2.1 Debates in Organizational Theory 139 1.2.2.2 Debates in Population vs. Integration 140 1.2.2.2.1 Matco-Industry vs. Micro-firm 140		
Part I: RESEARCH DESIGN	Executive Summary	45
Chapter 1Introduction	Expanded Executive Summary	58
1.1 Setting 127 1.1.1 Research Abstract 127 1.1.2 Rhetorical Style 128 1.1.3 International Academic Collaboration 129 1.1.4 Doctoral Committee 130 1.1.4.1 Informal Committee 130 1.2.1 Primary Research Questions 131 1.2.1 Primary Research Questions 132 1.2.1.2 Mid-level question 132 1.2.1.2 Mid-level question 135 1.2.1.2 Mid-level question 136 1.2.2 Secondary Research Questions 137 1.2.2.1 Debates in Economics 138 1.2.2.1.1 Markets vs. Hierarchies 138 1.2.2.1.2 Firm Boundaries and Minimization of Transaction Costs 138 1.2.2.2.1 Debates in Organizational Theory 139 1.2.2.2.1 Debates in Organizational Theory 139 1.2.2.2.1 Macto-Industry vs. Micro-firm 140 1.2.2.2.1 Macto-Industry vs. Micro-firm 140 1.2.2.2.1 Debates in Population Ecology 141 <	Part I: RESEARCH DESIGN	126
1.1 Setting 127 1.1.1 Research Abstract 127 1.1.2 Rhetorical Style 128 1.1.3 International Academic Collaboration 129 1.1.4 Doctoral Committee 130 1.1.4.1 Informal Committee 130 1.2.1 Primary Research Questions 131 1.2.1 Primary Research Questions 132 1.2.1.2 Mid-level question 132 1.2.1.2 Mid-level question 135 1.2.1.2 Mid-level question 136 1.2.2 Secondary Research Questions 137 1.2.2.1 Debates in Economics 138 1.2.2.1.1 Markets vs. Hierarchies 138 1.2.2.1.2 Firm Boundaries and Minimization of Transaction Costs 138 1.2.2.2.1 Debates in Organizational Theory 139 1.2.2.2.1 Debates in Organizational Theory 139 1.2.2.2.1 Macto-Industry vs. Micro-firm 140 1.2.2.2.1 Macto-Industry vs. Micro-firm 140 1.2.2.2.1 Debates in Population Ecology 141 <	Chapter 1 Introduction	127
1.1.1Research Abstract1271.1.2Rhetorical Style.1281.1.3International Academic Collaboration1291.1.4Informal Committee1301.1.4.1Informal Committee1301.2Research Questions1311.2.1Primary Research Questions1321.2.1.1High-level question1321.2.1.2Mid-level question1351.2.1.3Low-level question1361.2.2Secondary Research Questions1371.2.2.1Debates in Economics1381.2.2.2Firm Boundaries and Minimization of Transaction Costs1381.2.2.2.1Debates in Organizational Theory1391.2.2.2.1Social Determinism vs. Human Choice1401.2.2.2.1.2Macro-Industry vs. Micro-firm1401.2.2.2.1High Mortality Rates of Late Entrants1411.2.3Tertiary Research Questions1421.3Research Objectives1431.3.1The Rigor-Relevance Dialectic1431.3.2Multi-modal Objectives1451.3.2.1Model objective: Explanation / "Prediction"145	1.1 Setting	127
1.1.3International Academic Collaboration1291.1.4Doctoral Committee1301.1.4.1Informal Committee1301.1.4.1Informal Committee1301.2Research Questions1311.2.1Primary Research Questions1321.2.1.1High-level question1321.2.1.2Mid-level question1351.2.1.3Low-level question1361.2.2.1Debates in Economics1381.2.2.1Debates in Economics1381.2.2.1Debates in Sociology1391.2.2.2Debates in Organizational Theory1391.2.2.1.1Social Determinism vs. Human Choice1401.2.2.2.1.2Macro-Industry vs. Micro-firm1401.2.2.2.1.3Differentiation vs. Integration1401.2.2.2.1High Mortality Rates of Late Entrants1411.2.2.2.1High Mortality Rates of Late Entrants1411.2.3Tertiary Research Questions1421.3Research Objectives1431.3.1The Rigor-Relevance Dialectic1431.3.2Multi-modal Objectives1451.3.2.1Mode 1 objective: Explanation / "Prediction"145		
1.1.4 Doctoral Committee1301.1.4.1 Informal Committee1301.2 Research Questions1311.2.1 Primary Research Questions1321.2.1.1 High-level question1321.2.1.2 Mid-level question1351.2.1.3 Low-level question1361.2.2 Secondary Research Questions1371.2.2.1 Debates in Economics1381.2.2.1.2 Firm Boundaries and Minimization of Transaction Costs1381.2.2.2 Debates in Sociology1391.2.2.2.1 Debates in Organizational Theory1391.2.2.2.1 Debates in Organizational Theory1391.2.2.2.1 Debates in Organizational Theory1401.2.2.2.1 Debates in Population Ecology1411.2.2.2.1 Macro-Industry vs. Micro-firm1401.2.2.2.1 High Mortality Rates of Late Entrants1411.2.3 Tertiary Research Questions1421.3 Research Objectives1431.3.1 The Rigor-Relevance Dialectic1431.3.2 Multi-modal Objectives1451.3.2.1 Mode 1 objective: Explanation / "Prediction"145	1.1.2 Rhetorical Style	128
1.1.4.1Informal Committee1301.2Research Questions1311.2.1Primary Research Questions1321.2.1.1High-level question1321.2.1.2Mid-level question1351.2.1.3Low-level question1361.2.2Secondary Research Questions1371.2.2.1Debates in Economics1381.2.2.1.2Firm Boundaries and Minimization of Transaction Costs1381.2.2.2Debates in Sociology1391.2.2.2.1Debates in Organizational Theory1391.2.2.2.1Debates in Organizational Theory1391.2.2.2.1Debates in Organizational Theory1401.2.2.2.2Debates in Organization of Late Entrants1401.2.2.2.1Macro-Industry vs. Micro-firm1401.2.2.2.2Debates in Population Ecology1411.2.2.2.1High Mortality Rates of Late Entrants1411.2.3Tertiary Research Questions1421.3Research Objectives1431.3.1The Rigor-Relevance Dialectic1431.3.2Multi-modal Objectives1451.3.2.1Mode 1 objective: Explanation / "Prediction"145		
1.2Research Questions1311.2.1Primary Research Questions1321.2.1.1High-level question1321.2.1.2Mid-level question1351.2.1.3Low-level question1361.2.2Secondary Research Questions1371.2.2.1Debates in Economics1381.2.2.1.2Firm Boundaries and Minimization of Transaction Costs1381.2.2.2Debates in Organizational Theory1391.2.2.2.1.1Social Determinism vs. Human Choice1401.2.2.2.1.2Macro-Industry vs. Micro-firm1401.2.2.2.1.3Differentiation vs. Integration1401.2.2.2.1High Mortality Rates of Late Entrants1411.2.3Tertiary Research Questions1421.3Research Objectives1431.3.1The Rigor-Relevance Dialectic1431.3.2Multi-modal Objectives1451.3.2.1Mode 1 objective: Explanation / "Prediction"145	1.1.4 Doctoral Committee	130
1.2.1 Primary Research Questions1321.2.1.1 High-level question1321.2.1.2 Mid-level question1351.2.1.3 Low-level question1361.2.2 Secondary Research Questions1371.2.2.1 Debates in Economics1381.2.2.2 Firm Boundaries and Minimization of Transaction Costs1381.2.2.2 Debates in Sociology1391.2.2.1.1 Debates in Organizational Theory1391.2.2.2.1 Debates in Organizational Theory1391.2.2.2.1 Debates in Population vs. Human Choice1401.2.2.2.1.2 Macro-Industry vs. Micro-firm1401.2.2.2.1 High Mortality Rates of Late Entrants1411.2.3 Tertiary Research Questions1421.3 Research Objectives1431.3.1 The Rigor-Relevance Dialectic1431.3.2 Multi-modal Objectives1451.3.2.1 Mode 1 objective: Explanation / "Prediction"145		
1.2.1.1High-level question1321.2.1.2Mid-level question1351.2.1.3Low-level question1361.2.2Secondary Research Questions1371.2.2.1Debates in Economics1381.2.2.1.2Firm Boundaries and Minimization of Transaction Costs1381.2.2.2Debates in Sociology1391.2.2.1Debates in Organizational Theory1391.2.2.2.1Social Determinism vs. Human Choice1401.2.2.2.1.3Differentiation vs. Integration1401.2.2.2.1Macro-Industry vs. Micro-firm1401.2.2.2.1High Mortality Rates of Late Entrants1411.2.3Tertiary Research Questions1421.3Research Objectives1431.3.1The Rigor-Relevance Dialectic1431.3.2Multi-modal Objectives1451.3.2.1Mode 1 objective: Explanation / "Prediction"145		
1.2.1.2Mid-level question1351.2.1.3Low-level question1361.2.2Secondary Research Questions1371.2.2.1Debates in Economics1381.2.2.1.1Markets vs. Hierarchies1381.2.2.1.2Firm Boundaries and Minimization of Transaction Costs1381.2.2.2Debates in Sociology1391.2.2.1.1Debates in Organizational Theory1391.2.2.2.1Debates in Organizational Theory1391.2.2.2.1.1Social Determinism vs. Human Choice1401.2.2.2.1.2Macro-Industry vs. Micro-firm1401.2.2.2.1.3Differentiation vs. Integration1401.2.2.2.1High Mortality Rates of Late Entrants1411.2.3Tertiary Research Questions1421.3Research Objectives1431.3.1The Rigor-Relevance Dialectic1431.3.2Multi-modal Objectives1451.3.2.1Mode 1 objective: Explanation / "Prediction"145		
1.2.1.3Low-level question1361.2.2Secondary Research Questions1371.2.2.1Debates in Economics1381.2.2.1.1Markets vs. Hierarchies1381.2.2.1.2Firm Boundaries and Minimization of Transaction Costs1381.2.2.2Debates in Sociology1391.2.2.1.1Debates in Organizational Theory1391.2.2.2.1Debates in Organizational Theory1391.2.2.2.1.1Social Determinism vs. Human Choice1401.2.2.2.1.2Macro-Industry vs. Micro-firm1401.2.2.2.1.3Differentiation vs. Integration1401.2.2.2.1High Mortality Rates of Late Entrants1411.2.3Tertiary Research Questions1421.3Research Objectives1431.3.1The Rigor-Relevance Dialectic1431.3.2Multi-modal Objectives1451.3.2.1Mode 1 objective: Explanation / "Prediction"145		
1.2.2Secondary Research Questions1371.2.2.1Debates in <i>Economics</i> 1381.2.2.1.1Markets vs. Hierarchies1381.2.2.1.2Firm Boundaries and Minimization of Transaction Costs1381.2.2.2Debates in <i>Sociology</i> 1391.2.2.2.1Debates in <i>Organizational Theory</i> 1391.2.2.2.1.1Social Determinism vs. Human Choice1401.2.2.2.1.2Macro-Industry vs. Micro-firm1401.2.2.2.1.3Differentiation vs. Integration1401.2.2.2.2Debates in <i>Population Ecology</i> 1411.2.2.2.2High Mortality Rates of Late Entrants1411.2.3Tertiary Research Questions1421.3Research Objectives1431.3.1The Rigor-Relevance Dialectic1431.3.2Multi-modal Objectives1451.3.2.1Mode 1 objective: <i>Explanation / "Prediction"</i> 145	*	
1.2.2.1Debates in Economics1381.2.2.1.1Markets vs. Hierarchies1381.2.2.1.2Firm Boundaries and Minimization of Transaction Costs1381.2.2.1.2Debates in Sociology1391.2.2.2Debates in Organizational Theory1391.2.2.2.1Debates in Organizational Theory1391.2.2.2.1.1Social Determinism vs. Human Choice1401.2.2.2.1.2Macro-Industry vs. Micro-firm1401.2.2.2.1.3Differentiation vs. Integration1401.2.2.2.1High Mortality Rates of Late Entrants1411.2.2.2.1High Mortality Rates of Late Entrants1421.3Research Objectives1431.3.1The Rigor-Relevance Dialectic1431.3.2Multi-modal Objectives1451.3.2.1Mode 1 objective: Explanation / "Prediction"145		
1.2.2.1.1Markets vs. Hierarchies1381.2.2.1.2Firm Boundaries and Minimization of Transaction Costs1381.2.2.2Debates in Sociology1391.2.2.2.1Debates in Organizational Theory1391.2.2.2.1.1Social Determinism vs. Human Choice1401.2.2.2.1.2Macro-Industry vs. Micro-firm1401.2.2.2.1.3Differentiation vs. Integration1401.2.2.2.1High Mortality Rates of Late Entrants1411.2.2.2.1High Mortality Rates of Late Entrants1411.2.3Tertiary Research Questions1421.3Research Objectives1431.3.1The Rigor-Relevance Dialectic1431.3.2Multi-modal Objectives1451.3.2.1Mode 1 objective: Explanation / "Prediction"145		
1.2.2.1.2Firm Boundaries and Minimization of Transaction Costs1381.2.2.2Debates in Sociology1391.2.2.2.1Debates in Organizational Theory1391.2.2.2.1.1Social Determinism vs. Human Choice1401.2.2.2.1.2Macro-Industry vs. Micro-firm1401.2.2.2.1.3Differentiation vs. Integration1401.2.2.2.2Debates in Population Ecology1411.2.2.2.1High Mortality Rates of Late Entrants1411.2.3Tertiary Research Questions1421.3Research Objectives1431.3.1The Rigor-Relevance Dialectic1431.3.2Multi-modal Objectives1451.3.2.1Mode 1 objective: Explanation / "Prediction"145		
1.2.2.2 Debates in Sociology.1391.2.2.2.1 Debates in Organizational Theory.1391.2.2.2.1 Debates in Organizational Theory.1391.2.2.2.1 Social Determinism vs. Human Choice.1401.2.2.2.1.2 Macro-Industry vs. Micro-firm.1401.2.2.2.1 Differentiation vs. Integration.1401.2.2.2.2 Debates in Population Ecology.1411.2.2.2.1 High Mortality Rates of Late Entrants.1411.2.3 Tertiary Research Questions.1421.3 Research Objectives.1431.3.1 The Rigor-Relevance Dialectic.1431.3.2 Multi-modal Objectives.1451.3.2.1 Mode 1 objective: Explanation / "Prediction"145		
1.2.2.2.1Debates in Organizational Theory		
1.2.2.2.1.1Social Determinism vs. Human Choice1401.2.2.2.1.2Macro-Industry vs. Micro-firm1401.2.2.2.1.3Differentiation vs. Integration1401.2.2.2.2Debates in <i>Population Ecology</i> 1411.2.2.2.2.1High Mortality Rates of Late Entrants1411.2.3Tertiary Research Questions1421.3Research Objectives1431.3.1The Rigor-Relevance Dialectic1431.3.2Multi-modal Objectives1451.3.2.1Mode 1 objective: <i>Explanation / "Prediction"</i> 145	64	
1.2.2.2.1.2Macro-Industry vs. Micro-firm1401.2.2.2.1.3Differentiation vs. Integration1401.2.2.2.2Debates in <i>Population Ecology</i> 1411.2.2.2.2.1High Mortality Rates of Late Entrants1411.2.3Tertiary Research Questions1421.3Research Objectives1431.3.1The Rigor-Relevance Dialectic1431.3.2Multi-modal Objectives1451.3.2.1Mode 1 objective: <i>Explanation / "Prediction"</i> 145		
1.2.2.2.1.3Differentiation vs. Integration.1401.2.2.2.2Debates in Population Ecology.1411.2.2.2.2.1High Mortality Rates of Late Entrants.1411.2.3Tertiary Research Questions.1421.3Research Objectives.1431.3.1The Rigor-Relevance Dialectic.1431.3.2Multi-modal Objectives1451.3.2.1Mode 1 objective: Explanation / "Prediction"145		
1.2.2.2.2 Debates in Population Ecology.1411.2.2.2.2.1 High Mortality Rates of Late Entrants.1411.2.3 Tertiary Research Questions.1421.3 Research Objectives.1431.3.1 The Rigor-Relevance Dialectic.1431.3.2 Multi-modal Objectives1451.3.2.1 Mode 1 objective: Explanation / "Prediction"145		
1.2.2.2.2.1High Mortality Rates of Late Entrants.1411.2.3Tertiary Research Questions.1421.3Research Objectives.1431.3.1The Rigor-Relevance Dialectic.1431.3.2Multi-modal Objectives1451.3.2.1Mode 1 objective: Explanation / "Prediction"145		
1.2.3 Tertiary Research Questions1421.3 Research Objectives1431.3.1 The Rigor-Relevance Dialectic1431.3.2 Multi-modal Objectives1451.3.2.1 Mode 1 objective: Explanation / "Prediction"145		
1.3 Research Objectives1431.3.1 The Rigor-Relevance Dialectic1431.3.2 Multi-modal Objectives1451.3.2.1 Mode 1 objective: Explanation / "Prediction"145		
1.3.1The Rigor-Relevance Dialectic1431.3.2Multi-modal Objectives1451.3.2.1Mode 1 objective: Explanation / "Prediction"145		
1.3.2Multi-modal Objectives1451.3.2.1Mode 1 objective: Explanation / "Prediction"145		
1.3.2.1 Mode 1 objective: Explanation / "Prediction"		

1.3.3 Four T	ypes of Scholarship	148
	e Scholarship of Integration (Synthesis)	
	e Scholarship of <i>Practice</i> (Application)	
	e Scholarship of <i>Teaching</i> (Pedagogy)	
	e Scholarship of Discovery (Research)	
	ramework	
	Analysis	
	onomics-based terminology	
1.4.1.1.1	Firm	
1.4.1.1.2	Industry	
1.4.1.1.3	Extended Enterprise	
1.4.1.1.4	Ecosystem	
1.4.1.2 Soc	ciology-based terminology	
1.4.1.2.1	Organization	
1.4.1.2.2	Organizational Set	
1.4.1.2.3	Organizational Population	
1.4.1.2.4		
1.4.1.3 Co	mparision of Terminologies	
	les	
	ependent" variable: Long-term Firm Performance	
	Defining "Long-term"	
	Defining "Firm Performance"	
1.4.2.1.		
1.4.2.1.		
	dependent" variables	
	Primary variable: Enterprise Architecture	
	Intervening variables: Firm Function & Environment Evolution	
	erdependent variables	
	Correlative vs. Causal approaches	
	Variance vs. Process approaches	
	Randomness and Indeterminacy	
1.4.3 Bounda	ury Assumptions	169
	atial	
*	Market	
1.4.3.1.2	Technological	169
1.4.3.2 Ter	mporal	170
1.4.3.2.1	Long-term Trends	170
	Truncated Life-Cycle	
1.4.3.2.3	Bi- vs. Tri-phase Industry S-Curve	171
1.4.4 Summa	ry of Research Framework	172
1.4.4.1 Fra	mework Summary	173
1.4.4.1.1	High Level Summary	
1.4.4.1.2	Detailed Summary	
1.4.4.2 Fra	mework as Strategic Management Theory	
1.4.4.2.1	Market Structure	
1.4.4.2.2	Firm Conduct	

1.4.4.2.3 <i>Performance</i>	175
1.4.4.3 Framework as Social System Theory	176
1.4.4.3.1 Framework as Structural Functionalist Theory	176
1.4.4.3.1.1 Social Morphology	177
1.4.4.3.1.2 Social Physiology	177
1.4.4.3.1.3 Social Development	177
1.4.4.3.2 Framework as General System Theory	178
1.4.4.3.2.1 System Goals: Stability, Growth and Interaction	178
1.4.4.3.3 Framework as <i>Evolutionary</i> Theory	179
1.4.4.4 Framework as Temporal Theory	180
1.4.4.5 Framework as Architectural Design Theory	181
1.4.4.5.1 Trends & Trajectories via Architectural Abstraction & Aggregation	182
1.4.4.5.2 "Resolution" Limitations of an Architecture-based Framework	
1.4.4.5.3 Ontological Primacy Embedded within Framework	184
1.4.4.6 Framework as Contingency and Configuration Theories	
1.4.4.6.1 Framework as <i>Contingency</i> Theory	187
1.4.4.6.1.1 Endogenizing Lawrence and Lorsch	187
1.4.4.6.1.2 Differentiation and Integration in Inter-Firm Organizations	189
1.4.4.6.1.3 Architecture-Context-Performance	190
1.4.4.6.2 Framework as Configuration Theory	191
1.4.4.6.2.1 Configuration Theory: beyond Contingency Theory	
1.4.4.6.2.2 Classifications of Organizations	192
1.4.4.6.2.2.1 Single Domain Taxonomies and Typologies	
1.4.4.6.2.2.2 Multiple Domain Configurations	193
1.4.4.6.2.3 Theoretical Issues.	
1.4.4.6.2.3.1 Dimensional Complexity	193
1.4.4.6.2.3.2 Causal Ambiguity	
1.4.4.6.2.3.3 Temporal Stability	
1.4.4.6.2.4 Methodological Issues	
1.4.4.6.2.4.1 Construct Specification	194
1.4.4.6.2.4.2 Data Aggregation	
1.4.4.6.2.4.3 Unit of Analysis	195
1.4.4.6.2.4.4 Research Methodologies	
1.4.4.6.2.4.4.1 Inductive development	196
1.4.4.6.2.4.4.2 Deductive development	
1.4.4.7 Framework as <i>Three Essays</i>	
1.4.5 Aspects of Theory	
1.4.5.1 Direction of Theorizing	
1.4.5.2 Level of Analysis	
1.4.5.2.1 Meso-level	198
1.4.5.2.2 <i>Macro</i> -level	199
1.4.5.3 <i>Focus</i> of Theory	
1.4.5.4 Range of Operation	
1.4.5.4.1 Middle-Range Theory	
1.4.5.4.2 Theoretical Framework	
1.4.5.5 <i>Form</i> or Explanation	
r r	

1.4.5.5.1 Structural Explanations	201
1.4.5.5.1.1 Sequential	201
1.4.5.5.1.2 Network	
1.4.5.5.1.3 Functional	
1.4.5.5.2 Causal Explanation	202
1.4.5.5.2.1 Temporal Order	202
1.4.5.5.2.2 Association	202
1.4.5.5.2.3 Elimination of Plausible Alternatives (Spuriousness)	202
1.5 Bridging Intellectual Traditions: Engineering Systems & Strategic Management	203
1.5.1 Engineering Systems	203
1.5.1.1 Engineering Systems Defined	204
1.5.1.2 Engineering Systems approach to Strategic Management	
1.5.1.2.1 <i>Performance</i> as the Dependent Variable	
1.5.1.2.2 Holism and Feedback Processes	
1.5.1.2.3 Managing Change and the Life Cycle Perspective	206
1.5.1.2.4 The "-ilities"	
1.5.1.3 Engineering Systems sub-field: Enterprise Architecture	
1.5.1.3.1 Enterprise Architecting subfield: Competition	209
1.5.1.3.2 Competition case study: Boeing vs. Airbus	
1.5.1.4 Mapping Proposed Research onto ESD Intellectual "Topology"	
1.5.1.5 Firm-Industry Research Tradition	
1.5.2 Strategic Management	
1.5.2.1 The Scientific Model (and the "pretense of knowledge")	
1.5.2.2 Solving the Negative Problem (and the "gloomy vision")	
1.5.2.3 Self-fulfilling Theories (and the "double hermeneutic")	
1.5.3 Management / Engineering Knowledge as an Example of the Framework	
1.5.3.1 Making "Intellectual Bricks" vs. Building "Cathedrals of Knowledge"	
1.5.3.2 Management / Engineering Science as Modular Enterprise Architecture	
1.5.3.3 Management / Engineering Systems as Integral Enterprise Architecture	
1.6 Literature Analysis	
1.6.1 Previous Related Research	
1.6.1.1 Economics and Sociology Literatures	
1.6.1.2 Architecture Literatures	219
1.6.2 Placement of Research within the Strategic Management Literature	219
1.6.3 Placement of the Proposed Framework within the Literatures	
1.6.3.1 Framework as <i>Typology</i> (capturing the <i>internal-external</i> debate)	
1.6.3.2 Framework as Evolution (capturing the adaptation-determinism debate)	
1.6.4 Gaps in Literature	
1.6.5 Contributions to Literature	
1.6.5.1 <i>Theoretical</i> Contributions to Literature	222
1.6.5.2 Empirical Contributions to Literature	223
1.6.5.3 Research Methods Contributions to Literature	
1.6.6 Publication Plan	
1.6.6.1 Journal Articles	
1.6.6.1.1 Academic Journals	
1.6.6.1.1.1 Paper #1: Defining an Enterprise Architectural Typology	

1.6.6.1.1.2 Paper #2: Competitive Dynamics of Enterprise Architectures	226
1.6.6.1.1.3 Paper #3: The Evolution of Enterprise Architectures	226
1.6.6.1.1.4 Paper #4: The Evolution of Business Ecosystems	226
1.6.6.1.2 Practitioner Journals	226
1.6.6.2 Books	226
1.6.6.2.1 <i>Academic</i> book	227
1.6.6.2.2 Practitioner book	227
1.7 Research Importance	228
Chapter 2 Research Methodology	229
2.1 Fit between Research Methods and the State of Existing Theory	
2.1 The between Research Methods and the State of Existing Theory	
2.2.1 Grounded Theory Building	
2.2.1.1 Motivation	
2.2.1.2 Varieties of Grounded Theory	
2.2.1.2 Valleties of Grounded Theory	
2.2.1.2.1 Glaser & Stradss (and Glaser VS. Stradss)	
2.2.1.2 2 Elseinarde 2.2.1.3 Small-N Intra-Case and Medium-N Inter-Case Inference	
2.2.1.5 Small R mild Case and Roadam R mercedes mercedes	
2.2.1.4 <i>Empirical vs. Conceptual</i> Theory Bunding	
2.2.2 Wulti-Include 2.2.2.1 Case-studies (Field-based & Historical)	
2.2.2.1 Comparative Method	
2.2.2.2 Comparative Method 2.2.2.3 Logical Compound Synthesis	
2.2.2.4 Numerical Simulation Modeling	
2.2.3 Multi-level	
2.2.3 Micro-level	
2.2.3.2 <i>Macro</i> -level	
2.2.3.3 <i>Meso</i> -level	
2.2.4 Multi-lens	
2.2.4.1 The Strategic Design lens	
2.2.4.2 The <i>Political</i> lens	
2.2.4.2.1 <i>Micro</i> -politics	
2.2.4.2.2 Macro-politics	252
2.2.4.3 The Cultural lens	
2.2.4.4 The Temporal lens	
2.2.5 Multi-temporal (longitudinal)	
2.2.6 Complementary Qualitative & Quantitative Methods	
2.2.7 Induction-Deduction iteration	
2.3 Research Metaphysics	259
2.3.1 Positivism and Organizational Science	
2.3.2 Constructivist Methodology in Strategic Management	
2.3.3 Pragmatist Epistemology in Strategic Management	
2.4 Research Settings	
2.4.1 Primary Sample Selection	
2.4.1.1 Spatial setting	
2.4.1.1.1 Industrial setting	
2.4.1.1.2 Incumbent and Challenger	

2.4.1.1.3 Firms and their Extended Enterprises	. 265
2.4.1.2 <i>Temporal</i> setting	. 267
2.4.1.2.1 Industry Clockspeed	
2.4.1.2.2 Time span	
2.4.1.2.3 "Critical Event" / Temporal Discontinuity	
2.4.1.3 Industrial idiosyncrasies	
2.4.1.3.1 "Wicked" problems	
2.4.1.3.1.1 Messy problems: high dynamic complexity	
2.4.1.3.1.2 Negotiated problems: high behavioral complexity	
2.4.1.3.1.3 Wicked problems: Examples	
2.4.1.3.2 Economies of Scale & Barriers to Entry	
2.4.1.3.3 Increasing Returns & Imperfect Competition	
2.4.1.3.4 Strategic Trade (Industrial) Policy	
2.4.2 Secondary Sample Selection: Counterfactuals	
2.4.2.1 Control for <i>Industry</i> effects	
2.4.2.2 Control for Environmental effects	
2.4.2.3 Control for Sector effects	
2.4.2.4 Control for International and Socio-Economic effects	
2.4.2.5 Selection Criteria for Incumbent and Challenger	
2.4.3 Tertiary Sample Selection	
2.4.4 Addressing Sample Selection Bias	
2.4.4.1 Survivor Bias	
2.4.4.2 Sampling on the Dependent Variable	
2.5 Data Sources	
2.5.1 Primary data sources	
2.5.2 Secondary data sources	
2.6 Data Collection Methods and Techniques	. 278
2.6.1 Executive Summary	
2.6.2 Methods	
2.6.2.1 Ethnographic Methods	
2.6.2.2 Action Research / Clinical Methods / Policy Research	
2.6.2.2.1 Focus on Strategy Process (not Content)	
2.6.2.2.2 Focus on Intervention and Change	
2.6.2.2.3 Focus on Theory Development	
2.6.3 Techniques	. 286
2.6.3.1 Temporal (longitudinal)	
2.6.3.2 Spatial (triangulation)	
2.6.3.2.1 Horizontal (Inter-firm) triangulation	
2.6.3.2.2 Vertical (Intra-firm) triangulation	
2.6.3.2.3 Political, Cultural and Temporal triangulation	
2.7 Data Analysis Methods and Techniques	
2.7.1 Qualitative Analysis Methods	
2.7.1.1 Grounded Theory	
2.7.1.2 Linguistic Theory	
2.7.1.2.1 Discourse Analysis	
2.7.1.2.1.1 Rhetorical Analysis	. 298

2.7.1.2.2 Textual Analysis	298
2.7.2 Quantitative Analysis Methods	
2.7.2.1 Simulation Modeling	
2.7.2.2 Philosophical Stance on Modeling Complex Enterprises	
2.7.2.3 Modeling Epistemology	
2.7.2.4 Developing Causal Structures form Empirical Data	
2.7.2.5 Model Complexity	
2.7.2.6 Proposed System Dynamics Modeling within Framework	
2.8 Research Dissertation Critique	
2.8.1 Research Tradeoffs	
2.8.1.1 Accuracy (internal validity)	
2.8.1.2 Generalizability (external validity)	
2.8.1.3 Simplicity (parsimony)	
2.8.2 Research Strengths and Limitations.	
2.8.2.1 Accuracy (internal validity)	
2.8.2.2 Generalizability (external validity)	
2.8.2.3 Simplicity (parsimony)	
2.8.3 Towards "Good" Theory	
2.8.4 Future Research	
Part II: THEORETICAL CONSTRUCTS & PROPOSITIONS	309
	310
Chapter 3 Firm Performance	
3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	
3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310 312
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310 312 313
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310 312 313 313
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310 312 313 313 314
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310 312 313 313 314 315
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310 312 313 313 314 315 316
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310 312 313 313 314 315 316
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310 312 313 313 314 315 316 316 317
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310 312 313 313 313 314 315 316 316 317 318
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310 312 313 313 313 314 315 316 316 317 318 319
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310 312 313 313 313 314 316 316 316 317 318 319 319
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310 312 313 313 313 314 315 316 316 316 317 318 319 320
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310 312 313 313 313 314 315 316 316 316 317 318 319 320 321
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310 312 313 313 313 314 315 316 316 316 317 318 319 319 320 321 322
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310 312 313 313 313 314 315 316 316 316 317 318 319 319 320 321 322 322
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310 312 313 313 313 313 313 313 313 313 313 313 313 313 314 315 316 317 318 319 319 320 321 322 323 324
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310 312 313 313 313 313 313 313 313 313 313 313 313 313 314 315 316 317 318 319 319 320 321 322 323 324 326 327
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	
 3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle	310 312 313 313 313 313 313 313 313 313 313 313 313 313 314 315 316 317 316 317 318 319 319 320 321 322 323 324 327 327 327

3.2.2.2 Explanations based on Dynamic Complexity	328
3.2.2.3 Example: International Trade Subsidies	328
3.2.3 Intra-species vs. Inter-species Explanations	330
3.3 Notes from the Field: On Observing a Rare Species	331
3.3.1 Common Characteristics, Traits and DNA	332
3.3.2 Defining and Measuring Each Species	
3.4 Chapter Summary	334
Chapter 4 Enterprise Architectures	335
4.1 Introduction	
4.1.1 Definition of Purpose, Precision and Accuracy	
4.1.2 Construct of Architectural Form	
4.1.2.1 Basic definition of "Enterprise Architecture": Genotypes	
4.1.2.2 <i>Contingent</i> definition of "Enterprise Architecture": <i>Phenotypes</i>	
4.1.3 Construct as Continuum.	
4.1.4 Construct as Mediator	
4.1.4.1 between <i>Firm</i> and <i>Environment</i>	
4.1.4.2 between <i>Determinism</i> and <i>Choice</i>	
4.1.5 Construct as Embedded Enabler of Strategic Change	
4.1.6 Heuristics associated with Architectural Form	
4.2 Theoretical Foundations.	
4.2.1 Economic theories.	
4.2.1.1 <i>Micro</i> -economics	
4.2.1.1.1 Specialization and the <i>Division</i> of Labor	
4.2.1.1.2 New Institutional Economics	
4.2.1.1.2.1 Theory of the Firm	
4.2.1.1.2.2 Transaction Cost Economics: Markets, Hierarchies & Hybrids	
4.2.1.1.2.3 Agency Theory.	
4.2.1.1.3 Economics of Profit-Maximizing and Labor-Managed Firms	
4.2.1.1.3.1 Terminology	
4.2.1.1.3.2 Objective Functions	
4.2.1.1.3.2.1 Profit Maximizing (PM)	
4.2.1.1.3.2.2 Labor Managed (LM)	
4.2.1.1.3.2.3 Mixed Objective Functions	
4.2.1.1.3.3 Homogeneous Duopoly competition	347
4.2.1.1.3.3.1 Cournot (Quantity) competition	
4.2.1.1.3.3.1.1 Stackleberg (sequential) competition	
4.2.1.1.3.4 Heterogeneous ("Mixed") Duopoly competition	350
4.2.1.1.3.4.1 Cournot (Quantity) competition	
4.2.1.1.3.4.2 Bertrand (Price) competition	
4.2.1.1.4 Strategic Complementarities	353
4.2.1.2 Macro-Economics and Political Economy	
4.2.1.2.1 Varieties of Capitalism	
4.2.1.2.1.1 Liberal Market Economies vs. Coordinated Market Economies	
4.2.1.2.1.2 Consumer vs. Producer Economics	
4.2.1.2.1.3 Profit maximization (Consumer economics)	
4.2.1.2.1.4 Market-Share maximization (Producer economics)	358

4.2.1.2.1.5	Economic (comparative) Statics vs. Economic Dynamics	. 359
4.2.1.2.1.6	National Examples: Anglo-Saxon vs. German-Japanese models	359
4.2.2 Sociology &	Organizational theories	360
4.2.2.1 Theories	of Bureaucracy	360
4.2.2.1.1 Divis	sion of Labor vs. Centralization of Authority (Weber)	360
4.2.2.1.2 Conf	flict vs. Order	360
4.2.2.1.3 Theo	ory X and Theory Y (McGregor)	361
4.2.2.2 Social Sy	stems Theories	362
	ctural Functionalism	
4.2.2.2.1.1	Cooperative Systems	362
4.2.2.2.1.2	Cooptation	362
4.2.2.2.2 Gene	eral Systems Theory	363
4.2.2.2.2.1	Open vs. Closed Systems	363
4.2.2.2.2.2	Open-Closed Systems vs. Open-Closed Causality	364
4.2.2.2.3 Struc	ctural Contingency Theory	365
4.2.2.3.1	Mechanistic vs. Organic (Burns & Stalker)	366
4.2.2.3.2	Small & Large Batch and Process Technologies (Woodward)	367
4.2.2.2.3.2.	.1 Craft, Mass and Lean Production	367
4.2.2.3.3	Uncertainty Reduction (Thompson)	368
4.2.2.3.4	Differentiation and Integration (Lawrence & Lorsch)	369
4.2.2.2.3.4	.1 Critiques	369
	3.4.1.1 Invalid & Inconsistent Claim	
4.2.2.2.3	3.4.1.2 Longitudinal Discontinuity	370
	tical Theories of the Firm	
	Resource Dependence Theory (Pfeffer & Salancik)	
	Stakeholder Theory of the Firm	
4.2.2.3 Ecologic	al View	373
4.2.2.3.1 Popu	ulation Ecology (Autecology)	374
4.2.2.3.1.1	Organizational Form	374
4.2.2.3.1.2	Organizational Niche	374
4.2.2.3.1.3	Structural Inertia	374
4.2.2.3.2 Com	munity Ecology (Synecology)	375
4.2.2.3.2.1	Verhulst Population Growth in Finite Environment	375
4.2.2.3.2.2	Species Archetypes: r-strategists and K-strategists	375
4.2.2.3.2.3	Lotka-Volterra (Predator-Prey) Inter-species Competition	375
4.2.2.4 Institutio	nal and Neo-Institutional Theory	376
4.2.2.4.1 Insti	tutional Theory	376
4.2.2.4.2 Neo-	-Institutional Theory	376
4.2.2.5 Social No	etwork Theory	377
4.2.2.5.1 Emb	beddedness	377
4.2.2.5.1.1	Under-embedded network	377
4.2.2.5.1.2	Over-embedded network	377
4.2.2.5.1.3	Hybrid network	378
	alization	
4.2.2.5.2.1	Under-socialization	379
	Over-socialization	

4.2.2.5.3 Keiretsu as Inter-firm Networks	379
4.2.2.6 Behavioral Decision Theory	379
4.2.2.6.1 Bounded Rationality	379
4.2.2.6.2 Exploitation vs. Exploration	379
4.2.2.6.3 Loose vs. Tight Coupling	379
4.2.2.7 Complexity / Complex Adaptive Systems Theory	380
4.2.2.7.1 NK Model of Interdependencies	380
4.2.2.7.2 Fitness Landscapes	381
4.2.2.7.2.1 Part-Whole Relationships	381
4.2.2.7.2.2 Rugged Landscapes	381
4.2.2.7.3 Competition vs. Cooperation	382
4.2.3 Strategic Management theories	383
4.2.3.1 SCP vs. RBV	
4.2.3.2 Flexibility vs. Comittment	383
4.2.3.3 Profit-Maximizers vs. Profit-Seekers	383
4.2.3.4 <i>M</i> -Form vs. <i>N</i> -Form	
4.2.3.5 Strategic Groups	384
4.2.4 Architectural theories	385
4.2.4.1 Civil Architecture	
4.2.4.1.1 Form (and Structure)	386
4.2.4.1.2 Function	
4.2.4.1.3 Fit	
4.2.4.2 Product Architecture	387
4.2.4.2.1 Building Blocks, Components, Chunks, Modules	387
4.2.4.2.2 Interfaces	387
4.2.4.2.3 Typology of Product Architectures	
4.2.4.2.3.1 Modular	
4.2.4.2.3.2 Integral	388
4.2.4.2.4 Design Rules	390
4.2.4.2.4.1 Three Types of Modularity	390
4.2.4.2.4.1.1 Modularity in Design	390
4.2.4.2.4.1.2 Modularity in Manufacturing	
4.2.4.2.4.1.3 Modularity in Use	390
4.2.4.2.5 Product Performance	391
4.2.4.2.5.1 Modular performance	391
4.2.4.2.5.2 Integral performance	
4.2.4.3 System Architecture	392
4.2.4.3.1 Top-down Deterministic Mechanistic Reductionism	
4.2.4.3.2 Bottom-up Emergent Organic Holism	
4.2.4.4 Organizational Architectures.	
Comparing Physical- and Organizational Architectures	394
4.2.4.4.1.1 Common Points	
4.2.4.4.1.1.1 Architecture <i>Enables</i> Function	
4.2.4.4.1.1.2 Architecture Constrains other Functions	
4.2.4.4.1.1.3 Architecture does not <i>Predetermine</i> Choice	
4.2.4.4.1.2 Differences	395

4.2.4.4.1.2.1 Visibility	. 395
4.2.4.4.1.2.2 Evolution	
4.2.4.4.1.2.3 Emergence	
4.2.4.4.2 Two Levels of Organizational Architecture	
4.2.4.4.2.1 Inter-firm (Enterprise) Architectures	
4.2.4.4.2.1.1 Concept Extended from Product Architecture	
4.2.4.4.2.1.2 Sub-case Example: Supply Chains	
4.2.4.4.2.2 Intra-firm Architectures	
4.2.4.5 Multi-Level <i>Nesting</i> : Product-Organizational Architecture Mapping 4.2.5 Summary of Theoretical Underpinnings of Construct	
4.2.5 Summary of Theoretical Underpinnings of Construct4.3 Enterprise Architecture: 3D-Functional Decomposition	
4.3 Enterprise Architecture. 3D-Functional Decomposition	
4.3.1.1 <i>Product / Service</i> markets (customers)	
4.3.1.2 Supplier markets (suppliers)	
4.3.1.3 Supplier "Push" vs. Customer "Pull"	
4.3.2 Factors of Production Axis	. 410
4.3.2.1 <i>Capital</i> markets (investors)	
4.3.2.1.1 Capital Structure: Debt vs. Equity	
4.3.2.1.1.1 Debt markets	
4.3.2.1.1.2 <i>Equity</i> markets	. 411
4.3.2.1.1.2.1 Quality of Equity Investors	. 411
4.3.2.1.1.2.1.1 Public vs. Private Equity	
4.3.2.1.1.2.1.2 "Patient" vs. "Impatient" capital	
4.3.2.1.1.2.1.3 Institutional vs. Individual Investors	
4.3.2.1.1.2.2 Managerial capitalism	
4.3.2.1.1.2.2.1 Principal-Agent problem: Agency vs. Stewardship	
4.3.2.1.1.2.2.2 Board of Directors: "Architectural" Gatekeeper	
4.3.2.2 Labor markets	
4.3.2.2.1 Boundaries (make vs. buy)	
4.3.2.2.2 Interfaces (arm's length vs. trust-based)	
4.3.2.3 Dominant Factor of Production (<i>capital</i> vs. <i>labor</i>)	
4.3.2.3.1 <i>Traditional</i> vs. <i>Human</i> capitalism	
4.3.2.3.1.2 <i>Human</i> capitalism (<i>labor</i> dominance)	
4.3.2.3.2 Enterprise Architectural tendencies	
4.3.2.3.3 Cultural / National tendencies	
4.3.3 Competitive Enablers and Constraints Axis	
4.3.3.1 <i>Regulatory</i> markets (governments)	
4.3.3.2 Profit markets (competitors)	
4.3.4 Functional Decomposition	
4.3.4.1 Functional Independence	
4.3.4.2 Functional Interdependence	
4.3.4.3 Enterprise Performance	
4.4 Enterprise Architecture: Objective Functions, Boundaries & Interfaces	. 423
4.4.1 Enterprise Objective Functions	. 423
4.4.1.1 Maximizing Shareholder Value	. 424

4.4.1.2 Maximizing Stakeholder Surplus	425
4.4.2 Enterprise Boundaries	426
4.4.2.1 Spatial	428
4.4.2.1.1 Vertical Integration (boundaries)	428
4.4.2.1.2 Virtual Integration (interfaces)	428
4.4.2.2 Temporal	429
4.4.2.3 Effect of Spatio-Temporal Boundaries on Strategy	429
4.4.3 Enterprise Interfaces	430
4.4.3.1 Quantity of Stakeholders	430
4.4.3.2 <i>Quality</i> of Stakeholder Relationships	430
4 4 3 2 1 Two Relationship Archetypes	430
4.4.3.2.1.1 Managing Contracts: Short-term, Arm's Length	430
4.4.3.2.1.2 Growing Relationships: Long-term, Trust-Based	430
4.4.3.2.2 Costs of Quality (of Stakeholder Relationships)	431
4.5 Enterprise Architectural Forms (Isomorphic Archetypes)	432
4.5.1 Modular Enterprise Architectures	432
4.5.2 Integral Enterprise Architectures	433
4.5.2.1 Intra-species Heterogeneity within the <i>Integral</i> Enterprise Isomorph	434
4.5.2.1.1 Institutional Exogenous Push vs. Individual Endogenous Pull	434
4.5.2.1.2 Examples and <i>Sustainability</i> of the Integral Enterprise Isomorph	435
4.5.2.2 Integral Architecture and "New" Organizational Forms	436
4.5.2.3 Integral Example: Japanese Keiretsu	437
4.5.2.3.1 <i>Horizontal</i> keiretsu	437
4.5.2.3.2 <i>Vertical</i> keiretsu	437
4.5.3 Orthogonality of Archetypes	438
4.6 The Process of Architecting Enterprises	439
4.6.1 Formal (self-conscious) design	439
4.6.2 Emergent (unself-conscious) design	439
4.7 Chapter Summary	440
1.7 Chapter Summary	
Chapter 5 Competitive Dynamics	441
5.1 Introductory Constructs and Propositions	441
5.2 Theoretical Foundations	
5.2.1 Economic Theories	441
5.2.1.1 Penrose and Firm Growth	441
5.2.1.2 Marris and Growth vs. Profitability	442
5.2.1.3 Goodwin and the Business Cycle	443
5.2.1.4 Kuznets and the Machine Investment Cycle	445
5.2.2 Sociology and Organizational Theories	446
5.2.2.1 Structural Functionalism	446
5.2.2.2 System Theory	446
5.2.2.2.1 System Goals: Growth and Stability	446
5.2.2.2.2 Open vs. Closed Causal Systems	446
5.2.2.2.3 Open – Closed Systems and Functional In(ter)dependence	447
5.2.2.2.4 Feedback Systems: Positive & Negative	447
5.2.2.2.5 Feedback Systems: System Dynamics and Cybernetics	
5.2.3 Strategic Management Theories	448

5.2.3.1 Dynamic Capabilities	448
5.2.3.2 Functional Configurations	
5.2.3.2.1 The Four Types	448
5.2.3.2.1.1 Prospectors	448
5.2.3.2.1.2 Analyzers	
5.2.3.2.1.3 Reactors	
5.2.3.2.1.4 Defenders	448
5.2.3.2.2 Empirical Examples	
5.3 Structural Mechanics	
5.3.1 Structural Building Blocks	450
5.3.2 Fundamental Reference Modes	
5.3.3 The "Physics" of Growth	
5.3.4 Enterprise Inertias	
5.3.4.1 Structural Inertia	
5.3.5 Time and the Causal Levels of Competition.	
5.4 Enterprise Architecture Form-Structure Mapping	
5.4.1 Quantity Growth (Operations Strategy)	
5.4.1.1 Optimum Rates of Growth	
5.4.2 Quality Growth (Marketing Strategy)	
5.4.2.1 Structural vs. Strategic variables	
5.4.2.2 Strategic Positioning: Differentiation vs. Cost-Leadership	
5.4.2.3 Strategic Investment: <i>Flexibility</i> vs. <i>Commitment</i>	
5.4.2.4 Enterprise Efficiency vs. Effectiveness	
5.4.2.5 Strategic Biases of Enterprise Architectures	
5.4.2.6 Case Studies: Product Strategy in Commercial Airplanes	
5.4.2.6.1 Boeing 787 vs. Airbus A380	405
5.4.2.6.2 The Evolution of Boeing 787 vs. the Evolution of the Airbus A350	400
5.5 Opposing Dynamic Behaviors	/60
	409
5.5.3 Opposing Assumptions of Demand Durability	
5.5.4 Opposing Assumptions on Forecasting (managerial cognitive inertia)	
5.5.5 Opposing Assumptions of Span of Enterprise Control	
5.5.6 Opposing Views of Speed: Short-term vs. Long-term	
5.5.7 Opposing Assumptions of Strategic Investment	
5.5.8 Opposing Financial Strategies	
5.6 Case Study: the Business Cycle (and other "Exogenous" Shocks)	
5.6.1 Cross-Industry Examples	
5.6.1.1 Appliance industry	
5.6.1.2 Automobile industry	
5.6.1.3 Airplane industry	
5.6.1.4 <i>Airline</i> industry	479
5.6.2 Exogenous vs. Endogenous Views	
5.6.3 Dominant Firm Behavior	
5.6.4 Signal-to-Noise Ratios	
5.7 Symbiotic Inter-species Competition and Mixed Duopoly	481

5.7.1 Inter-species Competition in Community Ecology	. 481
5.7.2 Example: Biological Ecosystem	
5.8 Modeling Inter-species Competition	
5.8.1 Biological Competition within the Mathematical Modeling Tradition	
5.8.1.1 Population Growth of Verhulst (1838)	. 485
5.8.1.2 Predator-Prey Ecosystem of Lotka-Voltera (1925-1926)	
5.8.2 Firm Competition within the System Dynamics Tradition	
5.8.2.1 Embracing Macro-Structures: Forrester (1960-1970)	
5.8.2.2 Embracing Micro-Behaviors: Sterman (1985-2005)	
5.8.2.3 Embracing the Meso-Interactions: Morecroft (2000-2005)	
5.8.3 Formal Models of Business Ecosystems	. 487
5.8.3.1 Bertrand Competition & "The Principle of Competitive Exclusion"	
5.8.3.2 Predator - Prey Ecosystem Revisited	
5.8.3.3 Classic System Dynamics Models of Enterprise Architectures	
5.8.3.4 Modeling the Enterprise Archetypes: Modular & Integral	
5.8.3.5 Modeling the Competitor subsystem	
5.8.3.5.1 Competition for <i>Customers</i>	
5.8.3.5.2 Competition for <i>Investors</i>	
5.8.3.5.3 Competition for <i>Employees</i>	
5.8.3.5.4 Competition for Suppliers	
5.9 Tying Structural Dynamics to Valuation and Firm Performance	
5.10 Chapter Summary	493
	40.4
Chapter 6 Industrial Co-Evolution	
	101
6.1 Introductory Constructs and Propositions	
6.1.1 Change from a System Perspective	. 494
6.1.1 Change from a System Perspective.6.1.1.1 Adaptation.	494 495
6.1.1 Change from a System Perspective.6.1.1.1 Adaptation.6.1.1.2 Self-Organization.	494 495 495
 6.1.1 Change from a System Perspective. 6.1.1.1 Adaptation. 6.1.1.2 Self-Organization. 6.1.1.3 Evolution. 	494 495 495 495
 6.1.1 Change from a System Perspective. 6.1.1.1 Adaptation. 6.1.1.2 Self-Organization. 6.1.1.3 Evolution. 6.1.2 Employing Multiple Views on Change Processes. 	494 495 495 495 496
 6.1.1 Change from a System Perspective	494 495 495 495 496 497
 6.1.1 Change from a System Perspective. 6.1.1.1 Adaptation. 6.1.2 Self-Organization. 6.1.3 Evolution. 6.1.2 Employing Multiple Views on Change Processes. 6.1.2.1 Life-Cycle theory. 6.1.2.2 Teleological theory	494 495 495 495 496 497 497
 6.1.1 Change from a System Perspective. 6.1.1.1 Adaptation. 6.1.2 Self-Organization. 6.1.3 Evolution. 6.1.2 Employing Multiple Views on Change Processes. 6.1.2.1 Life-Cycle theory. 6.1.2.2 Teleological theory. 6.1.2.3 Dialectical theory. 	494 495 495 495 496 497 497 498
 6.1.1 Change from a System Perspective. 6.1.1.1 Adaptation. 6.1.2 Self-Organization. 6.1.3 Evolution. 6.1.2 Employing Multiple Views on Change Processes. 6.1.2.1 Life-Cycle theory. 6.1.2.2 Teleological theory. 6.1.2.3 Dialectical theory. 6.1.2.4 Evolutionary theory. 	494 495 495 495 495 496 497 498 498
 6.1.1 Change from a System Perspective	494 495 495 495 495 496 497 497 498 498 499
 6.1.1 Change from a System Perspective. 6.1.1.1 Adaptation. 6.1.2 Self-Organization. 6.1.3 Evolution. 6.1.2 Employing Multiple Views on Change Processes. 6.1.2.1 Life-Cycle theory. 6.1.2.2 Teleological theory. 6.1.2.3 Dialectical theory. 6.1.2.4 Evolutionary theory. 6.1.2.4.1 Evolutionary Economics. 6.1.2.4.2 Population Ecology. 	494 495 495 495 496 497 497 497 498 499 499 499
 6.1.1 Change from a System Perspective. 6.1.1.1 Adaptation. 6.1.2 Self-Organization. 6.1.2 Employing Multiple Views on Change Processes. 6.1.2.1 Life-Cycle theory. 6.1.2.2 Teleological theory. 6.1.2.3 Dialectical theory. 6.1.2.4 Evolutionary theory. 6.1.2.4.1 Evolutionary Economics. 6.1.2.4.2 Population Ecology. 6.1.2.5 Combinations of theories. 	494 495 495 496 496 497 497 498 498 498 499 499 500
 6.1.1 Change from a System Perspective. 6.1.1.1 Adaptation. 6.1.1.2 Self-Organization. 6.1.1.3 Evolution. 6.1.2 Employing Multiple Views on Change Processes. 6.1.2.1 Life-Cycle theory. 6.1.2.2 Teleological theory. 6.1.2.3 Dialectical theory. 6.1.2.4 Evolutionary theory. 6.1.2.4.1 Evolutionary Economics. 6.1.2.4.2 Population Ecology. 6.1.2.5 Combinations of theories. 6.2 Theoretical Foundations. 	494 495 495 495 496 497 497 498 498 498 498 499 500 501
 6.1.1 Change from a System Perspective. 6.1.1.1 Adaptation. 6.1.2 Self-Organization. 6.1.3 Evolution. 6.1.2 Employing Multiple Views on Change Processes. 6.1.2.1 Life-Cycle theory. 6.1.2.2 Teleological theory. 6.1.2.3 Dialectical theory. 6.1.2.4 Evolutionary theory. 6.1.2.4.1 Evolutionary Economics. 6.1.2.4.2 Population Ecology. 6.1.2.5 Combinations of theories. 6.2 Theoretical Foundations. 6.2.1 Economic and Strategic Management Theories. 	494 495 495 495 496 497 497 497 498 498 499 500 501 501
 6.1.1 Change from a System Perspective. 6.1.1.1 Adaptation. 6.1.2 Self-Organization. 6.1.2 Employing Multiple Views on Change Processes. 6.1.2 Employing Multiple Views on Change Processes. 6.1.2.1 Life-Cycle theory. 6.1.2.2 Teleological theory. 6.1.2.3 Dialectical theory. 6.1.2.4 Evolutionary theory. 6.1.2.4.1 Evolutionary theory. 6.1.2.5 Combinations of theories. 6.2 Theoretical Foundations. 6.2.1 Economic and Strategic Management Theories . 6.2.1.1 Life Cycle of Industry Structure, Technologies & Markets	494 495 495 496 496 497 497 497 498 498 498 499 500 501 501 501
 6.1.1 Change from a System Perspective. 6.1.1.1 Adaptation. 6.1.1.2 Self-Organization. 6.1.1.3 Evolution 6.1.2 Employing Multiple Views on Change Processes. 6.1.2.1 Life-Cycle theory 6.1.2.2 Teleological theory 6.1.2.3 Dialectical theory 6.1.2.4 Evolutionary theory 6.1.2.4.1 Evolutionary theory 6.1.2.5 Combinations of theories. 6.2 Theoretical Foundations. 6.2.1 Economic and Strategic Management Theories. 6.2.1.2 Life Cycle of Industry Structure, Technologies & Markets	494 495 495 496 496 497 497 497 498 498 498 498 499 500 501 501 503
 6.1.1 Change from a System Perspective. 6.1.1.1 Adaptation. 6.1.1.2 Self-Organization. 6.1.1.3 Evolution. 6.1.2 Employing Multiple Views on Change Processes. 6.1.2.1 Life-Cycle theory. 6.1.2.2 Teleological theory. 6.1.2.3 Dialectical theory. 6.1.2.4 Evolutionary theory. 6.1.2.4.1 Evolutionary theory. 6.1.2.5 Combinations of theories. 6.2 Theoretical Foundations. 6.2.1 Economic and Strategic Management Theories. 6.2.1.2 Life Cycle of Finance and Governance. 6.2.1.3 Life Cycle of Strategic Management Theories. 	494 495 495 495 496 497 497 497 497 498 499 500 501 501 503 506
 6.1.1 Change from a System Perspective. 6.1.1.1 Adaptation. 6.1.1.2 Self-Organization. 6.1.1.3 Evolution 6.1.2 Employing Multiple Views on Change Processes. 6.1.2.1 Life-Cycle theory. 6.1.2.2 Teleological theory. 6.1.2.3 Dialectical theory. 6.1.2.4 Evolutionary theory. 6.1.2.4 Evolutionary theory. 6.1.2.5 Combinations of theories. 6.2 Theoretical Foundations. 6.2.1 Economic and Strategic Management Theories. 6.2.1.2 Life Cycle of <i>Industry Structure</i>, Technologies & Markets	494 495 495 496 496 497 497 497 498 498 498 499 500 501 501 501 503 506 506
 6.1.1 Change from a System Perspective. 6.1.1.1 Adaptation. 6.1.1.2 Self-Organization. 6.1.1.3 Evolution 6.1.2 Employing Multiple Views on Change Processes. 6.1.2.1 Life-Cycle theory 6.1.2.2 Teleological theory 6.1.2.3 Dialectical theory 6.1.2.4 Evolutionary theory 6.1.2.4.1 Evolutionary teconomics. 6.1.2.5 Combinations of theories. 6.2.1 Economic and Strategic Management Theories. 6.2.1.2 Life Cycle of Industry Structure, Technologies & Markets. 6.2.1.2 Life Cycle of Strategic Management Theories. 6.2.1.3 Life Cycle of Strategic Management Theories. 6.2.1.3.1 Externally-focused SCP	494 495 495 495 495 496 497 497 497 497 498 499 499 500 501 501 501 503 506 506 506
 6.1.1 Change from a System Perspective. 6.1.1.1 Adaptation. 6.1.2 Self-Organization. 6.1.3 Evolution. 6.1.2 Employing Multiple Views on Change Processes. 6.1.2.1 Life-Cycle theory. 6.1.2.2 Teleological theory. 6.1.2.3 Dialectical theory. 6.1.2.4 Evolutionary theory. 6.1.2.4.1 Evolutionary theory. 6.1.2.5 Combinations of theories. 6.2 Theoretical Foundations. 6.2.1 Economic and Strategic Management Theories. 6.2.1.2 Life Cycle of <i>Industry Structure</i>, Technologies & Markets. 6.2.1.3 Life Cycle of Strategic Management Theories. 6.2.1.3 Life Cycle of RBV. 6.2.2 Sociology and Organizational Theories. 	494 495 495 495 496 497 497 497 498 498 499 500 501 501 503 506 506 508
 6.1.1 Change from a System Perspective. 6.1.1.1 Adaptation. 6.1.1.2 Self-Organization. 6.1.1.3 Evolution 6.1.2 Employing Multiple Views on Change Processes. 6.1.2.1 Life-Cycle theory 6.1.2.2 Teleological theory 6.1.2.3 Dialectical theory 6.1.2.4 Evolutionary theory 6.1.2.4.1 Evolutionary teconomics. 6.1.2.5 Combinations of theories. 6.2.1 Economic and Strategic Management Theories. 6.2.1.2 Life Cycle of Industry Structure, Technologies & Markets. 6.2.1.2 Life Cycle of Strategic Management Theories. 6.2.1.3 Life Cycle of Strategic Management Theories. 6.2.1.3.1 Externally-focused SCP	494 495 495 495 496 497 497 497 498 498 499 500 501 501 501 501 506 506 508 508 508

6.2.2.1.2 Four Causal Textures (Emery & Trist)	508
6.2.2.1.2.1 Step #1: Placid, Randomized	508
6.2.2.1.2.2 Step #2: Placid, Clustered	508
6.2.2.1.2.3 Step #3: Disturbed-Reactive	
6.2.2.1.2.4 Step #4: Turbulent Fields	509
6.2.2.1.3 Three Dimensions (Dess & Beard)	
6.2.2.1.3.1 Munificence	510
6.2.2.1.3.2 Dynamism	510
6.2.2.1.3.3 Complexity	511
6.2.2.1.3.4 Discussion	
6.2.2.1.4 Two Dimensions (Burns & Stalker)	513
6.2.2.1.5 Three Dimensions (Chandler)	513
6.2.2.1.6 Two Dimensions (Lawrence & Lorsch)	513
6.2.2.1.6.1 Certainty (Dynamic-Stable)	513
6.2.2.1.6.2 Diversity (Diverse-Homogeneous)	514
6.2.2.1.6.3 Critique	514
6.2.2.1.7 Environmental Uncertainty	
6.2.2.1.8 Rates of Environmental Change	515
6.2.2.2 Theories of Firm Evolution.	
6.2.2.3 Open Systems Theory	516
6.2.2.4 Structural Contingency Theory	
6.2.2.5 Population (Organizational) Ecology	
6.2.2.5.1 Natural Selection	
6.2.2.5.2 Structural Inertia	
6.2.2.5.3 Co-Evolutionary Dynamics	517
6.2.2.6 Structuration	
6.2.3 Technology and Innovation Theories	
6.2.3.1 <i>Product</i> Life Cycle	
6.2.3.2 Industry Life Cycle	
6.2.3.3 Technological Discontinuities	518
6.2.3.4 Disruptive Technologies	
6.2.3.5 Dominant Designs (Products)	
6.3 Industrial Evolution	
6.3.1 Industry Maturity Assessment Metrics	
6.3.1.1 Environmental Capacity	
6.3.1.1.1 <i>Quantity</i> of Output	
6.3.1.1.2 Quality of Output	
6.4 Evolution of Population Density: Firm Entry and Exit	
6.5 Evolution of "Landscapes"	
6.6 Evolution of Dominant Factor of Production	
6.6.1 Traditional capitalism	
6.6.2 Human capitalism	
6.7 Evolution of Dominant <i>Production</i> Strategy	
6.7.1 Craft production	
6.7.2 Mass production	
6.7.3 Lean production	
	551

6.8 Evolution of Dominant Product Strategy (Position)	
6.9 Evolution of Dominant Economic Offering	. 539
6.9.1 Co-Existence of Complements	
6.9.2 Co-Existence of Substitutes	
6.10 Evolution of Dominant Levels of Cognitive Inertia	. 540
6.11 Evolution of Dominant Growth Strategy	
6.11.1 Organic Growth	
6.11.2 Inorganic Growth (M&A)	. 541
6.12 Evolution of Dominant Intra-firm Structure	
6.12.1 Mechanistic vs. Organic structure	
6.12.2 Functional vs. Project structure	
6.13 Evolution of Dominant Designs in Enterprise Architectures	. 545
6.14 Evolution of Ecosystem Entropy ("The Architect's Dilemma")	. 548
6.14.1 Example: Commercial Airplane Industry	. 549
6.14.1.1 Boeing (1916): Founding	. 549
6.14.1.2 Boeing (1925-27): Airplanes/Airlines (forward integration)	. 549
6.14.1.3 Boeing (1928): Public Flotation (owner-manager dis-integration)	. 550
6.14.1.4 Boeing (1928-31): Vertical Acquisitions (value chain integration)	. 550
6.14.1.5 Boeing (1934-35): Government Break-up (value chain dis-integration)	
6.14.1.6 Boeing (1936-48): Labor Unions Established (labor dis-integration)	. 550
6.14.1.7 Boeing (1970): Patient Finance (customer integration)	. 551
6.14.1.8 Boeing (1987): Hostile Takeover Bid (investment horizon shortened)	. 551
6.14.1.9 Boeing (1997): Horizontal Acquisition (inorganic growth)	
6.14.1.10 Boeing (2005): Risk-sharing Partners (value chain dis-integration)	
6.14.1.11 Boeing (2005-2009) 787: "The Game-Changer"	
6.14.1.12 Boeing (2008) Departure of "The Red Queen"	
6.14.1.13 Airbus (1970): Founding (enterprise co-option and integration)	
6.14.1.14 Airbus (1974-77): Strategy (low cost & financing, stable production)	
6.14.1.15 Airbus (2000-01): Public Flotation (owner-manager dis-integration)	
6.14.1.16 Airbus (2001): Shareholders and the Response to 9-11	
6.14.1.17 Airbus (2006): Evolutionary Diffusion of "Ownership"	
6.14.1.17.1 Russian State Banks buy EADS shares	
6.14.1.17.2 BAE Systems sells shares to EADS	
6.14.1.17.3 Dubai International buys EADS shares	
6.14.1.17.4 Future Posssible Diversification	
6.14.1.17.4.1 German Bank, KfW to buy half of Daimler/Chrysler's stake	. 559
6.14.1.17.4.2 French Government to buy half of Lagardère stake	
6.14.1.18 Airbus (2006): CEO transitions	
6.14.1.19 Airbus (2007): Supply Chain Restructuring	
6.14.2 Example: Automotive Industry	
6.14.2.1 General Motors (1916): Incorporation	. 564
6.14.2.2 General Motors (1926): Vertical Integration of Fisher Body	
6.14.2.3 General Motors (1999): Vertical Dis-integration of Delphi	
6.14.2.4 General Motors (2005): Vertical "Re-integration" of Delphi	
6.14.2.5 Daimler & BMW (1994-2007): Acquitision & Divestiture of Rivals	
6.14.2.6 General Motors (2008-9): Becomes No. 2 & Bankruptcy Protection	

6.14.2.7 Toyota (1937): Founding through Organic Diversification	566
6.14.2.8 Toyota (1949): Spin-off of Nippondenso (value chain dis-integration)	566
6.14.2.9 Toyota (1950): Recession, Lay-offs, Strikes, Bankruptcy & Bailout	566
6.14.2.10 Toyota (1982): Reintegration of Sales and Operations Companies	
6.14.2.11 Toyota (1988): Vertical Integration in Auto Electronics	566
6.14.2.12 Toyota (1995-99): Vertical Integration with Daihatsu	
6.14.2.13 Toyota (2008): First Annual Loss	
6.14.3 Example: Airline Industry	568
6.14.3.1 United Airlines (1928-30): Pre-founding (value chain integration)	568
6.14.3.2 United Airlines (1931): Founding (value chain dis-integration)	569
6.14.3.3 United Airlines (1931): Formation of Labor Unions	569
6.14.3.4 United Airlines (1975-85): Labor Strikes (labor dis-integration)	569
6.14.3.5 United Airlines (1994): ESOP (attempted re-integration)	569
6.14.3.6 United Airlines (2001): Bankruptcy (dis-integration)	
6.14.3.7 United Airlines (2003): Launch of Ted (inorganic diversification)	
6.14.3.8 Southwest Airlines (1971): Founding	
6.14.3.9 Southwest Airlines (2001): Response to 9-11	569
6.14.3.10 Southwest Airlines (2008): Quarterly Losses	569
6.15 Evolution of Architecting Processes	
6.15.1 Enterprise Architectural States (Fit) and Paths (Change)	
6.15.1.1 Enterprise Architectural <i>Fit</i>	571
6.15.1.2 Enterprise Architectural Change	
6.15.1.2.1 (Managerial) Adaptation	
6.15.1.2.1 (Multidgenui) nudpration	
6.15.1.2.1.2 Dis-integration to Fight or for Flight?	
6.15.1.2.2 (Environmental) Selection	
6.15.1.3 Enterprise Inertia Part II: Architectural Inertia	
6.15.1.4 Punctuated Architectural Change: <i>Exploration</i> and <i>Exploitation</i>	
6.15.2 Profiles in Courage: Why Re-Integration is Difficult	
6.16 Chapter Summary	
0.10 Chapter Summary	202
Part III: INTEGRATING THE THEORY	584
Chapter 7 Mathematical Model and Numerical Simulation	585
7.1 Competition in a Constant (Unchanging) Market Environment	
7.1.1 Single Firm Growth in an Infinite Market	587
7.1.2 Single Firm Growth in a Constant, Finfite Market	590
7.1.3 Intra-species Competition in a Constant Market	
7.1.3.1 Parametric Study: Initial Conditions	
7.1.3.2 Parametric Study: Fractional Acquisition Rates	
7.1.4 Inter-species Competition in a Constant Market	
7.2 Competition in a <i>Diffusing</i> Market (Quantity)	
7.2.1 Diffusing Market (Quantity)	
7.2.1.1 First-Order Two-Stock Logistic Growth	
7.2.1.2 Bass Industry Diffusion Model	
7.2.1.3 Bass Industry Diffusion Model with Replacements	
7.2.1.4 Industry Studies of Diffusing Markets	

7.2.1.5 Market Diffusion & Obsolescence	611
7.2.2 Single Firm Growth in a Diffusing Market	612
7.2.3 Intra-species Competition in a Diffusing Market	614
7.2.4 Inter-species Competition in a Diffusing Market	
7.3 Competition in a Commoditizing Market (Quality)	
7.3.1 Commoditizing Market (Quality)	
7.3.1.1 Single-Loop Exponential Decay	
7.3.1.2 Double-Loop Logistic Decay	
7.3.1.3 Bass Industry Commoditization Model	
7.3.2 Single Firm Growth in a Commoditizing Market	
7.3.3 Intra-species Competition in a Commoditizing Market	
7.3.4 Inter-species "Competition" in a Commoditizing Market	636
7.4 Competition in a Diffusing, Commoditizing Market (Quantity and Quality)	
7.4.1 Diffusing, Commoditizing Market (Quantity and Quality)	640
7.4.1.1 Comparing Single- vs. Double-loop Diffusing, Commoditizing Models	
7.4.1.2 Comparing Diffusion vs. Commoditization Rates	642
7.4.1.3 Parametric Study: Product Durability	644
7.4.2 Single Firm Growth in a Diffusing, Commoditizing Market	
7.4.3 Intra-species Competition in a Diffusing, Commoditizing Market	
7.4.4 Inter-species Competition in a Diffusing, Commoditizing Market	652
7.5 Advanced Topics	
7.5.1 Firm-sector Topics	
7.5.1.1 Oscillation: Demand and Supply Lags	
7.5.1.1.1 Single Firm Experiencing Undamped Oscillation	
7.5.1.1.1.1 Parametric Study of Goal-Setting	
7.5.1.1.1.2 Parametric Study of <i>Productivity</i>	
7.5.1.1.2 Single Firm Experiencing <i>Damped</i> Oscillation	666
7.5.1.1.3 Single Firm Experiencing Growth and Damped Oscillation	
7.5.2 Market-sector Topics	
7.5.2.1 Market Diffusion and Obsolescence	
7.5.2.1.1 Three-loop Representation (S-I-R)	
7.5.2.1.2 Four-loop Representation (Single Bass)	
7.5.2.1.3 Four-loop Representation (Double Bass)	
7.5.2.1.4 Summary of Parametric Study	677
7.5.2.2 Overshoot and Collapse: 200-year Global Market	679
7.5.3 Summary	680
Charter 9 Summary and Canalysians	601
Chapter 8 Summary and Conclusions	
8.1 Framework Summary8.2 Theory Evaluation	
8.2.1 The Halo Effect	
8.2.1 The Halo Effect. 8.2.2 The Delusion of Correlation and Causality	
8.2.2 The Delusion of Single Explanations	
• •	
5 5	
0	
8.2.6 The Delusion of Lasting Success	
8.2.7 The Delusion of Absolute Performance	007

8.2.8 The Delusion of the Wrong End of the Stick	
8.2.9 The Delusion of Organizational Physics	
8.3 Further Research	
8.3.1 Past Empirical Case Studies	690
8.3.2 Future Empirical Case Studies	691
8.4 Toward a Theory of the Evolution of <i>Research</i> Ecosystems	
8.5 Conclusions	
Part IV: APPENDICES	
A. References	
B. Sources of Profitability: Industry vs. Firm	
C. Placement of Research within the Strategic Management Field	
D. Literature Review of Mixed Duopoly Economics	
E. Literature Review of System Dynamics Modeling of Firm Competition	
F. Mathematical Equations of Numerical Model (Vensim)	
G. Interview Participants	
H. Selected Sample of Qualitative Data for Discourse & Textual Analysis	
I. Feedback on Research	
J. Subject Index	1323

List of Figures

Figure 1: Contributing to the Debate in Strategic Management	. 61
Figure 2: Comparing Structural Contingency Theory with Ecological Contingency Theory	. 62
Figure 3: Summary of Research Design	. 66
Figure 4: Summary of Primary Definitions	
Figure 5: Overview of Theoretical Framework	. 70
Figure 6: Constituent Modules (Stakeholders) in a Generic Enterprise Architecture	. 72
Figure 7: Typology of Enterprise Architectures	. 74
Figure 8: Comparison of Unstable vs. Stable Growth	. 77
Figure 9: Quantity Growth of Competing Enterprise Architectures in the Airplane Industry	. 79
Figure 10: Quantity Growth of Competing Enterprise Architectures in the Automotive Industry	y 80
Figure 11: Quantity Growth of Competing Enterprise Architectures in the US Airline Industry	81
Figure 12: Exploration and Exploitation in Strategic Position Space	
Figure 13: Quality Space of Competing Enterprise Architectures in Airplane Industry	. 85
Figure 14: Quality Space of Competing Enterprise Architectures in Automotive Industry	
Figure 15: Quality Space of Competing Enterprise Architectures in Airline Industry	. 85
Figure 16: Quantity (Revenue) Growth in the Commercial Airplane Industry	. 87
Figure 17: Quantity (Revenue) Growth in the Automotive Industry	. 88
Figure 18: Quantity (Revenue) Growth in the US Airline Industry	. 88
Figure 19: Quality (Profitability) Growth in the Commercial Airplane Industry	
Figure 20: Quality (Profitability) Growth in the Automotive Industry	
Figure 21: Quality (Profitability) Growth in the US Airline Industry	. 90
Figure 22: Co-Evolution of Firm Performance and Environment (Quantity)	. 91
Figure 23: Market Carrying Capacity of the Global Airline Industry	. 92
Figure 24: CAGR of Market Carrying Capacity of the Global Airline Industry	. 92
Figure 25: Market Carrying Capacity of the Global Automotive Industry	
Figure 26: Market Carrying Capacity of the U.S. Airline Industry	. 93
Figure 27: Co-Evolution of Firm Performance and Environment (Quality)	. 94
Figure 28: Technological Carrying Capacity of the Global Airplane Industry	. 95
Figure 29: Technological Limits of the Global Airplane Industry	
Figure 30: Stylized Co-Evolution of Enterprises and Ecosystem	
Figure 31: Evolution of Dominant Designs in Enterprise Architectures: Airplane Industry:	. 99
Figure 32: Evolution of Dominant Designs in Enterprise Architectures: Automotive Industry.	100
Figure 33: Evolution of Dominant Designs in Enterprise Architectures: US Airline Industry	100
Figure 34: Commercial Airplane Industry Concentration / Population Density	
Figure 35: Automotive Industry Population Density, Dominant Design & Founding Dates	102
Figure 36: US Airline Industry Population Density, Dominant Design & Founding Dates	102
Figure 37: Simplified Summary of Theoretical Framework	
Figure 38: Structure and Behavior of Single Firm Growth in an Infinite Market	106
Figure 39: Fractional Net Growth Rate Assumption	
Figure 40: Structure and Behavior of Single Firm Growth in a Constant Market	107
Figure 41: Structure and Behavior of Intra-species Competition in a Constant Market	
Figure 42: Structure and Behavior of a Diffusing Market	109

Figure 43: Structure and Behavior of Intra-species Competition in a Diffusing Market	110
Figure 44: Fractional Net Growth Rate Assumptions	
Figure 45: Structure and Behavior of Inter-species Competition in a Diffusing Market	
Figure 46: Structure and Behavior of a Commoditizing Market	
Figure 47: Structure and Behavior of Intra-species Competition in a Commoditizing Market.	114
Figure 48: Structure and Behavior of Inter-species Competition in a Commoditizing Market.	115
Figure 49: Structure and Behavior of a <i>Diffusing</i> , <i>Commoditizing</i> Market	116
Figure 50: Structure/Behavior of <i>Intra</i> -species Competition in a <i>Diffusing</i> , <i>Commoditizing</i>	
	117
Figure 51: Structure/Behavior of Inter-species Competition in a Diffusing, Commoditizing	
Market	118
Figure 52: Integrating Academic Collaborators and Industrial Competitors	
Figure 53: Doctoral Committee	
Figure 53: Doctoral Committee	
Figure 54: Enterprise Architecture as a synthesis of External-Internal Theories Figure 55: Comparing the Performance of Shareholder- vs. Stakeholder-focused Firms	135
Figure 56: Primary Intellectual Social Science Fields	127
Figure 57: The Relationship between <i>Spatial</i> and <i>Temporal</i> Boundaries of the Firm	120
Figure 58: Central Debates in Organization Theory	
Figure 59: Multi-disciplinary Approach	142
Figure 60: Research at the Intersection of Strategy, Organization and Leadership	
Figure 61: Rigor-Relevance Interaction	144
Figure 62: Research Objectives of Explanation and "Prediction"	146
Figure 63: Working Definition of <i>Firm</i>	
Figure 64: Working Definition of Industry	
Figure 65: Working Definition of Enterprise	
Figure 66: Working Definition of <i>Ecosystem</i>	
Figure 67: Summary of Working Definitions	
Figure 68: Summary of Units of Analysis in Framework	157
Figure 69: Focus is on the Evolution of Dominant Species within a Fixed Environment	158
Figure 70: Focus is on the Evolution of Market Niches in a Changing Environment	158
Figure 71: Longitudinal Trajectories of Dominant Firms within an Industry's Evolution	159
Figure 72: Explaining Long-Term (1st Mode) Trajectories of Firm Performance	160
Figure 73: Key "Dependent" Variable: Shareholder Value	161
Figure 74: Primary "Independent" Variable: Enterprise Architecture	
Figure 75: Intervening Variables: Enterprise Function & Environment Evolution	164
Figure 76: Correlative vs. Causal approaches	
Figure 77: Temporal Boundary of the Framework	170
Figure 78: Bi- vs. Tri-phase Temporal Discretization of the Industrial S-Curve	
Figure 79: Structure of Proposed Mid-Range Theory	
Figure 80: Summary of Proposed Co-Evolutionary, Meta-Strategic Framework	
Figure 81: Detailed Causal Model	174
Figure 82: Framework as <i>Strategic Management</i> Theory	
Figure 83: Toward a <i>Structural Functionalist</i> approach to the Framework	176
Figure 84: Toward a <i>General System Theory</i> approach to the Framework	
Figure 85: Toward an <i>Evolutionary</i> approach to the Framework	
Figure 86: The Framework viewed through a <i>Temporal</i> perspective	
1 gute 66. The Flumework viewed unough a remporal perspective	100

Figure 87: Framework as Architectural Design Theory	. 181
Figure 88: Framework presented as "Ladder of Abstraction/Aggregation"	
Figure 89: Proposed Framework expressed as a Motorsport Race	
Figure 90: Intellectual "Double-Helix" in Strategic Management	. 186
Figure 91: Framework as Contingency Theory	. 187
Figure 92: Comparing Structural vs. Ecological Contingency Theories	. 188
Figure 93: Situating the Framework within the Contingency Literature	. 189
Figure 94: Architecture-Context-Performance Relationship	
Figure 95: Layout of the Dissertation - the Three Essays	
Figure 96: Summary of the Five Aspects of the Proposed Framework	. 198
Figure 97: Domain and Approaches within Engineering Systems	. 203
Figure 98: General research focus within the construct of an "engineering system"	. 205
Figure 99: Decomposition of Architectures.	. 207
Figure 100: Enterprise Architecture vs. Civil, Product & System Architectures	. 208
Figure 101: Specific research focus with the construct of an "engineering system"	
Figure 102: Proposed Research within ESD Intellectual "Topology"	
Figure 103: Case Study Building Blocks for Theory Development	
Figure 104: The Theory-Practice Double Hermeneutic in Social Science	
Figure 105: Making "Intellectual Bricks" vs. Building "Cathedrals of Knowledge"	. 215
Figure 106: Dissertation as the Evolution of the Dominant Research Architecture	. 217
Figure 107: Placement of the <i>Framework</i> within the Academic Literatures	
Figure 108: Proposed Publication Plan	. 227
Figure 109: Fit between Research Methods and the State of Strategy Research	. 229
Figure 110: Research Process Summary	. 236
Figure 111: Search for Outliers via In-Depth Case Studies	. 237
Figure 112: Integrated and Triangulated Research Design	. 241
Figure 113: Combining Linear Sequential and Nonlinear Spiral Development Processes	
Figure 114: <i>Multi-Method Research</i> and the Rigor-Relevance Tradeoff	
Figure 115: Tripartite Research Design Superimposed on Phenomenon	
Figure 116: The Three (+ one) Theoretical Lenses	
Figure 117: Quantity and Quality of Data	
Figure 118: Process used for Theory Building	
Figure 119: Realist vs. Constructivist Paradigms	
Figure 120: The "Construction" of Constructivism	
Figure 121: Influence of Industry <i>Structure</i> and Firm <i>Conduct</i> on Sample Selection	
Figure 122: Modular or Integral Enterprise Architectures?	
Figure 123: Historical Milestones of Main Competitors in Commercial Airplane Industry	268
Figure 124: Dynamic and Behavioral Complexity	. 269
Figure 125: Proposed <i>Theoretical</i> Sample	
Figure 126: Important Data Sources for each part of the Framework	
Figure 127: Researcher Intrusion Spectrum	
Figure 128: Research Timeline	
Figure 129: Fieldwork Timeline	
Figure 130: Fieldwork Timeline & Competitive Duopoly Dynamics	
Figure 130: Fieldwork Timeline & <i>competitive Duopory</i> Dynamics	
Figure 131: Fieldwork Timerine & the Business Cycle Figure 132: Empirical "Triangulation" of <i>Boeing</i> Case Study	
rigure 152, Empirical mangulation of Doeing Case Study	. 209

Figure 1	33: Intra-firm Research "Projects"	290
Figure 1	34: Empirical "Triangulation" of the Commercial Airplane Industry	291
Figure 1	35: Mapping Micro-Frames Across the Macro-Enterprise	292
Figure 1	36: Data from the Customer stakeholder with and without "political controls"	294
Figure 1	37: Data from the Supplier stakeholder with and without "political controls"	295
	38: Proposed System Dynamics Models of Framework	
Figure 1	39: Dominant Firm Performance	310
Figure 1	40: GM vs. Toyota Market Capitalization Trajectories	311
	41: United vs. Southwest Market Capitalization Trajectories	
	42: Architectural Imprint on the Income Statement.	
	43: Top-line Revenues: Auto Industry	
	44: Top-line Revenues: Airline Industry	
	45: Top-line Revenues: Airplane Industry	
	46: Bottom-line Profits: Auto Industry	
	47: Bottom-line Profits: Airline Industry	
	48: Bottom-line Profits: Airplane Industry	
	49: Profit-ability: Auto Industry	
	50: Profit-ability: Airline Industry	
	51: Profit-ability: Airplane Industry	
	52: Enterprise Stability: Auto Industry	
	53: Enterprise Stability: Airline Industry	
	54: Enterprise Stability: Airplane Industry	
	55: Boeing vs. Airbus Market (Delivery) Share Trajectories	
	56: "Wicked" Problems in the Commercial Airplane Industry	
	57: Common Characteristics of Dominant Competitors	
	58: Stylized Enterprise Stability	
Figure 1	59: Firm Performance within Framework	334
Figure 1	60: <i>Simple</i> definition of "Enterprise Architecture"	336
Figure 1	61: Contingent definition of "Enterprise Architecture"	337
Figure 1	62: Continuum of Enterprise Architectures	338
	63: Architecture as Continuum of Probabilities	
Figure 1	64: Transaction Costs of Non-Integration <i>between</i> and <i>within</i> Organizations	344
	65: Reaction Functions for PM and LM Duopolies in Quantity Space	
	66: Homogeneous Duopoly under Cournot (Quantity) Competition	
	67: Sequential Games in a <i>Homogenous</i> Duopoly	
	68: Reaction Functions for a Mixed Duopoly in Quantity Space	
	69: Heterogeneous Duopoly under Cournot (Quantity) Competition	
	70: Spectrum of Varieties of Capitalism	
	71: Organizational Theories of "Fit"	
	72: Closed vs. Open Organizational Systems	
•	73: Open and Closed <i>Causality</i> within an Open <i>Systems</i> Framework	
	74: Summary of Two Contingency Models	
	75: Two Ecologies: Community and Population	
	75: Two Ecologies. Community and Topulation	
	77: NK Model and Enterprise Architectures	
rigure 1	78: Competition within Stable and Rugged Landscapes	201

Figure 179: From Technical, to Socio-Technical, to Social Systems	385
Figure 180: Product Architecture Example	389
Figure 181: Mapping Function to Organizational (not Physical) Form	
Figure 182: Stakeholder Catalysts driving Product and Organizational Architectures	398
Figure 183: Product & Organizational Architectures in Commercial Airplane Industry	399
Figure 184: Inter-firm to Intra-firm Functional Mapping	
Figure 185: Deterministic Mapping of Product and Enterprise Architectures	
Figure 186: Construct in Architectural Theory	404
Figure 187: Construct in Economic / Political Science Theory	
Figure 188: Construct in Sociology / Organization Theory	
Figure 189: Summary of Architecture Typologies in the Literature	
Figure 190: Enterprise Architecture: Value Chain Axis	
Figure 191: Supplier "Push" vs. Customer "Pull"	
Figure 192: Enterprise Architecture: Factors of Production Axis	
Figure 193: Principal-Agent problem: Agency vs. Stewardship Theories	
Figure 194: Traditional capitalism vs. Human capitalism	
Figure 195: Enterprise Architecture: Competition Axis	
Figure 196: Functional In(ter)dependence	
Figure 197: Performance and Functional In(ter)dependence	
Figure 198: Enterprise Objective Functions	
Figure 199: Classical discussions around the "Boundaries of the Firm"	426
Figure 200: Enterprise Boundaries	
Figure 201: Effect of Spatio-Temporal Boundaries on Strategy	
Figure 202: The Costs of Quality (of Stakeholder Relationships)	
Figure 203: Institutional Exogenous Push vs. Individual Endogenous Pull	
Figure 204: Examples and <i>Sustainability</i> of the Integral Enterprise Isomorph	
Figure 205: Orthogonality of Archetypes	
Figure 206: Enterprise Architecture within Framework	
Figure 207: Principal-Agent conflicts in <i>Profits</i> and <i>Growth</i>	
Figure 208: Enterprise Architecture as a Generator of the Business Cycle	
Figure 209: Enterprise Architecture and the <i>Business</i> Cycle and <i>Kuznets</i> Cycle	
Figure 210: Fundamental Reference Modes	
Figure 211: First Order Growth Systems	
Figure 212: Architectural and Structural Inertia	
Figure 213: Sources of <i>Structural</i> Inertia	
Figure 214: <i>Time</i> and the Causal Levels of Competition	455
Figure 215: Enterprise Architecture Form-Structure Mapping	457
Figure 216: Strategy vs. Structure(s)	
Figure 217: Efficiency vs. Effectiveness in Strategy Space	
Figure 218: Efficiency Frontiers of the Enterprise Archetypes	
Figure 219: Examining the Product Market Strategies in Commercial Airplanes	
Figure 220: Product Performance Portfolios in Commercial Airplanes – 2006	
Figure 220: Product Performance Portfolios in Commercial Airplanes - 2000	
Figure 222: Evolutionary Trajectories of <i>Boeing & Airbus</i> ' Recent Product Offerings	
Figure 223: Opposing Strategies Towards Demand	
Figure 224: Opposing Assumptions of Demand Durability	470

Figure 225: Opposing Assumptions on Forecasting	471
Figure 226: Opposing Assumptions of Span of Enterprise Control	
Figure 227: Enterprise Structural Dynamics in the Automotive Industry	
Figure 228: Enterprise Structural Dynamics in the Large Commercial Airplane Industry	
Figure 229: Opposing Assumptions of Strategic Investment	
Figure 230: Symbiotic Competition in a Biological (boreal) Ecosystem	
Figure 231: Predator (Integral) - Prey (Modular) Architectural Competitive Dynamics	
Figure 232: System Dynamics Enterprise Subsystem Diagram	
Figure 233: System Dynamics Firm-Market Subsystem Diagram	
Figure 234: Enterprise Archetypes: Modular and Integral	
Figure 235: Theoretical Competitive Coupling between all Stakeholders	
Figure 236: Competitive Coupling between Value Chain Stakeholders	
Figure 237: Enterprise Structural Dynamics with Framework	
Figure 238: The Structure of Adaptation, Self-Organization and Evolution	
Figure 239: Integrating Theories of Change Processes	
Figure 240: Evolution in Managerial Adaptation & Environmental Selection	
Figure 241: Change Theories and the Evolution of Business Ecosystems	
Figure 242: Dividend Distribution Life Cycle	
Figure 243: Emergence of the Principal-Agent Problem with Industry Maturity	
Figure 244: Investor Disintegration in Maturing Industries	
Figure 245: Life Cycle of Strategic Management Theories	
Figure 246: Four Causal Textures and the Industry Life Cycle	
Figure 247: Trajectories of the Three Dimensions of Organizational Environments	
Figure 248: Three Dimensions of Organizational Environment & the Industry Life-Cycle	512
Figure 249: Discontinuities and Dominant Designs	
Figure 250: Industrial/Ecosystem Evolutionary Dynamics	
Figure 251: Dual S-Curves (<i>tight</i> -coupling assumption)	
Figure 252: Dual S-Curves (<i>loose</i> -coupling) Quality precedes Quantity	
Figure 253: Dual S-Curves (<i>loose</i> -coupling) Quantity precedes Quality	
Figure 255: Dual 5-Curves (18652-Coupling) Quality precedes Quality fields	
Figure 255: Rate of Change of Carrying Capacity of the Global Airline Industry	
Figure 256: Population Density in the Large Commercial Airplane Industry	
Figure 257: Population Density in the <i>Automotive</i> Industry	
Figure 258: Population Density in the US Airline Industry	
Figure 259: Conceptual Population Densities	
Figure 260: Mass and Population Densities	
Figure 261: Evolution of Landscapes	
Figure 262: Evolution of Dominant Factor of Production	
Figure 263: Evolution of Dominant Production Strategy	
Figure 264: Evolution of Dominant <i>Product</i> Strategy	
Figure 265: Evolution of Complements and Substitutes	
Figure 266: Evolution of Dominant Levels of Cognitive Inertia	
Figure 267: Diversification and Consolidation Strategies and the Industrial Evolution	
Figure 268: Dominant Designs in Enterprise Architectures	
Figure 269: Co-Evolutionary Feedback Dynamics of the "Double Helix"	
o i i	
Figure 270: The Evolutionary Trajectories of Architectures	340

Figure 271: Evolution of Dominant Designs in Enterprise Architectures in the Commercial	
Airplane Industry	
Figure 272: Value Chain Disintegration (for "Risk-Sharing")	. 553
Figure 273: Airbus' "ownership" in 2001	. 557
Figure 274: Airbus' "ownership" in 2007	. 560
Figure 275: Evolution of Dominant Designs in Enterprise Architectures in the Automobile	
Industry	. 564
Figure 276: Evolution of Dominant Designs in Enterprise Architectures in the US Airline	
Industry	
Figure 277: Evolution of Architecting Processes	. 570
Figure 278: Sources of Architectural Inertia	
	. 577
Figure 280: Cyclical Growth Spurts in a Maturing Industry Inhibit Architectural Change	. 579
Figure 281: Exploit-Explore Dynamics of Architectural Change	
Figure 282: Enterprise - Environment Evolution and Co-Evolution within Framework	
Figure 283: Constituent Elements of Conceptual Model	
Figure 284: Model Structure of Single Firm Growth in an Infinite Market	
Figure 285: Fractional Acquisition Rate of Firm in an Infinite Market	
Figure 286: Dynamic Behavior of a Single Firm in an Infinite Market	
Figure 287: Model Structure of Single Firm Growth in a Constant Market	
Figure 288: Fractional Acquisition Rate of Firm in a Constant Market	
Figure 289: Dynamic Behavior of a Single Firm in a <i>Constant</i> Market	
Figure 290: Model Structure of <i>Intra</i> -species Competition in a <i>Constant</i> Market	
Figure 291: Fractional Acquisition Rates of Competing Firms in a Constant Market	
Figure 292: Dynamic Behavior of <i>Intra</i> -species Competition in a <i>Constant</i> Market	
Figure 293: Dynamic Behavior of of Competing Initial Acquired Markets	
Figure 294: Model Structure of Relative Attractiveness of a Firm's Products/Services	
Figure 295: Fractional Acquistion Rates of Firms in Intra-species Competition	
Figure 296: Dynamic Behavior of Competing Fractional Acquisition Rates	
Figure 297: Fractional Acquisition Rates of Firms in <i>Inter</i> -species Competition	
Figure 298: Model Structure of <i>Inter</i> -species Competition in a Constant Market	
Figure 299: Dynamic Behavior of <i>Inter</i> -species Competition in a <i>Constant</i> Market	
Figure 300: Equivalence of Logistic Market Growth Model Structures	
Figure 301: Comparing the Structures of Diffusion Models	
Figure 302: The Dynamic Behavior of a Bass Industry Diffusion Model	604
Figure 303: Bass Industry Diffusion Model with Replacements	
Figure 304: Dynamic Behavior of <i>Stocks</i>	
Figure 305: Dynamic Behavior of Changes in Stocks and Constituent Flows	
Figure 306: Dynamic Behavior of Diffusion Rates and Accumulated Diffusion	
Figure 307: Dynamic Behavior of Accumulated Diffusion & Stocks	
Figure 308: Diffusing Market in the Commercial Airplane Industry	
Figure 309: Diffusing Market in the <i>Global Airline</i> Industry	
Figure 309. Diffusing Market in the Global Passenger Air Transport Value Chain	
Figure 310: Diffusing Market in the Grobal Tassenger Air Transport Value Cham Figure 311: Comparing Product Durability vs. Market Diffusion Rate	611
Figure 312: Model Structure of <i>Single Firm</i> Growth in a <i>Diffusing</i> Market	
Figure 313: Fractional Acquisition Rate of a Single Firm in a Diffusing Market	. 012

Figure 314: Dynamic Behavior of Single Firm in a Diffusing Market	. 613
Figure 315: Model Structure of Intra-species Competition in a Diffusing Market	. 614
Figure 316: Fractional Acquisition Rates of Homogeneous Firms in Intra-species Competition	
	. 615
Figure 317: Dynamic Behavior of a Single Firm and <i>Intra</i> -species Competition in a <i>Diffusing</i> Market	616
Figure 318: Dynamic Behavior of <i>Intra</i> -species Competition in a <i>Diffusing</i> Market (with	. 010
	. 617
Figure 319: Fractional Acquisition Rates of <i>Heterogeneous</i> Firms in Intra-species Competition	
	. 618
Figure 320: Dynamic Behavior of Intra-species Competition in a Diffusing Market (with	
Heterogeneous Maximum Fractional Acquisition Rates).	. 619
Figure 321: Fractional Acquisition Rates of Competing Firms in a Diffusing Maket	
Figure 322: Model Structure of Inter-species Competition in a Diffusing Market	
Figure 323: Dynamic Behavior Comparing Inter-species competition in Constant & Diffusin	
Markets	. 622
Figure 324: Dynamic Behavior Comparing Inter-species competition in a Diffusing Market	
Figure 325: The Structure of a Commoditizing Market (with Exponential Decay)	. 625
Figure 326: Dynamic Behavior of a Commoditing Market (with Exponential Decay)	. 625
Figure 327: The Structure of a Commoditizing Market (with Logistic Decay)	
Figure 328: Dynamic Behavior of a Commoditizing Market (with Logistic Decay)	
Figure 329: Comparing the Structures of Commoditizing Models	
Figure 330: Model Structure of Single Firm Growth in a Commoditizing Market	
•	. 628
Figure 332: Dynamic Behavior of Single Firm in a Commoditizing Market	. 629
Figure 333: Parametric Study of FARs on Differentiation Market	
Figure 334: Parametric Study of FARs on Cost Market	. 631
Figure 335: Fractional Acquisition Rates of Homogeneous Firms in Intra-species Competition	m
	. 632
Figure 336: Model Structure of Intra-species Competition in a Commoditizing Market	. 633
Figure 337: Dynamic Behavior of a Single Firm and Intra-species Competiton in a	
Commoditizing Market	. 634
Figure 338: Parametric Study of FARs in Intra-species Competition in Commoditizing Market	ets
	. 635
Figure 339: Fraction Acquisition Rates of Heterogeneous Firms in Inter-species Competition	1636
Figure 340: Model Structure of Inter-species "Competition" in a Commoditizing Market	
Figure 341: Dynamic Behavior of Inter-species Competition in a Commoditizing Market	
Figure 342: Comparing Model Structures of Diffusing, Commoditizing Markets	. 640
Figure 343: Comparing the Dynamic Behavior of Diffusing, Commoditizing Markets	. 641
Figure 344: Model Structure Comparing Market Diffusion vs. Commoditization Rates	
Figure 345: Dynamic Behavior of Diffusion vs. Commoditization Rates	
Figure 346: Model Structure of Product Durability in a Diffusing, Commoditizing Market	
Figure 347: Dynamic Behavior of a Diffusing, Commoditizing Market with Varying Product	
Durability	. 645
Figure 348: Model Structure of Single Firm Growth in a Diffusing, Commoditizing Market	

Figure 349: Fractional Acquisition Rate of a Single Firm in a Diffusing, Commoditizing Mar	ket
	. 646
Figure 350: Dynamic Behavior of a Single Firm in a Diffusing, Commoditizing Market	. 647
Figure 351: Fractional Acquisition Rates of Homogenous Intra-species Competitors in a	
Diffusing, Commoditizing Market	. 648
Figure 352: Model Structure of Intra-species Competition in a Diffusing, Commoditizing Ma	
	. 649
Figure 353: Dynamic Behavior of a Single Firm and Intra-species Competition in a Diffusin	-
Commoditizing Market	. 650
Figure 354: Parametric Study of FARs in Intra-species Competition in Diffusing, Commoditie	
Markets	. 651
Figure 355: Fractional Acquisition Rates of Inter-species Competitions in a Diffusing,	
Commoditizing Market	. 652
Figure 356: Model Structure of Inter-species Competition in a Diffusing, Commoditizing Ma	. 653
Figure 357: Comparing Dynamic Behavior of Inter-species Competition in a Commoditizing	
Market and a Diffusing, Commoditizing Market (with Diffusion suppressed)	
Figure 358: Comparing Dynamic Behavior of Inter-species Competition in a Commoditizing	
Market and a Diffusing, Commoditizing Market.	. 655
Figure 359: Comparing Dynamic Behavior of Intra-species and Inter-species Competition in	ı a
	. 656
Figure 360: Fractional Acquisition Rates of Inter-species Competition in a Diffusing,	
Commoditizing Market	. 657
Figure 361: Comparing the Dynamic Behavior of Intra-species Competition and Inter-species	es
Competition in Diffusing, Commoditing Markets	
Figure 362: Comparing Dynamic Behavior of of Inter-species Competition (having linear vs	
nonlinear FAR functions) in Diffusing, Commoditing Markets	. 659
Figure 363: Conceptual Model Structure of a Single Firm Growth and Oscillation	. 660
Figure 364: Model Structure of a Single Firm Undamped Oscillation	. 661
Figure 365: Model Structure of the Goal-Setting Parametric Study	. 662
Figure 366: Dynamic Behavior of the Goal-Setting Parametric Study	. 663
Figure 367: Model Structure of the Productivity Parametric Study	. 664
Figure 368: Dynamic Behavior of the Productivity Parametric Study	. 665
Figure 369: Model Structure of a Single Firm Damped Oscillation	
Figure 370: Dynamic Behavior of Damping in an Oscillating System	
Figure 371: Model Structure of a Single Firm Growth and Oscillation	
Figure 372: Comparing Damping in Firm Growth with Oscillation	
Figure 373: Conceptual Model of Market Diffusion and Obsolescence	
Figure 374: Market Diffusion & (Three-loop) Diffustion-Obsolescence	
Figure 375: Parametric Analysis comparing Diffusion and Substitution Rates	
Figure 376: Market Diffusion & (Four-loop) Diffustion-Obsolescence	
Figure 377: Parametric Analysis comparing Diffusion and Substitution Rates	
Figure 378: Market Diffusion & (Four-loop) Diffustion-Obsolescence	
Figure 379: Parametric Analysis comparing Diffusion and Substitution Rates	
Figure 380: Summary of Model Structures of Market Diffusion and Obsolescence	
Figure 381: Dynamic Behaviors of Market Diffusion and Obsolescence	. 678

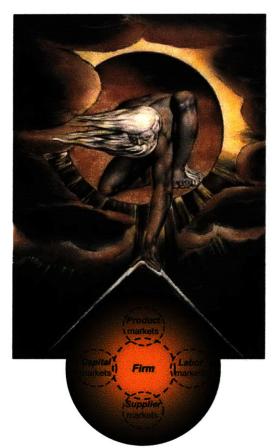
Figure 382: Global Carrying Capacity into which Global Technologies Diffuse	679
Figure 383: Full Model Structure of Inter-species Competition in a Diffusing, Commo	oditizing
Market (with Supply-Demand Lags)	
Figure 384: Summary of the Theoretical Framework as Evolutionary Ecology	681
Figure 385: Summary of Theoretical Framework in Quantitiy and Quality Space	
Figure 386: Theoretical Framework in Quantity Space	
Figure 387: Theoretical Framework in <i>Quality</i> Space	
Figure 388: Growth Phase of the Industry-Firm Evolution	
Figure 389: Maturity Phase of the Industry-Firm Evolution	
Figure 390: The Two-Phase Framework as a "Double Helix"	
Figure 391: Conceptualization of the Two-Phase Framework as a "Double Helix"	687
Figure 392: Future Empirical Case Studies	691
Figure 393: Toward a Theory of the Evolution of <i>Research</i> Ecosystems	
Figure 394: Resolving the Central Debates	
Figure 395: Framework Summary and Contributions to the Literatures	
Figure 396: Sources of Firm Profitability: Empirical Studies	

List of Tables

Table 1: Summary of Research Sample	65
Table 2: Summary of Organizational and Economics-based Typologies	71
Table 3: Sample Qualitative Data Indicating Architectural Forms	75
Table 4: Sample Qualitative Data Supporting Proposition 1a	78
Table 5: Summary of Data Supporting Proposition 1a	82
Table 6: Sample Qualitative Data Supporting Proposition 1b	84
Table 7: Terminology Comparision in Economics and Sociology	156
Table 8: Terminologies for Economic Firm Types	345
Table 9: Contrasting Managerial Styles: Theory X & Theory Y	361
Table 10: Contingency Theory Research Summary	365
Table 11: Mechanistic and Organic Organizational Archetypes (Burns & Stalker)	367
Table 12: Inter-Industry Differentiation and Integration Comparison	369
Table 13: Research on Modularity in Organizations	393
Table 14: Comparing Agency and Stewardship Theories	415
Table 15: Two Systems of Workplace Industrial Relations	417
Table 16: HR Practices in Configurations	417
Table 17: Strategy-HRM Fit	449
Table 18: Configuration Attributes	449
Table 19: Chronological Research in Dominant Designs	521
Table 20: Most Influential Research (of the 50 most influential publications in Strategy)	748
Table 21: Empirical Bases (of the 50 most influential publications in Strategy)	749
Table 22: Literature Review of Mixed Duopoly Economics	750
Table 23: Literature Review of System Dynamics Modeling of Firm Competition	751
Table 24: Selected Sample of Qualitative Data for Discourse & Textual Analysis	769

Executive Summary

Intelligent Design:



Architecting World-class Enterprises and Evolving Business Ecosystems

As industries evolve, so do winning strategies, successful organizational forms and effective leadership styles.

Having the knowledge of "what, when and how" - coupled with the courage to act on this knowledge is key to generating and sustaining world-class performance.

⁵ Image: "The Ancient of Days (God as an Architect)" by William Blake, 1794.

Architecting World-class Enterprises

Recently, the business world has experienced a global downturn, the likes of which hasn't been seen in living memory. We have witnessed some of the world's most powerful incumbents like *General Motors, United Airlines* and even *Boeing* struggle to successfully launch new products and services, access capital reliably, manage global supply chains, avoid damaging labor strikes, maintain strong balance sheets and in some instances avoid bankruptcy.

In understanding these complex times, while the *devil* undoubtedly lies in the details, it is often enlightening to take a 100,000 ft. "god's-eye" view of our business ecosystems and how they are evolving. We propose an architectural view.

Shareholder vs. Stakeholder Focus

One common view of the objective of business firms is the maximization of shareholder value, where the residual cash flow is returned to the shareholders. This can be seen in many famous incumbent firms, who have built their respective industries, *General Motors* and *Ford* in the automotive industry, and *United Airlines* and *American Airlines* in the US Airline industry.

Toyota Motors and Southwest Airlines however appear to be maximizing a very different objective function, that of "stakeholder surplus", where the residual cash flows are shared among the firm's key stakeholders, and in the process, the firm's investors fare better than if their interests were pursued at the expense of the other stakeholders.

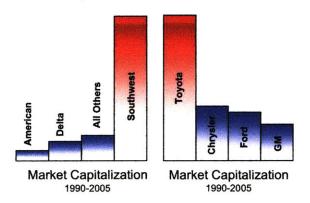
The extraordinarily high performance of these firms has been sustained for so long, that perhaps we are looking at a fundamentally different organizational species...

In diverse industries ranging from manufacturing to services, two world-class companies have monopolized the business press for decades now, holding numerous lessons for senior managers in recent decades: *Toyota Motors* and *Southwest Airways*. This article explores what the two firms have in common – what DNA are shared by this organizational "species"?

First and foremost, is how the "architects" (the senior leaders and leadership teams) of these world-class enterprises manage their environments, i.e. the things outside of their direct control or responsibility. How do they design their extended enterprise's objective function? How is power and wealth is created and shared? Examples of how the architects of these enterprises think and act are shown below:

"Under Japanese company law, shareholders are the owners of the corporation. But if corporations are run exclusively in the interests of shareholders, the business will be driven to pursue short-term profit at the expense of employment and spending on research and development. To be sustainable, corporations must nurture relationships with stakeholders such as suppliers, employees and the local community. So whatever the legal position, the corporation does not belong to its owners. It's not enough to serve shareholders." (Source: Mr. Okuda, Chairman, Toyota Motors; Financial Times, 1 August 2001).

"We can't let investors guide the company. That's not to say that investors aren't smart and don't have good ideas, because they do. They just have different motives. We've got to say true to who we are as a company and build for the long term." (Source: Gary Kelly, CEO, Southwest Airlines; The Dallas Morning News, 20 December 2007). As seen in the figure below, if those companies designed to maximize shareholder value are in fact delivering significantly less than those who are not trying to maximize that metric, then the question becomes, What on earth is going on here?



Such significant variance in the dependent variable would suggest that significant variance should reside in the explanation or the independent variable. In other words, the extraordinarily high performance of these firms has been sustained for so long, that perhaps we are looking at a fundamentally different organizational species - a fundamentally different enterprise architecture, which is better-suited to significantly different environmental conditions.

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On the Origin of Corporate Species

Darwin's work has stirred controversy 150 years ago that, surprisingly is alive today: the confrontation between God and Science...

Within businesses, a "generation" can be thought of as a firm's product or service offering, each new launch, a birth whereby some of the "genes" of the family are carried forward. In this way, the lifecycle of the organization may represent many generations, and a collection of such similar organizations represent a "species".

Modular & Integral Enterprise Architectures

As summarized in the diagram below, a typology of enterprise architectures – a continuum spanning two polar opposites – can be developed which form the basis the DNA of each species.

Objective functions range from the modular enterprise architecture's narrow maximization of shareholder value (competition between stakeholders) to the integral enterprise architecture's broader maximization of stakeholder surplus (cooperation among stakeholders).

In biology and business, morphology trumps physiology – i.e. species type is more important than health of the beast. A weak cactus will outlive a strong oak... in a desert.

Organizational theorists, called ecologists define "species" as the goals, boundaries and activities of an organization. Similarly architectural theorists define "forms" as objective functions, boundaries, and interfaces. The form or species provides a first-order explanation of performance. In biology and business, whether in organisms or organizations, morphology trumps physiology – i.e. species type trumps the health of the beast. A weak cactus will typically outlive a strong oak... in a desert.

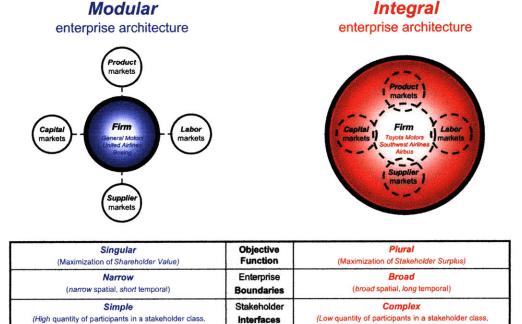
Architectures define how functions decomposed and divided among stakeholders. For simplicity we consider customers and suppliers (the value chain) and capital and labor (the factors of production).ⁱⁱ

Low quality of stakeholder relationships)

Boundaries define the extent of the stakeholder space and time horizon. Modular EAs have relatively narrow stakeholder interest and shorter time horizons. Integral EAs have relatively broad enterprise boundaries and longer time horizons.

Interfaces define the quantity and quality of the stakeholder relationships. Modular EAs have a large number of competing stakeholders in each class managed with short-term, arm's length contracts, while integral EAs have a small number of cooperating stakeholders in each class managed by long-term trust-based relationships. Modular EAs are therefore "positionally strong, while integral EAs are positionally weak.ⁱⁱⁱ

High quality of stakeholder relationships)



The Evolution of Business Ecosystems

Having defined a typology of enterprise architectural forms, we can now assemble a theory of how, why and when these forms grow and die. For this, we must describe the evolution of the environment, which puts pressure on enterprise architectures to either adapt to it, or to die under competitive pressures from new enterprise architectural forms – survival of the fittest, with "fit" crucially meaning in synch with what the environment demands, as opposed to "fit" meaning in good shape.

Inter-species Competition

But these two principles raise a perplexing puzzle for corporate leaders. If the ecosystem financially rewards dis-integration of the enterprise architecture in early part of an industry's evolution, but then rewards reintegration as the industry matures, is it easier for the incumbent to do this, or is it easier for a new integral enterprise architecture to be born? This is the crux of architectural leadership: the ability to adapt the boundaries of the enterprise architecture in stakeholder space and time horizons.

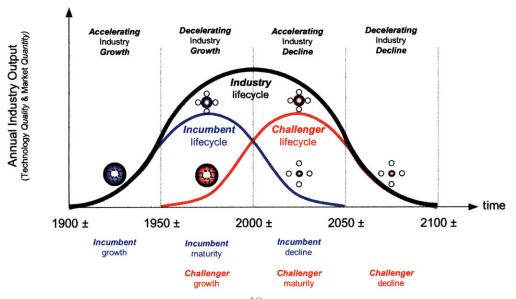
While enterprises seem to naturally disintegrate over time, reversing this process appears to require extraordinary (and extraordinarily rare) *architectural leadership*.

The environment and firm growth trajectories are characterized on two classical managerial dimensions: market growth rates (i.e. how much) and technology growth rates (i.e. what type). Many industries exhibit a classical S-shaped growth over time, with the annual rates of output therefore following a bell-shaped curve as shown below.^{iv}

Enterprise architectures early in the industry's evolution are integral, for radical *product* innovation. They then dis-integrate for speed to build a fast-growing market, and for greater cost-leadership and more modest product innovation. As the ecosystem begins to mature, integral enterprise architectures are required for radical *process* innovation.

The principle of *enterprise entropy* states that enterprise architectures tend to dis-integrate over time. The principle of *ecosystem dominance*, however states that winning enterprise architectures oscillate over the life-cycle of their industries from integral to modular and back to integral states. If such architectural leadership is in fact extraordinarily rare, then this raises the possibility for multiple species to occupy the same niche, incumbent firms having modular enterprise architectures, and late entrant challengers having integral enterprise architectures. Such competition between species is symbiotic, that is one species needs the other.

The market-making "r-strategists" are opportunists that attack markets with unlimited apparent growth potential. One the underlying growth opportunities begin to slow down, they are designed to exit that niche, leaving it to the market-taking "K-strategists", which are designed to thrive in environments with low resource availabilities. In the automotive and airline industries, GM & Ford, and American & United are market makers, while Toyota and Southwest are late entrant market makers.



Ironically, what works against competitors in one's own species, is precisely what doesn't work when competing against another species.

Evolution in the Airplane Ecosystem

Having described a theory of how business ecosystems evolve, we can now look at the empirical evidence in the ecosystem of commercial airplane design and manufacture – a rich dataset spanning 100 years of evolutionary data thus far, and including such famous r-strategists like *Douglas*, *Lockheed* and *Boeing*, who created and dominated the ecosystem for some half-century, before the emergence and eventual dominance over the subsequent half-century by the K-strategist, *Airbus* with its renewed integral form of enterprise architecture.

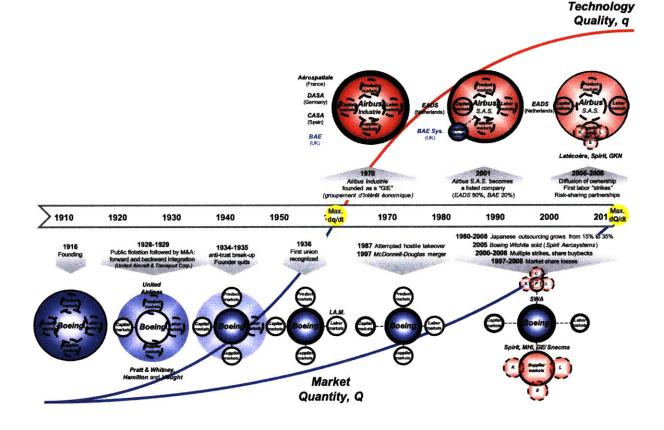
The Fossil Record

As can be seen in the diagram at the bottom, *Boeing* began its life, early in the industry's evolution as integral enterprise architecture – integral for radical product innovation. It then dis-integrated for speed to build a fast-growing market, and for greater cost-leadership and more modest product innovation. *Airbus* began its life late in the industry's evolution as an integral enterprise architecture – integral for radical process innovation. Both *Boeing* and *Airbus* are on similar trajectories, but *Airbus* is in a much less advanced state of dis-integration.

Boeing, the powerful racehorse, finds itself in a desert against Airbus, a fragile, young camel – but a camel nonetheless.

The ecosystem is now locked in an epic evolutionary battle between the strongest remaining survivor of the r-strategists (created from the merger of *Boeing* and *McDonnell Douglas*) and the only K-strategist, *Airbus*. This rare inter-species competition – a mixed duopoly – is one of the most fascinating and famous competitions in international business today. We will next examine the "fossil record" of each species to determine who was/is winning, how, when and why. *Boeing*, the powerful racehorse, finds itself in a desert against *Airbus*, a weak young camel – but a camel nonetheless. Recalling Collins' famous book, *Boeing* is evolving from "Good to Great"... to Gone.

Let us now turn our attention as business ecologists to the environment to see what types of forces have created and are destroying these enterprise architectural forms – these species.



Ecosystem Maturity: Quality

We characterize the maturity of the ecosystem using two dimensions: the rate of change of technology and the rate of change in market size. In other words we are interested in what is being demanded – the type or *quality* of goods and services, and how much is being demanded – the *quantity* of goods and services. Both dimensions have limits to growth in supply and demand. We begin by briefly exploring the maturity of the ecosystem in terms of technology quality.

Airplane Ecosystem Maturity: Quality

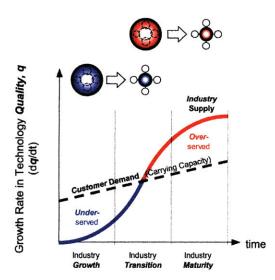
In order to illustrate ecosystem maturity in quality space, we turn briefly to the large commercial airplane industry.

As can be seen in the figures below, the number of major companies competing in this space appears to have risen gradually over the first fifty years of evolution, followed by a gradual fall of companies from this space either through exit or consolidation.^{vi}

"Once the dominant design emerges, the basis of competition changes radically, and firms are put to the test that very few will pass."

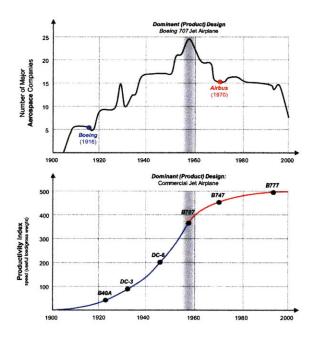
Researchers of the evolution of technological innovation have noted that significant technological events – called "dominant designs" can mark significant transformation of the competitive environment. James Utterback noted, "once the dominant design emerges, the basis of competition changes radically, and firms are put to the test that very few will pass."

Prior to the dominant product design, the environment is characterized by radical product innovation, with firms competing to establish a standard product, and for customers to accept this as the benchmark. Christensen referred to this as "under-served" markets. After the establishment of the dominant product design, the environment is characterized by incremental product innovation and the opportunity for radical process innovation, with firms competing to win customers on a quality, cost and delivery basis, as opposed to increasing product performance. Christensen referred to this as "overserved" markets with the conditions ripe for the emergence of a disruptive innovation.



As can also be seen in the figure at the bottom, the transition from firm proliferation towards consolidation occurred in the late 1950s at the emergence of the dominant design: the jet airplane.vii Prior to its arrival marked a period of significant uncertainty, experimentation and radical product innovation. After its arrival marked a period of diminishing returns from radical product innovation as technological saturation began to occur in terms of higher (40,000 ft cruising altitude), faster (just below the sound barrier) and farther (half-way around the world).

The basis of competition gradually switched from "higher, faster, farther" to "better, faster, cheaper" which is dominated by radical process innovation, best enabled by integral enterprise architectures – the same which launched the industry 50 years earlier, but this time focused on a radically different objective.



Ecosystem Maturity: Quantity

Having defined the first dimension of an ecosystem's maturity, the rate of change of technological growth – *quantity* space, we now turn to the complementary dimension of the rate of change of market growth – *quality* space.

Airplane Ecosystem Maturity: Quantity

One measure of the maturity of the global commercial airplane industry is to observe the maturity of its customers, the annual global airline industry's available seat kilometers (ASKs).

"Perhaps the most ubiquitous force leading to structural change is a change in the long-run industry growth rate."

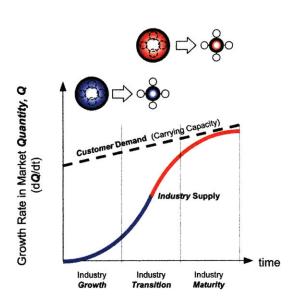
In Michael Porter's seminal book, *Competitive Strategy*, he noted: "Perhaps the most ubiquitous force leading to structural change is a change in the long-run industry growth rate."^{vuii}

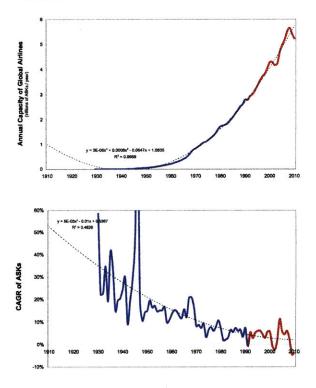
As all ecosystems have limits to growth or "carrying capacities", one would expect the rates of change of growth to begin to diminish. The carrying capacities could be defined by the penetration of an innovation into a constant population, or in addition it could capture the slowing of the growth of the population size representing the total market.

As can be seen in the figure below, the rates of change of environmental growth can impact the types of enterprise architectures which thrive in environments of rapid or slow growth. As can be seen in the figure below, global annual ASKs have grown exponentially since the industry began in the 1920's.

As the world's population is beginning to saturate, with ultimate size of around 10 billion people occurring between 2050 and 2100, one would expect this to impact the amount of air travel. Early indications are that this long-term rate of growth has started to inflect and will continue to grow, but at increasingly slower rates.

The implication of this slowing underlying growth rates is to continue to favor those enterprise architectures which are built to grow in environments that aren't. This will be discussed in the following sections.





Firm Strategies: Quality

While the "ecosystem" defines the broad industry where competition is taking place (e.g. automobiles, airlines, airplanes), "niches" define where these species chose to live and compete. In market strategy space this can be thought of as Michael Porter's generic strategies of differentiation and costleadership. We refer to these distinctions as either "Higher, Faster, Farther" (which refer to competition based on product performance) and "Better, Faster, Cheaper" (which refer to competition on the basis of quality, delivery and cost).

Differentiation vs. Cost-Leadership

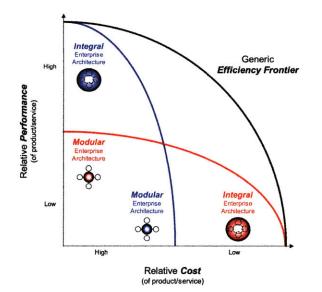
We now briefly look at the long-term trajectories of market strategies of each pair of species in our three ecosystems. As shown in the figure below, the respective incumbents *General Motors*, *United Airlines* and *Boeing* initially gained their dominance via *product* innovation which moved them initially from differentiation (enabled by an integral enterprise architecture) towards cost-leadership strategies (enabled by a modular enterprise architecture), which later constrained their ability for cost-leaderhip.

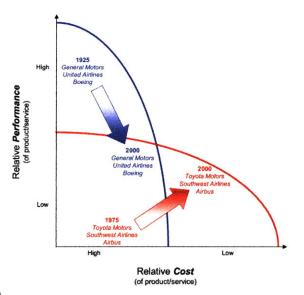
Enterprise architectures enable and constrain strategy. Integral EAs confer exploration advantages, while Modular EAs confer exploitation advantages.

As Porter popularized in his 1996 HBR article, firms have an *efficiency frontier* which conceptually demonstrates a tradeoff between the generic strategies of differentiation and cost-leadership.^{ix} What our research demonstrates is that a) enterprise architectures both enable and constrain choice of generic strategies, and b) each enterprise architecture has a skewed efficiency frontier which can bias its strategic choice.

As shown in the figure below, integral enterprise architectures confer *exploration* advantages in radical innovation of both products and processes, via patient capital investing in long-term physical or human capital, with rapid and frequent feedback between customers and suppliers. Modular enterprise architectures on the other hand confer *exploitation* advantages via impatient capital driving faster shortterm decisions, functional-specialization and marketbased competition between and among stakeholders. Conversely, the late-entrant challengers *Toyota Motors, Southwest Airlines*, and *Airbus* initiated their dominance competing in mass markets as costleaders via *process* innovation enabled by integral enterprise architectures. Examples from the early decades of each late-entrant include *Toyota's* cheap cars, *Southwest's* cheap seats, and *Airbus'* short-haul, high-volume airplanes. Over time, their enterprise architectures are disintegrating, enabling them to move from mass markets of cost-leadership into fragmented niches of differentiation. Examples of these new niches might include *Toyota's* Lexus, and *Airbus'* long-haul, low-volume A380 superjumbo.

Today, all the companies in our sample find themselves in maturing, commoditizing mass markets, and with the late entrants out-competing their powerful incumbents in the cost-leadership space, as their architectures enable them to do so.





Firm Strategies: Quantity

The level of vision or myopia appears to be a function of the enterprise architecture. That is, the more patient the capital, the more long-term the trust-based partnerships, the more complex the stakeholder tradeoffs, the slower the short-term speed, but the faster the long-term speed of integral enterprise architectures, like *Toyota, Southwest* and *Airbus*. Conversely, the less patient the capital, the more short-term and contractual the relationships, the more simple the inter-stakeholder objective function, the faster the short-term speed, but the slower the long-term speed of the modular enterprise architectures, like *GM*, *United* and *Boeing*. This is a classic "tortoise-hare" story, where the race does not always go to the swiftest.

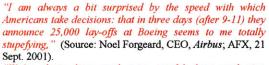
The Tortoise and The Hare

"Boeing quickly moved last week to cut commercial transport delivery in an announcement that surprised even some veteran Boeing-watchers by its swiftness and scope. At a hastily arranged news conference Sept. 18, one week after the terrorist attacks in the U.S., the company said it could also lay off up to nearly one-third of its commercial aircraft workforce. Alan R. Mulally, Boeing president and CEO of Boeing Commercial Airplanes, said When you order airplanes today, the lead time is anywhere from 10-14 months, so we need to make these decisions for production next year as soon as possible." (Source: Alan Mulally, President & CEO, Boeing Commercial Airplanes; Aviation Week, 24 Sept. 2001).

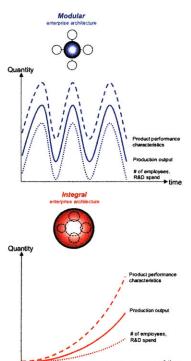
"History tells us that the quicker a company acts to counter adverse economic conditions, the better able it will be to work its way through a downturn and emerge stronger when the economy recovers." (Source: Jim McNerney, Chairman, President & CEO, The Boeing Company; memo to employees, 17 Feb. 2009).

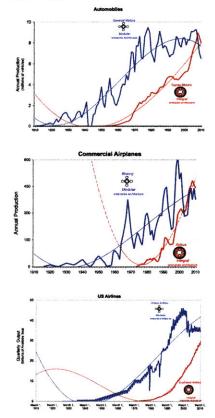
Modular enterprise architectures are built for *short-term* speed, while integral enterprise architectures are built for *long-term* speed. *This is a classic tortoise-hare story.*

Modular enterprise architectures, therefore create or amplify the instabilities that they are designed to serve - i.e. the boom-and-bust "business cycle". Integral enterprise architectures, on the other hand create or dampen the stabilities that they are designed to serve - i.e. *Toyota, Southwest* and *Airbus* do not see such a severe cycle. The principle of *optimum speed* states that in maturing environments, the optimum rate of growth is much slower than the maximum possible as summarized below.



"We've always been much more careful about production rates. We do see peaks and troughs but we've always managed to limit the highs and lows better than they do in the USA." (Source: Philippe Camus, EADS Co-Chairman; ATT, 20 Sept. 2001).





Financial Performance: Revenues

Corporate value – or at least expected value – comes from a company's ability to grow its top-line revenues, and ultimately convert this into bottom-line profits. The data seem to suggest that early entrant modular and late entrant integral enterprise architectures grow in different ways in different stages of an industry's life-cycle and therefore focus on different sides of this income statement equation.

Modular enterprise architectures, those which launch and exploit industries, attract investors who value top-line revenue growth potential. The conversion of this into bottom-line profits is taken as an article of faith.

Financial Performance: Profits

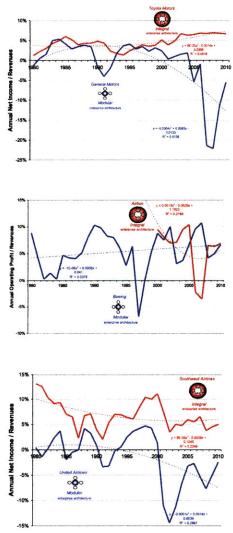
Conversely, where *growth* investors favor industries with inherently rapid top-line revenue growth, *value* investors tend to be more impressed with the conversion of top-line growth into bottom-line profits. This emphasis tends to be more prevalent in industries where top-line growth has diminished and focus has shifted towards companies that can grow profits in environments that aren't growing.

Integral enterprise architectures, those which overtake incumbents, attract investors who value bottom-line profit growth. Top line growth occurs inadvertently, as these companies take market share from incumbent modular enterprise architectures.

Modular enterprise architectures are focused on *top-line revenue growth*, while integral enterprise architectures are focused on *bottom-line profit growth*.

Agency Theory posits that the separation of ownership from management creates the principalagent problem, in which the managerial agents are incentivized to grow the top-line revenues, while the investors would prefer the growth of bottom-line profits.

As seen in the figures to the right, we combine the top –line and bottom-line revenues into a profitability or return on sales metric. Over the last 30 years, in industries that are in a maturing state, it appears that late entrant integral enterprise architectures are exhibiting profit margins that are not only higher than those in incumbent modular enterprise architectures, but their trajectories are increasing over time, while those of the modular enterprise architectures are falling.



The Power of Architecture

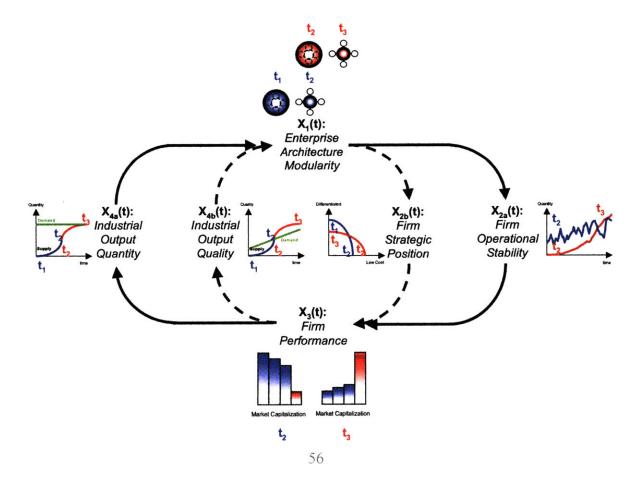
Let us now summarize the journey that we have been on. In order to explain the sources of long-term firm performance, we traced two concurrent causal loops in technology (quality) and market (quantity) space, through the macro-organizational architectural form, function and fit with the environment. These processes arise in the study of organisms as well as organizations: morphology and physiology and ecology – the definitions of species. The power of architecture is summarized in the figure below.

The Architecture of Power

What makes the design, operation and evolution of organizations many of orders of magnitude more complex than that of organisms, is that the functional "modules" of organisms (e.g. heart, brain, etc.) tend not to have different goals and objectives from the whole organism. The same is not necessarily true with macro-organizations or extended enterprises, where investors, unions, customers and suppliers can and often do have conflicting goals and objectives from that of the enterprise.

"The business firm is a political coalition and the executive is a political broker. The composition and goals are not given, they are negotiated and bargained."

The architecture of the extended enterprise is one of the most powerful concepts in determining long-term firm performance as it both enables and constrains choice of strategic position as well as growth rates. The entrepreneurial architect can seek to radically transform the environment by launching the next discontinuous innovations via integrality. S/he can dis-integrate the architecture to exploit the market growth, or s/he can either attempt to re-integrate the architecture to fit with the demands of a maturing ecosystem, or establish a new integral architecture. Many years ago, organizational theorist James March developed a theory of the firm as a political coalition, in which "The business firm is a political coalition, and the executive is a political broker. The composition of the firm is not given; it is negotiated. The goals of the firm is not given; they are bargained. Political scientist Robert Dahl defined "power" as "the ability to get things done when goals conflict". From these power and political perspectives, we begin to see the secrets of successful enterprise architecting, which we will summarize next.



Design Intelligence: Knowledge & Courage

The nervous system of the organization appears to be distributed vertically throughout the hierarchy as well horizontally throughout the extended enterprise like the nervous system of an organism. Within the macro-organizational "brain" lies the development and dissemination of system-level *knowledge* and *courage* – design intelligence. We must first learn the right things to do (before we can do things right), but often the bottleneck is having the courage to do what we have learned is the right thing to do.

Evolution by Intelligent Design

So which is it that drives the evolution of business ecosystems - Intelligent Design or Evolution by natural selection? Visionary and courageous architects create both the enterprises and the environment that their business will operate in. Both these will enable and later constrain what future leaders can do. After creating the environment, subsequent architects can match the environment's demands by disintegrating their enterprises. Further reintegration of the incumbents has (thus far) proven elusive, providing a new opportunity for new visionary and courageous architects to re-set the evolutionary clock back to integrality.

In the Intelligent Design vs. Evolution debate,

System-level *knowledge*, what do each set of stakeholders want? What is the optimum balanced tradeoff to maximize the enterprise's value over the time horizon that I am interested in. This is a raw intelligence exercise, both at the top and distributed vertically and horizontally.

System-level *courage*, how do I enact this decision? This is an emotional intelligence exercise, both at the top and distributed vertically and horizontally.

For *Southwest Airlines*, the source of integrality may be/have been it pull from the center by CEO Herb Kelleher. For *Airbus*, it may be pushed together from the outside social forces. For *Toyota*, it might be both push and pull.

Architectural Leadership Lessons:

From this research, we have seen that architectural leadership has the following characteristics:

- Architectural Leadership is a political process of making complex trade-offs with "external" stakeholders.
- It requires extremely high levels of intelligence or personal knowledge of the ecosystem and emotional intelligence to develop long-term, trust-based relationships, and the courage to enact complex decisions.
- This knowledge and courage, while often developed at an early age, is in fact strengthened via enterprise crucibles, in which key leaders of one's enterprise develop shared knowledge and courage together over time.

It appears therefore, that in the Intelligent Design vs. Evolution debate, dominant organizational species evolve through the intelligent design of their extended enterprises. *Variation* is not entirely random, and the *selection* forces directing such evolution are not supernatural. Instead such architectural direction is often superhuman, notwithstanding the fact that even the most powerful business "gods" appear to have their limits.

This research is "agnostic" over which enterprise architecture is better – there is no one best way that excels in all situations. Like evolution, it merely states that the state of the environment defines which "leadership genes" will be selected and which "organizational species" will dominate.

ⁱ This article is based primarily on the finding s of a seven year international research project. See Theodore F. Piepenbrock, *"Toward a Theory of the Evolution of Business Ecosystems"*, MIT PhD Dissertation, 2009.

ⁱⁱ This is a development of the theory presented in Charlie H. Fine's *Clockspeed: Winning Industry Control in the Age of Temporary Advantage*, 1998, Perseus Books.

ⁱⁱⁱ This is according to classic organizational economic theory, like Porter's Five Forces framework.

¹⁷ Michael Porter noted: "The grandfather of concepts for predicting the probable course of industry evolution is the familiar life-cycle." See Michael E. Porter, *Competitive Strategy*, 1980 The Free Press: New York, pg. 157.

^v James M. Utterback, Mastering the Dynamics of Innovation, 1994, HBS Press, pg. 24.

^{vi} See Murman et al. Lean Enterprise Value, 2002.

^{vii} See McMasters and Cummings, "Airplane Design - Past, Present and Future." *Journal of Aircraft*, Vol. 39. 2002

^{viii} See Michael E. Porter, *Competitive Strategy*, 1980, The Free Press: New York, pg. 164.

^{ix} See Michael E. Porter, "What is Strategy?" Harvard Business Review, November-December, 1996, pp. 61-78.

Expanded Executive Summary

Toward a Theory of the Evolution of Business Ecosystems: Enterprise Architectures, Competitive Dynamics, Firm Performance and Industrial Co-Evolution

Theodore F. Piepenbrock MIT, Engineering Systems Division

ABSTRACT

This paper contributes toward the building of a theory of the evolution of business ecosystems. In the process, it addresses a question that has been posed by evolutionary theorists in the economics and sociology literatures for decades: "Why do firms in the same industry vary *systematically* in performance *over time*?" Seeking a *systematic* explanation of a *longitudinal* phenomenon inevitably requires characterizing the evolution of the industrial ecosystem, as both the organization (firm) and its environment (industry, markets and institutions) are co-evolving. This question is therefore explored via a theoretical sample in three industrial ecosystems covering manufacturing and service sectors, with competitors from the US, Europe and Japan: commercial airplanes, motor vehicles and airlines. The research is based primarily on an in-depth seven-year, multi-level, multi-method, field-based case study of both firms in the large commercial airplanes industry *mixed* duopoly as well as the key stakeholders in their extended enterprises (i.e. customers, suppliers, investors and employees). This field work is supplemented with historical comparative analysis in all three industries, as well as nonlinear dynamic simulation models developed to capture the essential mechanisms governing the evolution of business ecosystems.

A theoretical framework is developed which endogenously traces the co-evolution of firms and their industrial environments using their highest-level system properties of *form, function* and *fitness* (as reflected in the system sciences of *morphology, physiology* and *ecology*), and which embraces the evolutionary processes of *variation, selection* and *retention*. The framework captures the path-dependent evolution of heterogeneous populations of enterprise architectures engaged in *symbiotic inter-species competition* and posits the evolution of *dominant designs* in enterprise architectures that oscillate deterministically and chaotically between *modular* and *integral* states throughout an industry's life-cycle. Architectural innovation – at the extended enterprise level – is demonstrated to contribute to the failure of established firms, with causal mechanisms developed to explain tipping points.

This research lies at the intersection of the intellectual domains of strategic management, organization science and complex systems theory. It aims to contribute to fundamental debates in these fields regarding the sources of superior long-term performance. Specifically, do the sources reside within the firm or in the firm's environment (i.e. industry structure)? What are the roles of managerial adaptation and environmental selection in the creation and sustainment of such performance? Furthermore, how does this shape our understanding of strategic leadership? Our empirical findings suggest that sources of superior firm performance lie neither exclusively within the firm, nor in its industrial environment, but in *how* the firm interacts with its environment – i.e. in the network *architecture* of the firm's extended enterprise. It appears that these enterprise architectures, which both enable and constrain managerial agency and adaptation through spatially and temporally bounded rationality, give rise to architectural inertia and the power of environmental selection. Finally, the data suggest that the qualities of strategic leadership, which maximize firm performance over the industry's evolution, are architectural: namely the definition and maintenance of enterprise objective functions, boundaries and interfaces.

INTRODUCTION

Research Question

At its most fundamental level, this paper addresses the following question that has been posed directly and indirectly by evolutionary theorists in both the economics (Nelson, 1991) and sociology (e.g. Hannan & Freeman, 1977; Carroll, 1993) literatures:

"Why do firms in the same industry vary systematically in performance over time?"

Although it is typical that the unit of analysis is the firm and the dependent variable is long-term performance, addressing this question more subtly requires a *systematic* explanation of *longitudinal* phenomena, which inevitably requires characterizing the evolution of the business ecosystem, as both firm and industry are co-evolving.⁶

Early in our research, intriguing empirical data began to be revealed: as firms and industries co-evolved, the dominant form of the firm's objective function and its resulting interaction with its environment appeared to change. This manifested itself in the counter-intuitive observation that firms which were not focused on exclusively maximizing shareholder value, were in fact delivering significantly more of it than firms who focused exclusively on maximizing it. This result appeared in a variety of industries ranging from manufacturing to services. The exploration of why, when and how this phenomenon happens became a driving impetus of the research. Thus a second question emerged which appears to lie at the heart of the first question which was originally posed fifty years ago by Edith Penrose (1959):

"How do firms that have a *stakeholder* approach differ in competitiveness from firms that maximize *stockholder* wealth?"

Proposed Theoretical Framework

Most research implicitly assumes that competing firms are of the same species, and thus focus on secondorder *efficiency*-based explanations. We propose an alternative first-order *effectiveness*-based explanation, namely that where significant sustained long-term variance in performance between firms exists (e.g. *Toyota Motors* vs. *General Motors*, or *Southwest Airlines* vs. *United Airlines*) it is more productive to classify such competition as *inter-species*. We therefore characterize a late-entrant "challenger" species of organization (driven to maximize *stakeholder surplus*) which has evolved to systematically out-compete over the long term, the traditional "incumbent" species (driven to maximize *shareholder value*).⁷

We will argue that firms adopting different objective functions, will have different enterprise architectural forms (Hannan and Freeman, 1977), and will present a typology of isomorphic (DiMaggio and Powell, 1983) organizational sets ranging from integral to modular enterprise architectures, and having different levels of fit with their environment (Lawrence and Lorsch, 1967). In addition, the greater the variance in architectural forms, the greater the potential variance in long-term firm performance, contingent upon the demands and opportunities provided by the competitive environment of the enterprise's ecosystem.

⁶ Wiggins & Ruefli (2002) empirically explore the sustainability of competitive advantage using a rare longitudinal sample comprising 6,772 firms in 40 industries over 25 years, demonstrating just how rare the phenomenon is.
⁷ Note: in order to assist the reader to easily and rapidly identify the various "species" throughout this paper, we highlight in blue, the early-entrant incumbent species and in red, the late-entrant challenger species.

LITERATURE REVIEW

Situating within the Literatures

While significant research has been undertaken to understand how firms compete and (separately) how environments evolve, little theoretical work has been undertaken to understand how organizations and environments interact and co-evolve, and even less empirical work exists to begin to ground such theoretical studies. In the following, we briefly summarize three broad literatures, situating our potential contribution within them.

Strategic Management. Research on competition between firms is mature, and captures a rich debate which spans exogenous industry-level explanations for firm performance (Mason, 1939; Bain, 1956; Porter, 1980 and 1985), as well as endogenous firm-level explanations (Penrose, 1959, Wernerfelt, 1984) known as the resource-based view.⁸ Relatively little work has been done to begin to endogenize the environment in order to provide a higher-level of analysis – that of competition between organizational sets (i.e. extended enterprises), and the resulting evolution of organizational fields (i.e. ecosystems) as shown in Figure 1 below. Importantly, this analysis of "how" the firm engages the environment begins to re-ingtegrate strategy *process* and strategy *content* schools (Petttigrew, 1992).

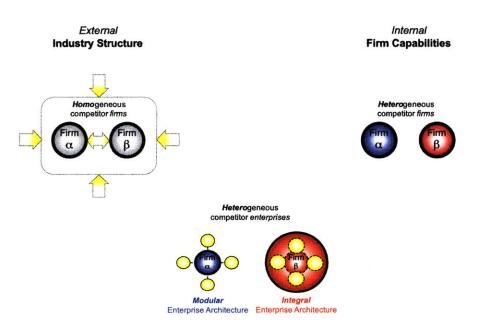


Figure 1: Contributing to the Debate in Strategic Management

The industrial organization literature characterizes the firm's environment as a locus of competition or "extended rivalry" (Porter, 1980), with the objective function of the firm being profit-maximization, usually for maximizing the objective function of one specific stakeholder: the shareholders, resulting in a zero-sum competition within the organizational set. Conversely, relatively little work has been done to characterize other forms of organizational set, where the objective function is a more plural maximization of stakeholder surplus (Freeman, 1984) and the interaction between the two in *mixed duopoly* (e.g. Lambertini & Rossini, 1998). The *strategic complementarities* literatures in economics and political science (e.g. Milgrom & Roberts, 1990 and 1995; Hall & Soskice, 2001) have produced the basis from which to build empirically.

⁸ We also aim to integrate the heretofore opposed literatures from organizational economics (e.g. transaction costs, agency theory, property rights and information economics) and organizational capabilities.

Organization Science. Within the broad field of open systems organization science, the past 30 years has seen the emergence and maturing of four major "schools" under the rubric of "organizations and environments" (Scott, 2003): organizational ecology (Hannan and Freeman, 1977 and 1984), neoinstitutionalism (Meyer and Rowan, 1977; DiMaggio and Powell, 1983; Uzzi, 1997), resource dependence (Pfeffer and Salancik, 1978) and transaction cost economics (Williamson, 1975 and 1985). While these schools tend to address the limitations inherent in the strategic management literature – namely exogenous treatment of the environment – each has its limitations in endogenizing the environment. Organizational ecology and neo-institutionalism tend to focus on populations of isomorphic organizational set; transaction cost economics tends to focus on efficiency as the primary driving mechanism defining firm boundaries. This paper attempts to address these limitations, namely: heterogeneous populations, competing dynamically, with effectiveness (not efficiency) being the governing performance mechanism (Brittain and Freeman, 1980; Brittain, 1994).

Finally, the theory that contributed significantly to the development of the aforementioned four schools over 40 years ago, *structural* contingency theory (Burns and Stalker, 1961; Lawrence and Lorsch, 1967; Thompson, 1967) proposed a similar framework to the *ecological* contingency theory presented herein with two noteworthy differences. First, their *intra*-organizational characterization of the processes of differentiation and integration has similarities to architectural modularity and integrality presented herein, but now with *inter*-organizational focus. Second, their contingency theoretic framework was essentially expressed as *variance* theory, with the environmental variable expressed as a moderator variable, and no explicit mediator variable. This paper attempts to build from Lawrence and Lorsch's (1967) classic by 1) moving from firm to organizational set as the unit of analysis, and in doing so, 2) endogenize the macro-level of the organizational set and included as mediator variables covering strategic and operations choices. The differences between the variance-based *structural* contingency theory and the proposed process-based *ecological* contingency theory are summarized in Figure 2 below.

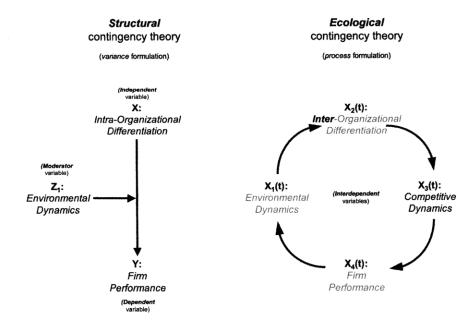


Figure 2: Comparing Structural Contingency Theory with Ecological Contingency Theory

Complex Systems Theory. While the two literatures mentioned above, each focus on organizational systems, the complex systems literature concentrates on the abstract principles governing general systems ranging from physical, to biological, to organizational. While general systems theory is a broad and mature literature (Von Bertalanffy, 1950 and 1962), we aim to focus this discussion on three primary threads of system science: system architecture, system dynamics, and ecosystem dynamics which theorize about complexity.

System architecture has its roots in managing *functional* complexity (Simon, 1962; Alexander 1964; Rechtin, 2000). It has impacted various socio-technical domains, including: product design (Ulrich, 1995) and more recently in *intra*-organization design (Anderson and Tushman, 1990; Henderson and Clark, 1990) and *inter*-organization design (Langlois, 1988; Sanchez and Mahoney, 1996; Fine, 1998; Schilling, 2000; Sako, 2003; Aoki and Jackson, 2008). While much of this work focuses on supply chain design, little of it focuses explicitly and more broadly on the architecture of entire organizational sets. This literature would therefore be an example of *progressive* intertextual coherence (Locke and Golden-Biddle, 1997).

System dynamics has its roots in defining and managing *dynamic* complexity in social systems (Forrester, 1961; Sterman, 2000), that is, where cause and effect are distant in space and time. Although it has been applied to various complex organizational settings (Forrester, 1958; Hall, 1976; Morecroft, 1985; Sastry, 1997; Repenning, 2002), it has only occasionally been used to explain how the competitive dynamics among firms interacts with the industry's evolution. Where such studies have been made (Paich and Sterman, 1993), inter-firm competition occurs between homogeneous enterprise architectures. System dynamics has yet to be combined with system architecture to develop a theory of how functional and dynamic complexity evolve in organizational settings. Again, this literature would be another example of *progressive* intertextual coherence.

Ecosystem dynamics has its roots in defining *competitive* complexity. While population growth models have a long history (Verhulst, 1938), and simple intra-species competition models have been proposed (Lotka, 1925; Volterra, 1931; Hannan and Freeman, 1977), only more recently have inter-species typologies been proposed in biology (MacArthur and Wilson, 1967) and subsequently in sociology (Brittain and Freeman, 1980). The science of ecosystem dynamics has yet to develop significant theoretical and empirical research on inter-species competition. Again, this literature would be another example of *progressive* intertextual coherence.

Problematizing the Literatures

Having situated this paper within the extant literatures, we would like to now note where this paper departs and where possible contributions may lie.

Incomplete. From the above discussion of a variety of literatures interested in explaining the dependent variable of organizational performance, it is clear that the literatures, while mature, are *incomplete*. A gap exists regarding how competition occurs at the organizational set level and how these co-evolve with the organizational fields within which they are embedded.

Inadequate. The extant literatures have not adequately addressed the question, by underemphasizing the role that complexity (functional, dynamic, behavioral, and competitive) plays in understanding the evolution of business ecosystems. System architecture and ecosystem dynamics serve as a set of organizing principles which characterize the evolution of a spectrum of system forms, functions and environmental fit.

Incommensurate. Finally, because these extant literatures have gaps that have not been filled, or have been filled with inadequate literatures, there are rare but noteworthy cases where the extant theories can

result in misleading characterizations of competition and industry evolution. Examples of such counterintuitive insights, which go against the received conventional wisdom - discussed later in this paper - are briefly summarized.

In the strategic management literature's industry structure school (Porter, 1980), the treatment of members of one's organizational set as "extended rivals", may not under certain conditions result in maximization of profits to the focal firm. Likewise, the objective function that seeks to maximize shareholder value, may not under certain conditions achieve its aim. Conversely, the objective function that seeks to maximize stakeholder surplus, may under certain circumstances achieve more shareholder value than firms who are expressly trying to maximize this metric.

In the organizational ecology literature (Hannan and Freeman, 1977), which assumes homogenous *intra*-species competition, late entrants exhibit higher mortality rates than early entrants. However, when competition involves heterogeneous *inter*-species competition, late entrants not only survive, they can end up dominating the industry.⁹

Contribution to the Literatures

Although the fields of strategic management and organization science, with their half-century old roots in economics and sociology are considered by many to be mature, there is clearly an opportunity to integrate prior streams of research from distant disciplines to produce a new framework in order to resolve its original unsolved debates of *internal* vs. *external* sources of firm performance and *adaptation* vs. *selection* processes of organizational change. A contribution might be made in bringing for the first time, a typology or configuration from the intellectual domains of system architecting and system dynamics (i.e. complexity science) formally and systematically to the study of organizations in order to explain their evolution, structure, function and performance.

Methodological Fit with the State of Literature

From this discussion of the extant literatures, it is clear that the strategic management field exists in a general state of maturity, particularly with respect to the establishment of *variance* theories that explain sources of competitive advantage and firm performance. Strong methodological fit exists, therefore with more quantitative methods to test and validate these existing theories (Edmondson and McManus, 2007).

However, as little empirical and theoretical research exists to describe *how* business ecosystems evolve, the state of the field with respect to *process* theory can be considered nascent. In this research environment, strong methodological fit exists for a more qualitative approach to the research design.¹⁰ In the following section, therefore we will describe the research methods that are designed to meet the challenges of this nascent literature.

⁹ Under the environmental conditions of industry maturity.

¹⁰ Edmondson and McManus (2007) note that the use of qualitative methods in a mature field represents an "offdiagonal" methods strategy, which may generate new opportunities for insights provided that a study's focus is reframed from the broad to the narrow. In this case, we are focusing from variance to process theory.

RESEARCH DESIGN

Empirical Sample

We build grounded theory from a comparative study of *inter*-species competition between pairs of firms possessing heterogeneous enterprise architectures¹¹ in three industries. The theoretical sample is summarized in Table 1 below.¹²

Sample Type	Research Methods	Sector	Industry	Focal Firm	Nat- ional Origin	Date of Birth	Current Enterprise Architecture	Firm Long-term Performance
Primary	Field-	Mfg. &	Large	Boeing	US	1916	Modular	Decreasing
	based case study	Services	Commercial Airplanes	Airbus	EU	1970	Integral	Increasing
Second-	Available	Mfg.	Automotive	GM	US	1908	Modular	Decreasing
ary	data analysis			Toyota	Japan	1937	Integral	Increasing
	-	Services	US Airlines	United	US	1926	Modular	Decreasing
				Southwest	US	1970	Integral	Increasing

Table 1: Summary of Research Sample

The theoretical sample was chosen to expose and explain variance in both the dependent variable (firm performance) and independent variable (enterprise architecture), while balancing the needs for generalizability and parsimony in this exploratory stage of grounded theory building. The cases succinctly demonstrate that the theoretical framework has the possibility of applying to industries ranging from manufacturing to services, and in socio-economic environments including the US, Japan and Europe. In addition, in order to gain and sustain access to executive-level informants of the competing firms in the primary sample, we used the secondary sample to stimulate action-learning via the exploration of acknowledged world-class firms in both manufacturing e.g. *Toyota Motors* (Womack, Jones and Roos, 1990) and services e.g. *Southwest Airlines* (Hoffer Gittell, 2003). This served as the basis of discussion around which the senior decision-makers of the primary sample revealed their cognitive frames regarding themselves and those of their competitor.¹³

Potential Limitations. This non-random, small-N, theoretical sample used for theory *building* necessarily draws critiques of theory *validation* using random, large-N, statistical sample. As we aim to build *process* (not *variance*) theory which links "dependent" and "independent" variables in endogenous closed-loop feedback, capturing longitudinal switching of high and low performers, we begin to mitigate the concerns of sampling on the dependent variable¹⁴ and survivorship bias.¹⁵

¹¹ Each firm is posited to be representative of a population of isomorphic organizational sets, giving the theoretical sample potential for increased external validity.

¹² This comparison of pairs of high- and low-performers in the same industries is similar to other theory building research in strategy *content* (e.g. Lawrence and Lorsch, 1967) and strategy *process* (e.g. Pettigrew and Whipp, 1990).

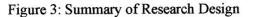
¹³ In order to protect the anonymity of the informants, evidence is reported based on generic enterprise architecture type, and not individual firm.

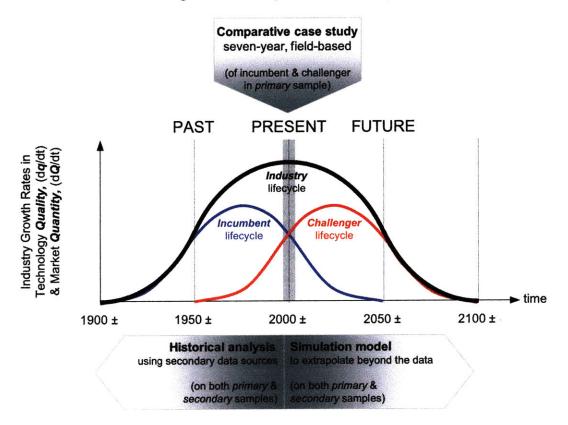
¹⁴ Where the criterion for selecting the sample of firms is based on the "dependent variable", firm performance.

¹⁵ Where the survivors are fallaciously compared with the historic average, despite having unusual properties.

Research Methods

As a theory of industrial evolution implies the study of a longitudinal or diachronic phenomenon, we employ a tripartite temporal logic to research methods: collecting and analyzing data from the past, present and projecting it into the future. The three methods used therefore are *historical comparative analysis, field-based case study* and *dynamic simulation model* as shown in Figure 3 and discussed below.¹⁶





Field-based Case Study. We build grounded theory (Glaser & Strauss, 1967; Eisenhardt, 1989) from an in-depth, seven-year, field-based case study of the primary sample, in which coding of observational, interview and archival data generated robust sets of constructs and propositions.

Historical Comparative Analysis. In order to verify and project the analysis of the above field-based case study back in time, analysis of past data followed methods of business history (Penrose, 1960; Chandler, 1962) using secondary data sources in both the primary and secondary samples.

Dynamic Simulation Model. In order to verify the historical analyses as well as project them forward in time, a dynamic simulation model (Davis, Eisenhardt and Bingham, 2007) was created to integrate the explicit causal structures and to explore the dynamic behavior generated by the model.¹⁷

¹⁶ While the three methods were used concurrently, data and analysis evolved from more qualitative to quantitative.

¹⁷ The purpose of this numerical simulation is not for quantitative calibration and prediction, but instead to gain qualitative understanding and insight into the posited governing "physics" of the underlying causal structures. This combination of case-based grounded theory and numerical simulation has been recently used in the management literature (Rudolph and Repenning, 2002) to induce theory both from data and other theories.

Data Collection

The data collection strategy utilized multiple methods and multiple sources as is briefly described in the following sections.

Primary Data Sources. For the primary case study, we constructed a macro-level model of the structure, function and evolution of the organizational set from the micro-level cognitive frames of senior decision makers within each stakeholder of the organizational set. These data came from over 100 senior level informants (e.g. CEOs, presidents, vice-presidents and directors) distributed both vertically within the organizations and horizontally across both organizational sets.

The field-based data for the primary sample are largely taken from over 3,500 hours of ethnography (Van Maanen, 1988) and clinical methods participant observation (Schein, 1987) spread longitudinally over seven years from January 2002 to January 2009. Three-month field visits occurred every summer for seven years, with additional two-week trips every winter and spring. This included over 150 in-depth, semi-structured interviews and interview-based surveys, totaling over 300 hours. My relationship to the informants in both organizational sets was as a doctoral student paid to teach strategy in executive education and workshop format to senior decision-makers.

This longitudinal design allowed for intensive triangulation of the data sources across endogenous and exogenous changes. For example, during the five years of the study informants occupied multiple positions and positions (such as CEO), were occupied by multiple informants. In addition, the longitudinal design allowed for observation of how the competing organizational sets responded to changing environmental conditions including the exogenous shock of the September 11, 2001 terrorist attacks, the normal rise and fall of the business cycle, as well as the change in market leadership, which for the first time shifted from the incumbent to the challenger during the time of this study.

Secondary Data Sources. In addition, in order to ascertain the structure, function and evolution of the organizational sets beyond the temporal scope of direct observation, access was acquired to historical available data sources, including public documents and official records (e.g. annual company reports and SEC filings), private documents (e.g. internal company memos) and mass media (e.g. historical interviews of leaders in the business press and trade journals). By way of example, in order to paint a historical record of the evolutionary trajectory of the firms in the primary sample, all of the annual company reports covering nearly 100 years of history, totaling over 3,500 pages were collected for analysis.

Data Smoothing for Trends. Finally, as this research aims to explain long-term trends (i.e. a "first-mode" *signal*), the transfer of data to theory requires a smoothing of short-term *noise*, manifested as local events.¹⁸ Such smoothing requires "empirical patience", which operationally implies a long data gestation time constant, before the stock of potential data, is drained by an outflow into the stock of theory-building data.

¹⁸ By analogy, in a theory of annual seasonal weather change (i.e. "due to the earth's tilt and its solar orbit, winter is colder than summer in the northern hemisphere") the fact that "noisy" daily temperature measurements might reveal local "inconsistencies" with the trend does not necessarily invalidate the theory.

THEORETICAL FRAMEWORK & EMPIRICAL EVIDENCE

Overview of Theoretical Framework

Definitions. Before specifying the unit of analysis and levels of analysis, we provide four definitions along the dimensions of competition-cooperation and substitutes-complements as continuous (not binary) variables. These definitions, given in both economics and sociology terminology, are summarized in Figure 4 below.

The type of *organization* under consideration is the *firm*, which is comprised of a collection of interacting internal functional organizations (e.g. marketing, R&D, manufacturing). These internal interactions tend toward the *cooperative* trading of *complementary* services.

The organizational *field* (DiMaggio and Powell, 1983) or *population* (Hannan and Freeman, 1977) or *industry* (Porter, 1980) is defined as an aggregate collection of externally interacting organizations or competing firms. These external interactions tend toward the *competitive* selling of *substitute* products and services.

The organizational *set* (Blau and Scott, 1962) or "extended *enterprise*" is defined as a focal firm and its key exchange actors (e.g. customers, suppliers, investors and employees). The set is therefore a collection of interacting internal functional organizations (or stakeholders). These internal interactions tend toward the *cooperative* selling of *complementary* products and services.

Finally, the organizational *community* (Aldrich, 1999) or *ecosystem* is defined as an aggregate collection of externally interacting heterogeneous organizations or competing enterprises. These external interactions tend toward the *competitive* selling of *substitute* products and services.

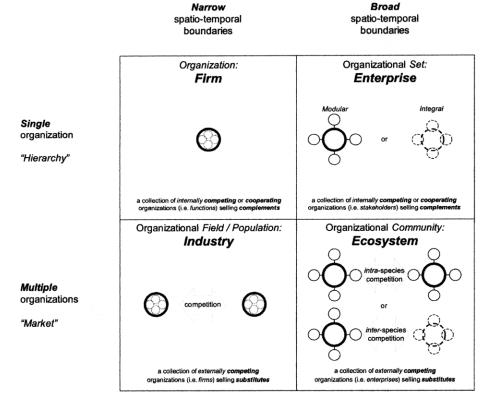


Figure 4: Summary of Primary Definitions

Units of Analysis. The theoretical framework utilizes multiple units of analysis operating at different levels. The formal unit of analysis that defines the dependent variable is that of the business *firm* and specifically the performance of the single product "strategic business unit" within the more general diversified corporation (Porter, 1980).

In order to understand and explain the sources of firm performance, this framework posits the construct of an *extended enterprise*¹⁹ that serves as the primary explanatory or independent variable of the framework.

Finally, in order to understand and explain the evolutionary forces that generate the primary explanatory variable, this framework posits the construct of an *ecosystem* of competing extended enterprises having different ecological forms or belonging to different ecological species (Hannan and Freeman, 1977).²⁰

Levels of Analysis. The levels of analysis occur both above and below the level of the firm. At a microlevel, the cognitive frames (Goffman, 1974) of the most senior leaders are mapped across the macro-level extended enterprise in order to determine and triangulate on the enterprise's architectural form and its function. In this dual micro- and macro-level of analysis, the enterprise architecture is analyzed as an enacted system that enables and constrains but does not determine managerial action (Giddens, 1979).

Variables. This paper however breaks with traditional strategic management research which strives to build and test *variance* theory - relating dependent and independent variables under strict necessary and sufficient conditions. Instead, this paper favors the building and testing of *process* theory, which seeks only necessary conditions plus a recipe for how they interact (Mohr, 1982; Van de Ven and Poole, 1995). In this way, the "dependent" and "independent" variables are linked via "moderating" and "mediating" variables to become a system of temporally and causally-linked "interdependent" variables. The entire system of causal relations therefore forms a closed feedback model whereby the evolution of business ecosystems is actually an endogenous theory, and the variables become antecedents (Richardson, 1991).

Despite this focus on process theory, we believe it useful to also characterize the four primary variables in familiar *variance* theoretic terms for illustrative purposes. In its simplest form, the dependent variable is long-term firm performance, and the independent variable is the enterprise architecture. We identify two types of intervening variables that relate the "dependent" and "independent" variables: *environmental maturity*, which describes the conditions that create and sustain different enterprise architectures, and *enterprise stability*, which describes how the enterprise functions or competes in strategic and operational terms.

¹⁹ Researchers using the organizational set level of analysis include: resource dependence theorist (Pfeffer and Salancik, 1978), transaction cost economists (Williamson, 1975 and 1985) and industry structural analysts in strategic management (Porter, 1980).

²⁰ Scott (2003) notes that "organizational field" has similar definitions within organization studies: "interorganizational community" (Hawley, 1950; Warren, 1967), "organizational community" (Aldrich, 1999), "industry system" (Hirsch, 1985), and "societal sector" (Scott and Meyer, 1991).

Framework Summary. The theoretical framework is comprised of four constitutive construct sets representing the highest-level industry system properties of environmental *fitness*, enterprise architectural *form*, firm *function* and *performance* (as reflected in the system sciences of *ecology*, *morphology*, and *physiology*). These are linked by proposition sets as shown proceeding clockwise in Figure 5 below. In addition, the theoretical framework captures the essential evolutionary processes of *variation*, *selection* and *retention*, as first expressed for organizations in evolutionary sociology (Aldrich, 1979) and evolutionary economics (Nelson & Winter, 1982).

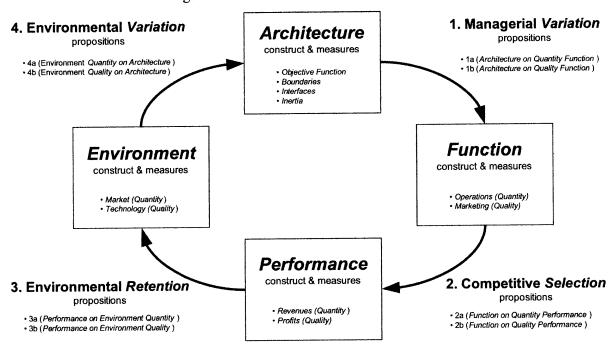


Figure 5: Overview of Theoretical Framework

The first construct set defines the construct of enterprise architecture, which describes how the focal firm interacts with its environment. A typology of ideal enterprise architectures will be defined along a continuum ranging from modular to integral network forms. In variance theory terms, this module captures the primary *explanatory* variables.

The second construct set describes the competitive dynamics between enterprise architectures. It describes how each type of enterprise architecture functions in terms of key high-level operations and marketing variables. A typology of ideal operations and marketing strategies will be mapped to the typology of enterprise architectures. In variance theory terms, this module captures the primary *mediating* variables.

The third construct set describes how the competitive dynamics of each type of enterprise architecture impacts long-term firm performance. A typology of ideal financial strategies will be mapped to the typology of enterprise architectures. In variance theory terms, this module captures the primary *dependent* variables.

The fourth construct set describes how long-term firm performance impacts the evolution of the industry, which in turn creates the conditions for future enterprise architectural development. In variance theory terms, this module captures the primary *moderating* variables.

Primary Construct: Enterprise Architecture

Theoretical Background. From the outset, we stated that seek a *systematic* explanation for long-term performance. We thus seek to characterize the firm-environment as a *system* of strategic complementarities (Milgrom and Roberts, 1990 & 1995), and as a typology of such complementarities (Hall and Soskice, 2001). The main construct of an *enterprise architecture* is introduced which originally emanates from architectural theory, which maps *form* to *function* (morphology to physiology) and specifies a typology of architectural forms ranging from *modular* to *integral*. Within design science, such an architectural typology has been developed for information (Simon, 1962), products (Ulrich, 1995; Baldwin and Clark, 2000), systems (Rechtin, 1991) and supply chains (Fine, 1998), but rarely to entire organizational sets.

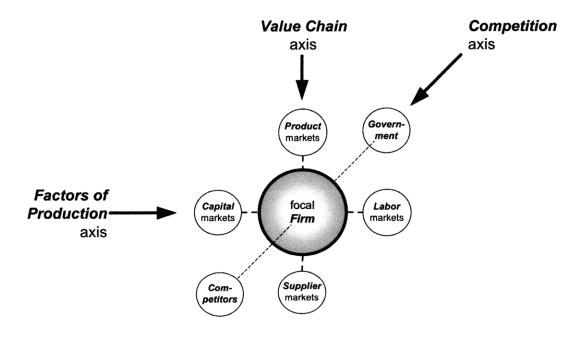
Within organization science, *intra*-organizational typologies have been posited (e.g. Burns & Stalker, 1961; Lawrence & Lorsch, 1967; Miles & Snow, 1978). In addition, *inter*-organizational interactions have been proposed including: "the firm as a political coalition" (March, 1962), "theory of the firm" / "transaction cost economics" (Coase, 1937; Williamson, 1975), "resource dependence theory" (Pfeffer and Salancik, 1978), "five-forces analysis" (Porter, 1980), "stakeholder theory of the firm" (Freeman, 1984), "social network analysis" (Granovetter, 1985; Uzzi, 1997) and "varieties of capitalism" (Hall and Soskice, 2001). Finally, the evolution of isomorphic organizational forms has been posited in both neo-institutional theories (Meyer & Rowan, 1977; DiMaggio & Powell, 1983) and organizational ecology at the population- (Hannan & Freeman, 1977) and community levels (Astley, 1985). Typologies of "species" of organisms and organizations have arisen in biological ecology (MacArthur & Wilson, 1967) and organizational ecology (Brittain and Freeman, 1980) respectively. These species range from *r*-strategists (opportunists) to *K*-strategists (equilibrium-based) species. Table 2 below summarizes the typologies and configuration theories that have bee proposed in disciplines ranging from economics to sociology.

Level	Typology (Disciplinary Basis)	Туре 1	Type 2	Source	
Micro	Organizational Structure (Structural Contingency Theory)	Mechanistic	Organic	Burns & Stalker (1961)	
	Organizational Structure (Structural Contingency Theory)	Differentiation	Integration	Lawrence & Lorsch (1967)	
	"Strategic Types" (Organizational Theory)	Prospector	Defender	Miles & Snow (1978)	
	Organizational "Forms" (Organizational Ecology)	r-strategist	K-strategist	Brittain & Freeman (1980)	
	Organizational Learning (Organizational Theory)	Exploitation	Exploration	March (1991)	
	"Generic Strategies" (Economics)	Differentiation	Cost Leadership	Porter (1980)	
	"Mixed Duopoly" (Economics)	Profit Maximizer	Labor Managed	Lambertini & Rossini, (1998)	
Meso	Network Theory (Economic Sociology)	Under-embedded	Over-embedded	Granovetter (1985), Uzzi (1997)	
	Inter-organizational "Architecture" (Complex Systems Theory)	Modular	Integral	Piepenbrock (2009)	
Macro	Varieties of Capitalism (Political Economy)	Liberal Market Economy	Coordinated Market Economy	Hall & Soskice (2001)	

Enterprise Architecture as *Organizational Set.* An enterprise architecture is defined as the *form* of the organizational set.²¹ An organizational set is a network comprising the firm and its key stakeholders. More specifically, the firm is seen to be the focal actor located at the center of a network of dyadic ties connecting the stakeholders to the firm. The extent of this network or enterprise is defined as including those stakeholders whose interactions with the firm significantly affect its performance (on a cost-benefit basis) over the time horizon of interest to the goals of the firm.

Before we can define an architectural typology of enterprises, we must first define the key modules or stakeholders of the organizational set, that is, we must first perform a functional decomposition or the enterprise. Each module is chosen for its relatively high internal interdependence and its relatively high external independence. For analytical simplicity, we decompose the enterprise along three dimensions or axes, with a pair of stakeholders associated with each axis: 1) the "value chain" of classical strategic management (Porter, 1985), which comprises customers and suppliers and captures classical demand and supply relationships; 2) the "factors of production" of classical economics which comprises providers of capital and labor²²; and 3) the competitive axis, i.e. those stakeholders which enable and constrain competition, (e.g. government and competitors). The primary modules of a generic enterprise architecture are summarized in Figure 6 below.²³

Figure 6: Constituent Modules (Stakeholders) in a Generic Enterprise Architecture



²¹ The architectural form of the organizational set (or morphology in organisms) represents an organization's "genotype", which may be common to both challenger (predators) and incumbent (prey). For example, the genotype of entrepreneurial radical innovators is an integral enterprise architecture – whether incumbent or late-entrant. A genotype's function and development within a specific environment, defines a richer concept of a "phenotype" or species, which is captured in the *ecology-morphology-physiology* framework.

²² Note, while stakeholders in the "value chain" axis tend to represent "firms", stakeholders in the "the factors of production" axis tend to represent investment and labor "institutions."

²³ Note, for parsimony, the remainder of this paper focuses primarily on the first two dimensions of the enterprise, namely on customers, suppliers, investors and employees. For a fuller discussion of the broader organizational set, please refer to Piepenbrock (2009).

Construct Definitions & Measures. As Nohria and Gulati (1994) point out, no single unified perspective on organizations is shared between most major open systems schools of thought. For example, while contingency theorists, organizational ecologists and institutional theorists focus broadly on determinants of organizational *form*, resource dependence and transaction cost theorists focus on determinants of organizational *boundaries*, while resource dependence and network theorists focus on determinants of inter-organizational *relationships*.

The primary construct presented herein attempts to synthesize these theories, by proposing an integrated construct set which combines organizational *form, boundaries* and *relationships* in the notion of an interorganizational or enterprise architecture.²⁴ These enterprise architectures are hypothesized to lie on a theoretical continuum ranging from *modular* to *integral* forms. These two extremes represent ideal types of architectures or archetypes, which can be defined in terms of three interrelated sets of properties: *objective functions*, enterprise *boundaries* and stakeholder *interfaces*.²⁵ Each will be briefly defined below.

Objective Functions: The objective function of the focal firm – within the classic corporate governance framework (Shleifer and Vishny, 1997) is defined by the way it appropriates residual profits to its enterprise, which ranges from maximization of *shareholder value* for the focal firm to maximization of *stakeholder surplus*. The former tends toward zero-sum *inter*-stakeholder competition, while the latter tends toward positive-sum *inter*-stakeholder cooperation. Intermediate objective functions are a weighted average of stakeholder claims.

Enterprise Boundaries. The objective function defines the spatio-temporal boundaries of the enterprise to be managed. "Spatial" refers to stakeholder space (not physical or geographic space), and "temporal" refers to the time horizon to which the enterprise is managed. For the shareholder value maximizer, the enterprise boundaries tend to be more *narrowly* defined both spatially around the firm, and temporally towards the short-term. For the stakeholder surplus maximizer, the enterprise boundaries tend to be more *narrowly* defined enterprise boundaries tend to be more *narrowly* defined both spatially around the firm, and temporally towards the short-term. For the stakeholder surplus maximizer, the enterprise boundaries tend to be more *broadly* defined both spatially around the entire extended enterprise, and temporally towards the long-term.²⁶

Stakeholder Interfaces. The firm-stakeholder interfaces define the degree of complexity or functional in(ter)dependence. High functional independence is associated with narrow spatio-temporal boundaries, while high functional interdependence is associated with broad spatio-temporal boundaries. Interfaces can be divided into dimensions of quantity and quality of stakeholder relationships.²⁷ The quantity defines the number of providers within a stakeholder class and the quality defines the type of firm-stakeholder relationships, ranging from arm's-length, contract-based, market transactions to trust-based, relational coordination. The former tends toward zero-sum intra-stakeholder competition, while the latter tends toward positive-sum intra-stakeholder cooperation.

²⁴ This new construct redirects emphasis from *formal* aspects of the organization towards more *informal* aspects. Schilling and Steensma (2001) employ different empirical measures for modular organizations.

²⁵ In organizational ecology, a similar definition of a "species" or "organizational form" consists of: *goals*, *boundaries* and *activities* (Aldrich, 1979, pg. 28.)

²⁶ The *spatial* and *temporal* dimensions are posited to be non-orthogonal, i.e., the broader the set of stakeholders, the longer the time frame that one must consider.

²⁷ The *quantity* and *quality* dimensions are posited to be non-orthogonal, i.e. with high quantity being coupled with low quality and low quantity being coupled with high quality.

Architectural Typology: *Modular-Integral*. The following three axioms, summarized in Figure 7 below, define the architectures of enterprises in terms of their *objective functions*, enterprise *boundaries* and stakeholder *interfaces*.

The first axiom relates architectural form to function. The form that an enterprise architecture assumes is driven to some extent by its *objective function*, which represents the weighted average of the interests of its constituent stakeholders.

Axiom 1: When modular enterprise architectures are observed empirically, the focal firm's objective function will tend toward singluar maximization of shareholder value. Conversely when integral enterprise architectures are observed empirically, the focal firm's objective function will tend toward pluralistic maximization of stakeholder surplus.

The second axiom relates architectural form to spatio-temporal boundaries. The form that an enterprise architecture assumes is driven to some extent by the boundaries within which the leader(s) of the focal firm manage(s) toward.

Axiom 2: When modular enterprise architectures are observed empirically, the spatiotemporal boundaries of the focal firm will be relatively narrow and coincident with the boundaries of the firm and the time expectations of its shareholders. Conversely when integral enterprise architectures are observed empirically, the spatio-temporal boundaries of the focal firm will be relatively broad and beyond the boundaries of the firm and its shareholders.

The third axiom relates architectural form to the level of complexity of the stakeholder interfaces with the focal firm. The form that an enterprise architecture assumes is driven to some extent by the quantity and quality of stakeholder relationships with the focal firm.

Axiom 3: When modular enterprise architectures are observed empirically, the focal firm will tend to have a higher quantity of lower quality (i.e. contract-based) interactions within each stakeholder group. Conversely when integral enterprise architectures are observed empirically, the focal firm will tend to have a lower quantity of higher quality (i.e. relationship-based) interactions within each stakeholder group.

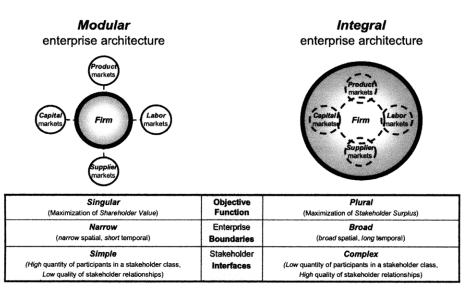


Figure 7: Typology of Enterprise Architectures

Empirical Data. The following representative qualitative data summarized in Table 3 below begins to support the above axioms of modular and integral enterprise architectural forms.

Industry	Firm	Quotation (Source)			
Large	Boeing	"[Union President] Blondin recalls asking: 'I just don't understand why you always			
Com-	(Modular)	fight us.' Blondin says [Boeing HR VP] Calhoun replied: 'You just don't get it. V			
mercial		represent Corporate America. You represent labor. We are always going to b			
Air-		adversaries."" (Source: BusinessWeek, 26 Sept. 2005).			
planes	Airbus	"I am always a bit surprised by the speed with which Americans take decisions: that in			
	(Integral)	three days (after 9-11) they announce 25,000 lay-offs at Boeing seems to me to			
		stupefying," (Source: Noel Forgeard, CEO, Airbus; AFX, 21 Sept. 2001).			
Auto-	General	"When the Japanese producers encounter these gigantic market waves, they will quickly			
mobiles	Motors	become as mediocre as we are. They will have to start hiring and firing workers			
	(Modular)	along with suppliers and will end up as mass-producers in short order." (Source: GM			
		Executive; Womack, Jones & Roos, 1990).			
	Toyota	"Under Japanese company law, shareholders are the owners of the corporation. But if			
	Motors	corporations are run exclusively in the interests of shareholders, the business will be			
	(Integral)	driven to pursue short-term profit at the expense of employment and spending on			
		research and development. To be sustainable, corporations must nurture			
		relationships with stakeholders such as suppliers, employees and the local			
		community. So whatever the legal position, the corporation does not belong to its			
		owners. It's not enough to serve shareholders." (Source: Mr. Okuda, Chairman,			
		Toyota Motor Corporation; Financial Times, 1 Aug. 2001).			
		"Toyota's business philosophy is to realize stable, long-term growth by working hard			
		to strike a balance between the requirements of people and society, the global			
		environment and the world economy. Our goal is to grow with all our stakeholders,			
		including customers, shareholders, employees and business partners." (Source: Toyota			
		Motors Corporation Annual Report, 2003).			
U.S.	United	"We don't want to kill the golden goose,' Dubinskynicknamed Mad Dog [head of			
	1				
Airlines	Airlines,	the Airline Pilots Association] told Goodwin [United Airlines CEO]. 'We just want to			
Airlines	Continent	the Airline Pilots Association] told Goodwin [United Airlines CEO]. 'We just want to choke it by the neck until it gives us every last egg." (Source: Roger Lowenstien,			
Airlines	<i>Continent</i> <i>al Airlines</i>	the Airline Pilots Association] told Goodwin [United Airlines CEO]. 'We just want to choke it by the neck until it gives us every last egg." (Source: Roger Lowenstien, "Into Thin Air", New York Times, 17 Feb. 2002).			
Airlines	Continent	the Airline Pilots Association] told Goodwin [United Airlines CEO]. 'We just want to choke it by the neck until it gives us every last egg." (Source: Roger Lowenstien, "Into Thin Air", New York Times, 17 Feb. 2002). "I already hear labor leaders crying out, 'Let's go back to the old ways and let's get that			
Airlines	<i>Continent</i> <i>al Airlines</i>	the Airline Pilots Association] told Goodwin [United Airlines CEO]. 'We just want to choke it by the neck until it gives us every last egg." (Source: Roger Lowenstien, "Into Thin Air", New York Times, 17 Feb. 2002). "I already hear labor leaders crying out, 'Let's go back to the old ways and let's get that again.' Do you know that a walrus isn't born fat and ugly – they become that way? So,			
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Table 3: Sample Qualitative Data Indicating Architectural Forms

1. Managerial Variation: Architecture-Function Relationship

Construct Definitions & Measures

Having defined a typology of enterprise architectures, the next step is to describe how these constructs function and interact over time in a competitive environment. Two primary variables are used which consider competition in terms of both *quality* or "what to offer?" and *quantity* or "how to offer it"? Porter (1980) frames this *quality* decision as a strategic position choice, which is broadly either *differentiation* or *cost-leadership*. Forrester (1961) frames this *quantity* decision as an operational stability choice, which is broadly either *unstable* or *stable* growth.

While organizational scholars have posited relationships between organizational form and competitive variables, for example that *intra*-organizational structure follows strategy (Chandler, 1962; Miles and Snow, 1978; Arthur, 1992; Delery and Doty, 1996), little research has shown which *inter*-organizational form delivers these strategic and operational choices the most effectively. Neither do they explain the conditions under which the converse is true, namely, when strategy follows structure.

Similarly, while organizational scholars have posited a tradeoff between the activities of exploration and exploitation (March, 1991), few have specified the *inter*-organizational forms that best deliver each activity.

Enterprise architectures can enable and constrain choice in competitive variables. The following two propositions serve to define the relationship between enterprise architectures and choices in strategic and operational variables.²⁸

Proposition 1a: *Quantity* of Firm Growth. The first proposition relates enterprise architecture to *quantity*-type variables or operational stability choices. The choices that leaders of focal firms make are driven to some extent by their enterprise architecture.

Operations management scholars have advanced the construct of "stability" in the context of growth strategies (Forrester, 1961). Growth can be characterized either as *unstable* exponential growth which emphasizes reinforcing feedback, while de-emphasizing system carrying capacities or limits to growth²⁹; or conversely as *stable* goal-seeking growth which emphasizes balancing feedback and emphasizing system carrying capacities and limits to growth.³⁰

Proposition 1a: When modular enterprise architectures are observed empirically, the focal firm's operational strategy will tend toward unstable growth; it will have relatively high short-term speed, but relatively low long-term speed. Conversely when integral enterprise architectures are observed empirically, the focal firm's operational strategy will tend toward stable growth; it will have relatively low short-term speed, but relatively high long-term speed.

²⁸ For a discussion of how strategic and operational variables interact, see Piepenbrock (2009).

²⁹ The presence of delays in balancing shorter-term demand with supply causes "boom and bust" oscillation, often associated with unstable growth.

³⁰ Recent research (Piepenbrock, 2004) has theorized that enterprise stability is an "enabling constraint" that allows a slow enterprise to grow the capabilities to move quickly. Ironically, limiting the maximum short-term rate of growth, can maximize the long-term rate of growth.

As shown in Figure 8 below, the time histories of input variables (like number of employees or amount of R&D spend) and output variables (like number of units produced) reveal very different dynamic behaviors. Note that the rate of change of the inputs or outputs (i.e. the slope of the time histories) determines the "speed" of growth.

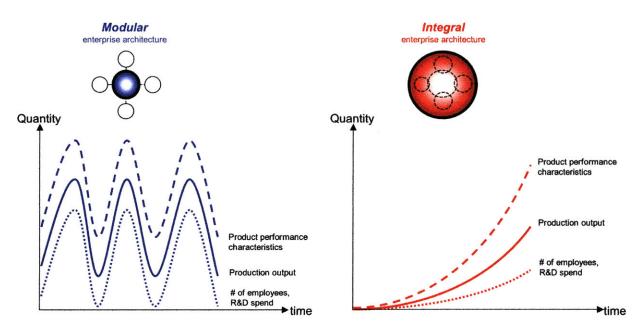


Figure 8: Comparison of Unstable vs. Stable Growth

For *short* time horizons, the absolute value of the rate of change of output of the modular enterprises tends to always exceed the rate of change of output of integral enterprises. Mathematically, this can be expressed as:

$$|dQ_m/dt| > |dQ_i/dt|$$
 (for small dt)

For *longer* time horizons, the absolute value of the rate of change of output of the integral enterprises tends to always exceed the rate of change of output of long enterprises. Mathematically, this can be expressed as:

$$|dQ_m/dt| < |dQ_i/dt|$$
 (for large dt)

In addition, it appears that rate of change of output of integral enterprises tends to not go negative. In other words, integral enterprises are designed to grow at such a rate that they will not have to significantly shrink output. Mathematically, this can be expressed as:

$$dQ_i/dt < 0$$

Qualitative Empirical Data. Before presenting select quantitative date, we begin by reviewing select qualitative data as summarized in Table 4 below.

Industry	Focal Firm (Architecture)	Quotation (Source)		
Large Com- mercial Airplanes	Boeing (Modular)	"Boeing quickly moved last week to cut commercial transport delivery estimates through 2002 in an announcement that surprised even some veteran Boeing-watchers by its swiftness and scope. At a hastily arranged news conference Sept. 18, one week after the terrorist attacks in the U.S., the company said it could also lay off up to nearly one-third of its commercial aircraft workforce. Alan R. Mulally, Boeing president and CEO of Boeing Commercial Airplanes, said the layoffs would begin during the last quarter of this year. 'When you order airplanes today, depending on the model, the lead time is anywhere from 10-14 months, so we need to make these decisions for production next year as soon as possible.'" (Source: Alan Mulally, President & CEO, Boeing Commercial Airplanes; Aviation Week, 24 Sept. 2001). "History tells us that the quicker a company acts to counter adverse economic conditions, the better able it will be to work its way through a downturn and emerge stronger when the economy recovers." (Source: Jim McNerney, Chairman, President & CEO, The Boeing Company; memo to employees, 17 Feb. 2009).		
	Airbus (Integral)	"Airbus has continually increased its market share. This performance highlights Airbus's ability to meet sustained growth targets by steadily increasing production output." (Source: EADS Annual Report 2000). "We've always been much more careful about production rates. We do see peaks and troughs but we've always managed to limit the highs and lows better than they do in the USA." (Source: Philippe Camus, EADS Co-Chairman; ATI, 20 Sept. 2001).		
Auto- mobiles	General Motors (Modular)	"When the Japanese producers encounter these gigantic market waves, they will quickly become as mediocre as we are. They will have to start hiring and firing workers along with suppliers and will end us as mass-producers in short order." (Source: <i>GM</i> Executive; Womack, Jones & Roos, 1990).		
	Toyota Motors (Integral)	"In a high-growth period, productivity can be raised by anyone. But how many can attain it during the more difficult circumstances induced by low-growth rate? This is the deciding factor in the success or failure of an enterprise." (Source: Taiichi Ohno, <i>Toyota Motors Company</i> Executive Vice President; Ohno, T. 1978, pg 114). "The Toyota Production System can be realized only when all the workers become tortoises. Speed is meaningless without continuity. Just remember the tortoise and the hare." (Source: Taiichi Ohno, <i>Toyota Motor Company</i> Executive Vice President; Ohno, T. 1978, pg. 63).		
U.S. Airlines	United Airlines (Modular)	"I don't' want to take advantage of the situation, but we have to do what is right for the company and events of September 11 have opened certain doors for the company that were pretty much closed before." (Source: Rakesh Gangwal, US Airways President; Hoffer-Gittell, 2003).		
	Southwest Airlines (Integral)	"The 'experts' always think we need to expand at a more rapid pace . What these so-called experts express is their desire for <i>Southwest</i> to jump at opportunities at a more rapid clip . Apparently growth excites investors. [But] nobody is pushing us. That could never happen." (Source: Matt Hafner, Director, <i>Southwest Airlines;</i> Jody Hoffer Gittell, (2003), pg. 246).		

Table 4: Sample Qualitative Data Supporting Proposition 1a

Quantitative Empirical Data. Proposition 1a describes the rates of growth and associated enterprise stability in enterprise architectures within an ecosystem. One would expect *Boeing's* more modular enterprise architecture to grow at higher short-term rates, while lower long-term rates (i.e. with less stability). Conversely, one would expect *Airbus'* more integral enterprise architecture to grow at lower short-term rates, while higher long-term rates (i.e. with greater stability). Figure 9 summarizes the output quantities for the competing focal firms in the primary sample, after the emergence of the dominant product design.

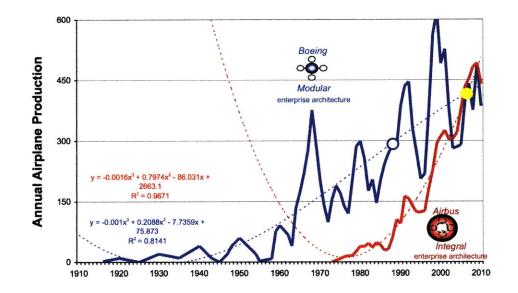


Figure 9: Quantity Growth of Competing Enterprise Architectures in the Airplane Industry

Qualitatively, after nearly 100 years of dominance, the market share-leading incumbent, Boeing is eventually overtaken by the late-entrant challenger, Airbus. Note that the late-entrant exhibits smoother growth (i.e. slow short-term growth, with fast long-term growth). Three observations can be made regarding quantity outputs: 1) during an upturn, the rate of change of output growth of a modular enterprise architecture generally exceeds that of an integral enterprise architecture; 2) during a downturn, the rate of change of output decline of a modular enterprise architecture generally exceeds that of an integral enterprise architecture; and 3) negative growth of an integral enterprise architecture is rare. These three observations combine to state that the long-term growth rates of integral enterprise architectures exceed those of modular enterprise architecture. Finally, note that the late-entrant appears to experience a prolonged incubation period of relatively low production, while capabilities are presumably built. This behavior might imply the need for patient capital.

Quantitatively, over the long-term since *Airbus* began production in 1974, its output CAGR is 12.5%, which is approximately seven times *Boeing's* output CAGR of only 1.8% over the same time period. A simple least squares fit regression analysis³¹ using logistic, third order cubic polynomial trend lines, demonstrates both *Airbus'* higher long-term growth rate, as well as continued exponential growth. *Boeing* on the other hand has a lower long-term growth rate, and has begun to inflect towards downward concavity (i.e. industry exit).

³¹ Note that for simplicity, the regression analyses shown use Ordinary Least Squares method. However, as the longitudinal time-series data are not independent, but autocorrelated, they require more advanced regression methods like Auto Regressive Moving Average (ARMA) models.

As illustrated in Figure 10 below, similar trajectories can be seen in the automotive industry.

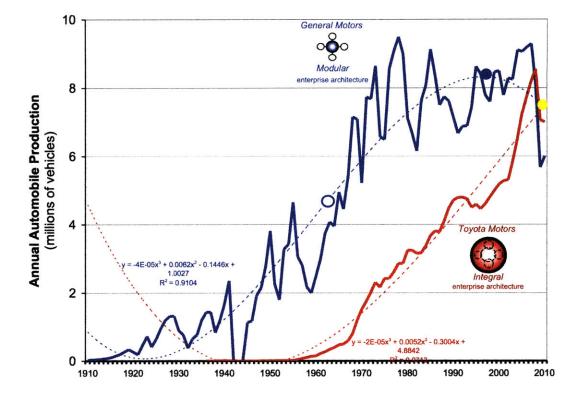


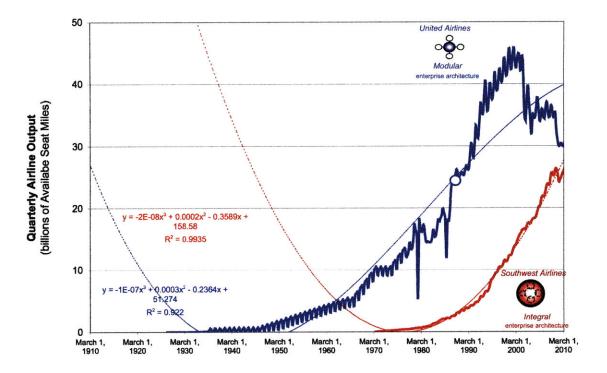
Figure 10: Quantity Growth of Competing Enterprise Architectures in the Automotive Industry

Qualitatively, after nearly 100 years of dominance, the market share-leading incumbent, General Motors is eventually overtaken by the late-entrant challenger, Toyota Motors. Note that the late-entrant exhibits smoother growth (i.e. slow short-term growth, with fast long-term growth). Note also that while GM's output is beginning to resemble an S-curve, with the inflection point occurring in the mid-1960s, Toyota's output is best described as exponential growth, with an inflection point not yet attained. Finally, again note that the late-entrant appears to experience a prolonged incubation period of relatively low production, while capabilities are presumably built. This behavior might imply the need for patient capital.

Quantitatively, over the long-term since Toyota began production in 1937, its output CAGR is 11.8%, which is approximately five times GM's output CAGR of only 2.6% over the same time period. A simple least squares fit regression analysis using logistic, third order cubic polynomial trend lines, demonstrates both Toyota's higher long-term growth rate, as well as continued exponential growth. GM on the other hand has a lower long-term growth rate, and has begun to inflect towards downward concavity (i.e. industry exit). Note also that the polynomials cross – i.e. competitive dominance switches – after the incumbent species has peaked in output growth rates, while before the challenger species has inflected.

As illustrated in Figure 11 below, similar trajectories can be seen in the airline industry.

Figure 11: Quantity Growth of Competing Enterprise Architectures in the US Airline Industry



Qualitatively, after nearly 100 years of dominance, the market share-leading incumbent, United Airlines is being overtaken by the late-entrant challenger, Southwest Airlines. Note that the late-entrant exhibits smoother growth (i.e. slow short-term growth, with fast long-term growth). The integral enterprise architecture's relative stability is evidenced by an absence of downward labor strikes, upward acquisitions and its ability general to dampen significant exogenous events like 9-11 terrorist attacks on the US, as well as the "noise" of minor seasonal fluctuation. Finally, again note that the late-entrant appears to experience a prolonged incubation period of relatively low production, while capabilities are presumably built. This behavior might imply the need for patient capital.

Quantitatively, over the long-term since Southwest Airlines began operation in 1970, its output CAGR is 20%, which is approximately six times United Airline's output CAGR of only 3% over the same time period. A simple least squares fit regression analysis using logistic, third order cubic polynomial trend lines, demonstrates both Southwest's higher long-term growth rate, as well as continued exponential growth. United on the other hand has a lower long-term growth rate, and has begun to inflect towards downward concavity (i.e. industry exit).

Table 5 below summarizes the empirical data supporting proposition 1a which captures the relationship between enterprise architectures and their function in *quantity* space.

Industry	Focal Firm	Enterprise Architecture	Quantity Growth During Intra-Species Competition	Quantity Growth During Inter-Species Competition
Large Commercial Airplanes	Boeing	Modular	1916-1970 CAGR = 2%	1970-2010 CAGR = 3%
	Airbus	Integral		1970-2010 CAGR = 13%
Auto- mobiles	General Motors	Modular	1908-1937 CAGR = 15 %	1937-2010 CAGR = 3 %
	Toyota Motors	Integral		1937-2010 CAGR = 12%
Airlines	United Airlines	Modular	1926-1970 CAGR = 23 %	1970-2010 CAGR = 3%
	Southwest Airlines	Integral		1970-2010 CAGR = 20%

Table 5: Summary of Data Supporting Proposition 1a

The question of how profitable this growth is will be covered in the next proposition set.

Proposition 1b: *Quality* of Firm Growth. Strategic management scholars have advanced the construct of an "efficiency frontier" in the strategic positioning space (Porter, 1996), which is defined by the orthogonal axes of differentiation and cost-leadership, or as specialist and generalists in ecological niche theory (Brittain & Freeman, 1980). As shown in Figure 12 below, a tradeoff between the two strategic positioning choices is posited to exist. *Efficiency* is defined as the distance of the firm from the frontier. Conversely, *effectiveness* is defined as the distance of the frontier from the origin. As the enterprise architecture enables and constrains performance, it defines the effectiveness potential of the enterprise (Pfeffer and Salancik, 1978). The shape of this efficiency frontier, while conceptually symmetrical at the industry level, is not symmetrical at a firm level. Firms that choose to focus on one strategy, develop capabilities and inertia around that choice, which makes switching to another strategy, while possible, lower in potential performance than a firm which chose to focus on it.

The second proposition relates enterprise architecture to *quality*-type variables or strategic positioning choices. The choices that leaders of focal firms make are driven to some extent by their enterprise architecture. When firms want to *explore* (March, 1991) or innovate radically in either products for differentiation or processes for cost-leadership, they will emphasize integration (Lawrence and Lorsch, 1967). Conversely, when firms want to *exploit* or innovate incrementally³² in either products for differentiation or processes for cost-leadership, they will emphasize modularity³³ as shown in Figure 12 below.

Proposition 1b: When integral enterprise architectures are observed empirically, the focal firm will be engaged in exploration (or radical innovation in either products or processes) of niche markets. Conversely, when modular enterprise architectures are observed empirically, the focal firm will be engaged in exploitation of mass markets.

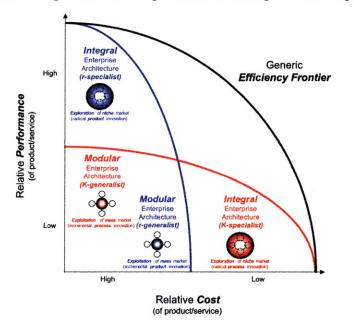


Figure 12: Exploration and Exploitation in Strategic Position Space

³² Often modular enterprise architectures will continue (unsuccessfully) to achieve radical product innovation.

³³ When the theory of modularity is applied to physical products (Ulrich, 1995) or even supply chains (Fine, 1998), the opposite conclusion is reached: namely that modularity leads to lower cost. This conclusion appears not to consider dynamic capabilities (Teece, Pisano and Shuen, 1997).

Qualitative Empirical Data. Before presenting select quantitative date, we begin by reviewing select qualitative data as summarized in Table 6 below.

Industry	Focal Firm	Quotation	
and the second	(Architecture)	(Source)	
Large Com- mercial Airplanes	Boeing (Modular)	"In 1966 The Boeing Company will observe its fiftieth anniversary. It is difficult to conceive any other half century in man's history more stimulating, challenging and more rewarding. In those fifty years man's scientific and technological progress has surpassed the total of such advancement in all previous history, and Boeing is proud to have played a leading role in that fantastic acceleration. There is a moment now for a rededication to the next fifty years, and the next, and the next" (Source: The Boeing Company, Annual Report, 1965). "Our products bring better value to our customers, and our pricing reflects that value. We also have a responsibility to our shareholders, and that means pricing that allows us to make our financial goals. Do I think that we will ever be the lower-price option? No. Do I think that should keep us from gaining more than 50 percent market share? I answer "no" to that as well. (Source: Scott Carson, Vice President of Sales, Boeing Commercial Airplanes, Boeing Frontiers, April 2005). "Fundamental, game-changing innovation like that we're pursuing on the 787 usually has a 'bleeding-edge' quality to it – meaning it goes beyond 'leading edge' into a realm where both the risks and the potential returns are high." "We're on the bleeding edge of taking a big, big step that was just a quarter step too far." (Sources: Jim McNerney, Chairman & CEO, The Boeing Company; BusinessWeek, 23 April 2008; The Chicago Tribune, 22 May 2008).	
	Airbus (Integral)	"When we set up 30 years ago, <i>Airbus</i> ' goal was to pool European capabilities and technological resources to build an aircraft that would reliably and cost- effectively carry passengers in true wide-body comfort. The name <i>Airbus</i> is synonymous with lower operating costs for airlines. <i>Airbus</i> has continually increased its market share. Why? Operational efficiency is the first and last word in analyzing <i>Airbus's</i> unique market success." (Source: <i>EADS</i> Annual Report 2000).	
Auto- mobiles	General Motors (Modular)	"Here's what's new about GM's strategy this year: Nothing." "GM brought brand differentiation to the world in the 1920s. As the decades passed, and our product portfolio expanded, we slowly drifted away from that simple but effective strategy. Today the GM product revolution again is strengthening our brands." (Source: General Motors Annual Report, 2003, pp. 3 and 8).	
	Toyota Motors (Integral)	"Cost Reduction is the Goal: At <i>Toyota</i> , as in all manufacturing industries, profit can be obtained only by reducing costs. Cost reduction must be the goal of consumer products manufacturers trying to survive in today's marketplace." (Source: Taiichi Ohno 1978).	
U.S. Airlines	United Airlines (Modular)	"We have chosen to close our discount subsidiary, <i>Ted</i> in order to focus on our strengths in serving our premium customers – the historic source of our competitive advantage."	
	Southwest Airlines (Integral)	"Southwest's business model, like that of Toyota, is to provide a low-cost product by utilizing its resources efficiently, while providing record levels of reliable service." (Source: Jody Hoffer Gittell, 2003 pp. 3-4.)	

Table 6: Sample Qualitative Data Supporting Proposition 1b

Quantitative Empirical Data. Proposition 1b describes the strategic position taken by enterprise architectures within an ecosystem. One would expect *Boeing's* more modular enterprise architecture (as well as that of its dominant competitive predecessor) to compete via a *differentiated* product strategy that stresses product capabilities based on product innovation. Conversely, one would expect *Airbus'* more integral enterprise architecture to compete via a *cost-leadership* product strategy based on process innovation.

Figure 13, Figure 14 and Figure 15 below summarizes the quality of output for the firms in the airplane, automotive and airlines industries respectively.

Figure 13: Quality Space of Competing Enterprise Architectures in Airplane Industry

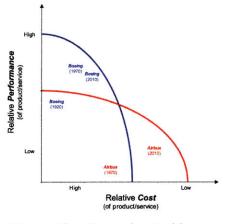


Figure 14: Quality Space of Competing Enterprise Architectures in Automotive Industry

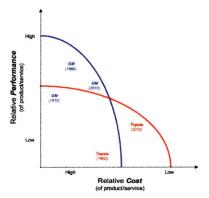
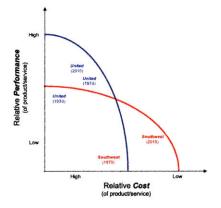


Figure 15: Quality Space of Competing Enterprise Architectures in Airline Industry



2. Competitive Selection: Function-Performance Relationship

Construct Definitions & Measures

The dependent variable used in this research – which is typical for most research in strategic management – is long-term firm performance, defined specifically as *economic* or *financial* performance. As such, there are a vast number of measures and metrics upon which to base the research (McGrahan and Porter, 1997). This is made even more complicated given the fact that the spectrum of enterprise architectures represents a range of performance objective functions, making a direct comparison of performance difficult.

In order to reconcile this dilemma, the common performance metric that will be used for all enterprise architectures will be maximization of shareholder value as represented by market capitalization. Although this is the explicit goal of the *shareholder*-based enterprise architecture, and only an indirect and implicit goal of the *stakeholder*-based enterprise architecture, it allows crucial comparison of zero-sum vs. positive-sum outcomes, which reveal the conditions under which an integrated approach outperforms a modular approach to enterprise architectures.

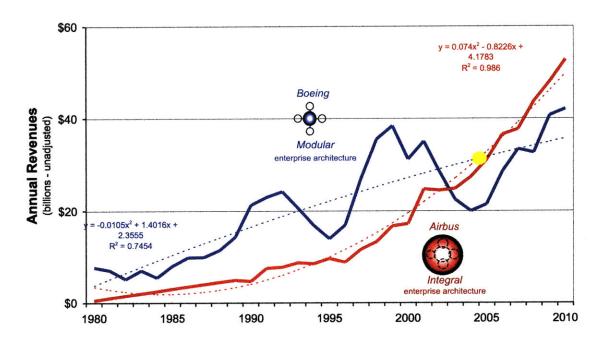
Shareholder value has been demonstrated to be dependent upon both *past* financial performance and *future* growth prospects (Dobbs and Koller, 2005). These sub-variables will be important in understanding the distinction between enterprise architectures and their underlying mechanics. Past performance is reflected on the firm's income statement, and can be decomposed into *top-line* revenues and *bottom-line* net income or profits. Longitudinal time-histories of these two variables can help explain longitudinal trajectories of shareholder value.

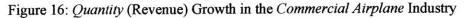
Modular enterprise architectures assign a functional decomposition resulting in a clear separation and of ownership (by principals, typically shareholders) and management (their agents). This "efficiency" results in the classic principal-agent problem (Jensen and Meckling, 1976). *Agency Theory* posits that managers are typically interested in maximization of top-line revenues, as their pay and influence is tied to expanding the size of the firm, while investors are typically interested in maximization of bottom-line profits. Integral enterprise architectures on the other hand assign a less clear functional separation of ownership and management, alleviating some of the problems and costs of agency. Resolution of these functional conflicts occurs above at the enterprise architectural level. Researchers have referred to this as *Stewardship Theory* (Donaldson and Davis, 1990).

Proposition 2a: *Quantity* of Firm Performance (Revenues). Enterprise architectures, by enabling and constraining choice in key competitive variables, ultimately lead to firm performance. The following two propositions serve to define the relationship between enterprise architectures and key performance variables of growth in revenues, profits and shareholder value.

The first proposition relates enterprise function to firm performance expressed as long-term quantity growth or revenues.

Proposition 2a: When competing modular and integral enterprise architectures are observed empirically, the focal firm of the modular enterprise architecture will tend to have lower longterm rates of revenue growth, relative to the focal firm of the integral enterprise architecture. **Empirical data.** Proposition 2a describes the rates of growth of revenues in enterprise architectures within an ecosystem. One would expect *Boeing's* more modular enterprise architecture to grow at higher short-term rates, while lower long-term rates (i.e. with less stability). Conversely, one would expect *Airbus'* more integral enterprise architecture to grow at lower short-term rates, while higher long-term rates (i.e. with greater stability). Figure 16 summarizes the revenue quantities for the competing focal firms in the primary sample.





Note that over the long-term since *Airbus*'s founding (1974-2006), *Boeing*'s revenue CAGR (unadjusted for inflation) was only 7.3%, while for *Airbus* it was more than double at 18.6%. While *Boeing* grows its revenues more quickly than *Airbus* during an upturn, it shrinks its revenues much more rapidly than *Airbus* during a downturn, with the net result being that the long-term revenue growth rates of *Airbus* are significantly higher than *Boeing*. The question of whether *Airbus*' higher long-term revenue growth is associated with higher profitability will be considered next.

As illustrated in Figure 17 and Figure 18 below, similar trajectories can be seen in both the automotive and airline industries respectively. Quantitatively, over the long-term (1980-2010), *Toyota's* revenue CAGR is 10%, which is approximately two times *GM's* revenue CAGR of only 4%. Similarly, *Southwest Airlines'* revenue CAGR is 14%, which is nearly three times *United Airlines'* revenue CAGR of only 5%.

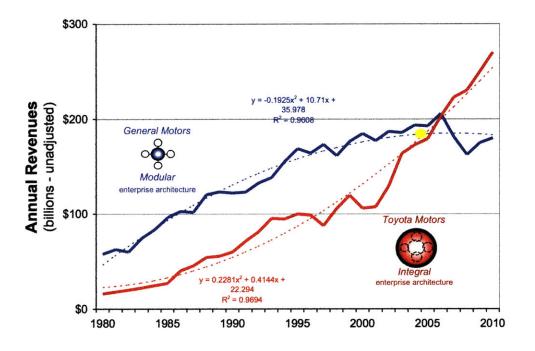
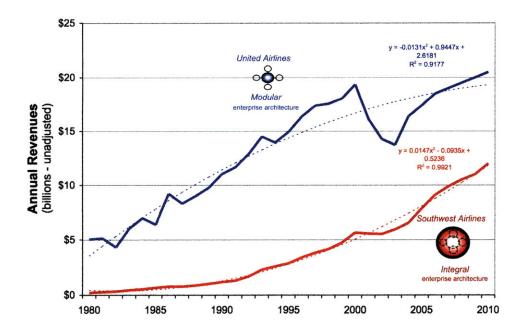


Figure 17: Quantity (Revenue) Growth in the Automotive Industry

Figure 18: Quantity (Revenue) Growth in the US Airline Industry



Proposition 2b: *Quality* of Firm Performance (Profitability). The second proposition relates enterprise function to firm performance expressed as long-term *quality* growth or *profits*.

Proposition 2b: When competing modular and integral enterprise architectures are observed empirically, the focal firm of the modular enterprise architecture will tend to have lower longterm rates of profit growth, relative to the focal firm of the integral enterprise architecture.

Empirical Data. While the firm may be growing in terms of quantity of revenues, this does not speak about the quality of growth or the efficiency of converting such growth into residual cash flows or profits. Proposition 2b describes the rates of growth of profitability in enterprise architectures within an ecosystem. One would expect *Boeing's* more modular enterprise architecture to grow at higher short-term rates, while lower long-term rates (i.e. with less stability). Conversely, one would expect *Airbus'* more integral enterprise architecture to grow at lower short-term rates, while higher long-term rates (i.e. with greater stability). Figure 19 summarizes the profitability quantities for the competing focal firms in the primary sample, over periods for which data is publicly available.

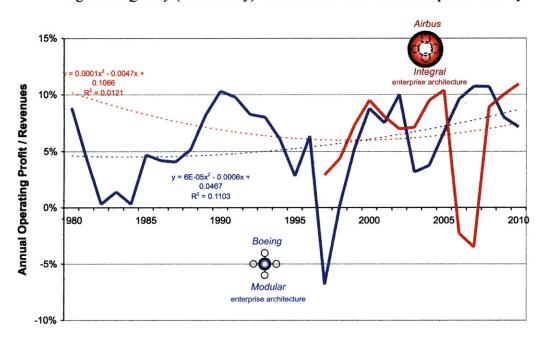


Figure 19: *Quality* (Profitability) Growth in the *Commercial Airplane* Industry

Qualitatively, while *Boeing* grows its profitability more quickly than *Airbus* during an upturn, it shrinks its profitability much more rapidly than *Airbus* during a downturn, with the net result being that the long-term profitability growth rates of *Airbus* are significantly higher than *Boeing*. There is some evidence to support the proposition that high long-term revenue growth rates can be coupled with high long-term profitability rates by integral enterprise architectures.

Quantitatively, as both data sets show large variation, resulting in low R^2 values, only the most basic descriptive statistic is reliable. Over the period for which comparative data exists (1997-2008), both *Boeing* and *Airbus* have averaged 6% annual operating profits. This amount is in line with *Boeing's* longer term (1980-2008) average of 6%.

As illustrated in Figure 20 and Figure 21 below, similar trajectories can be seen in both the automotive and airline industries respectively. Quantitatively, over the long-term (1980-2010), *Toyota's* average profitability is 5% and increasing, while *GM's* average profitability is only -1% and decreasing. Similarly, *Southwest Airlines'* average profitability is 7% and stabilizing, while *United Airlines'* average profitability is only -1% and decreasing.

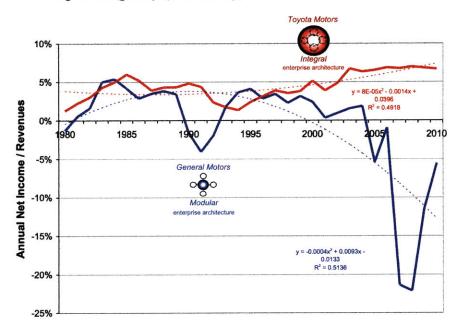
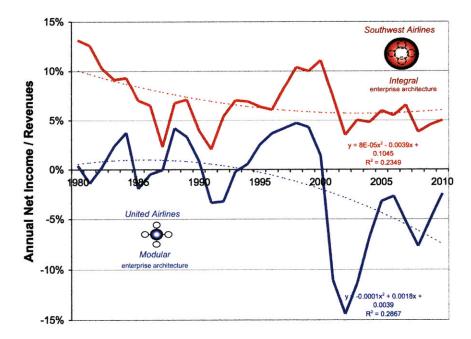


Figure 20: Quality (Profitability) Growth in the Automotive Industry

Figure 21: Quality (Profitability) Growth in the US Airline Industry



3. Competitive Retention: Performance-Environment Relationship

Construct Definitions & Measures

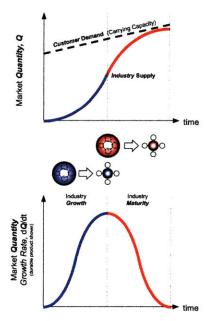
Both strategy (Porter, 1980, pg. 164) and organization (Lawrence and Lorsch, 1967, pg. 19) researchers have long recognized the importance rates of environmental change on competition and organizational forms. As far back as 1838, Cournot postulated a profit-maximizing firm which was subject to the constraints of *demand* and *technology*. This framework similarly distinguishes between two types of industrial evolution: *quantity* and *quality*, each possessing its own growth trajectories, which can be expressed stylistically as life cycle or S-curves. Just as the Architecture-Function relationship distinguished between quantity and quality at the firm level, the same distinction is made at the ecosystem level.

Proposition 3a: *Quantity* of Environmental Growth. The first proposition relates firm performance to environmental maturity in *quantity* terms, as summarized in Figure 22 below.³⁴

Quantity space refers to the *amount* of products and services supplied and demanded in an ecosystem, which is influenced by such variables as population size, GDP growth, etc. This characterization of the environment is well-known in marketing research and has been modeled using Bass diffusion processes (Bass, 1969).

Proposition 3a: When considering the industry's rates of growth in customer demand, emerging industries, i.e. those that exhibit slow but increasing rates of quantity growth tend to be built by / reward integral enterprise architectures, which specialize in slow (equilibrium) behavior. Transitioning industries, i.e. those that exhibit high rates of quantity growth tend to be built by / reward modular enterprise architectures, which specialize in fast (opportunistic) behavior. Maturing industries, i.e. those that exhibit fast but decreasing rates of quantity growth tend to be built by / reward integral enterprise architectures, which specialize in slow (equilibrium) behavior.

Figure 22: Co-Evolution of Firm Performance and Environment (Quantity)



³⁴ This "quantity" formulation captures organizational ecologists' construct of "mass dependence" (Barron, 1999).

Empirical data. The carrying capacity of the ecosystem in *quantity* space can be defined by the underlying availability of critical environmental resources from any of the stakeholders in the organizational set. The data presented below³⁵ takes customer demand as the key ecosystem variable, which for the primary sample is the underlying market growth in the global airline industry. As can be seen in Figure 23 below, the exponential growth trajectory appears to be following the logistic S-curve.

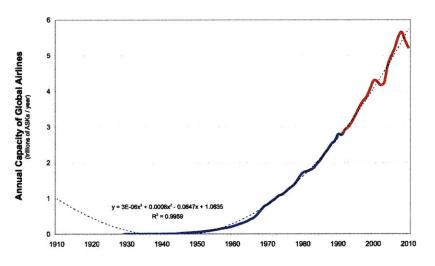
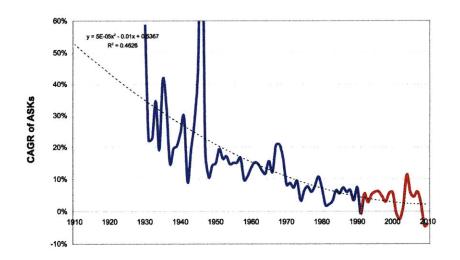


Figure 23: Market Carrying Capacity of the Global Airline Industry

The critical question rate of change of this growth will reveal whether or not the market is beginning to saturate, creating the environmental conditions for re-integration of the dominant enterprise architecture. In order to determine if this ecosystem growth is speeding up or slowing down, Figure 24 below shows the compound annual growth rate (CAGR). While the industry is growing, the annual rate of change of this growth has been diminishing over time - signaling a "maturing" market – and is asymptotically approaching the CAGR of global GDP.

Figure 24: CAGR of Market Carrying Capacity of the Global Airline Industry



³⁵ Data source: Air Transport Association (ATA). Excludes data from the USSR prior to 1970.

As illustrated in Figure 25 and Figure 26 below, similar trajectories can be seen in both the global automotive³⁶ and US airline³⁷ industries respectively.

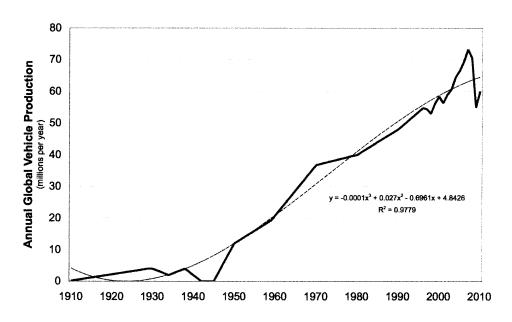
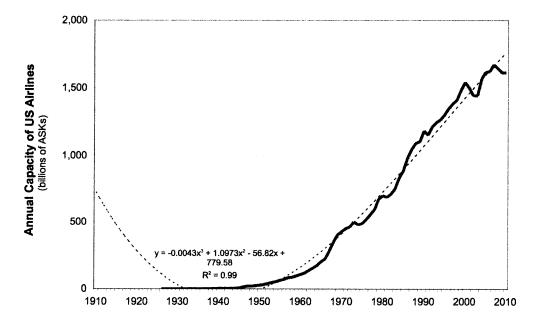


Figure 25: Market Carrying Capacity of the Global Automotive Industry

Figure 26: Market Carrying Capacity of the U.S. Airline Industry



³⁶ Automotive data source:s Organisation Internationale des Constructeurs d'Automobiles (<u>www.oica.net</u>) and Hirooka (2006), pg. 73.

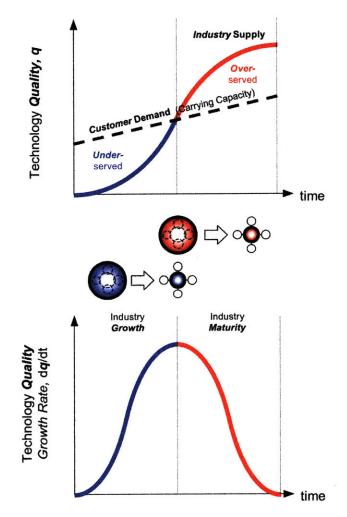
³⁷ Note, the data come from the Air Transport Association (ATA), and includes all US airlines passenger and cargo traffic for both domestic and international operations.

Proposition 3b: *Quality* of Environmental Growth. The second proposition relates firm performance to environmental maturity in *quality* terms and is summarized in Figure 27 below.

Quality space refers to the type of products and services supplied and demanded in an ecosystem, which is influenced by such variables as technological innovation, etc. This characterization of the environment is well-known in technology and innovation research (Christensen and Bower, 1996).

Proposition 3b: When considering the industry's rates of growth in technological innovation, emerging industries, i.e. those that exhibit slow but increasing rates of quality growth (i.e. under-served markets) tend to be built by and reward integral enterprise architectures, which specialize in radical product innovation (i.e. exploration). Transitioning industries, i.e. those that exhibit high rates of quality growth tend to be built by and reward modular enterprise architectures, which specialize in incremental product and process innovation (i.e. exploitation). Maturing industries, i.e. those that exhibit fast but decreasing rates of quality growth (i.e. over-served markets) tend to be built by and reward integral enterprise architectures, which specialize in radical process innovation (i.e. exploration).





Empirical Data. The carrying capacity of the ecosystem in *quality* space can be defined by the underlying availability of critical environmental resources from any of the stakeholders in the organizational set. The data presented below takes supplier capability as the key ecosystem variable, which for the primary sample is the underlying growth in technological carrying capacity of the global airline industry as measured by an industry standard of airplane productivity (McMasters and Cummings, 2002). As can be seen in Figure 28 below, the growth trajectory appears to have followed the logistic S-curve, with the inflection point having occurred in the late 1950's with the emergence of the dominant product design of jet aircraft. Prior to this, competition existed in improving product performance, where rates of change in performance were increasing. After the emergence of the dominant design, when the rates of change in product performance began to diminish, competition is hypothesized to move toward other dimensions of cost, quality and delivery. The current state of technological carrying capacity is saturating around the asymptotic physical limits of speed, range, etc.³⁸

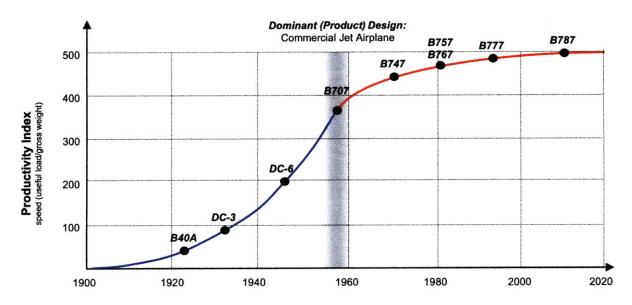
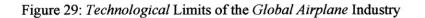
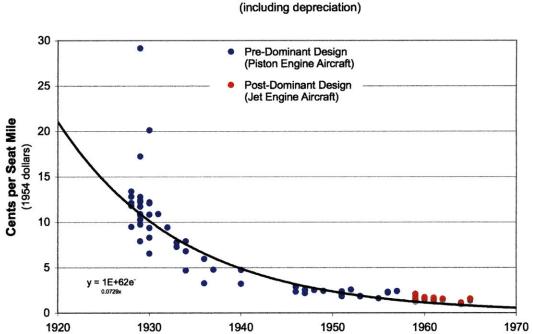


Figure 28: Technological Carrying Capacity of the Global Airplane Industry

In addition to saturation of product performance, the long-term trends in product operating costs have dropped asymptotically toward zero (Philips, 1971), as shown in Figure 29 below.

³⁸ Since the inception of the jet age, maximum speed (in economical mass transport) has been constrained to remain just below the drag divergence Mach number to avoid excessive fuel consumption. In addition, maximum range is confined to approximately half the earth's circumference.





New Airplane Operating Costs (including depreciation)

4. Environmental Variation: Environment-Architecture Relationship

Construct Definitions & Measures

Enterprise architectures, through their competitive interactions, reflexively shape and are crucially shaped by their environment. It is through this interaction between organization and environment, or more precisely between organizational set and organizational field (Scott, 2003), that both co-evolve.

Organizational ecologists (e.g. Hannan and Freeman, 1977) focus on macro-level constructs of organizational founding (entry) rates, failure (exit) rates, and inertial (change) rates. In particular, they observe that while organizational change does in fact occurs it tends to unfold at rates that are lower than change demanded by the environment. This organizational momentum is captured by the construct of structural inertia, which helps explain failure rates and founding rates.

Structural contingency theorists (e.g. Burns and Stalker, 1961; Lawrence and Lorsch, 1967), have long postulated that the environment is an important factor in defining the organizations within it. In particular, they have pointed to rates of change of key environmental factors like technology and customer demand as driving the optimum structure of organizations operating within these environment. For them, however, the environment is considered as a static exogenous variable moderating organizational structure and successful performance.

Technology and innovation theorists (e.g. Abernathy and Utterback, 1978) and affiliated organizational theorists (e.g. Anderson and Tushman, 1990; Henderson and Clark, 1990) have taken steps to advance structural contingency theory by endogenizing technological evolution and its effect on organizational evolution. These researchers posit the existence of "dominant designs" in products, which fundamentally change the nature of competition from pre-dominant design focus on *product* innovation, to the post-dominant design focus on *process* innovation. Later theorists (Suarez and Utterback, 1995; Klepper, 1996) in this vein have posited ecological firm entry/exit relationships to the evolution of industries.

This framework, by co-opting more of the environment (i.e. the organizational set) into the causal explanation of organizational performance can begin to endogenize the dynamics of the evolution of the environment and the enterprises within it. In this sense it is contingency theory at a higher level of analysis than the organization, namely that of the organizational set, or *ecological* contingency theory. In addition, by formalizing "dominant designs" in an architectural framework, one can begin to integrate the organizational and environmental or technological evolution.

Proposition 4a: *Dominant Designs* in Enterprise Architectures. The first proposition relates environmental maturity to required levels of integration in enterprise architectures, which is summarized in Figure 30 below.

Proposition 4a: Dominant designs in enterprise architectures at the ecosystem level tend to oscillate between integral and modular states throughout the lifecycle of the industry.

As the environment initially demands radical product innovation and patience, the dominant enterprise architectures tend to be integral. Subsequently, as the environment demands incremental product innovation, coupled with impatience, the dominant enterprise architectures tend to be modular. Then, as the environment demands radical process innovation and patience, the dominant enterprise architectures again tend to be integral. Finally, as the environment demands incremental process innovation, coupled with impatience, the dominant enterprise architectures again tend to be integral. Finally, as the environment demands incremental process innovation, coupled with impatience, the dominant enterprise architectures tend to be integral.

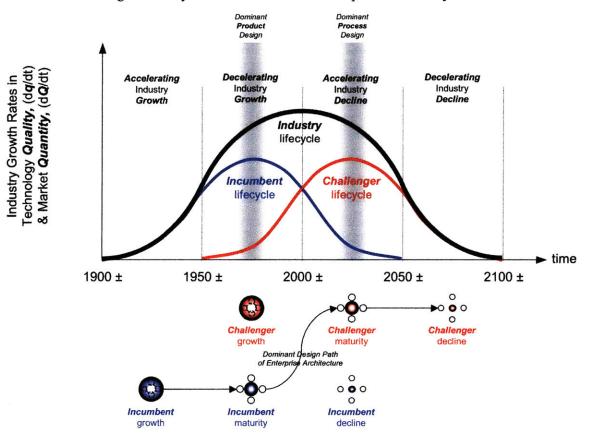
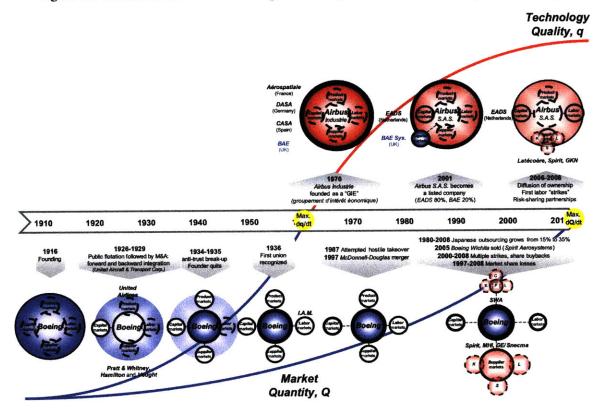


Figure 30: Stylized Co-Evolution of Enterprises and Ecosystem

Empirical Data. Having established the birth dates and associated and founding conditions (e.g. population densities) of the two firms in the primary sample, Figure 31 below summarizes the qualitative evolutionary trajectories of the enterprise architectures of these firms.

Figure 31: Evolution of Dominant Designs in Enterprise Architectures: Airplane Industry:



The organizational *sets* appear to initially begin with an integral enterprise architectural form and subsequently disintegrate monotonically into a modular form over time. Note that this phenomenon appears to apply to both incumbent and challenger enterprises and be independent of the founding date of the enterprise.

At the ecosystem (or organizational *field*) level however, the dominant design in enterprise architecture appears to oscillate from integral to modular and back to integral forms. While re-integration of the incumbent enterprise architecture in order to achieve fit with the demands of the ecosystem is not theoretically precluded, empirically it is not observed. This suggests that in the theoretical sample analyzed, the incumbents reach a tipping point, whereby their reinforcing behavior tips from virtuous to vicious – that is, it is more efficient for the environment to *select* a new species, than for the existing species to be *retained* via managerial adaptation.

Superimposed on the evolutionary trajectories of the enterprise architectures, is a notional S-curve, representing the industry growth in both quantity and quality. One may begin to posit a relationship between the state of these key environmental variables and the states of the incumbent and challenger enterprise architectures. Empirical data will be offered in the following sections to refine this conceptual relationship.

As illustrated in Figure 32 and Figure 33 below illustrate similar trajectories in both the automotive and airline industries respectively.

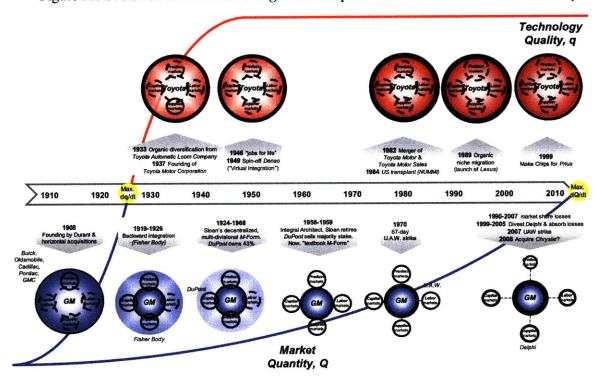
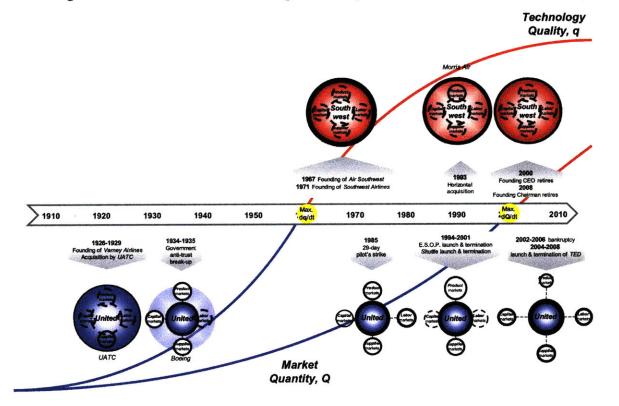


Figure 32: Evolution of Dominant Designs in Enterprise Architectures: Automotive Industry

Figure 33: Evolution of Dominant Designs in Enterprise Architectures: US Airline Industry



Proposition 4b: Entry and Exit of Enterprise Architectures. The second proposition relates environmental maturity to entry and exit of dominant enterprise architectures.³⁹

Proposition 4b: Early entrant (incumbent) enterprise architectures tend toward monotonic disintegration, with increasing levels of architectural inertia inhibiting their reintegration. Thus it is easier for the environment to produce a new species of late entrant (challenger) enterprise architectures.

Empirical Data. Figure 34 below summarizes the birth dates within the population densities for the firms in the primary sample.⁴⁰

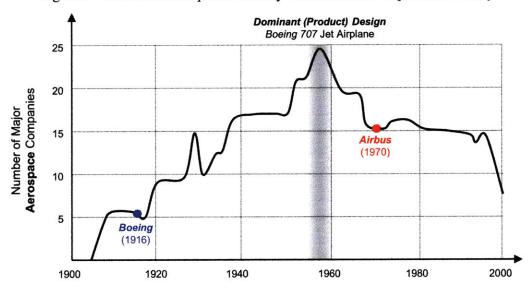


Figure 34: Commercial Airplane Industry Concentration / Population Density

Soon after the invention of the airplane at the turn of the century, the number of firms in the aerospace industry grew for approximately fifty years during an era of ferment (Abernathy & Utterback, 1978) which was dominated by increasing product innovation resulting in improved product performance characteristics (i.e. "higher, faster, farther"). A "dominant design" in the product occurred in the late 1950's with the emergence of the commercial jet airplane⁴¹, followed by a shake-out and consolidation of the industry, which continued for the next fifty years. Following the merger of Boeing with McDonnell Douglas in 1997, the large commercial airplane industry effectively became a global duopoly between Boeing & Airbus.42

The founding dates of the two firms in the primary sample are also plotted in the figure above. Boeing, the incumbent was founded in 1916, well before the dominant product design and Airbus the challenger was founded in 1970, well after the dominant product design.

³⁹ Note: this "quantity" formulation captures the organizational ecologists' construct of "density dependence" (Barron, 1999). ⁴⁰ Based on Weiss and Amir (1999).

⁴¹ The Boeing 707 is considered representative of the "dominant design". Note however that other scholars (e.g. Tushman and Murmann, 1998) have cited an earlier "dominant design" in the Douglas DC-3 in 1936. See Piepenbrock (2008) for further discussion.

⁴² As the market segment, "large commercial airplanes" is broadly defined as airplanes having over 100 seats. smaller airplane manufacturers (e.g. Embraer) have recently begun to enter this space.

As illustrated in Figure 35 and Figure 36 below, similar phenomena in the trajectories in both the automotive and airline industries respectively are observed.

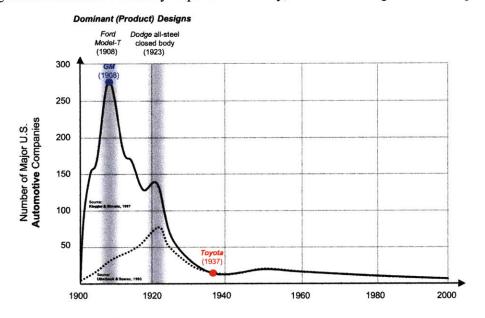
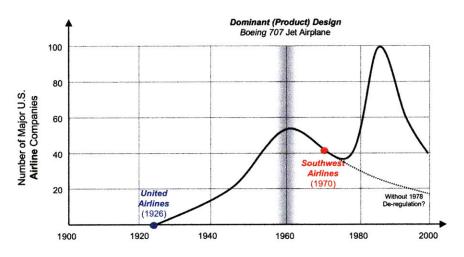


Figure 35: Automotive Industry Population Density, Dominant Design & Founding Dates

In the automotive industry, the dominant design was established in 1908 with Ford's Model T.⁴³ General Motors, the incumbent was founded in 1908, when the dominant design arrived and Toyota the challenger was founded in 1937, after the establishment of the dominant design.

Figure 36: US Airline Industry Population Density, Dominant Design & Founding Dates



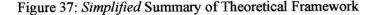
In the airline industry, the dominant design was established around 1960 with *Boeing's* 707 jet airplane.⁴⁴ *United Airlines*, the incumbent was founded in 1926, well before the dominant design and *Southwest Airlines* the challenger was founded in 1970, after the dominant design.

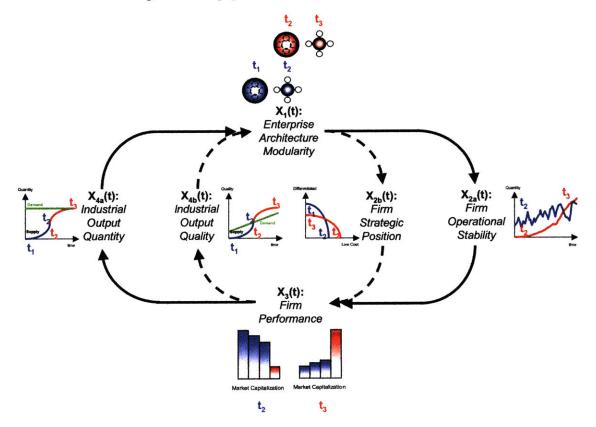
⁴³ Recent scholars (e.g. Klepper, 1997) argue that the US auto industry shakeout occurred in 1908, coincident with the arrival of the Ford Model-T as a candidate for dominant design. Utterback & Suarez (1993), citing a different data set possessing a more coarse filter, demonstrate shakeout in 1923 arguing that *Dodge's* all-steel, closed body automobile is the dominant design. See Piepenbrock (2009) for further discussion.

⁴⁴ See Tushman and Anderson (1986) and Kelly and Amburgey (1991).

Summary of Theoretical Framework

The theoretical framework, which traces the dynamic evolution of a generic business ecosystem is summarized in Figure 37 below.⁴⁵ Two main causal loops describe the co-evolution of the ecosystem and its constituent enterprises in terms of both product quantity (solid outer loop) and quality (dashed inner loop) that is demanded and supplied. Beginning with the industrial output variables $X_{4a}(t)$ and $X_{4b}(t)$ shown on the left of the figure, we will trace out two clockwise revolutions of the causal loop diagram to describe how the ecosystem grows and eventually matures⁴⁶, and how concurrently incumbent firms' enterprises build the industry and are ultimately overtaken by late-entrant challenger firms' enterprises.





Industry *Growth* **Phase.** At time t_1 , when an industry is born, a significant gap exists between the quantity and quality of a new product or service's supply and demand potential (shown in green). Firms (like *General Motors, United Airlines* and *Boeing*) that can bring higher performing products to market will gain early competitive advantage. In this phase of product innovation, integration is required in the product, firm and enterprise architectures. Such integral enterprise architectures have relatively low rates of growth due to their relatively "patient" capital, labor, customers and suppliers. Spatio-temporal boundaries begin as relatively broad, with the firm's relationship with its stakeholders being long-term, using trust-based relational contracts, and the resulting enterprise value being divided in a positive-sum cooperative game among stakeholders.

⁴⁵ A more detailed summary of the theoretical framework including the major balancing loops is discussed in Piepenbrock (2009).

⁴⁶ This framework traces the evolution of the business ecosystem from growth to maturity phases. For simplicity, it does not play out the evolution beyond maturity into the decline phase.

As the industry approaches time t₂, the gap between the quantity and quality of a new product's supply and demand potential diminishes at a faster rate as the rates of change of industry growth are rising. In order to meet the demands of the rapidly growing mass market, firms that can rapidly build capacity reap economies of scale. High rates of radical product innovation diminish, and are replaced by efficiencies of functional specialization. In this phase, disintegration (or modularization) of product, firm and enterprise architectures provide competitive advantage. Such modular enterprise architectures (like *General Motors, United Airlines* and *Boeing*) have relatively high rates of growth due to their relatively "impatient" capital, labor, customers, and suppliers. Spatio-temporal boundaries of the enterprise diminish, with the firm's relationship with its stakeholders becoming short-term, using arm's length contracts, and the resulting enterprise value being divided in a zero-sum competitive game among stakeholders.

Industry *Maturity* **Phase.** At time t_2 , the industrial output S-curves are near their inflection points. After the industry reaches time t_2 , the gap between the quantity and quality of a new product or service's supply and demand potential begins to diminish at a slower rate as the rates of change of industry growth begin to slow down. New customers are being added at slowing rates, and the appetite for higher performance products is now being dominated by a demand for cheaper products. At this inflection point in the industry's quantity and quality S-curves, two scenarios now occur.

Incumbent firms (like *General Motors, United Airlines* and *Boeing*) continue to over-serve the market by chasing smaller and smaller market segments consisting of higher and higher profit-margin customers (Christensen, 1997). Under new cost pressures, they continue to outsource, compete suppliers and unions harder and continue to attract more and more impatient capital. Although the industry is slowing down, the incumbent enterprise architectures continue to speed up, with their stocks of structural inertia and their impatient capital growing.

Challenger firms (like *Toyota Motors, Southwest Airlines* and *Airbus*), having a different enterprise architecture can enter and take advantage of the industry's changing characteristics. Now, the rates of technological innovation begin to slow down, as the dominant product design has been established by the dominant enterprise architecture, which is now in a modular form. This slowing down of the industry, both in quantity and quality terms, provides the conditions for a new firm with a different enterprise architecture to enter and to bring supply and demand back in balance both in quantity terms (i.e. slower) and quality terms (i.e. *process* innovation for higher quality, lower cost, faster delivery). As in the birth of the industry, innovation requires integration of product, firm and enterprise architectures. Such integral enterprise architectures have relatively low rates of growth due to their relatively "patient" capital, labor, customers, and suppliers. Spatio-temporal boundaries of the enterprise increase, with the firm's relationship with its stakeholders becoming long-term, using trust-based contracts, and the resulting enterprise value being divided in a positive-sum cooperative game among stakeholders.

The competition to establish the dominant product architecture by the now-modular incumbent enterprise architectures has sown the seeds of their own destruction. The emergence of a dominant design in product architecture has established the conditions for the emergence of a new dominant design in enterprise architecture. The dominant enterprise architecture oscillated throughout the industry's lifecycle from integral to modular to integral.

MATHEMATICAL MODEL and NUMERICAL SIMULATION

Generic Equations of Motion. The evolution of business ecosystems will be expressed formally by a system of simultaneous differential equations,⁴⁷ where the state variables, X_n are stocks which accumulate net flows (dX_n/dt) over time.

$$dX_{1}/dt = f_{1}(X_{1}, X_{2}, ..., X_{n})$$

$$dX_{2}/dt = f_{2}(X_{1}, X_{2}, ..., X_{n})$$

.

$$dX_{n}/dt = f_{n}(X_{1}, X_{2}, ..., X_{n})$$

Note that such equations form a feedback system that generates system dynamics endogenously, via information from the various state variables, which feed back to influence their own rates of change.

Model Build-Up. In the following subsections, the model will be constructed progressively, each time adding a higher level of sophistication in order to more clearly understand the underlying assumptions, parameters, structure and behavior of the model at each stage of complexity. The following stages will be discussed sequentially:

- Single Firm Growth in an *Infinite* Market
- Single Firm Growth in a Constant Market
- Intra-species Competition in a Constant Market⁴⁸
- *Diffusing* Market (Quantity)
- Intra-species Competition in a Diffusing Market
- Inter-species Competition in a Diffusing Market
- *Commoditizing* Market (Quality)
- Intra-species Competition in a Commoditizing Market
- Inter-species "Competition" in a Commoditizing Market
- Diffusing, Commoditizing Market (Quantity and Quality)
- Intra-species Competition in a Diffusing, Commoditizing Market
- Inter-species Competition in a Diffusing, Commoditizing Market

⁴⁷ In the traditions of the general system theory (e.g. Von Bertalanffy, 1950), cybernetics (e.g. Ashby, 1952), system dynamics (e.g. Forrester, 1961); as well as organizational ecology (e.g. Hannan and Freeman, 1977).

⁴⁸ We will not cover the case of *inter*-species competition in an unchanging environment here, because theoretically, significant sustained environmental variation is required in order to produce and sustain significant variation in organizational species. Inter-species competition in a constant market would be a special parametric study when exploring inter-species competition in a logistic growth market, in which the market diffusion rate is much greater than the competitor growth rates.

Single Firm Growth in an Infinite Market. First, we assume a monopolist operating under increasing returns to scale. This assumption captures a variety of business phenomena including economies of scale, learning curve effects, etc. Under this reinforcing feedback, the more market the firm accumulates, the faster it continues to be accumulated.

Second, we assume initially that the firm exists in a market of unlimited growth potential – unlimited carrying capacity. The firm then is able to grow at its maximum fractional rate, r which is assumed to be constant and is determined by a number of goals and constraints which might include the rate of return on residual cash flows promised to risk bearers.⁴⁹

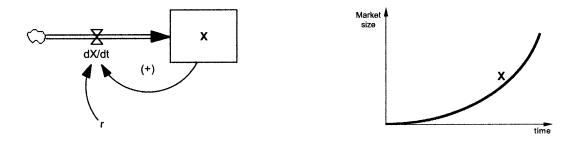
Most models in organizational ecology focus on population size or density - expressed as number of organizations - as the primary state variable, which accumulates net flows of organizational entries and exits (e.g. Hannan and Freeman, 1977). Population size is of lower importance in these formulations. This paper however focuses instead on organizational size as approximated by the amount of environmental resources an organization accumulates, or more specifically in the case of business ecosystems, the amount of a market a firm possesses. In this way, a population could consist of a spectrum of organizations ranging from a large number of equally sized firms, each possessing the same percentage of the total market; to a single firm operating as a monopolist possessing the entire market. We will derive equations of motion for a firm accumulating sales, X over time.⁵⁰

The following differential equation captures this simple reinforcing feedback:

$$dX/dt = rX \tag{1}$$

Figure 38 below illustrates the causal structure⁵¹ and resulting behavior of this *linear* first-order formulation, which results in unrestrained exponential growth of the firm's market acquisition.

Figure 38: Structure and Behavior of Single Firm Growth in an Infinite Market



This equation also describes the early growth of a firm in a finite market, when its accumulated quantity of market, X is far from the carrying capacity of the market. This will be covered in the subsequent section.

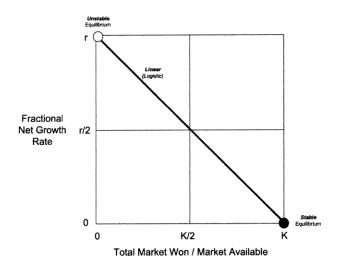
⁴⁹ This is actually the fractional net growth rate, and has the units of percent of market growth per unit of time.

⁵⁰ For the present discussion, we assume that the firm converts demand into supply instantaneously or without any delays associated with order backlogs, inventory backlogs etc. Such delays in a balancing loop can account for cyclical oscillatory behavior. As the time horizon of interest in this evolutionary research is measured in centuries, the oscillations which manifest themselves over timeframes of decades are of secondary importance.

⁵¹ In the diagrammatic representations of the differential equations, the variables within "boxes" represent stocks or accumulations, while the variables below the "valves" represent rates or flows in and out of the stocks.

Single Firm Growth in a *Constant* **Market.** As no firm exists in an infinitely rich resource environment, we next constrain the model by imposing finite but constant market carrying capacity, K, which might represent the size of population of potential customers or sales. The assumption here is that, as the firm acquires more of the finite market, K, the rate of firm growth, r begins to reduce linearly⁵², making the organization's rate of growth dependent upon the proportion of the carrying capacity that remains unexploited⁵³, as shown in Figure 39.

Figure 39: Fractional Net Growth Rate Assumption

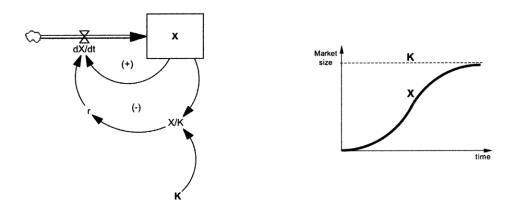


We therefore extend the previous differential equation (1) to capture the mode-switching from reinforcing to balancing feedback as the firm approaches the carrying capacity of the market. This new logistic equation is shown below:⁵⁴

$$dX/dt = rX - rX^2/K$$
⁽²⁾

Figure 40 below illustrates the causal structure and resulting behavior of this *nonlinear* first-order formulation, which results in sigmoid or S-shaped growth of the firm's market capture.

Figure 40: Structure and Behavior of Single Firm Growth in a Constant Market



⁵² This linear relationship, which produces logistic growth, will be relaxed in subsequent sections which explore interspecies competition.

⁵³ This is called "mass dependence" in the organizational ecology literature.

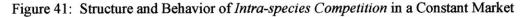
⁵⁴ This was first formulated in social systems by Verhulst (1838) in his logistic population growth model.

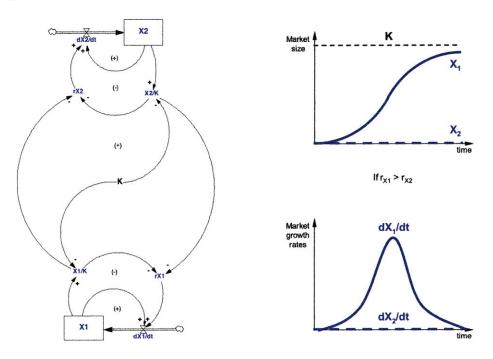
Intra-species Competition in a Constant Market. In most markets, no firm exists without competition; we therefore need to next introduce competition between firms for customers in a common market. At this point, we assume two identical isomorphic competitors, X_1 and X_2 having homogeneous enterprise architectures occupying the same mathematical point niche. We therefore extend the previous differential equation (2) to account for the simple fact that the addition of sales to either competitor decreases the rate of growth of the other competitor.⁵⁵ Both competitors are now connected via a reinforcing loop that amplifies differences in market share resulting in an unstable equilibrium.⁵⁶ The new, coupled system of differential equations is shown below:⁵⁷

$$dX_{1}/dt = r_{X1}X_{1} - r_{X1}X_{1}^{2}/K - r_{X1}X_{1}X_{2}\alpha_{12}/K$$
(3a)

$$dX_2/dt = r_{X2}X_2 - r_{X2}X_2^2/K - r_{X2}X_2X_1\alpha_{21}/K$$
(3b)

Figure 41 below illustrates the causal structure and resulting behavior of this nonlinear *second*-order formulation, which results in sigmoid or S-shaped growth of each competitor's market capture. Provided that both firms have identical forms and occupy the same market niche, no two-firm (or more generally, two-population) equilibrium can be stable – any exogenous shock to the system will result in the elimination of one of the firms (or populations).⁵⁸





⁵⁵ In ecology, this is called "exploitation" (vs. "interference") competition (Brian, 1956). Other dynamic models formulate competition using more operational variables (Sterman, Henderson, Beinhocker and Newman, 2007).

⁵⁶ This severe "winner-takes-all" competitive assumption is akin to Bertrand (price) competition, rather than the weaker form of Cournot (quantity) competition where the market is shared in proportion to relative firm growth rates. Under this assumption, the "competition coefficients", α_{12} and α_{21} equal 1.

⁵⁷ This system of equations formed the basis for modeling competition within the seminal organizational ecology framework (Hannan and Freeman, 1977: 942). It is based on the classic Lotka-Volterra equations for *competing* populations, after Lotka (1925) and Volterra (1931). Note that this is different from the classic Lotka-Volterra equations for *predator-prey* populations which generate chaotic oscillation due to a central *balancing* loop.

⁵⁸ This is known in ecosystem theory as the "principle of competitive exclusion" (Gause, 1934).

Diffusing Market (Quantity). Next, we relax the assumption of a constant carrying capacity of the resource environment, K (Brittain, 1994). Instead, we permit sigmoid growth as it approaches its own inherent carrying capacity.⁵⁹ This assumption captures the scenario of a new product/service that either: 1) diffuses logistically throughout a constant population of potential consumers (Bass, 1969), or 2) diffuses instantaneously through a logistically-growing population of potential consumers (Verhulst, 1838), or 3) some combination of the two.⁶⁰

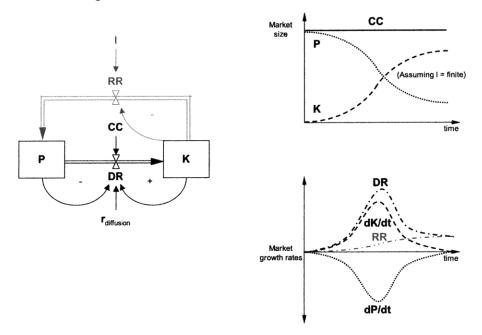
The new, coupled system of differential equations is shown in its most simple form below:

$$dP/dt = RR - DR = K/l - r_d PK/CC$$
(4a)

$$dK/dt = DR - RR = r_d PK/CC - K/l$$
(4b)

Here, P denotes the *potential* market; K denotes the *adopting* market; CC denotes the carrying capacity of the system; DR denotes the *diffusion* rate; r_d denotes the fractional *diffusion* rate; RR denotes the *replacement* or *repurchase* rate; I denotes the average product life. Figure 42 below illustrates the causal structure and resulting behavior of this nonlinear *first*-order formulation, which again results in sigmoid or S-shaped growth for the resource environment.

Figure 42: Structure and Behavior of a Diffusing Market



For simplicity, we will assume that the average product life, 1 approaches infinity (i.e. the market consists of durable goods)⁶¹, making the replacement rate, RR approach zero. Noting that P = CC - K, the new differential equation which captures the dynamics of *diffusion* is:

$$dK/dt = r_d K (1 - K/CC)$$
(4c)

⁵⁹ For simplicity, we model a linear relationship between the diffusion rate and available carrying capacity, which results in logistic growth.

⁶⁰ The more general formulation of a resource environment comprising an interaction of logistic consumer population growth with logistic diffusion of an innovation is discussed in Piepenbrock (2009).

⁶¹ This assumption is not an unreasonable approximation for the primary case study of large commercial airplanes, with average product lives ranging from 25-50 years.

Intra-species Competition in a *Diffusing* Market. Next, we reintroduce two members of the same species, competing for the logistically growing market. The new, coupled system of differential equations is shown in its most simple form below:

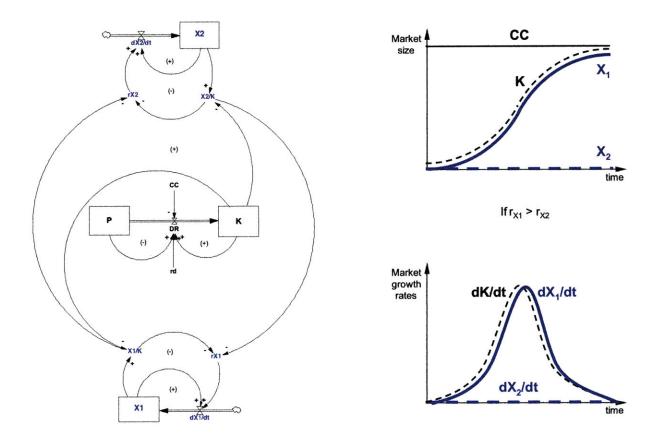
$$dX_1/dt = r_{X1}X_1 - r_{X1}X_1^2/K - r_{X1}X_1X_2\alpha_{12}/K$$
(5a)

$$dX_2/dt = r_{X2}X_2 - r_{X2}X_2^2/K - r_{X2}X_2X_1\alpha_{21}/K$$
(5b)

$$dK/dt = r_K K - r_K K^2/CC$$
(5c)

Figure 43 below illustrates the causal structure and resulting behavior of this nonlinear *third*-order formulation, which again results in sigmoid or S-shaped growth for both the resource environment and the dominant firm (or population of firms) that created it.

Figure 43: Structure and Behavior of Intra-species Competition in a Diffusing Market

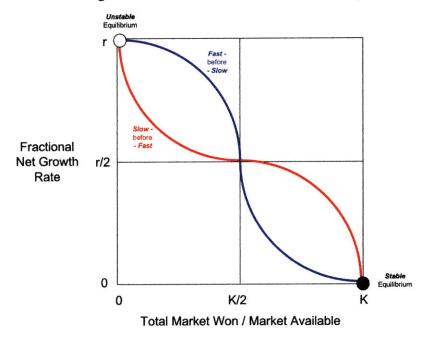


Although this refinement of Hannan and Freeman's (1977) classic does not itself add new insights into the behavior of competing organizations or populations, it is a necessary building block for the next step of the formulation of the evolution of business ecosystems, namely, it establishes the condition necessary for the establishment of interspecies competition, resulting in an extension of the theory of competitive exclusion (Gause, 1934).

Inter-species Competition in a Diffusing Market. Since in the previous stage, we have allowed the environment to grow logistically, we can now acknowledge the possibility of variation in organizational forms as a consequence of variation in environmental rates of growth. This gives rise to the potential for dominance switching: i.e. the late entry of a new species of organization, and the associated early exit of the incumbent species. The two types of competing organizational species modeled therefore reflect either increasing rates or decreasing rates of environmental growth.

The incumbent species, X which builds the market is known in bio-ecology as an *r-strategist*, and the late-entrant challenger species, Y which takes the market is known as a *K-strategist* (MacArthur and Wilson, 1967). The primary difference between this formulation and the previous, is that each competitor's fractional net growth rates are no longer linearly density-dependent, with the (*Modular*) *r-strategist* growing faster when the environment is experiencing rapid growth, and the (*Integral*) *K-strategist* growing faster when the environment's rate of growth is slowing down, as shown in Figure 44 below.





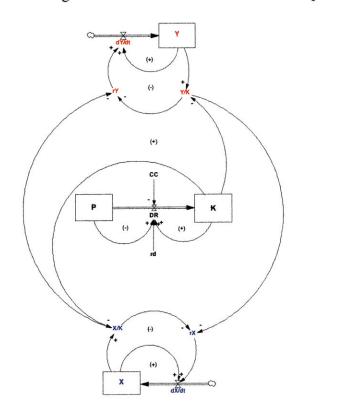
The new, coupled system of differential equations is shown below:

 $r_X > r_Y$ when (X+Y) < K/2 $r_X < r_Y$ when (X+Y) > K/2 $dX/dt = r_X X - r_X X^2/K - r_X X Y \alpha_{XY}/K$ (6a)

$$dY/dt = r_y Y - r_y Y^2/K - r_y X Y \alpha_{yy}/K$$
(6b)

$$dK/dt = r_d K - r_d K^2/CC$$
(6c)

Figure 45 below summarizes the causal structure and resulting behavior of this nonlinear *third*-order formulation which results in S-shaped (but no longer logistic) growth for the competitor's state variables. Crucially note that the r-strategist tends to exit when the growth rate of the market begins to drop below its own growth objectives. Environmental variance therefore produces variance in the architectures of the organizational sets, which creates symbiotic inter-species competition, with a more complex theory of competitive exclusion.



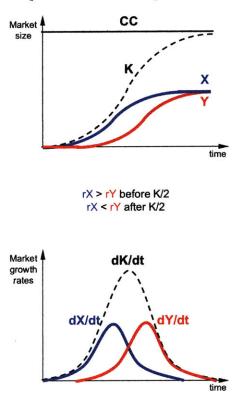


Figure 45: Structure and Behavior of Inter-species Competition in a Diffusing Market

Commoditizing Market (Quality). Having permitted the carrying capacity of the market, K to grow logistically, we now go back to a constant market assumption, but instead allow the *quality* of the market customer preferences to diffuse from high-performance *differentiated* products and services towards *low-cost* products and services (Abernathy and Utterback, 1978; Christensen, 1997). This in effect allows market niches to evolve, which has the potential to shape the entry and exit of different species of organizational sets.

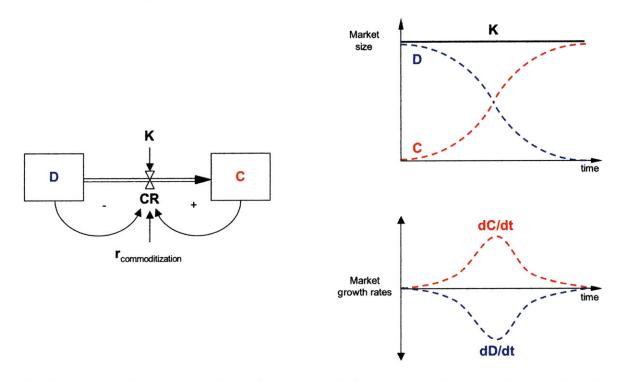
The new, coupled system of differential equations is shown in its most simple form below:

$$\frac{dD}{dt} = -CR = -r_c DC/K$$

$$\frac{dC}{dt} = CR = r_c DC/K$$
(7a)
(7b)

Here, C denotes the *cost-based* market; D denotes the *differentiation-based* market; K denotes the adopting market's *capacity*; CR denotes the *commoditization* rate; r_c denotes the fractional *commoditization* rate. Figure 46 below illustrates the causal structure and resulting behavior of this nonlinear *first*-order formulation, which again results in sigmoid or S-shaped growth for the transforming resource environment.⁶²

Figure 46: Structure and Behavior of a Commoditizing Market



Noting that D + C = K, the new differential equations which capture the dynamics of *commoditization* is shown below:

$$dD/dt = r_c D (1 - D/K)$$
(7c)

$$\frac{dC}{dt} = r_{c}C(1 - C/K)$$
(7d)

⁶² Again, as in the characterization of the diffusing market, the commoditizing market's sigmoid growth is assumed to proceed logistically, for analytical simplicity.

Intra-species Competition in a Commoditizing Market. In the previous stage, the resource environment was characterized as existing in one dimension: the rate of change of market growth, dK/dt. This formulation extends the model to include a second dimension: the rate of change of technology commoditization, dC/dt. This captures the construct of a dominant design in the product offering (Abernathy and Utterback, 1978), which marks the shift in market demand from increasing rates of change of improvement in product performance, where competition is based on product innovation, to increasing rates of change of improvement in product cost, where competition is based on process innovation.⁶³ In order to control for the previous effects of market growth, we hold the market size, K constant.⁶⁴ The new coupled system of differential equations is shown below:

$$dX_1/dt = r_{X1}X_1 - r_{X1}X_1^2/D - r_{X1}X_1X_2\alpha_{12}/(D + C)$$
(8a)

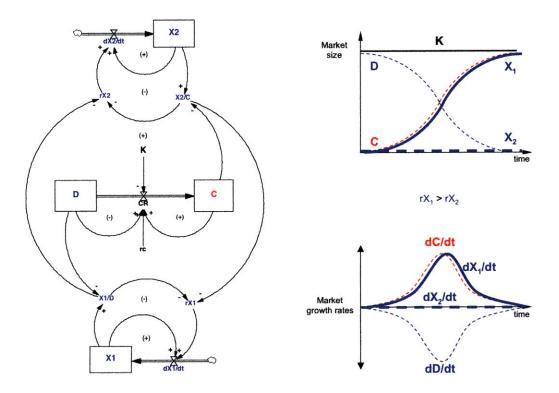
$$\frac{dX_1/dt = r_{X1}X_1 - r_{X1}X_1^2/D - r_{X1}X_1X_2\alpha_{12}/(D + C)}{dX_2/dt = r_{X2}X_2 - r_{X2}X_2^2/C - r_{X2}X_2X_1\alpha_{21}/(D + C)}$$
(8a)
$$\frac{dD}{dt} = r_c D (1 - D/K)$$
(8c)

$$|D/dt = r_c D (1 - D/K)$$
(8c)

$$\frac{1}{C/dt} = r_c C \left(1 - C/K\right)$$
(8d)

Figure 47 below summarizes the causal structure and resulting behavior of this nonlinear third order formulation⁶⁵ which results in sigmoid or S-shaped transition from a market dominated by sales of products/services based on differentiation, D to a market dominated by sales of products/services based on cost, C. Note that this formulation represents direct competition between organizations within the environment.

Figure 47: Structure and Behavior of Intra-species Competition in a Commoditizing Market



⁶³ Although a "dominant design" is often seen as a *discrete* event, the market is modeled as a *continuously* evolving.

⁶⁴ This control will relaxed in the next section, where both market size, K and type, C will grow logistically.

⁶⁵ The addition of two state variables is only a first-order addition as one is completely determined by the other.

Inter-species "Competition" in a Commoditizing Market. In the previous stage, both competitors were assumed to be of the same species, and therefore broadly able to compete in both the differentiation-based and cost-based niches (i.e. the competition coefficients α were at or near 1) – for example both intraspecies competitors, GM and Ford can transition from a differentiated product focus towards a cost focus. However, the emergence of a new species, having an integral enterprise architecture (like Toyota) is much better suited towards cost-leadership, making their competition coefficient a approach zero. In this extreme case of interspecies competition, each species focuses on the niche that they are best suited to, and "competition" takes on a symbiotic nature, due to the presence of architectural inertia. The new coupled system of differential equations is shown below:

> $dX/dt = r_X X - r_X X^2/D \qquad r_X X + r_X X^2/D \qquad r_X X + r_X X^2/D \qquad (D - C)$ (9a)

$$\frac{dY}{dt} = r_Y Y - r_Y Y^2 / C \quad (9b)$$
(9b)
(9c)
(9c)

$$\frac{d\Gamma}{dt} = r_{c} D (1 - D/K)$$
(9c)

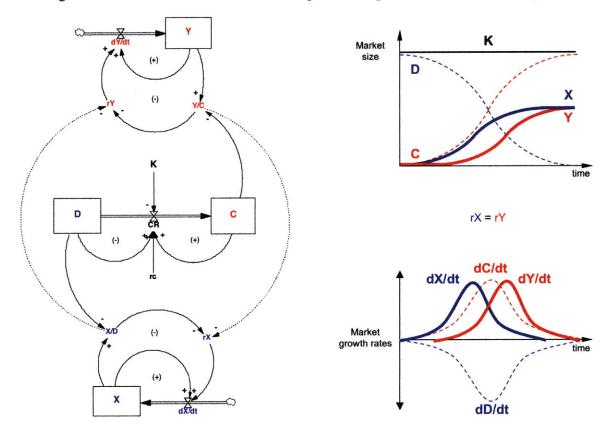
$$\frac{dD}{dt} = r_{c} D (1 - D/K)$$
(9c)

$$\frac{dC}{dt} = r_{c} O (1 - O/K)$$
(9d)

$$\frac{dC}{dt} = r_c C \left(1 - C/K\right) \tag{90}$$

Figure 48 below summarizes the causal structure and resulting behavior of this nonlinear third order formulation⁶⁶ which results in sigmoid or S-shaped transition from a market dominated by sales of products/services based on differentiation, D to a market dominated by sales of products/services based on cost, C. Note that this formulation represents indirect competition between organizations occupying different niches within the environment.

Figure 48: Structure and Behavior of Inter-species Competition in a Commoditizing Market



⁶⁶ The addition of two state variables is only a first-order addition as one is completely determined by the other.

Diffusing, Commoditizing Market (Quantity and Quality). We now combine the previous two descriptions of the market environment, where the *quantity* of the market, K grows logistically (Bass, 1969), while simultaneously, the *quality* of the market customer preferences diffuses from high-performance *differentiated* products and services towards *low-cost* products and services (Abernathy and Utterback, 1978). This allows the entry and exit of different species of organizational sets for two reasons: the rate of change in market *quantity* and the rate of change in technological *quality* enable market niches to evolve. The new, coupled system of differential equations is shown below:

$$\frac{dP}{dt} = -r_{d}P(1 - P/CC)$$
(10a)

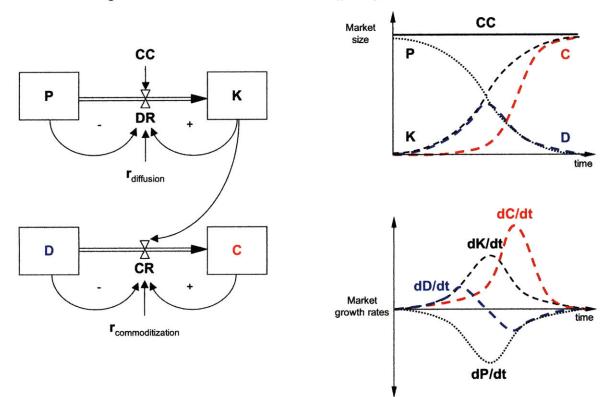
$$\frac{dK}{dt} = r_d K \left(1 - K/CC \right) \tag{100}$$

$$\frac{dC}{dt} = r_{c}C(1 - C/K)$$
(10d)

$$\mathbf{I}_{\mathbf{C}}^{\mathsf{I}}\mathbf{U}_{\mathbf{C}}^{\mathsf{I}}=\mathbf{I}_{\mathbf{C}}^{\mathsf{C}}\left(\mathbf{I}-\mathbf{C}/\mathbf{K}\right)$$

Figure 49 below illustrates the causal structure and resulting behavior of this nonlinear *second*-order formulation. Although the total market, K again results in logistic sigmoid or S-shaped growth, niches D rises and falls, while niche C rises in S-shaped growth to eventually characterize the entire market. Note, however that if the fractional diffusion rate, $r_d >>$ than the fractional commoditization rate, r_c , then the behavior approaches that shown in Figure 43.

Figure 49: Structure and Behavior of a Diffusing, Commoditizing Market



Intra-species Competition in a Diffusing, Commoditizing Market. The model now has two different ways of defining the state of evolutionary maturity of the environment: *quantity* and *quality* – that is, *how much* product is produced/consumed, and *what type* of product is produced/consumed. This section therefore combines these two characterizations of the market environment into one model, where two firms of the same species (characterized by the architectures of their respective extended enterprises) compete. The extent of competitive intensity is defined by the ability of each firm to overcome architectural inertia and transition from niche D to niche C as the market evolves. A summary of the coupled system of differential equations is shown below.

$$dX_{1}/dt = r_{X1}X_{1} - r_{X1}X_{1}^{2}/D - r_{X1}X_{1}X_{2}\alpha_{12}/K - r_{X1}X_{1}X_{2}\alpha_{12}/(D + C)$$
(11a)

$$dX_{2}/dt = r_{X2}X_{2} - r_{X2}X_{2}^{2}/C - r_{X2}X_{1}X_{2}\alpha_{21}/K - r_{X2}X_{2}X_{1}\alpha_{21}/(D + C)$$
(11b)

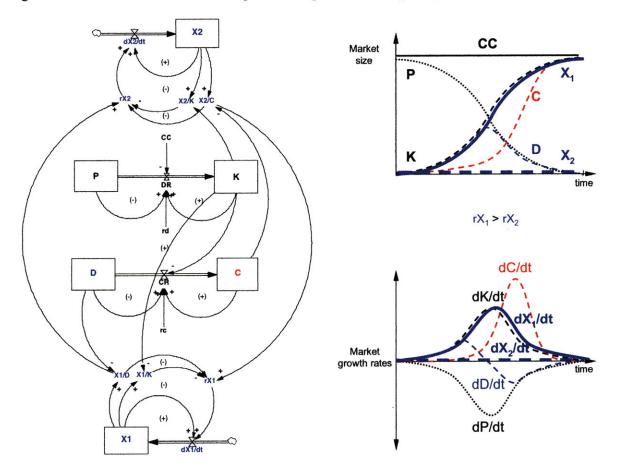
$$dK/dt = r_d K (1 - K/CC)$$
 (11c)

$$dD/dt = -r_c D (1 - D/K)$$
(11d)

$$\frac{dC}{dt} = r_c C \left(1 - C/K\right) \tag{11e}$$

Figure 50 below summarizes the causal structure and resulting behavior of this nonlinear *fourth*-order formulation which results in S-shaped growth of the general market K, and the niche, C. Due to architectural inertia, each species is constrained to its own niche resulting in early exit, late entry and dominance-switching throughout the life-cycle of the industry.

Figure 50: Structure/Behavior of Intra-species Competition in a Diffusing, Commoditizing Market

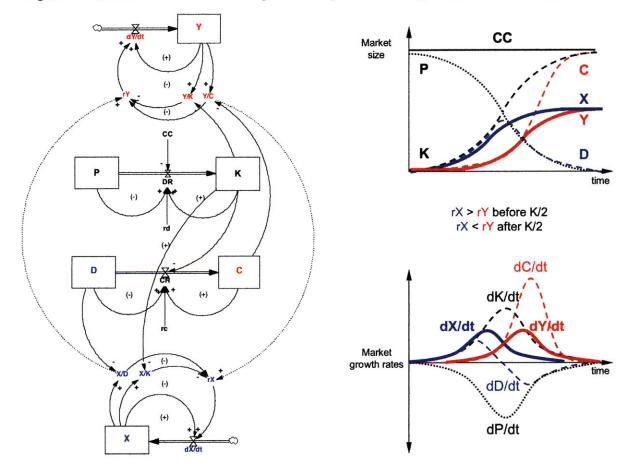


Inter-species Competition in a Diffusing, Commoditizing Market. The model now has two different ways of defining the state of evolutionary maturity of the environment: *quantity* and *quality* – that is, *how much* product is produced/consumed, and *what type* of product is produced/consumed. This final section therefore combines these two characterizations of the market environment into one model, where two different species of firms (characterized by the architectures of their respective extended enterprises) compete. The extent of competitive intensity is defined by the ability of each firm to overcome architectural inertia and transition from niche D to niche C as the market evolves. A summary of the coupled system of differential equations is shown below.

$r_X > r_Y$ when $(X+Y) < K/2$	$dX/dt = r_X X - r_X X^2/D - r_X X Y \alpha_{XY}/K - T \in X Y \alpha_{XY}(D - C)$	(12a)
$r_X < r_Y$ when $(X+Y) > K/2$	$\frac{dY}{dt} = r_Y Y - r_Y Y^2 / C - r_Y X Y \alpha_{YX} / K = r_Y N Y \alpha_{YC} (D - C)$	(12b)
	$dK/dt = r_d K (1 - K/CC)$	(12c)
	$dD/dt = -r_c D (1 - D/K)$	(12d)
	$\frac{dC}{dt} = r_{c}C(1 - C/K)$	(12e)

Figure 51 below summarizes the causal structure and resulting behavior of this nonlinear *fourth*-order formulation which results in S-shaped growth of the general market K, and the niche, C. Due to architectural inertia, each species is constrained to its own niche resulting in early exit, late entry and dominance-switching throughout the life-cycle of the industry.

Figure 51: Structure/Behavior of Inter-species Competition in a Diffusing, Commoditizing Market



DISCUSSION and CONCLUSIONS

Summary of Findings and Results

Industry-leading firms like Airbus, Toyota Motors, and Southwest Airlines in the manufacturing and services sectors respectively while not trying to solely maximize shareholder value have ironically delivered significantly more of it than their competitors who are trying to maximize this metric. In the process, these late-entrant challengers have displaced significant market-making incumbents – in fact, the dominant competitors of their species – in Boeing, General Motors and United Airlines respectively. The key to this puzzle lies in understanding the how such firms interact with their environments – that is, in the architecture of their organizational sets. The theoretical sample revealed the integral enterprise architectures (or K-strategists) can be successfully grown in socio-economic environments as diverse as Europe, Japan and the United States.

Discussion of Plausible Rival Hypotheses

At the outset of the is paper, we clearly stated that the objective of the research was to begin to answer a fundamental question in strategy and organization:

"Why do firms in the same industry vary systematically in performance over time?"

The theory presented herein attempted to explicitly pose a *systematic* explanation for a *longitudinal* phenomenon: namely, how does a firm interact with its external stakeholders as a system, and how does this interaction evolve over time. Most plausible rival hypotheses concerning the explanation of long-term firm performance, however seem to be non-systemic and focused on short-term "noisy" data. Another way of stating this is that they tend not to focus on the evolution of the environment and the subsequent evolution of the competing species of competitors. Such explanations implicitly assume intraspecies competition, which relies on explanations of *exogenous* events, simple *execution* problems or even *legitimacy*.

Exogenous Events. One of the most common non-systemic explanations is that *GM*, *United* or *Boeing* are experiencing events beyond their control, whether they are labor strikes, oil shocks or global credit crunches. This overlooks that their competitors *Toyota*, *Southwest* and *Airbus* experience the same events with fewer consequences, as their enterprise architectures endogenize or co-opt (Selznick, 1948) environmental constraints more effectively, for example by offering employment stability in return for year-on-year productivity improvements, thus avoiding labor strikes; by using a conservative hedging strategies to minimize the effects of high oil prices; or by maintaining conservative balance sheets with reserve cash to assist customers with financing of their products and services.

Execution. Another common non-systemic explanation frequently put forward by the leaders of their organizations is that *GM*, *United* or *Boeing* are simply experiencing execution problems. This class of plausible rival hypothesis, which focuses on poor execution of strategy, rather than on poor strategy itself or even more fundamentally, enterprise architectural misfit with environmental conditions is embedded in the focus on increasing *efficiency*, given a fixed strategy or enterprise architecture. A problem with this hypothesis may develop if longitudinal evidence demonstrates that such execution problems are persistent. Clearly, if a firm consistently and persistently is unable to execute its strategy successfully over the long term, then perhaps it has the "wrong" strategy, or an enterprise architecture which constrains its ability to pursue the most effective strategy.

Legitimacy. Another more ideologically-based non-systemic explanation is that *Toyota, Southwest* and *Airbus* are "cheating" due to their unusually close relationships with capital, labor and supplier markets or government and are therefore "illegitimate" forms of business systems. This is manifested by their competition referring to them as "Japan Inc.", Texas Inc.", or "Europe Inc." respectively. This

explanation may in fact be defensible, provided that an external refereeing organization had the power to declare their illegitimacy and enforce rules systematically and longitudinally against their existence. The fact that such refereeing organizations do not exist, or are not able to enforce rules legitimating only one enterprise architecture, might seem to imply that a plurality of architectures may in fact exist and thrive empirically in real business ecosystems.

Liability of Maturity. One of the most common plausible rival hypotheses which attempts to explain firm success is that the younger the challenger firm, the lower its costs, and the easier it is to be the cost-leader; or conversely, the older the incumbent firm, the higher its costs (e.g. due to pensions for an aging work-force), and the harder it is to be the cost-leader.

This can be questioned for example by looking at the evolution of the US airline industry, which is currently populated by a collection of expensive "legacy" carriers who created the industry and the relative late arrival of the challenger, *Southwest Airlines. Southwest's* long-term cost leadership has sustained a thirty-year attack from a series of newer and therefore (potentially) less expensive competitors, who arrived nearly a decade after *Southwest's* founding, due to deregulation of the US market.⁶⁷ What distinguishes *Southwest*, is the relative integrality of its enterprise architecture relative to younger challengers. This supports the claims of the organizational ecologists, who contend that mortality rates should be high for late entrants.

It is interesting to note that organizational ecologists have determined across a broad range of industries that in populations of isomorphic organizations, late entrants have statistically higher mortality rates than early entrants. In these cases however, the late entrant not only survives, but it overtakes the incumbent. In other words, the explanation for *integral* enterprise architectures' success as late entrants is that the form of its enterprise architecture is more adapted to a maturing environment – it is a new species in an evolving environmental niche.

⁶⁷ See Kelly and Amburgey (1991, pg. 603) for their analysis of entry and exit in the US airline industry.

Interest, Importance and Contributions

As business ecosystems continually evolve, a framework exploring the co-evolution of organizations and their environment would be of theoretical interest to strategic management, organization science and complex systems researchers, as well as of practical interest to senior executives in industry, particularly those facing significant environmental change and potential lack of organization-environment fit, and those engaged in "inter-species" competition. By adapting organizational ecology's focus on multiple organization *density* to strategic management's focus on single organizations, we attempt to bridge the two domains.

Firm-Industry Debate in Strategic Management

It was from this open-ended intensive, in-depth, longitudinal inductive study of both focal firms, that the data revealed something that the literature had not allowed for: a different species of organizational set which possessed fundamentally different architectural form, function, structure and behavior from its competitor. This allowed us to revisit and shed new light on Porter's (1996) classic construct of an *efficiency frontier* in light of heterogeneous enterprise architectures. Later analysis of the environment revealed fundamentally different conditions at the founding of each organizational set, which promoted their growth and development. In addition, the data revealed that both organizational sets served a symbiotic function for the other. While both were locked in conventional competition, one created the environmental conditions that enabled the other to grow and ultimately dominate. Concurrent analysis of the secondary samples confirmed that the same evolutionary processes and symbiotic inter-species competition occurred in a variety of settings ranging from manufacturing to services and across national boundaries from the US to Japan to Europe.

Adaptation-Determinism Debate in Organization Science

The framework acknowledges the concurrent roles of managerial adaptation and environmental selection in the co-evolution of firms and industries through the construct of organizational set architecture, which simultaneously enables and constrains agency. Rather than diminishing the role of agency, the framework identifies an enhanced role of top management, namely CEO not as chief executive, but as "chief architect" who defines and maintains the objective function, boundaries and interfaces of the organizational set. These findings contribute to the understanding of *strategic leadership* as an architecting activity which focuses upward and outward of the organization (Durbin, 1979), as opposed to downward and inward. As such, these findings refocus the attention of strategic management scholars from their traditional focus on *efficiency* (i.e. doing things right) to a focus on *effectiveness* (i.e. doing the right things) for a broader set of stakeholders than just customers or investors. This in turn implies that new models firms and their leaders, may focus again on power (Pfeffer and Salancik, 1978) and politics (March, 1962).

Although the theoretical framework developed herein was constructed inductively from multiple case studies, it does confirm and support both theoretical propositions from the literature's illustrious past (e.g. Burns and Stalker, 1961 and Lawrence and Lorsch, 1967), as well as from its more recent cutting edge. For example, Lenox, Rockart and Lewin (2006 & 2007) recently developed numerical simulations of Kaufmann's (1993) NK model to demonstrate theoretically that for industries with high interdependency among activities, there will be only a few high performers earning profits well above the industry average and a relatively large number of laggards. The three pairs of case studies presented herein support not only this claim, but also present a theoretical model which describes how such interdependencies evolve at both the ecosystem and organizational levels.

Modular-Integral Debates in Complex Systems

Simultaneity. This research attempts to shed more light on the classic intra-organizational architectural forms implied in Lawrence and Lorsch's 1967 classic: *Organization and Environment: Managing Differentiation and Integration.* From the title, we can see clear references to modularity and integrality within organizations as reflected in the demands of their environments. Their proposition that when the environment demands increasing intra-organizational differentiation, this must be accompanies with associated increasing intra-organizational integration (no matter how difficult combining these two may be). The research presented in this paper however, demonstrates how such apparent difficulties of matching these two opposing activities actually occur in modular enterprise architectures, and how and why this can both lead to competitive advantage and competitive disadvantage.

Functional Performance. The framework also begins to expose an apparent contradiction regarding the relative *functional performance* of modular vs. integral systems, depending upon the underlying ontological underpinnings of the phenomena under observation. When viewing systems as mechanistic e.g. in products (Ulrich, 1995) or even supply chains (Fine, 1998), a set of architectural propositions emerge which may in fact differ from those which emerge from a more complex organic point of view of organisms – and crucially – organizations, where dynamic capabilities (Teece, Pisano and Shuen, 1997) may exist.⁶⁸

Architectural theorists have posited that modular (or loosely-coupled) systems exhibit relative lower-cost. This may in fact be true for products or organizations viewed mechanistically, however for those organizations exhibiting integral architectures which enable the development of dynamic capabilities, the converse appears to be true.

Conversely, the same architectural theorists have posited that integral (or tightly-coupled) systems exhibit efficiency due to function-sharing, resulting in relatively higher performance system architecture. Our theory however demonstrates that "high-performance" is a relative property which is contingent upon the demands of the environment, whereby modular (or loosely-coupled) enterprise architectures can exhibit higher performance than integral, provided that the environment demands and rewards short-term speed and flexibility.

Evolvability. Finally, the framework also engages the classic premises of theories of systems architecture, and in doing so, begins to expose an apparent contradiction regarding the relative *"evolvability"* of modular vs. integral systems. Architectural theorists from Simon (1962) to Baldwin and Clark (2000), have posited that modular (or loosely-coupled) systems create an "option value" which copes well with future environmental design uncertainties, resulting in a more adaptable system architecture.

However, this research begins to demonstrate that by applying the same principles of system architecture to the more complex settings of organisms - and crucially - organizations, one can begin to observe empirically from the case studies discussed herein, that integral (or tightly-coupled) systems may in fact have higher evolutionary capabilities than modular systems – the key being the time horizon over which design evolution occurs. If the environment is relatively stable and certain, requiring only continuous albeit incremental design changes, then wholesale system-wide change is possible, and it is the integrality of the architecture of the enterprise that creates the setting for such organizational learning. If, however,

⁶⁸ As an aside, the dynamic capabilities theorists (Teece, Pisano and Shuen, 1997) define these capabilities as "the firm's ability to integrate, build, and reconfigure internal and external competences to address *rapidly* changing environments". We note that such capabilities appear apply also to firms in less rapidly changing environments, like *Toyota Motors* and *Southwest Airlines* (which ironically, Teece et al. name in their seminal paper).

the environment is relatively unstable and uncertain, the potential for radical design changes over a relatively short period of time is beneficial, and it is the modular architecture that enables such short-term flexibility.

The establishment of a universal "design rule" of architectural evolvability, appears to be contingent therefore in the epistemological characterization of the system under consideration, with modularity apparently conferring adaptability in mechanistic systems in turbulent environments, while integrality appears to confer adaptability in organic systems in stable environments.

Varieties of Capitalism & Mixed Duopoly Research

While most of the recent research in applying theories of the political economy to the firm (Hall and Soskice, 2000) has focused on descriptive models of macro-organizational forms, few have focused on firm performance as the dependent variable, explaining the environmental contingencies (e.g. market maturity) under which firms embedded in each of the national institutional archetypes (Liberal Market Economies vs. Coordinated Market Economies) tend to dominate.

This research empirically identifies a significant outlier (i.e. *Southwest Airline's* integral enterprise architecture), a Coordinated Market Economy-based firm, which is embedded within the archetypal US Liberal Market Economy. It has not only survived, but has grown to dominate the US airline industry comprising a population of incumbent LME firms. This case appears to offer significant counter-intuitive insights for both managers and a rich data set for researchers on how to create an inter-organizational architecture which does not utilize the apparent "natural" strengths of a national institutional archetype.

Similarly, in recent micro-economic research about mixed duopolies (e.g. Lambertini & Rossini, 1998), much has focused on theoretical models which determining equilibrium states, whereas this research attempts to demonstrate dis-equilibrium dominance-switching dynamics, and presents empirical evidence for such preliminary claims.

Limitations of Theoretical Framework

The framework presented herein aspires to initiate a theoretical basis for explaining the evolution of business ecosystems, by building from the foundations of the intellectual domains of strategic management and ecological-level organizational theory, and bridging across them with system architecture theory. Inevitably, such an endeavor will fall far short of its aims, some of the limitations of which are briefly discussed below.

External (Spatial) Validity. While the framework possesses reasonably strong internal validity, it is clearly limited in its external validity, i.e. in its generalizability or the scope of its applicability. This is due both to the small N theoretical sample size inherent in this initial exploratory study, as well as due to the rather narrow boundary around the environmental conditions for applicability: i.e. industries which exhibit product & process innovation (Klepper, 1996, pg. 565.). Such limited generalizability is likely to limit the utility of the framework, provided that the pursuit of greater generalizability is possible with such dynamically and functionally complex systems.

External (Temporal) Validity. The framework is limited temporally in its ability to explain the evolution of business ecosystems only from growth through maturity phases. Empirical data, upon which the framework was founded does not yet exist for industrial decline phases.

Future Research

As such a framework undoubtedly raises more questions than it answers, a rich research agenda can be developed which seeks to characterize the structure, function, and evolution of various species of organizational sets and their ecosystems. Some examples of this research might include the following:

Increase External Validity. The most important next steps would include additional longitudinal fieldbased case studies of competitors in other industries, exhibiting significant long-term variance in dependent and independent variables, enterprise architecture and firm performance respectively. This is needed not only to improve the external validity of the existing theoretical framework, but more importantly to begin to map out the key parameter ranges, which might alter the structure and behavior of the industry's evolution. For example, what is the effect of rapid changes to the exogenous variables like technology supply? Would *environmental selection* create a new enterprise architecture in such an environment, or would *managerial adaptation* evolve the incumbent firm due to the perpetually low levels of structural inertia?

Expand Temporal Scope of Framework. Additional empirical work is required in the case studies involved in this paper to determine what happens as industries evolve into later stages of maturity and eventually decline. Do all enterprise architectures begin as integral for exploration and eventually disintegrate for exploitation, creating a law of enterprise entropy? Conversely, do late entrants with integral architectures increase their integrality as the industry matures and declines, as the mathematical formalism would suggest?

Acknowledgements

The authors would like to thank the Engineering Systems Division, the Leaders for Global Operations program, the Lean Advancement Initiative and the Communications Future Program at the Massachusetts Institute of Technology, as well as Oxford Executive Education at the Saïd Business School of the University of Oxford for their support of this research.

Part I: RESEARCH DESIGN

Chapter 1 Introduction

1.1 Setting

This chapter will briefly answer the key "what?" and "why" questions regarding the research design. Chapter 2 will then go on to answer the "how?", "where?" and "when?" questions.

"It is not the strongest of the species that survive, nor the most intelligent, but the one that is **most** responsive to change."⁶⁹

"In the natural world, species evolve – that is, they change to meet new challenges – or they die. The same genetic imperative operates in business."⁷⁰

At its fundamental level, this research is about explaining long-term organization performance, at an architectural or morphological level – namely how do organizational species evolve, via managerial action or via environmental selection?

1.1.1 Research Abstract

"This is a comparative study of six organizations [three pairs, each] operating in the same industrial environment. The subsystems in each organization were differentiated from each other in terms of subsystem formal structures, the member's goal orientation, member's time orientations and member's interpersonal orientations. A relationship was found between the extent to which the states of differentiation and integration in each organization met the requirements of the environment and the relative economic performance of the organizations."⁷¹

This research aims to contribute to a fundamental debate in the field of strategic management regarding the source of long-term firm performance – namely does it reside within the firm or in the firm's environment? The answer is hypothesized to lie neither exclusively within the firm, nor in its environment, but in *how the firm interacts with its environment* – i.e. in the nature of the *architecture* of the firm's *extended enterprise*⁷².

"One of the enduring problems facing the field of strategic management is the lack of theoretical tools available to describe and predict the behavior of firms and industries. The fundamental problem is that industries evolve dynamically over time as a result of complex interactions among firms, government, labor, consumers, financial institutions, and other elements of the environment. Not only does industry structure influence firm behavior, but firm behavior in turn can alter the structure of an industry and the contours of competition."⁷³

Using concepts from the emerging field of *engineering systems* taken from the intellectual domains of *system architecture* and *system dynamics*, a framework is developed which traces the co-evolution of firms and their environments using their most abstract system properties of *form*, *function*, *structure*, *behavior* and *environmental fit*. The framework, which is rooted in the

⁶⁹ Charles Darwin.

⁷⁰ Charles Fine (1998), pg. 3.

⁷¹ Lawrence and Lorsch (1967b), pg. 1.

⁷² Fine (1998) and Dyer (2000) argue that competition is between supply and value chains. This research dissertation attempts to develop and extend such research to stakeholders beyond the supply chain.

⁷³ Levy, D. (1994), pg. 167.

intellectual traditions of contingency and configuration theories, posits the evolution of "dominant designs" in enterprise architectures throughout an industry's life-cycle, which oscillate deterministically and chaotically between *modular* and *integral* states.

"From a complexity perspective, research will have to focus on hypotheses about whole systems, their dynamics and the relationship between the dynamic and success."⁷⁴

The research builds grounded theory based initially on a seven-year, multi-level, multi-method, longitudinal case study of the enterprises of *Boeing* vs. *Airbus*, the global duopoly in the commercial airplane industry. The theory is further tested and generalized across a theoretical sample of firms in manufacturing and service sectors, with nonlinear dynamic simulation models developed to capture the governing dynamics of long-term firm performance. The developed framework is grounded empirically, analytically as well as theoretically by synthesizing a broad literature of enquiry ranging from economics to organizational theory.

"A fundamental understanding of **industry evolution** is critical to **strategy research**. The mechanisms that impart advantage for some firms over others should be evident in their effects on industry dynamics, and their efficacy will likely be altered with the course of industry evolution. The study of the effects of **interdependency** on industry evolution provides a very useful mechanism for strengthening the connections between both past and future strategy research at the firm and industry levels."⁷⁵

1.1.2 Rhetorical Style

This dissertation is written in the style of "scholarly dialogues". As opposed to merely citing relevant references, original quotations from prominent researchers are used throughout in order to capture the richness and clarity of their original arguments.⁷⁶

As one of the central points of this research is the identification and characterization of interspecies competition, where relevant, any quotation referring to growing market environments, or incumbent species, which manifest themselves today as having modular enterprise architectures will be shown in blue. Conversely, any quotation referring to maturing market environments, or challenger species, which manifest themselves today as having integral enterprise architectures will be shown in red.

⁷⁴ Stacey, R.D. (1995), pg. 493.

⁷⁵ Lenox. M.J., Rockart, S.F. and Lewin, A.Y. (2007), pg. 613.

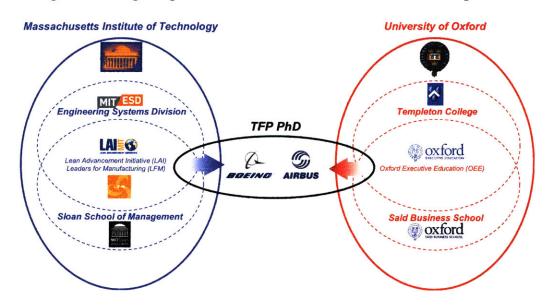
⁷⁶ Bold has been added *ex post* by this author in order to emphasize points made in this dissertation.

1.1.3 International Academic Collaboration

As shown in Figure 52 below, this work is the product of a series of both collaborative and competitive and yet integrative partnerships between the following world-class institutions:

- The academic institutions of MIT and The University of Oxford: ٠
 - Within MIT:
 - Engineering Systems Division
 - Sloan School of Management
 - Within Oxford: 0
 - Templeton College⁷⁷
 - Saïd Business School .
- The academic / industrial partnerships:
 - Within MIT:
 - Leaders for Manufacturing (LFM)⁷⁸
 Lean Aerospace Initiative (LAI)⁷⁹
 - Within Oxford:
 - Oxford Executive Education (OEE)
- The industrial competitors engaged with these academic institutions:
 - o Boeing
 - o Airbus

Figure 52: Integrating Academic Collaborators and Industrial Competitors



⁷⁷ Now, Green Templeton College.

⁷⁸ Now, Leaders for Global Operations (LGO)

⁷⁹ Now, Lean Advancement Intitative (LAI)

1.1.4 Doctoral Committee

The doctoral committee is designed to meet the overall logic inherent in the research plan. Its composition is an integral part of the research design supporting the research question and methodology. The committee, shown in Figure 53 below, represents the academic institutions upon which this research is based: the MIT *Engineering Systems Division*, the *MIT Sloan School of Management*.

The committee individually and collectively has functional, epistemological and industry-based domain expertise. In support of the international case study upon which this research is based (which will be outlined in detail in this document), the committee is based out of the following geographical centers:

- Dr. Charles Fine Professor, *Sloan School of Management* and *Engineering Systems Division* Massachusetts Institute of Technology, USA
- Dr. Deborah Nightingale Professor, *Engineering Systems Division* and *Aeronautics & Astronautics* Massachusetts Institute of Technology, USA
- Dr. Yossi Sheffi Professor, Engineering Systems Division and Civil & Environmental Engineering Massachusetts Institute of Technology, USA
- Carolyn Corvi Vice-President / General Manager of Airplane Programs Boeing Commercial Airplanes⁸⁰

1.1.4.1 Informal Committee

In addition to my core committee at MIT in the US, I was priviledged to have intellectual support during the European phase of my research, at the University of Oxford in the UK, the base from which I studied *Airbus*. The primary faculty with whom I worked were:

- Dr. Mari Sako
 Professor, International Business
 Saïd Business School, The University of Oxford, UK
- Dr. Sophie Marnette Professor, Linguistics & Philology The University of Oxford, UK

⁸⁰ Recently retired.

Figure 53: Doctoral Committee



Dr. Charles H. Fine

- Chrysler LGO Professor of Management & Engineering Systems
- Director, MIT International Motor Vehicle Program (IMVP)
- PhD committee Chairman and Thesis Supervisor



Dr. Deborah J. Nightingale

- Professor of the Practice of Engineering Systems and Aeronautics & Astronautics
- Director, MIT Lean Advancement Initiative (LAI)
- PhD committee member



Dr. Yossi Sheffi

- Professor of Engineering Systems and Civil & Environmental Engineering
- Director, MIT Engineering Systems Division (ESD)
- PhD committee member



Carolyn Corvi

- Vice President & General Manager, Boeing Commercial Airplanes (retired)
- MIT Sloan Fellow
- PhD committee member

1.2 Research Questions

"Hinnings and Greenwood (2002) bemoan the fact that organizational scholars have stopped asking big, important questions and instead have devoted an increased focus on technical precision and manageable research projects."⁸¹

This research dissertation is driven to answer some of the most fundamental academic questions within the field of strategic management as well as some of the most pressing questions facing senior leaders in some of the most competitive environments in industry. In this sense, theory and empiricism are tightly coupled and are the driving impetus behind this research endeavor.

"Often by definition, truly important research questions do not have clear solutions until after the research has been conducted. If solutions are well known in advance of the research, the question may be appropriate for consulting practice, but clearly not for basic scientific research... At issue here is not that strategic management research incorporates elements of consulting practice. The issue is one of formulating and addressing important research questions that capture the attention and motivation of scholars and practitioners alike in the merits for studying them."⁸²

⁸¹ Pfeffer (2005), pg. 99.

⁸² Van de Ven, A.H. (1992), pp. 181-182.

1.2.1 Primary Research Questions

This research attempts to answer a set of *primary* questions seeking explanations for firm performance and the nature of competition as well as a set of *secondary* questions regarding the origins of firm performance and the nature of strategic choice. The *primary* set of research questions focus on "what" is the relative explanatory power of different determinants of firm performance. The *secondary* set of research questions focus on "bow" the different determinants of firm performance are formed.⁸³ Each set of questions will be discussed briefly in the following sections.

1.2.1.1 High-level question

In its highest, most abstract form, this research plan focuses on the following question:

"Why do firms in the same industry vary systematically in performance over time?"⁸⁴

Seeking a *systematic* explanation of a *longitudinal* phenomenon inevitably requires characterizing the evolution of the industrial ecosystem, as both the organization (firm) and its environment (industry, markets and institutions) are co-evolving. This question is therefore explored *systematically* and *longitudinally* through the lens of Engineering Systems: 1) within the *domain* of Extended Enterprises, where architectural competition is examined in a theoretical sample of three classic engineering systems: aerospace, automotive and airlines; and 2) using the *approaches* of Design and Dynamics, by analyzing enterprise architectures and their change management processes and by modeling their competitive dynamics.

This fundamental question, which lies at the center of an ongoing debate in the strategic management research community, is the most generalized form of the research question posed by the doctoral plan described herein.⁸⁵ The debate in question is between those who assert that the sources of differential firm performance and competitive advantage lies in firm positioning within the *external* environment of the industry versus those who assert that advantage lies in a firm's *internal* resources.

The industry structure proponents argue that in a competitive environment, firm heterogeneity is a short-lived phenomenon, and that any internal advantage would be quickly discovered and competed away. The resource-based theorists argue that such sustainable advantages arise from rare and inimitable capabilities.⁸⁶

While recent empirical studies (Hansen and Wernerfelt, 1989; Rumelt, 1991; Powell, 1996; Roquebert et al., 1996; McGrahan and Porter, 1997; Wiggins and Ruefli, 2002; Hawawini et al.,

⁸³ Farjoun, M. (2002), pp. 565.

⁸⁴ This question has been posed by numerous researchers, including Nelson, R. (1991) and Hoopes, D.G. et al. (2003). I am indebted to Prof. Mari Sako for pointing this out to me.

⁸⁵ Population ecologists are interested in the general question on why firms differ in disequilibrium as well as equilibrium states, while strategic management researchers are implicitly interested in a subset of firm heterogeneity: namely why firms differ in equilibrium or, why successful firms differ (Carroll, G., 1993).

⁸⁶ Wiggins and Ruefli (2002) explore the sustainability of competitive advantage using a rare longitudinal sample comprising 6,772 firms in 40 industries over 25 years, demonstrating just how rare the phenomenon is.

2003)⁸⁷ have in fact begun to quantify the relative importance of each point of view, other researchers have noted that this debate in fact misses the point:

"The debate as to which of the resource-based or the industry structure perspectives on firm strategy is the more valid is not a particularly useful one as **both** organizational capabilities and the firm's environment drive strategy and performance."⁸⁸

Noted economist Alfred Marshall characterized the irony of choosing in this external-internal debate via analogy:

"Context and capability provide two blades of strategic scissors that come together in the creation of a corporately value-added output."⁸⁹

This research therefore attempts to discover the deep underlying foundational nature of longterm firm competitive performance as the dependent variable, and the evolutionary systemic interactions between the firm's capabilities and its environment. This research therefore attempts to:

"...respond to the lack of understanding about co-evolutionary processes within the field of strategic management and to calls for more studies that synthesize firm- and industry-level perspectives in strategy and organization research."⁹⁰

"The interplay between organizational processes and industry dynamics in determining the firm's 'capability trajectory'... [as] an open systems perspective is clearly not new. However, the strategy field has not been terribly effective at bridging such levels of analysis and perspectives."⁹¹

In particular, the notion of *enterprise architecture* is developed to provide a guiding causal explanation for the observed phenomena, as shown in Figure 54 below.⁹² It is hypothesized that this meso-level *enterprise architecture* reflexively shapes and is shaped by the firm's internal capabilities as well as simultaneously shapes and is shaped by the external environment. In the spirit of *structuration* theory (Giddens, 1979), an enterprise's architecture simultaneously enables and constrains managerial action, but does not necessarily determine it.

Various "species" of enterprise architectures will be described which have varying degrees of designed environmental fit. Instead of the environmental determinism defining managerial action or vice versa, we will investigate the conditions under which managers reflexively "define how the environment defines my organization." This theory therefore attempts to build on theories of influential scholars like Edith Penrose:

"Firms not only alter the environmental conditions necessary for the success of their actions, but, even more important, they know that they can alter them and that the **environment is not independent** of their own activities."⁹³

⁹² The original pilot research study which explored these concepts is Piepenbrock T.F. (2004).

⁸⁷ See Appendix B for a summary of the external-internal debate.

⁸⁸ Henderson, R. and Mitchell, W. (1997).

⁸⁹ Loveridege, R. (2003), pg. 99.

⁹⁰ Huygens M. et al. (2001), pg. 972.

⁹¹ Levinthal, D. and Myatt, J. (1994), pg. 49.

⁹³ Penrose, E.T. (1959), pg. 42.

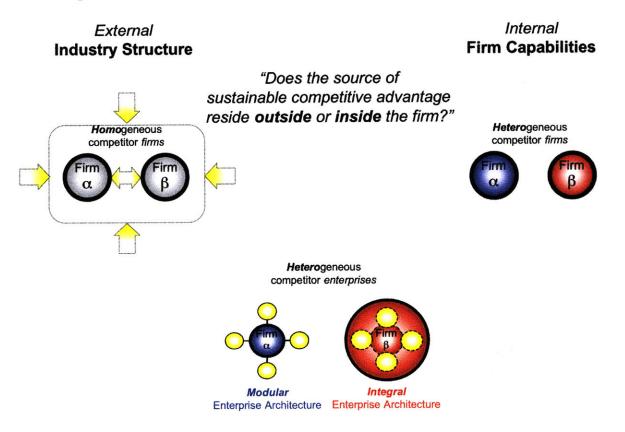


Figure 54: Enterprise Architecture as a synthesis of External-Internal Theories

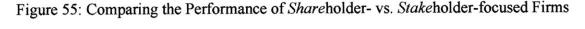
In addition to merely describing enterprise architectures as static phenomena, this research also aims to explore how they compete diachronically, and finally how this diachronic competition shapes the evolution of the enterprise architectures themselves over time.

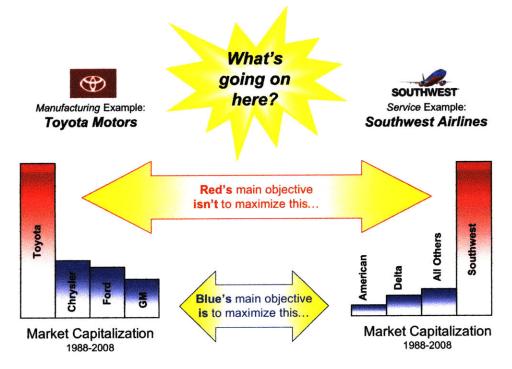
1.2.1.2 Mid-level question

Embedded in the preceding discussion lies a slightly lower-level, less abstract, and more specific question which derives from Penrose's (1959) original research:

"How do firms that have a stakeholder approach differ in competitiveness, commitment, and strategic flexibility from firms that maximize stockholder wealth?"⁹⁴

This question actually forms the central focus of the research. In fact, as will be demonstrated in Chapter 3, the question will be stated more provocatively as "How do firms whose primary objective is to maximize shareholder value, deliver significantly less of it than those firms who are not trying to maximize shareholder value?" Figure 55 below summarizes the question as applied to two world-class companies, *Toyota Motors* in the manufacturing sector, and *Southwest Airlines* in the services sector.





The answer will be hypothesized to lie in how firms manage their firm-environment ecosystems; in whether or not cause and effect are perceived to be close or distant in space and time. Such a complex and counterintuitive question will drive the need for a research design that embraces both dynamic and behavioral complexity, as will be discussed in Chapter 2.

⁹⁴ Rugman, A.M. and Verbeke A. (2002).

Although clearly a subset of the original abstract, high-level firm performance question, this question focuses the problem more clearly on those firms that have different objective functions. It is important to note that this question therefore focuses the research away from the more generalized question of competition among firms regardless of their objective functions, whether they be the same or different.

It will be hypothesized later in this research, that the firm's objective *function* drives the firm's relationship with its immediate environment or extended enterprise – both spatially and temporally. More explicitly, enterprise architectural *form follows function*.

1.2.1.3 Low-level question

Finally, the above high- and mid-level questions ultimately derive from the idiosyncratic, context-specific, low-level question that arose from industry:

"How did Airbus emerge from obscurity in the commercial aircraft industry and unseat Boeing as the premier commercial aircraft company in the world?" $p^{0.95}$

This question is interesting given previous research studies (Collins and Porras, 1994) have classified *Boeing* as "built to last" - that is "visionary", "successful" and "enduring" compared to its lifelong rival, *McDonnell Douglas* (which it ultimately acquired).

"How did **Boeing** emerge from obscurity in the commercial aircraft industry and unseat **McDonnell Douglas** as the premier commercial aircraft company in the world?"⁹⁶

Again, this form of the question is clearly a subset of the original abstract, high-level firm performance question. In addition, is can be demonstrated to be a form of the more specific mid-level question regarding the stakeholder-shareholder dichotomy.

In attempting to provide an answer to this low-level question, this research plan will in addition attempt to move back up in abstraction to provide a more general, mid-level theory explaining systematic long-term performance differences between competing enterprise architectures. While no explicit claims will be made for a higher-level theory, this research attempts to incrementally contribute to the original debate of firm performance in the field of strategic management.

⁹⁵ This question, which originated from *Boeing* senior executive committee during the initial two-year pilot study is an example of other industry and firm-specific questions like explaining *Toyota & Southwest Airlines* success over their dominant rivals *GM & Ford* and *American & United Airlines* respectively.

⁹⁶ Collins and Porras (1994), pg. 17.

1.2.2 Secondary Research Questions

While the *primary* research questions come from the applied field of strategic management, a second set of questions arose as the research progressed from strategic management's foundational disciplines: economics and sociology as shown in Figure 56 below. These surrounded the fundamental nature of firms (vs. markets) as well as the epistemological nature of strategic choice (vs. determinism).

"I advance two related theses. First, economic theory predicts that organizations will be a mess but not a mystery. Second, classic case studies conducted by organizational sociologists support this prediction. Fully defending and articulating these theses will require a book...""⁹⁷

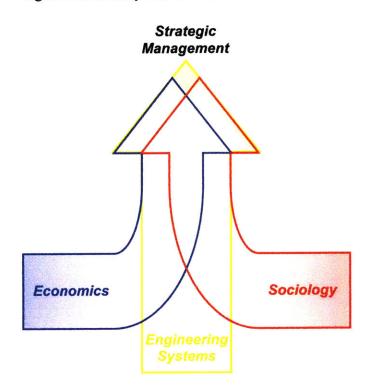


Figure 56: Primary Intellectual Social Science Fields

"I suspect that there is an enduring reason that the neoclassical 'economic man' theories seem to have more reach, resonance, and staying power than people-centered stakeholder relations theories. They are easier to teach, easier to do. Economic theories are neat. People are messy. Analytics are crisp, emotions are messy.""⁹⁸

⁹⁷ Gibbons, R. (1999), pg. 145.

⁹⁸ Kanter (2005), pg. 94.

1.2.2.1 Debates in *Economics*

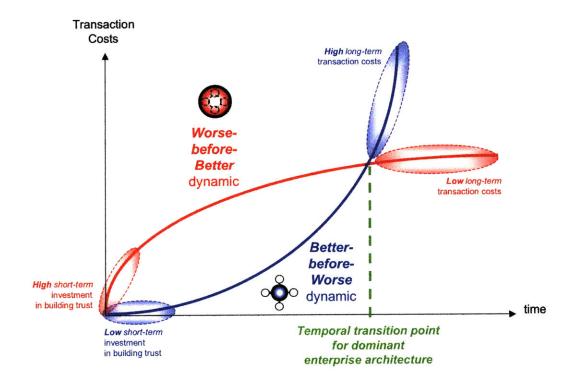
1.2.2.1.1 Markets vs. Hierarchies

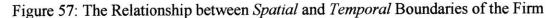
A fundamental question in the field of economics surrounds the very nature of the firm (Coase, 1937; Williamson, 1975, 1985), positing their existence is due to the failure of markets.

The fundamental construct posited by this research dissertation – enterprise architecture – attempts to engage this market-hierarchy debate by challenging the boundaries of the firm as a unit of competitive advantage via such mechanisms as transaction costs and relational contracting.

1.2.2.1.2 Firm Boundaries and Minimization of Transaction Costs

Williamson's (1975, 1985) transaction cost economics (TCE) proposed that firms should organize their spatial boundaries to minimize transaction costs. This proposed research attempts to enrich the TCE dialogue by exploring the nonlinear dynamic relationships governing which time horizons do Williamson's prescriptions apply. As shown in Figure 57 below, do temporal boundaries affect the spatial boundaries? Does short-term minimization of transaction costs?





1.2.2.2 Debates in Sociology

1.2.2.2.1 Debates in Organizational Theory

This firm-environment interaction forms a central and ongoing debate in strategic management and organization theory. The richness and complexity of this debate is captured through the following two "diagonal" questions of Astley and Van de Ven's (1983) integrative meta-theoretical framework and shown in Figure 58 below.⁹⁹ Namely, the northwest-southeast diagonal:

"Is organizational life determined by **intractable environmental constraints**, or is it actively created through **strategic managerial choices**?"

and the equally challenging southwest-northeast diagonal:

"Are organizations neutral technical instruments engineered to achieve a goal, or are they institutionalized manifestations of the vested interests and power structure of the wider society?"

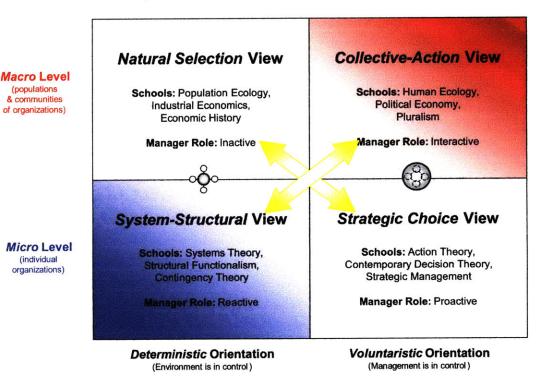


Figure 58: Central Debates in Organization Theory¹⁰⁰

⁹⁹ Astley and van de Ven (1983), pp. 245-273.

¹⁰⁰ Astley and van de Ven (1983).

1.2.2.2.1.1 Social Determinism vs. Human Choice

In the first question, the enterprise architecture is either defined by the environment - leaving no room for managerial action, or it is built endogenously by powerful proactive leaders.¹⁰¹

1.2.2.2.1.2 Macro-Industry vs. Micro-firm

In the second question, the firm is seen as being either overwhelmed by the exogenous forces of the environment, or as being an integral part of an endogenized extended enterprise. The implications are that managers should either *react* to the contingent demands of the environment, or they should *interact* with their extended enterprise.

What these two questions clarify is that long-term firm performance is a complex interaction played out on at least two dimensions: the macro- (industry) vs. micro- (firm) level, and the social determinism vs. free will duality of human nature.

"As far as 'choice vs. determinism' is concerned, the alternative perspective focuses on the possibility of open-ended choices available to agents made possible by chaotic dynamics, but constrained by the feedback structure of the system. Even though the system may be deterministic with regard to structure, it is open-ended with regard to outcome."¹⁰²

As will be discussed in subsequent chapters, this research proposes an intermediate vehicle for explanation between the choice-determinism debate. The enterprise architecture construct simultaneously enables and constrains, but does not determine the outcomes.

1.2.2.2.1.3 Differentiation vs. Integration

Organizational theorists – and most notably structural contingency theorists (Lawrence and Lorsch, 1967) – noted that tasks tended to be differentiated and then reintegrated. This research dissertation empirically clarifies that *successful* firms match appropriate levels of differentiation with integration, while in less successful firms, levels of differentiation tend to exceed levels of integration.

¹⁰¹ Empirically, this question arises when examining the origin of integral enterprise architectures like *Southwest Airlines* and *Airbus Industrie*. In the *Southwest* example, it is hypothesized that the enterprise architecture is built proactively and internally (or endogenously) by the visionary founder and chairman, Herb Kelleher. Conversely, in the *Airbus* example, it is hypothesized that the enterprise architecture is built inactively and externally (or exogenously) by the founding European nations.

¹⁰² Stacey, R.D. (1995), pg. 490.

1.2.2.2.2 Debates in Population Ecology

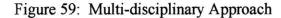
1.2.2.2.2.1 High Mortality Rates of Late Entrants

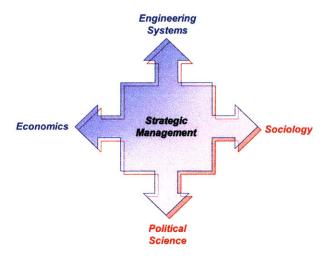
The sociological sub-field of population ecology has long observed that late entrants in an industry's evolution (e.g. those arriving post-dominant design) tend to have higher mortality rates (Hannan and Freeman, 1984). Plausible hypotheses and explanations have focused on firm age and inertia, both as a strength and a weakness in determining firm mortality.

This research dissertation however identifies a special "species" of late entrant, who not only survive against the odds, but in fact thrive and go on to dominate the industry. This research further moves beyond the traditional theories of inertia and explores the hypothesis of firm-environment co-evolutionary fit.

1.2.3 Tertiary Research Questions

While the *primary* research questions centered on the field of strategic management, and the *secondary* research questions centered on its constituent fields of economics and sociology, the *tertiary* research questions focus on the fields at the core of the primary explanatory variable of this research: the architecture of the extended enterprise. As will be discussed later, this builds from well-established theory in engineering systsms (i.e. theories of systems, complexity and architecture), as well as from well-established theory in political science (i.e. theories of power and politics), as shown in Figure 59 below.





While the above are the broad scientific disciplines embraced with this research, it would be helpful to narrow down the intellectual space so that I might point out a few notable interactions which this work attempts to contribute. As shown in Figure 60 below, this research is effectively about the intersection of strategy, leadership and macro-organizational design and change. The intersections most relevant to this research are: Strategic Leadership, Strategic Organization, and Leadership of (not in) Organizations (Hooijberg et al., 2007).

Figure 60: Research at the Intersection of Strategy, Organization and Leadership



1.3 Research Objectives

The purpose and objectives of the research are three-fold: First to *describe* empirically the evolutionary trajectory of internal capabilities of selected competing firms and the evolutionary characteristics of the external environment within which they compete. Second, to *explore* the evolutionary trajectories of the strategies employed by these firms, and finally to *explain* how the external environment and internal capabilities interact over time to produce performance trajectories - that is how, when and why these firms dominate their industry.

"The final product of building theory from case studies may be concepts, a conceptual framework, propositions, or possibly mid-range theory."¹⁰³

Although admittedly ambitious, the intended output of this research is a meta-theoretical framework or model whose purpose is to organize and advance existing mid-range theoretical models.¹⁰⁴

1.3.1 The Rigor-Relevance Dialectic

The dialectic between the thesis (rigor) and antithesis (relevance) is well-known in the academic and practitioner literatures.

"Academic fights are more brutal than fights in the real world because the stakes are so low."¹⁰⁵

"Organizations have become the dominant institution on the social landscape. Yet the body of knowledge published in academic journals has practically no audience in business."¹⁰⁶

"Cooperation between academics and managers is so rare that when it happens, it makes national newspaper headlines. It is hard to be both rigorous and relevant. This dilemma occurs because the set of skills, values, mind-sets, and attitudes that are needed to conduct rigorous academic research are fundamentally different from the set of skills, values and attitudes needed to conduct managerial research. The two skill sets also conflict. By trying to do both, an academic researcher runs the risk of paying a huge straddling cost... one has the trade-offs that arise from inconsistencies in an academic's image or reputation... Although great ideas are always welcome, the truth of the matter is that most good managerial research is not of this kind... One type of managerially relevant research is the one intended to develop grand new theories without the necessary empirical evidence to support them. The idea is to develop these theories and then have future researchers empirically test them for accuracy and validity (think of Darwin's theory of evolution). This type of research requires a writer to take creative leaps an offer ideas and insights not immediately supported by available data. This is risky business, and we should enourage young colleagues to avoid this type of research. It is better suited to academics who can afford to take such risks – perhaps academics who have already received tenure in the system. "¹⁰⁷

¹⁰³ Eisenhardt, K. (1989), pg. 545.

¹⁰⁴ This ambition was similarly stated by Farjoun, M. (2002), pp. 572.

¹⁰⁵ This quote is most recently from an interview with Dr. Henry Kissinger (Summer 2003 issue of *Bulletin*, the American Association of Neurological Surgeons). He embraced both sides of the relevance-rigor debate as a professor for nearly 20 years at Harvard University, US national security advisor, secretary of state under two US presidents, and Nobel laureate. He playfully highlights both sides by acknowledging the importance of rigor, but evaluates it within the relevance frame.

¹⁰⁶Daft & Lewin (1990), pg. 1, in their paper launching the new academic journal, Organization Science.

¹⁰⁷ Markides, C. (2007), pp. 762, 764 and 766.

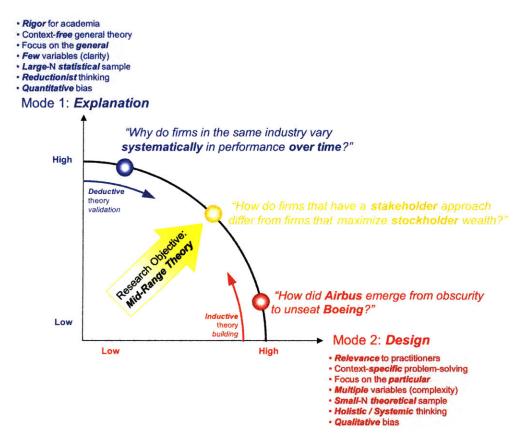
"Analyzed are 32 established organizational science theories in terms of their rated importance, validity, and usefulness. Little evidence of any relationships among these variables is found."¹⁰⁸

The resolution of this dialectic between thesis and antithesis into a workable synthesis - while difficult - requires a higher level of abstraction.

"I have striven in these writings of mine, without defacing the truth, to satisfy **everybody**; and perhaps I have not satisfied **anybody**, and if this should be so, I shall not be astonished by it, because I judge it impossible, without angering **many**, to write of the affairs of their own times."¹⁰⁹

As shown in Figure 61 below, these complementary objectives refer to the classic 'rigorrelevance' debate in management (Argyris and Schon, 1991), which are distinguished as 'mode 1' knowledge production which is primarily driven by academic concerns, and 'mode 2' which is primarily an intense interaction between knowledge production and knowledge dissemination and application (Gibbons et al., 1994).





"Somewhere between the specific that has no meaning and the general that has no content there must be, for each purpose and each level of abstraction, an **optimum degree of generality**".¹¹⁰

¹⁰⁸ Miner, J. (1984), pg. 296. The relevance-rigor dialectic is posed by Vermeulen, F. (2005).

 ¹⁰⁹ From Niccolo Machiavelli's *The History of Florence*, quoted in Feaver, G. (1984), pg. 564.
 ¹¹⁰ Boulding, K.

1.3.2 Multi-modal Objectives

"To predict requires that we posit a correlation between present and future events; to explain we posit a correlation between present and past events."¹¹¹

The objectives of this research are divided in the following subsections into the primary objectives rooted in the *explanatory* sciences, and the secondary objectives rooted in the *design* sciences (van Aken, 2004) or *policy* sciences (Etzioni, 2006).

1.3.2.1 Mode 1 objective: Explanation / "Prediction"

"Evolutionary explanations are scientifically legitimate, even if they can't be used to predict the exact nature of changes."¹¹²

Due to the inherently complex, highly nonlinear and potentially chaotic nature of the phenomenon being studied, long-term prediction is not feasible in a *deterministic* sense. However, as the theory developed herein is evolutionary, processes of variation, selection and retention act to make *probabilistic* predictions.

"Hypothetical probability predictions do not have any value for actual prediction except insofar as the conditions mentioned in the hypothesis are predictable or experimentally producible; hence there will be cases where we can explain why certain animals and plants survived even when we could not have predicted that they would."¹¹³

The research does however aspire toward understanding and explanation by uncovering the underlying causal structure which drives behavior. While the establishment of the causal structure is possible, the variety of parameters in the form of decision rules, ultimately makes behavior impossible to predict. It is the pursuit of this "generic" causal structure that is "universal" and that allows for "generalization" of the theory, not in the prediction of the resulting behavior.

"The complexity, situation specificity, and changing nature of the firm and its environment strains conventional approaches to theory-building and hypothesis testing."¹¹⁴

"From a complexity perspective research will be unable to yield predictors of or prescriptions for long-term success – research will have to focus on explanation instead, on hypotheses about whole systems, their dynamics, the conditions under which they will display different kinds of dynamic, and the relationship between the dynamic and success."¹¹⁵

Figure 62 below summarzes the objectives of explanation and "prediction" superimposed on the phenomena of interest – namely, interspecies competition and the co-evolution of business ecosystems. These objectives will be matched by a research method as discussed in chapter 2.

¹¹¹ Aldrich, H.E. (1979), pg. 52.

¹¹² Aldrich, H.E. (1979), pg. 52.

¹¹³ Scriven (1959), pg. 478.

¹¹⁴ Porter, M.E. (1991), pg. 97.

¹¹⁵ Stacey, R. (1995).

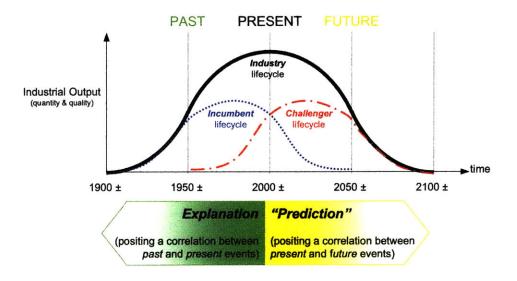


Figure 62: Research Objectives of Explanation and "Prediction"

1.3.2.2 Mode 2 objective: Design

"The scientist discovers that which exists, the engineer creates that which never was.""16

"Policy research is always dedicated to changing the world while basic research seeks to understand it as it is."¹¹⁷

The difference between the objective of the scientist and the engineer is vast. In fact social "scientists" (like Jay Forrester) who came to management from an engineering background, tended to transport a design objective for organizations.

"The goal is 'enterprise design' to create more successful management policies and organizational structures...which influence growth and stability."¹¹⁸

However, it was Nobel prize laureate, Herbert Simon (1988) who noted that the design objective was not private domain of engineers:

"Engineers are not the only professional designers. Everyone designs who devises courses of action aimed at changing existing situations into preferred ones. The intellectual activity that produces material artifacts is no different fundamentally from the one that... devises a new sales plan for a company. Design, so construed, is the core of all professional training: it is the principal mark that distinguishes the professions from the sciences. Schools of Engineering as well as schools of architecture and business... are all centrally concerned with the process of design."¹¹⁹

¹¹⁶ From aerodynamicist, Theodore von Karman (1881-1963).

¹¹⁷ Etzioni, A. (2006), pg. 833.

¹¹⁸ Forrester, J.W. (1961).

¹¹⁹ Simon, H. (1988), pg. 67.

Unlike engineering in the physical sciences or medicine in the biological sciences, management did not evolve from administrative sciences. In the field of organization studies, the design objective languished.

"Social scientists are trained to do good empirical research and descriptive theory building without being overly concerned with implications for organization design or performance outcomes. Researchers try to develop parsimonious theories based on a small number of variables that can explain phenomena across a range of organizations. Prescriptive research, however, requires comprehensive understanding of a specific situation that is not often generalizable to other settings. Most scientific journals do not encourage publication of papers whose objective is prescription or design application. Scientific journals typically favor manuscripts that provide generalizable theories from comparative empirical studies, which frequently are not sufficiently concrete or detailed enough to yield design suggestions."

With regard to the field of strategic management, Porter (1991) notes that the two primary approaches to theory building in strategy include rigorous, situation-specific, mathematical *models* of limited complexity vs. multivariate *frameworks* like the "competitive forces" approach, which capture the complexity.¹²¹

"The need to inform practice has demanded that strategy researchers ... pursue the building of frameworks rather than restrict research only to theories that can be formally modeled."¹²²

For these reasons, while this research ultimately aims for mid-range theory, it simultaneously strives for building a conceptual framework, generating rich propositions and ultimately testable hypotheses.

Although much strategy research has progressed quickly from the descriptive to the normative as it has transitioned from theory to practice, this work aims to cautiously engage the normative debate. Due to the relative immaturity of the theories developed from this research, much more confirmatory work is needed before confident normative recommendations can be made.

"The field of strategic management is avowedly **normative**. It seeks to guide those aspects of... management that have material effects on the survival and success of the business enterprise."¹²³

Normative prescription limitations notwithstanding, this research plan does not aim to stop with a rich, complex description of the case study. Rather, it adopts a *positivist* view of research, in which the goal is to develop testable hypotheses and theory which are generalizable across different settings (Eisenhardt, 1989).

"A more ambitious result would be an effective partnership of descriptive-driven and prescriptive-driven research."¹²⁴

¹²⁰ Daft and Lewin (1990), pg. 4.

¹²¹ Porter, M.E. (1991, pg. 98) notes that the use of frameworks can be challenged because their complexity makes it difficult to falsify arguments.

¹²² Porter, M.E. (1991), pg. 98.

¹²³ Teece, D. J., Pisano, G., and Shuen A. (1997).

¹²⁴ van Aken (2004), pg. 242.

This research plan therefore takes its queues from Forrester (1961), Simon (1969, 1988), van Aken (2004) and Etzioni (2006) for the development of *design* knowledge, which occupies the middle ground between descriptive theory and actual application.

1.3.3 Four Types of Scholarship

"In his book Scholarship Reconsidered, Ernst Boyer (1990) described four different kinds of scholarship: the scholarship of discovery (research), the scholarship of integration (synthesis), the scholarship of practice (application), and the scholarship of teaching (pedagogy). Historically, business schools have celebrated and accommodated as equals the practitioners of all four kinds of scholarship. Over the last 30 years, we have lost this taste for pluralism. Those with primary interests in synthesis, application, or pedagogy have been eliminated from our milieu or, at best, accommodated at the periphery and insulated from the academic high table that is now only reserved for the scientists."¹²⁵

It is important at the outset to set the expectations of the reader of this research. While by the very definition of doctoral *research*, this work intends to focus on the scholarship of discovery, it moreover attempts to embrace the pluralism of the other three forms of scholarship: integration, practice and teaching (Boyer, 1990). One of the primary reasons for such attempted plurality of scholarship is that it is in the process of engaging these "lesser" three (integration, practice and teaching) that the "primary" research form emerged. In fact, stated in a more counter-intuitive way, although the desired *end* is "good" research, the *means* employed is clearly the pursuit of the other three forms of scholarship.

"We need to temper the pretense of knowledge and re-engage with the scholarships of integration, application, and pedagogy to build management theories that are broader and richer than the reductionist and partial theories we have been developing over the last 30 years."¹²⁶

"More and more business schools are currently embarking on campaigns to hire significant numbers of clinical professors (sometimes called 'professors of practice'). These clinical professors typically excel at what Boyer called the scholarships of practice, synthesis and pedagogy."¹²⁷

¹²⁵ Ghoshal, S. (2005), pg. 80.

¹²⁶ Ghoshal, S. (2005), pg. 87.

¹²⁷ Hambrick, D.C. (2005), pg. 105.

1.3.3.1 The Scholarship of *Integration* (Synthesis)

As will be discussed in more detail in chapter 2, much of the value of this research lies in its integration of a variety of disparate intellectual traditions, ranging from economics to sociology in the social sciences to engineering and architecture in the physical sciences.

1.3.3.2 The Scholarship of *Practice* (Application)

As was discussed briefly in this chapter, much of the impetus for the development of this research was grounded in the application of real problems rooted in practice.

1.3.3.3 The Scholarship of *Teaching* (Pedagogy)

As was alluded to in the acknowledgements section, much of the actual content of this research framework was derived from the teaching and learning from research participants in the spirit of knowledge "co-creation". This included the opportunities to "teach" graduate students, faculty and senior executives at MIT and the University of Oxford, as well as executives in numerous companies within *Boeing* and *Airbus*' ecosystem.

1.3.3.4 The Scholarship of *Discovery* (Research)

Finally, although the ultimate aim of this project is to pursue the process of academic discovery within the bounds of "normal science," it must be said that any success or lack thereof will be largely constrained by the trade-offs inherent in the active pursuit of the other three forms of scholarship.

1.4 Research Framework

1.4.1 Unit of Analysis

The unit of analysis will be presented using both economics and sociological terminology, which while not identical in meaning, convey a richness of constuct unavailable with only one convention.

1.4.1.1 *Economics*-based terminology

While the dependent variable focuses on the long-term *firm* performance, this research hypothesizes that a source of this performance lies in the firm's relationship with its *environment*, therefore the unit of analysis is the firm's *extended enterprise*.

"The importance of the concepts of **differentiation** and **integration** to the analytic scheme developed here can best be indicated by the definition of the **primary unit of analysis** in this study – the **organizational system**. An organization is defined as a system of interrelated behaviors of people who are performing a task that has been differentiated into several distinct subsystems, each subsystem performing a portion of the task, and the efforts of each being integrated to achieve **effective performance of the system**."¹²⁸

The above definition of "organization" taken from Lawrence and Lorsch's classic 1967 work was used to describe *intra*-firm subsystems or functional divisions. In this research, the same definition of "organization" can be applied, only this time, defining *inter*-firm subsystems or stakeholder groups.

"By these definitions, the **boundaries of organizations** will not always coincide with their legal boundaries: some institutions, such as large corporations, encompass a number of organizations by our definition; while others, such as certain subcontractors, do not constitute a single complete organization."¹²⁹

The following definitions briefly draw distinctions among the various levels of analysis.

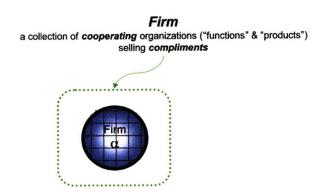
¹²⁸ Lawrence, P.R. and Lorsch, J.W. (1967), pg. 3.

¹²⁹ Lawrence, P.R. and Lorsch, J.W. (1967), pg. 4.

1.4.1.1.1 Firm

Within the firm, this research more specifically aims to focus on a subset of the firm, namely the "strategic business unit" (or SBU) as shown in Figure 63 below. This research thereby focuses on long-term firm performance in the realm of *business* strategy, as opposed to *corporate* strategy.

Figure 63: Working Definition of Firm



One of the reasons that the strategic business unit was selected as the unit of analysis is its relative importance in determining variance in profitability. Researchers (Rumelt, 1991; Powell, 1996; Roquebert et al., 1996; McGrahan and Porter, 1997; Hawawini et al., 2003) have demonstrated that 32%-45% of variance in firm profitability is directly attributed to SBU effects while only 1%-18% is attributed to corporate effects, and 10%-20% attributed to industry effects.¹³⁰

1.4.1.1.2 Industry

In ecomonics, an *industry* is the supply side of a *market*. For clarity, this research uses Porter's (1980) definition of "industry" as a collection of firms selling substitute goods or services as shown in Figure 64 below.

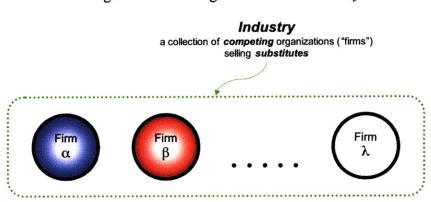
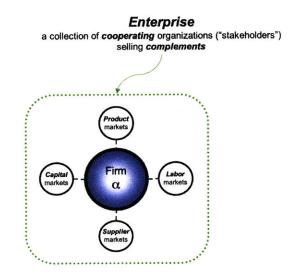


Figure 64: Working Definition of Industry

1.4.1.1.3 Extended Enterprise

"The battlefront in today's competitive wars, and the ultimate core competency of a business organization, is the design of the ... extended enterprise."131

Instead of taking an "engineering" perspective, by looking downwards and inwards into the firm itself for answers, this research takes an "architectural" perspective, by looking upwards and outwards into the firm's ecosystem¹³² or extended enterprise¹³³ as shown in Figure 65 below. The enterprise is defined as those organizations which impact the firm's success. In this sense, the enterprise can be thought of as the "environment" in traditional organizational theory.





This definition of an enterprise draws upon Barnard's (1938) concept of organizations as cooperative systems. Note that the stakeholder axes and constituent stakeholders will be discussed in detail in essay #1, as will a discussion of the firm as a "nexus of contracts" / "nexus of relationships".

The name of the firm at the center of the extended enterprise will be the "keystone" firm, borrowed from biological ecosystem theory.¹³⁴

"In strategy courses, we have presented the 'five forces' framework (Porter, 1980) to suggest that companies must compete not only with their competitors but also with their suppliers, customers, employees and regulators. "135

¹³⁰ See Appendix B.

¹³¹ Fine, C.H. (1998).

¹³² In the biological ecology literature, the organism, whose presence in the ecosystem drives the behavior and performance of many others is known as the "keystone" organism. ¹³³ As a diversified firm's SBU is the unit of analysis, one cannot ignore the parent firm's relationship to the SBU

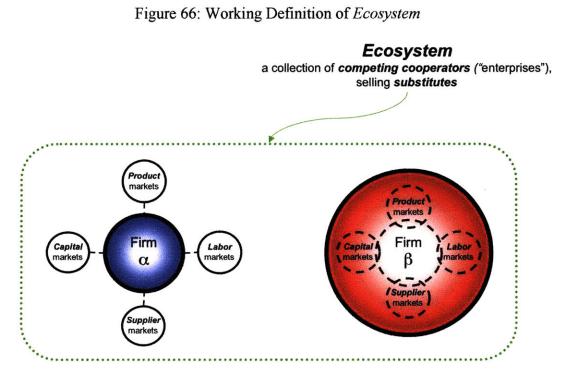
when taking an architectural perspective of the extended enterprise.

¹³⁴ Recently, Iansiti, M. and Levien. R. (2004) applied this metaphor to business ecosystems.

¹³⁵ Ghoshal, S. (2005), pg. 75.

1.4.1.1.4 Ecosystem

Finally, if an *industry* is defined as a collection of competing organizations (firms), and an *enterprise* is defined as a collection of cooperating organizations (stakeholders), then as shown in Figure 66 below, an *ecosystem* is defined as a collection of competing enterprises or "competing cooperators".



From above it should be noted that in theory, competing enterprises can be coupled through any or all stakeholders, the most common of which can be customers (i.e. product markets).

As will be discussed in the next chapter, this research dissertation will focus on the competitive dynamics of a *duopoly ecosystem*, that is, not just two competing firms, but two competing enterprises. We will also begin to explore when such "competing cooperators" become "cooperating competitors".

1.4.1.2 Sociology-based terminology

1.4.1.2.1 Organization

"Organization is the arrangement of personnel for facilitating the accomplishment of some agreed **purpose** through the allocation of **functions** and responsibilities"¹³⁶

Although the definition of an organization varies, I use a classic definition from Selznick (1948) which emphasizes *goal* or *purpose* and *functional decomposition* as important aspects. Given this research project's interest in business ecosystems, this would be similar to *firm* (or more colloquially, *company*) using economics terminology.

1.4.1.2.2 Organizational Set

Moving up one level of analysis is the organizational set, that is the organizational unit that consists of the focal organization and its interdependent organizations (or stakeholders). Again, using economics terminology, this would be similar to *enterprise* or *extended enterprise*.

"A crucial defining characteristic of the concept of **organization set** is that it views the environment from the standpoint of a specific (focal) organization."¹³⁷

The organization set level of analysis is typically used by a variety of disciplines focused on studying organizational-environment interactions, like resource dependence (Pfeffer and Salancik, 1978) and transaction cost economics (Williamson, 1975)

"Analysts employing the resource dependence approach, typically work at the level of the organization set as do many of those utilizing transaction cost approaches."¹³⁸

This research will posit a typology of organizational sets which range from internally competitive to internally cooperative (like an *interorganizational community* – see below).

1.4.1.2.3 Organizational Population

"[Populations consist of...] all the organizations within a particular boundary that have a common form."¹³⁹

Although population ecologists define a *population* of organizations as those organizations having a common *form*, the precise definition of what constitutes form is rather elusive – sometimes purposefully so.

"Hannan & Freeman (1977, 1989) explicitly refrained from proposing any fixed rules or typology for identifying organizational forms. They argued that form may be generally inferred from an

¹³⁶ Selznick, 1949, pg. 114.

¹³⁷ Scott, 2003, pg. 126.

¹³⁸ Scott, 2003, pg. 127.

¹³⁹ Hannan and Freeman, 1977, pg. 936.

organization's formal structure or normative order, and that the classification of an organization as one form or another may be specified according to the interests of the investigator."¹⁴⁰

Having noted the plurality in the current literatures, this research tends to focus on the systemic properties inherent in both architectural as well as biological definitions, namely: goals, boundaries and activities.

"Organizational forms – the specific configurations of goals, boundaries, and activities – are the elements selected by environmental criteria, and change may occur through new forms eliminating old ones or through the modification of existing forms."¹⁴¹

Organizational populations are collections of isomorphic organizations, competing within the same niche. Thus, an economist's "industry" may be comprised of one or more populations.

"Ecologists define populations as organizations exhibiting the same structural form while economists define industries as including all organizations serving the same demand or function, which could include quite diverse types of providers of substitutable products."¹⁴²

In light of the primary construct of this research – the enterprise architecture – an organizational population refers to those enterprise architectures (organizational sets) having similar architectural forms, this is modular or integral.

1.4.1.2.4 Organizational Community/Field

"Interorganizational communities and organizational fields... focus attention on a collection of diverse types of organizations engaged in competitive and cooperative relations."¹⁴³

"An organizational community is a set of co-evolving organizational populations joined by ties of commensalism and symbiosis through their orientation to a common technology, normative order, or legal-regulatory regime."¹⁴⁴

An organizational *community* or *field* transcends the level of analysis of an organizational *population* by encompassing both similar and dissimilar organizations, which allows for the potential for birth and death of organizational populations.

"A number of advantages are associated with this level of analysis. First, we can examine the interdependence and coevolution of organizations of differing types. Organizations that both compete and cooperate with similar and diverse organizations. Second, a community or field-level perspective allows us to observe not only the waxing and waning of a particular type of organization but also the disappearance of some types and the emergence of new forms (Astley, 1985). Third, the organizational field can be viewed as encompassing the other levels: the individual organization, the organizational set, and two or more populations of interdependent organizations. "¹⁴⁵

¹⁴⁰ Romanelli, E., (1991), pg. 82.

¹⁴¹ Aldrich, H.E., (2006), pg. 28.

¹⁴² Scott, (2003), pg. 127.

¹⁴³ Scott, (2003), pg. 129.

¹⁴⁴ Aldrich, H.E. and Ruef, M, (2006), pg. 243.

¹⁴⁵ Scott, (2003), pp. 130-131.

1.4.1.3 Comparision of Terminologies

Table 7 below summarizes the terminology used for the analyses in both economics and sociological terms.

 Table 7: Terminology Comparision in Economics and Sociology

Notes	Economics	Sociology
Focal unit of Enterprise	Firm	Organization
Primary construct	Enterprise	Organizational Set
Homogenous collection of competing Firms	Industry	Organizational Population
Heterogenous collection of competing Firms		Organizational Community/Field
Homogeneous collection of competing Enterprises	Ecosystem	Population of Organizational Sets
Heterogeneous collection of competing Enterprises		Community/Field of Organizational Sets

Figure 67 below summarizes the definitions in both economics and sociological terms.

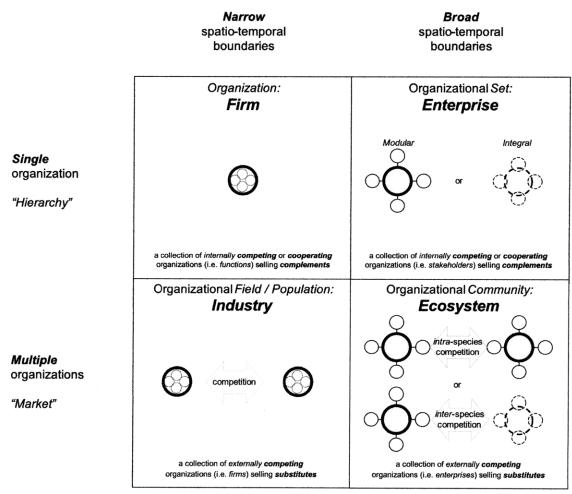


Figure 67: Summary of Working Definitions

Figure 68 below summarizes conceptually the how the unit(s) of analysis are applied to the proposed framework. Note that the primary construct of "enterprise architecture" is at the level of organizational *set*, while the overarching unit of analysis is the level of organizational *community* (of organizational *sets*).

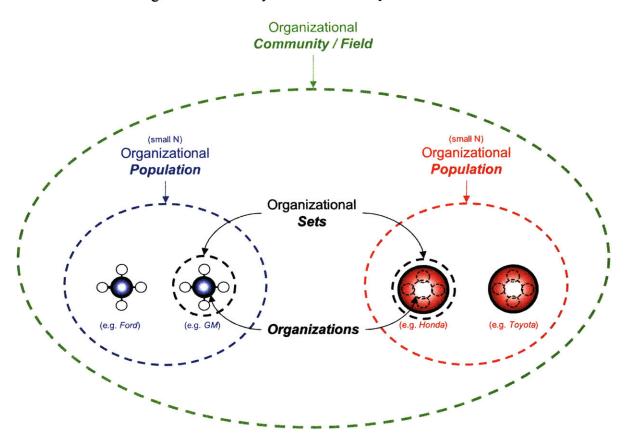


Figure 68: Summary of Units of Analysis in Framework

One final clarification of definitions is needed. This framework holds constant and focuses its investigative lens on the environment or market. For example, this may be "the design and manufacture of large commercial airplanes." This market may evolve over time in both quantity and quality spaces, and it in fact may support differing species of competitors. When one of the propositions states that dominant designs oscillate over time from integral to modular to integral, it is referring to the enterprise architectures of the dominant species, which could theoretically be the same species which evolves, or it could be the emergence and exit of multiple species. This is illustrated in Figure 69 below.

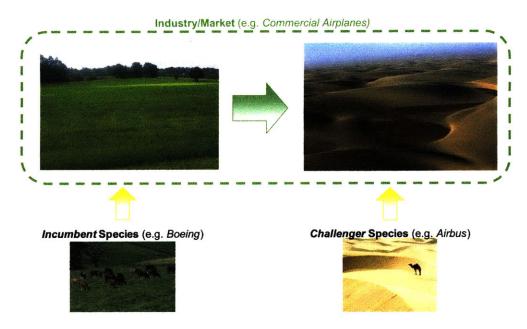
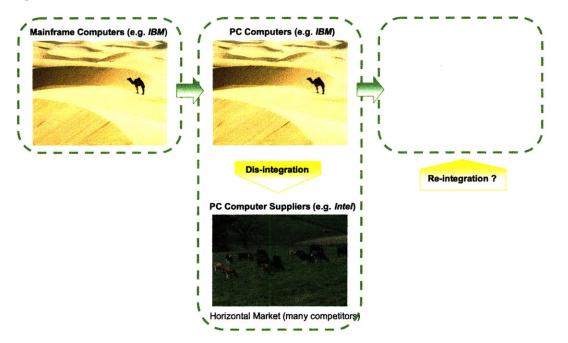


Figure 69: Focus is on the Evolution of Dominant Species within a Fixed Environment

This is in contrast with a body of resesearch (e.g. Fine, 1998) which aims to postulate theories concerning the evolution of market niches within a changing environment as illustrated in Figure 70 below. Here, the firm-supplier make-buy interface is posited to oscillate over time from integral to modular to integral.

Figure 70: Focus is on the Evolution of Market Niches in a Changing Environment



1.4.2 Variables

The following subsections briefly discuss the relevant variables used in the research dissertation. The dissertation is initially introduced in terms of the familiar and traditional correlative terms of *dependent* and *independent* variables.

"The scope of variables that basic research encompasses can be quite legitimate and effective but also rather narrow. Policy researchers must be more eclectic and include at least all the variables that account for a significant degree of variance in the phenomenon that the policy aims to change."¹⁴⁶

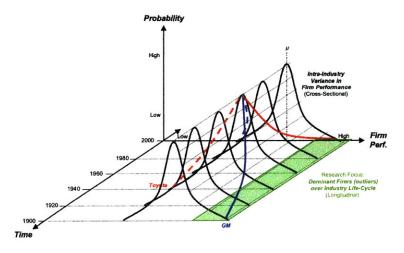
As the goal of this research is to develop complex causal mechanisms, the dissertation then proceeds to clarify the variables as *interdependent*.

1.4.2.1 "Dependent" variable: Long-term Firm Performance¹⁴⁷

At the highest, most abstract level, this research seeks to explain the variable of performance – and specifically long-term firm performance. The following subsections will decompose this variable into the definitions used for the purpose of the research.

Explanations of sustained superior firm performance in the industrial organization-based "barriers" or resource-based "inimitability" frameworks, tend to focus on cross-sectional distributions either between or within industries. This research however focuses on *longitudinal* data of *intra*-industry sustained long-term firm performance. As such, we are interested in tracking the performance of dominant firms as they grow and die throughout the industry's life-cycle, as illustrated in Figure 71 below.

Figure 71: Longitudinal Trajectories of Dominant Firms within an Industry's Evolution



¹⁴⁶ Etzioni, A. (2006), pg. 838-839.

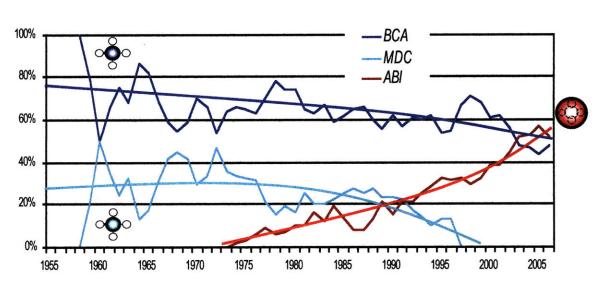
¹⁴⁷ It should be pointed out that this research attempts to explain the circular causal interactions of competencecompetition using feedback principles, therefore the explicit acknowledgement of "dependent" and "independent" variables can be misleading.

1.4.2.1.1 Defining "Long-term"

As this research seeks underlying mechanisms for how the external competitive environment shapes and is shaped by firms' internal capabilities, long-term trends must be observed. This research therefore seeks systemic "first mode" explanations of long-term trends and performance trajectories. As this research also seeks to explain co-evolution of firm performance with industrial evolution, the definition of "long-term" will correspond to the development of the industrial life-cycle S-curve. While this period will vary from industry to industry, it is observed to take from 10 to 50 years depending on the speed of industrial development.

As shown in Figure 72 below, "long-term" performance will therefore exceed the length of the typical 3-5 year business cycle. In doing so, local "non-systemic" (or higher mode) explanations for firm performance will be "filtered out". Examples of such non-systemic causal explanations include various *endogenous functional* explanations: e.g. a better/worse product design, a more/less effective marketing campaign, a labor strike, or various *exogenous environmental* explanations: e.g. the oil-crisis, 9-11 terrorist attacks, etc. This research is interested in those enabling and constraining "structures" (or enterprise architectures) which consistently and systematically create better product designs, more effective marketing campaigns, no expensive labor strikes or which consistently and systematically control exogenous events .

Figure 72: Explaining Long-Term (1st Mode) Trajectories of Firm Performance





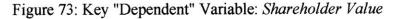
1.4.2.1.2 Defining "Firm Performance"

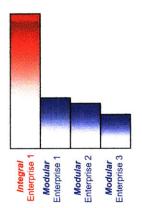
Such performance can be measured in a number of ways¹⁴⁸, including survival/longevity, market share or profitability.

"Profit is an opinion ... "

The continuous dependent variable used in this research (as is typical for most research in competitive strategy) is long-term firm competitive performance, defined specifically as *economic* or *financial* performance.¹⁴⁹ As such, there are a vast number of measures and metrics upon which to base the research.¹⁵⁰ This is made even more complicated given the fact that the theory constructed herein identifies a spectrum of *enterprise architectures* each having diametrically-opposed performance objective functions (as characterized by Penrose's question above). This makes a direct comparison of performance difficult, as each architecture purports to achieve different objectives.

In order to reconcile this dilemma, the common performance metric that will be used for all enterprise architectures will be maximization of shareholder value as represented schematically in Figure 73 below as market capitalization, even though this is the explicit goal of the shareholder-based architecture, while it is an indirect and implicit goal of the stakeholder-based architecture.





Market Capitalization

The research will demonstrate the circumstances under which shareholder value is maximized by those architectures actively attempting to do so, and when it is maximized by those architectures that are not solely focused on this objective.

¹⁴⁸ Ford and Schellenberg (1982) identify three different frameworks: the goal approach, the systems recource approach and the constituency approach.

¹⁴⁹ It is well-known in strategic management literature (Powell), that performance based on financial measures is sensitive to the financial measures chosen, and moreover, the notion of performance, is actually a socially-constructed phenomenon (Fligstein).

¹⁵⁰ A common financial performance metric used within the strategic management literature is "accounting profit" (McGrahan and Porter, 1997).

1.4.2.1.2.1 Sub-variables: profitability and growth

"Growth might be the lifeblood of a business, but it isn't always the best or most sustainable way to create value for shareholders. Return on invested capital (ROIC) is often just as important a measure of value creation and can be easier to sustain at a high level."¹⁵¹

The notion of shareholder value (or market value) has been demonstrated to be mediated by the effects of *growth* and *profitability*, which have direct linkages to the *exploitation* and *exploration* tendencies of different enterprise architectures (Cho and Pucik, 2005). The firm's growth performance will be measured by the three compound annual growth rates of total assets (inputs), total revenues (outputs) and economic and market value added, EVA & MVA (value).¹⁵² The firm's profitability performance is measured by three profitability ratios of ROA, ROE and ROI.¹⁵³

As will be argued later, the different enterprise architectures tend to have objective functions based on either profitability or growth (Thurow, 1992). For this reason, both will be tracked.

1.4.2.1.2.2 Sub-variables: past performance and future health

"Managing companies for success across a range of time frames – a requisite for achieving both performance and health – is one of the toughest challenges in business." 154

In addition, the notion of shareholder value has been demonstrated to be dependent upon *past* financial performance and *future* growth prospects.¹⁵⁵ These sub-variables will be important in understanding the distinction between enterprise architectures and their underlying mechanics.

"It's common corporate-finance knowledge that something on the order of 60 to 80 percent of the value of a business lies in its long-term cash flows. And if you're investing with a short-term horizon you're giving up the value creation of a business."¹⁵⁶

¹⁵¹ Cao, B. Jiang, B. and Koller, T. (2006), pg. 12.

¹⁵² Note that there is an inherent conflict embedded in strategy research between the typical unit of analysis, and the metric used as the dependent variable. Desirable market-based financial variables like MVA are typically reported for the corporate entity in a diversified conglomerate, while those for the disaggregated strategic business unit are more difficult to determine.

¹⁵³ It should be noted for the *Boeing–Airbus* duopoly that the notions of returns on assets, equity and investment are difficult to measure and not necessarily reliable measures of profitability (Dess and Robinson, 1984). As each firm embarks on different strategic make-buy paths for example, the boundaries of the firm change, as does the ownership of assets and therefore the meaning of ROA. In addition, each firm is on a different trajectory of equity offerings and ownership, the notion of ROE is difficult to compare. In this instance, a more transparent and meaningful measure in a capital-intensive duopoly with large economies of scale would be used like market share. ¹⁵⁴ Dobbs, Leslie and Mendonca (2005), pg. 63.

¹⁵⁵ Dobbs and Koller (2005).

¹⁵⁶ David Blood, Managing Partner of Generation Investment Management, in Mendonca and Oppenheim (2007), pg. 4.

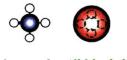
1.4.2.2 "Independent" variables

1.4.2.2.1 Primary variable: Enterprise Architecture

"A proposed theory may posit that construct A leads to outcome B, but since A is a 'consruct,' the reader often wonders what A is in real life. How would one measure A? How would one know that the empirical variable that one has obtained really captures A? By seeing a concrete example of every construct that is employed in a conceptual argument, the reader has a much easier time imagining how the conceptual argument might actually be applied to one or more empirical settings."¹⁵⁷

The primary construct developed to explain the dependent variable of long-term firm performance is the enterprise architecture, that is the firm and is relationships with its key stakeholders, as is shown in Figure 74 below. As was addressed earlier, this construct attempts to resolve a key debate in the field of strategic management between the source of competitive advantage as residing internally within the firm or externally in the environment.

Figure 74: Primary "Independent" Variable: Enterprise Architecture



"Independent" Variable: Enterprise Architecture



"Dependent" Variable: Long-Term Firm Performance

¹⁵⁷ Siggelkow, N. (2007), pg. 22.

1.4.2.2.2 Intervening variables: Firm Function & Environment Evolution

"The ability to get closer to theoretical constructs is particularly important in the context of longitudinal research that tries to unravel the underlying dynamics of phenomena that play out over time. As scholars have increasingly begun to appreciate the role of dynamic processes (e.g., path dependency or evolutionary processes), rich longitudinal research is needed to provide the details of how these processes actually play out."¹⁵⁸

In addition to explaining the source of long-term firm performance, the research seeks to explain where the "independent" variable itself comes from. In order to do this, the research proposes two other mechanisms or variables for this purpose: enterprise function as a *mediating* variable between enterprise architecture and long-term firm performance, and environmental evolution as a *moderating* variable between long-term firm performance and enterprise architectures as shown in Figure 75 below.

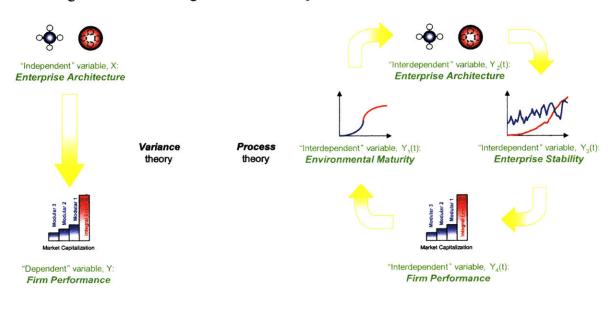


Figure 75: Intervening Variables: Enterprise Function & Environment Evolution

¹⁵⁸ Siggelkow, N. (2007), pg. 22.

1.4.2.3 Interdependent variables

"The only meaningful way to study organization is to study it as a system. As Henderson [1935] put it, the study of a system must rely on a method of analysis, '...involving the simultaneous variations of mutually dependent variables."¹⁵⁹

Modern organizational theory has long recognized the organization as a system of mutually dependent variables (Scott, 1961). Such mutually dependent variables has been referred to by noted organizational studies scholar, Karl Weick (1979) as "interdependent" variables.

"The cause-effect relationships that exist in organizations are dense and often circular."¹⁶⁰

Such interdependent variables can be thought of as arranged in a system of causal feedbacks (Forrester, 1961; Weick, 1979) generating both positive and negative feedback loops operating in complex organizations (Richardson, 1991).

"Modern organization theory asks a range of interrelated questions: (1) What are the strategic parts of the system? (2) What is the nature of their **mutual dependency**? (3) What are the main processes in the system which **link** the parts together? (4) What are the **goals** sought by systems? [5] What **research tools** should be used for the study of the system?"¹⁶¹

This research dissertation therefore embraces the underlying systemic nature of the organizational phenomena under consideration and its highly interdependent variables. The operational questions being answered reflect those of a systems-theoretic approach applied to the study of organizations.

"The utility of the notions of 'mechanistic' and 'organic' management systems resides largely in their being related as dependent variables to the rate of environmental change.

There are other 'independent variables' which directly affect the form taken by any management system (although, even conceptually, their independence from each other as well as from the management system, is not to be insisted upon; causal relationships in this, as in other social fields, are not one-way affairs)."¹⁶²

1.4.2.3.1 Correlative vs. Causal approaches

Although the preceding discussion of the *dependent* and *independent* variables implies that the research dissertation will focus on traditional large sample statistical regression analyses to establish correlation among variables, in fact due to the nature of the question, data and epistemology, a feedback causal approach will be undertaken as shown in Figure 76 below.¹⁶³

¹⁵⁹ Scott, W.G. (1961), pg. 15.

¹⁶⁰ Weick, K. (1979), pg. 7.

¹⁶¹ Scott, W.G. (1961), pg. 16.

¹⁶² Burns, T. and Stalker, G.M. (1961), pp. vii and 96.

¹⁶³ Sterman (2000), pg. 141 warns about the importance and difficulty in establishing causal not correlative relationships between variables in system dynamics.

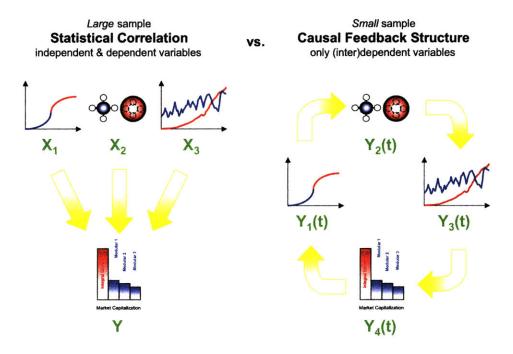


Figure 76: Correlative vs. Causal approaches

"We must wait until theories have been much better developed before we can highlight the relatively few variables which can be measured and rigorously examined statistically."¹⁶⁴

As mentioned earlier, the theory generated from this research intends to identify the fundamental macro-variables that drive long-term trends and trajectories in firm performance. It is hoped that further future theory development and refinement will lead to the justification for the use of more rigorous statistical methods needed to fully validate and extend the theory. For the purposes of this research program, the establishment of underlying causality takes precedence over correlation. This focus on seeking underlying causality takes its queue from the pragmatic design-oriented tradition of architectural theory, upon which much of the grounded theory of this research is based:

"Instead of just looking for statistical connections between variables, we may try to find causal relations between them... The search for causal relations of this sort cannot be mechanically experimental or statistical; it requires interpretation: to practice it we must adopt the same kind of common sense that we have to make use of all the time in the inductive part of science. The data of scientific method never go further than to display irregularities. We put structure in them only by inference and interpretation. In just the same way, the structural facts about a system of variables in an ensemble will come only from the thoughtful interpretation of observations. We shall say that two variables interact if and only if the designer can find some reason (or conceptual model) which makes sense to him and tells him why they should do so."¹⁶⁵

¹⁶⁴ Porter, M.E. (1991).

¹⁶⁵ Alexander, C. (1964), pp. 108-109.

1.4.2.3.2 Variance vs. Process approaches

"Process research is concerned with understanding how things evolve over time and why they evolve in this way. Whereas variance theories provide explanations for phenomena in terms of dependent and independent variables, process theories provide explanations in terms of the sequence of events leading to an outcome."¹⁶⁶

Variance theories attempt to point toward correlation in the constructs. They are concerned with *what* the relative explanatory power of different constructs are (e.g. external competition vs. internal capability in determining firm performance).

Process theories, conversely attempt to uncover plausible causality in the system. They are concerned with *how* the constructs are formed (Van de Ven, 1992).

As will be described in more detail in chapter 2, this research dissertation will attempt to build theory primarily from *process* data, although the aim of using *variance* data is recognized and will ultimately be recommended (Markus and Robey, 1988; Langley, 1999).

"Although process explanations featuring the role of history and learning were central in the founding of the main [strategy] theories (e.g. Selznick, 1957; Penrose, 1959; Chandler, 1962), they have been largely neglected by subsequent research."¹⁶⁷

Over the past 40 years since the establishment of some of the most significant strategic management theories, much research in the strategic management field has drifted away from a *process* approach towards a *variance* approach, as would be expected. This research dissertation however attempts to join the recent calls in the strategic management literature to restart the cycle of knowledge creation by focusing again on *process* explanations, due to the observation that over the past 40 years there have been significantly new phenomena which need to be understood and explained. In this research, it is the nature of competition between two radically different architectural forms or "species", which heretofore have not come into "contact" that is unique and therefore requires a new approach.

¹⁶⁶ Langley, A. (1999).

¹⁶⁷ Farjoun, M. (2002), pg. 565.

1.4.2.3.3 Randomness and Indeterminacy

"The model suggests that the relationship between environments and organizations is not random but is indeterminate, and that the very indeterminacy of environmental effects on organizations is potentially explainable."¹⁶⁸

The emphasis of this research on *process* theory, with *interdependent* variables attempts to reveal that the firm's relationship with its environment is not fully random, yet neither is it fully determinate. The same situation of theory drove the research agendas of other scholars (Pfeffer and Salancik, 1978).

"Given this causal sequence, one may not observe a perfect relationship between organizational actions and structures and the environment for several reasons. First, since each intermediate variable undoubtedly has other causes besides those specified, the relationship between between environments and organizational actions and structures may be attenuated by these other factors. Second, because of the linked nature of the causal process, any indeterminacy or error in the process will be magnified because of the intermediate steps that link environments with organizations. For instance, even if each of the causal links were as strong as a .8 correlation, the overall correlation between environmental dimensions and organizational characteristics would be only .51. It is not surprising, therefore, that researchers often fail to find strong relationships between environmental characteristics and organizational outcomes."

¹⁶⁸ Pfeffer, J. and Salancik, G.R. (1978), pg. 228.

¹⁶⁹ Pfeffer, J. and Salancik, G.R. (1978), pg. 229.

1.4.3 Boundary Assumptions

1.4.3.1 Spatial

The framework developed herein has boundaries of application, and assumptions embedded in the boundaries. They will be addressed in terms of the market (demand) environment and the technological (supply) environment.

1.4.3.1.1 Market

The product and service offerings of the firms and industries studied are relatively homogeneous and stable. That is, competitors in the automobile industry are largely competing on the production of cars and competitors in the airline industry are largely competing on the delivery of seat miles. The complex fracturing and fragmentation of markets into niches or the evolution into services is not the primary focus of the research.¹⁷⁰

1.4.3.1.2 Technological

Technological development is assumed to progress smoothly between discontinuities.

¹⁷⁰ I am indebted to Prof. Mari Sako for helping to identify this, and for challenging my thinking in this set of assumptions.

1.4.3.2 Temporal

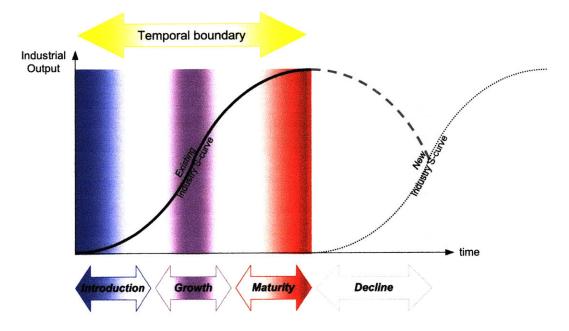
This dissertation aims to develop a theory of the evolution of business ecosystems. By definition therefore, it aims to analyze the evolution temporally (that is diachronically) from the "birth" to "death" of an industry (and its associated ecosystem), as well as between "life-spans" of successive industries.

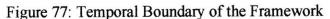
1.4.3.2.1 Long-term Trends

"The model is not intended to account for short-run changes, which are temporary responses to local conditions, but rather for long-run transformations in the form of social organization."¹⁷¹

1.4.3.2.2 Truncated Life-Cycle

In order to bound the analysis and more importantly to bring parsimony to the developed theory, this dissertation will focus on a truncated version of the classical industry lifecycle (Porter, 1980, pg. 158.), namely from the *introduction* phase through the *growth* phase, and finally through the *maturity* phase. This research will therefore give less emphasis to the *decline* phase. As shown in Figure 77 below, the dissertation therefore effectively maps out the classic "S-curve". An implicit assumption is that the evolution of a new industry will occur near the peak of industry sales.





¹⁷¹ Aldrich, H.E. (2006), pg. 27.

1.4.3.2.3 Bi- vs. Tri-phase Industry S-Curve

Finally, this dissertation initially sets out to describe a theory of the evolution of business ecosystems in terms of a *bi*-phase temporal discretization of the industrial S-curve. This is done to present the competing generic environmental regimes of *exponential growth* vs. that of *goalseeking stability* characterized by *emerging* and *maturing* markets respectively.

Once simplification is established, then a further refinement is made in which the environment is characterized into a *tri*-phase temporal discretization of the industrial S-curve as shown in Figure 78 below.

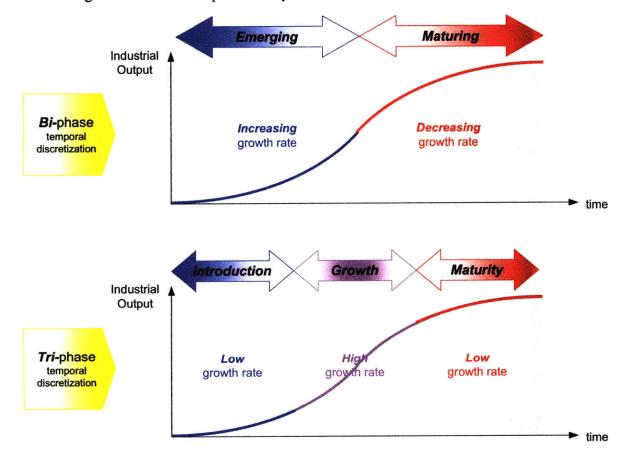


Figure 78: Bi- vs. Tri-phase Temporal Discretization of the Industrial S-Curve

1.4.4 Summary of Research Framework

The following section briefly summarizes the three main a priori constructs used for the research. In addition, some of the fundamental propositions are developed. The mid-range theory that is derived from these constructs and propositions, can be seen as an *architectural* design *heuristic*.

As the research develops, the intent is the development of testable proposition-derived hypotheses that are based on measurable data. The low-level substantive theory that is derived from these hypotheses and data can be seen as an *engineering* design *law*. The structure of the mid-range theory is illustrated below in Figure 79.

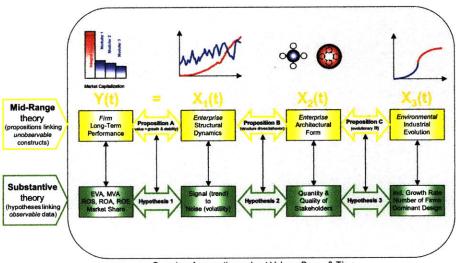


Figure 79: Structure of Proposed Mid-Range Theory

The theory attempts to show how long-term firm performance is ultimately caused by enterprise architectural form, and how it causes the evolutionary environmental conditions which create the architectural forms. Given the unit of analysis, the dependent and independent variables, the equation that this research will attempt to derive, constrain (bound), and ultimately prove is the following:

$$Performance = f(form, structure, environment)$$

or more explicitly:

Long-Term Firm Performance = $f(enterprise \ architectural \ form, \ input-output \ structural \ dynamics, \ industrial \ evolutionary \ dynamics)^{172}$

Boundary Assumptions about Values, Space & Time

¹⁷² I am indebted to Prof. Charlie Fine for clarifying these relationships. Note that over the long term, each "independent" variable is itself time-dependent, as well as dependent upon the other "independent" variables.

1.4.4.1 Framework Summary

1.4.4.1.1 High Level Summary

The primary "independent" variables are derived from the propositions and constructs developed in this research and are summarized in Part II. These include the construct of an *enterprise architecture*, and the proposition that it drives the enterprise's *structural dynamic* behavior, (i.e. its growth and profitability), which ultimately drives the *industrial evolution*. These constructs and their propositional relationships are briefly summarized in Figure 80 below:

Firm Output Integral Modular Enterprises Enterprises 15 Short-term Speed & Flexibility 10 **Competitive Dynamics** 5 ong-term Sp & Stability Maximization of Maximization of 1990 1950 1960 1970 1980 Shareholder Value Stakeholder Surplus Enterprise Firm Architectures Performance Industry Output Stable Markets Aodular lodular nies of Scope Industrial **Co-Evolution Growing Markets** (Economies of Scale Market Capitalization 2000 1900 1950 1975 1925

Figure 80: Summary of Proposed Co-Evolutionary, Meta-Strategic Framework

"Key dimensions at the firm and environmental levels have reciprocal relationships so that firms develop capabilities either through choice or selection, that then shape the environment which, in turn, further shapes capabilities. Thus firm strategy and performance fundamentally arise from interactions between organizational and competitive factors at several levels of analysis."¹⁷³

¹⁷³ Henderson, R. and Mitchell, W. (1997), pg. 12.

1.4.4.1.2 Detailed Summary

"Critical to understanding contemporary differences in market share and profitability among firms within an industry is systematic knowledge of how those differences arose in the first place. Understanding the structural evolution of industries – the rate of change in output and prices, the rates of entry and exit (turnover), and the growth and decline of individual firms (mobility) and industry participation – is widely recognized as fundamental to identifyling the origins of profitable market leaders who can sustain performance over time. Industry evolution provides important important contingencies that affect the viability of various firm strategies. Without a keen grasp of the underlying mechanisms driving industry evolution and the resulting changes that occur at the industry level over time, we are less able to identify why certain firms in an industry are the winners and other losers (Agarwal and Gort 2002)."¹⁷⁴

As shown in Figure 81 below, the aforementioned high-level summary will be further developed into a more detailed framework consisting of an endogenous causal model.

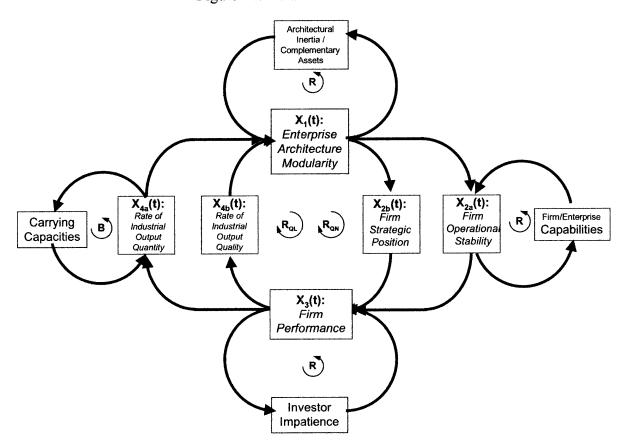
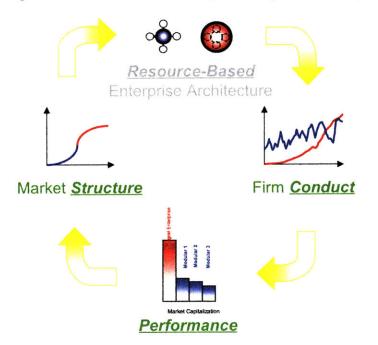


Figure 81: Detailed Causal Model

¹⁷⁴ Lenox, M.J., Rockart, S.F. and Lewin, A.Y. (2007), pg. 599.

1.4.4.2 Framework as Strategic Management Theory

The framework can be summarized as shown in Figure 82 below in terms of the classic industrial organization / strategic management paradigms of "structure-conduct-performance" (Mason, 1939; Bain, 1956) and "the resource-based view" (Penrose, 1959; Wernerfelt, 1984).





1.4.4.2.1 Market Structure

"The rate of growth of the market can serve as an important trait of market structure. Fast growth, for instance, reduces the payout of short-run collusive strategies relative to strategies aimed at raising the firm's sustainable market share."¹⁷⁵

1.4.4.2.2 Firm Conduct

"Market conduct comprises the processes whereby firms choose their preferred price and product outcomes and reconcile their divergent offers in the market place. It also covers predatory or exclusionary conduct."¹⁷⁶

1.4.4.2.3 Performance

"A chief test of market performance is the rate of return."¹⁷⁷

¹⁷⁵ McGugan, V.J. and Caves, R.E. (1974), pg. 391.

¹⁷⁶ McGugan, V.J. and Caves, R.E. (1974), pg. 392.

¹⁷⁷ McGugan, V.J. and Caves, R.E. (1974), pg. 394.

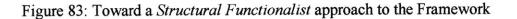
1.4.4.3 Framework as Social System Theory

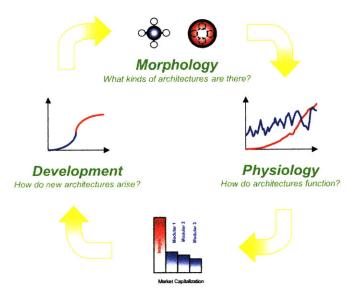
Much of the early work on social systems in the 1950s and 1960s can be discussed within two influential paradigms, *structural functionalism* and *general system theory* (Burrell and Morgan, 1979).¹⁷⁸ Later, social system theory "evolved" into an evolutionary theory as put forth by the organizational ecologists (Hannan & Freeman, 1977) among others. The following three subsections briefly discuss the proposed framework within these paradigms.

1.4.4.3.1 Framework as Structural Functionalist Theory

"The concept of **function** as defined thus involves the notion of **structure** consisting of a set of **relations** amongst unit entities, the continuity of the structure being maintained by a **life-process** made up of the activities of the constituent units."¹⁷⁹

Each of the three independent variables of the framework corresponds with the structural functionalist problems of: *social morphology* (i.e. what kinds of social structure are there?), *social physiology* (i.e. how do social structures function?) and *social development* (i.e. how do new types of social structure come into existence?). As shown in Figure 83 below, the theory presented within this dissertation can be expressed within the structural functionalist paradigm.¹⁸⁰





¹⁷⁸ Note that *structural functionalism* makes explicit use of a biological metaphor, while *systems theory* does not (Burrell and Morgan, 1979, pg. 49).

¹⁷⁹ Radcliffe-Brown (1952), pg. 180. Note that Radcliffe-Brown cautions that social structures can only be observed through their function.

¹⁸⁰ As will be discussed later in this chapter, a "structural functional" explanation differs from the "causal" explanation.

1.4.4.3.1.1 Social Morphology

"Morphology: The branch of biology that deals with the form and structure of organisms without consideration of function."¹⁸¹

"Anatomy: The science of the shape and structure of organisms and their parts."¹⁸²

To begin with, the architecture (i.e. form and structure) of the enterprise will be defined independent of the strategic and operational functions they fulfill.

1.4.4.3.1.2 Social Physiology

"Physiology: The biological study of the functions of living organisms and their parts."¹⁸³

In particular, having defined the architecture (i.e. the form and structure) of the enterprise, the framework will attempt to tie causal arguments to the strategic position (i.e. physiological function) of the architecture. Specifically that integral enterprise architectures, born into mature industries tend to have a cost-leadership posture or strategic function.

1.4.4.3.1.3 Social Development

Finally, having defined the architectural form, structure and strategic function of the enterprise, the framework will endeavor to explain how these structures and functions evolve over time, for example, how integral enterprise architectures, born into mature industries begin with a cost-leadership posture or strategic function and later evolve into a differentiated strategic function.

¹⁸¹ From "Dictionary.com".

¹⁸² From "Dictionary.com".

¹⁸³ From "Dictionary.com".

1.4.4.3.2 Framework as General System Theory

"Certain methods of studying behavior apply to all organized systems, namely structure, function and evolution. Any organized system can be seen from these three perspectives which encompass the broadest scope of a general system theory."¹⁸⁴

In addition, each of the four interdependent variables of the framework corresponds with the system concepts of *General System Theory* (Rapoport, 1968): *evolution, function, structure* and *behavior* (or performance - to use a variable pertinent to strategic management) as shown in Figure 84 below.

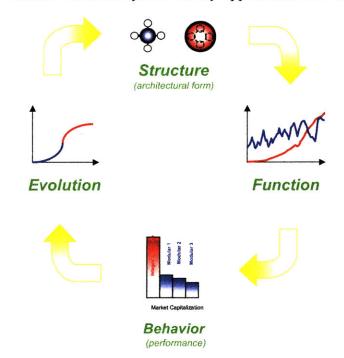


Figure 84: Toward a *General System Theory* approach to the Framework

1.4.4.3.2.1 System Goals: Stability, Growth and Interaction

Unlike traditional research in the strategic management literature which focuses on the isolation of a few isolated low-level variables to explain firm performance, this work attempts to aggregate many confounded variables into three high-level, aggregate, system variables.

In Essays #1 and #2, we will discuss the enterprise objective functions or goals, which in terms of general systems theory, can be stated as *stability*, *growth* and *interaction* (Henderson, 1935, pg. 86).

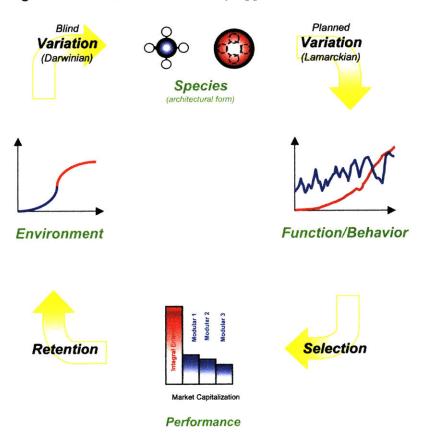
¹⁸⁴ Rapoport, A. (1968), pg. xx.

1.4.4.3.3 Framework as Evolutionary Theory

"Evolutionary theory explains how particular forms of organizations come to exist in specific kinds of environments. Variation, selection, retention and struggle occur simultaneously rather than sequentially. Analytically, the process may be separated into discrete phases, but in practice they are linked in continuous feedback loops and cycles."¹⁸⁵

Each of the four proposition sets of the framework corresponds with the evolutionary mechanisms of: *variation* (i.e. how do new types of social structure come into being?), *selection* (i.e. how do social structures compete successfully?) and *retention* (i.e. how do new types of social structure become perpetuated?). Note that the *variation* mechanism is further subdivided into "blind" or Darwinian variation, whereby the environment dictates organizational form, and "semi-blind" or Lamarckian variation, whereby management dictates organizational activities like market and production strategy. As shown in Figure 85 below, the theory presented within this dissertation can be expressed within the evolutionary paradigm, with the proposition sets shown below as the connecting yellow arrows.

Figure 85: Toward an Evolutionary approach to the Framework



¹⁸⁵ Aldrich, H.E. and Ruef, M. (2006), pg. 26.

1.4.4.4 Framework as Temporal Theory

The independent variables associated with function, structure and evolution each take on a different *temporal* perspective as shown in Figure 86 below. The function-related variable takes a (small dt) "*static*" view, defining the properties and characteristics of the architectures. The structure-related variable takes a (medium dt) "*dynamic*" view of how the static structures interact to drive dynamic behavior. Finally, the evolution-related variable takes a (large dt) "*evolutionary*" view of how the environment evolves dominant architectural "species" which oscillate nonlinearly. The evolutionary trajectories of enterprise architectures are seen from the lenses of *adaptation* and *selection*.

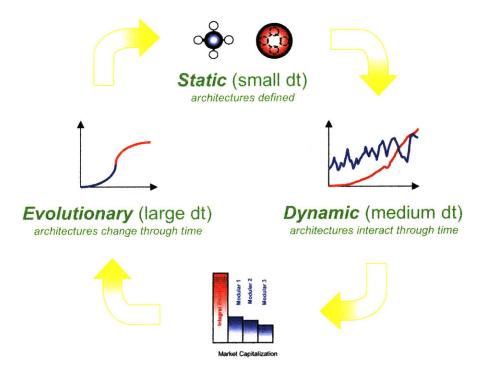


Figure 86: The Framework viewed through a Temporal perspective

Note that for *very* large dt, that is, after firms and industries cycle around the above loop numerous times, the random processes of variation, selection and retention begin to take hold and evolve the architectural characteristics of species. The scope of this research does excludes such long-term evolutionary pressures.

1.4.4.5 Framework as Architectural Design Theory

"A quest for field-tested and grounded technological rules, which in the field of management will be predominantly qualitative and heuristic by nature, means trading the priestly beauty of truth for the soldiery glory of performance."¹⁸⁶

The objective of building a rigorous and relevant conceptual framework, which aims to contribute to the explanation and delivery of long-term firm performance, will be met using a high level of abstraction. As such, the conceptual *form* of the firm and its relationship with its environment will provide fundamental answers to the question of performance, whereas more detailed, operational explanations using a lower level of abstraction will provide more precise explanations, *given* an architectural-level explanation. In this sense, the architectural form is a solution-neutral restatement of the problem¹⁸⁷, and as such the architecture enables and constrains (but does not determine) what the enterprise can do.

"Architectural insights are worth far more that ill-structured engineering analyses."¹⁸⁸

As shown in Figure 87 below, the framework can be demonstrated to follow the architectural design process, as in the process used to design and build artifacts of civil architecture.

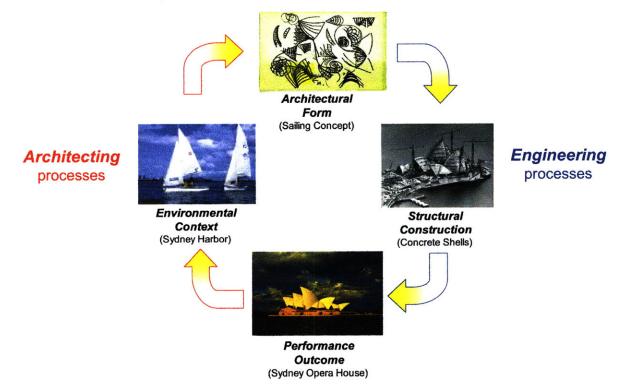


Figure 87: Framework as Architectural Design Theory

¹⁸⁶ van Aken (2004), pg. 242.

¹⁸⁷ From MIT Prof. Ed Crawley.

¹⁸⁸ Rechtin, E. (1991) and Rechtin, E. (2000), pg. x.

1.4.4.5.1 Trends & Trajectories via Architectural Abstraction & Aggregation

Although the proposed framework is being derived empirically from the field-based data of observing and developing the phenomena of business competition, it also (upon reflection) can be seen to have its roots in the abstractions and aggregations of architectural design theory. The act of architecting a social structure progresses (both linearly as well as iteratively) from the intense study of the environment in the abstract, to the induction of a high-level form or concept, to the deduction of lower-level structures (from well-tested laws), finally to the creation or delivery of a high-performing entity (Piepenbrock, 2004).

As shown in Figure 88 below, this research will therefore attempt to explain the high-level *abstract* architectural forms and their *aggregate* behaviors that firms and their extended enterprises will need to exhibit long-term high-performance in different environmental conditions. In this sense, this research dissertation is seeking underlying long-term *trends* and performance *trajectories* – the "signals" through the "noise" of lower levels of abstraction.

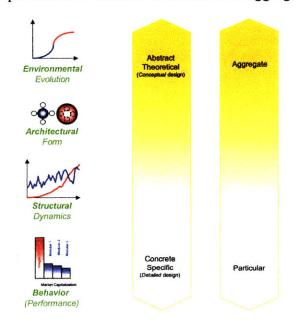


Figure 88: Framework presented as "Ladder of Abstraction/Aggregation"

Of more relevance to the performance objectives as stated in this research dissertation, another analogy of the framework can be developed as shown in Figure 89 below. An analogy of architectural abstraction might be to explain or design a high-performance solution in a motor sport race. Instead of immediately launching into low-level detailed explanations of engine power and torque or design for aerodynamics, an architectural approach would ensure the high-level abstract *form* achieves *fit* with its environmental demands and its overall *function*. Therefore observing that the race will take place in a mud bog as opposed to a slick racetrack gives the abstract solution that a crude "tractor" form will dominate any race car, now matter how powerful its engine or low its drag coefficients.

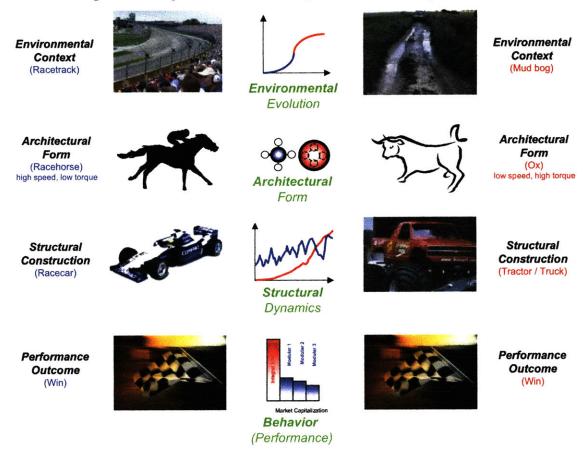


Figure 89: Proposed Framework expressed as a Motorsport Race

1.4.4.5.2 "Resolution" Limitations of an Architecture-based Framework

The framework presented herein attempts to contribute towards a general theory of the evolution of business ecosystems, which in the process explains long-term firm performance. It is however, by its very design, a conceptual framework with a low degree of "resolution". That is, it predicts *generally* under which *aggregate* conditions, a firm *should* outperform its rivals over the *long term*. For example: "the greater the maturity of the market, the more enterprise architectures with greater integrality should dominate."

As such, it will be demonstrated that the high-level enterprise architecture transcends the firm's strategy and its operational efficiency. Due to its low resolution, there will be "noisy" exceptions, which will play out over the short term, where for example, excellent strategy coupled with excellent execution trumps poor architecture in a near-transition environment.

1.4.4.5.3 Ontological Primacy Embedded within Framework

"Of all the manifestos concerning the relationship of form and function, "form follows function" is surely the most famous, as well as being the most sweetly succinct. It is also one of the most misinterpreted. It is not a statement of importance, granting function a greater stature than form, but one of process: function must be discerned before form can be fashioned and, implicitly, to do otherwise would be nonsensical."¹⁸⁹

Finally, a note should be made regarding the assumptions on *ontological primacy* embedded within the framework presented. Although the framework appears to be presented as following the ideals of *institutional* as opposed to *neoclassical economic* approaches to strategy¹⁹⁰; as following the ideals of *holism* as opposed to *reductionism*; as being led from the front by Aristotle's "*causa finalis*" (final cause) as opposed to being pushed from behind by the "*causa efficiens*" (efficient cause); as following the teleological notions that:

- form follows function
- structure follows form
- *performance* follows *structure*
- *environment* follows *performance*
- function follows environment
- (repeat...)

In reality, the framework is intended to acknowledge the cyclic interdependence of these variables, such that *emergence* is made possible.¹⁹¹ In addition, the framework is intended to acknowledge the richness of multiple causality of the "product-producer" relationship, as opposed to the cause-effect relationship.¹⁹²

¹⁸⁹ Richardson, A. (1993), pg. 35.

¹⁹⁰ Loveridge, R. (2003), pg. 99.

¹⁹¹ Weidlich, W. (2000), pp. 13-21.

¹⁹² Ackoff, R. (1981), pg. 21.

1.4.4.6 Framework as *Contingency* and *Configuration* Theories

"Contingency and configuration theories have received considerable attention, both in organizational theory and in strategic management research."¹⁹³

The framework attempts to re-engage and moderate the internal-external debate within the strategic management field by re-asserting the *contingency* and *configuration* theories as described in the following subsections.

"For many years, contingency and configuration theorists have asserted a connection between organizational alignments and performance (Burns and Stalker, 1961; Woodward, 1965; Lawrence and Lorsch, 1967; Miles and Snow, 1978; Mintzberg, 1979; Miller and Friesen, 1984.)"¹⁹⁴

Over the past 50 years, strategic management researchers have identified a range of factors that have been demonstrated to be influential in determining superior firm performance. These have progressed chronologically from the external factors of industrial organization economics (Bain, 1956) to the external-internal fit of contingency theory (Lawrence and Lorsch, 1967) to the internal factors of the resource-based view (Wernerfelt, 1984),

"[the] move from external factors, to 'fit' perspectives, to internal elements... highlight the range of factors important to superior performance."¹⁹⁵

The shift away from contingency theory took place as theorists rediscovered the resource-based view, which manifested itself in practice as the "core competencies" movement of the 1980s and 1990s. This movement tended to focus on benchmarking dissected best practices from worldclass companies, and attempting to copy them non-systemically, which was a noted departure from the holistic thinking of contingency theory. Recently, an number of notable academics at reputable institutions have called for a revisiting of the classical theories:

"Its one of the oldest, most fundamental ideas in management theory: that executives should understand how the many distinct functional components of a firm interrelate to achieve the proper fit. It is time to resurrect the idea of addressing the part-whole relationship of the firm. Without this systemic way of looking at companies, firms run the risk of engaging in compartmentalized thinking that can lead to the adoption of practices that are a poor fit and work to a firm's disadvantage."¹⁹⁶

While this research dissertation will appear to take the debate back along the intellectual pendulum towards environmental fit, as shown in Figure 90 below, it is hoped that a new light will be shed on contingency theory – particularly how and when external and internal factors interact via the enterprise architecture construct.

¹⁹³ Powell, T.C. (1992), pg. 120.

¹⁹⁴ Powell, T.C. (1992), pg. 119 & 120.

¹⁹⁵ Rouse and Daellenbach (1999), pp. 487-488.

¹⁹⁶ Summary of the current research of Levinthal, D. and Siggelkow, N. at the University of Pennsylvania's Wharton School; in *Knowledge at Wharton*, May 17, 2006.

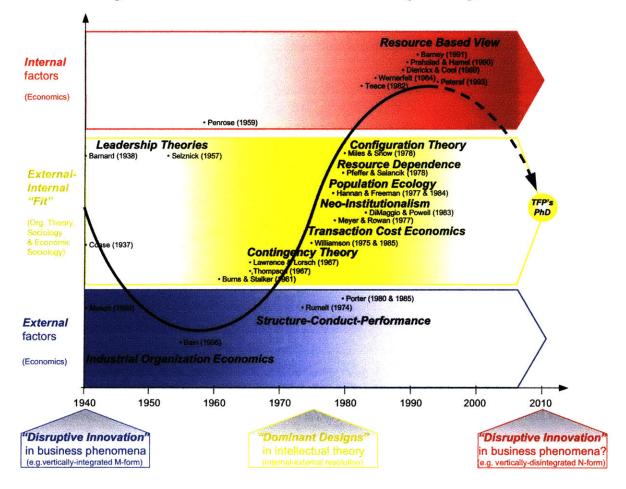


Figure 90: Intellectual "Double-Helix" in Strategic Management

Note that this research attempts to re-engage the sociological literatures which tend to focus on environmental "fit". While both contingency theory and population ecology tend to both agree on this feature, each differs as to the level at which change or adaptation takes place, with the contingency theorists focusing more on the organizational level in the form of "top-down" leadership and choice, and the population ecologists focusing more on the population level and the "bottom-up" leadership embedded in DNA (Levinthal, 1997).

1.4.4.6.1 Framework as *Contingency* Theory

"This is a comparative study of six organizations operating in the same industrial environment. The subsystems in each organization were differentiated from each other in terms of subsystem formal structures, the member's goal orientation, member's time orientations and member's interpersonal orientations. A relationship was found between the extent to which the states of differentiation and integration in each organization met the requirements of the environment and the relative economic performance of the organizations."¹⁹⁷

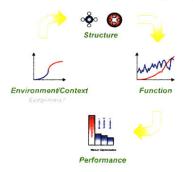
The above quotation, taken from the abstract of one of the most cited and influential pieces of research in the fields of strategic management and organizational theory, Lawrence and Lorsch's 1967 classic, "Differentiation and Integration in Complex Organizations," offers a close description of the research proposed herein.¹⁹⁸

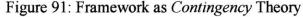
Like Lawrence and Lorsch's original work, this research also proposes a comparative study of six organizations, albeit in three pairs of organizations each operating in the same environments. In addition, this work proposes to identify differing member properties (e.g. goal- and time orientations) as characteristic of different architectural forms.

As will be discussed later in Chapter 2, although this research dissertation is founded on the basis of building grounded theory (in the same way as the original Lawrence and Lorsch work), it also serves to validate, refine and extend their original findings.

1.4.4.6.1.1 Endogenizing Lawrence and Lorsch

The proposed framework makes assertions (in the vein of contingency theory) that firm performance results from the alignment of *endogenous* organizational "design" variables with *exogenous* environment or context variables.¹⁹⁹ In fact, one of the aims of this research is to begin to endogenize the claims of contingency theory, in that contingent exogenous environmental variables can be endogenized causally, as shown in Figure 91 below.





¹⁹⁷ Lawrence and Lorsch (1967), pg. 1.

¹⁹⁸ Lawrence and Lorsch (1967) was among the top 20 most influential works in the field of strategic management as determined in a bibliometric study by Ramos-Rodriguez & Ruiz-Navarro, (2004).

¹⁹⁹ The noted "problems" with contingency theory (Schoonhoven, 1981) will be addressed in the research.

On of the major differences of this research relative to classical contingency theory lies in its positing how firm performance endogenously shapes the environmental context, which in turn defines organizational form. Classical contingency theory (e.g. Lawrence and Lorsch, 1967) is essentially *variance* theory, in which the environment is a variable which moderates between the independent variable of firm structure and the dependent variable of firm performance.

As shown in Figure 92 below, the framework proposed herein explicitly endogenizes more of the environment, and in this sense is now an *inter*-organizational or "ecological contingency theory" as opposed to an *intra*-organizational "structural contingency theory." In this way, the framework is essentially *process* theory, whereby environment is not a moderating variable, but an interdependent variable. Crucially, classical contingency theory characterizes the environment using discontinuous states, whereby for example, environmental instability may or may not precede environmental stability. The framework presented herein however posits that states of environmental instability (i.e. increasing rates of quantity and quality growth), under conditions of logistic growth.

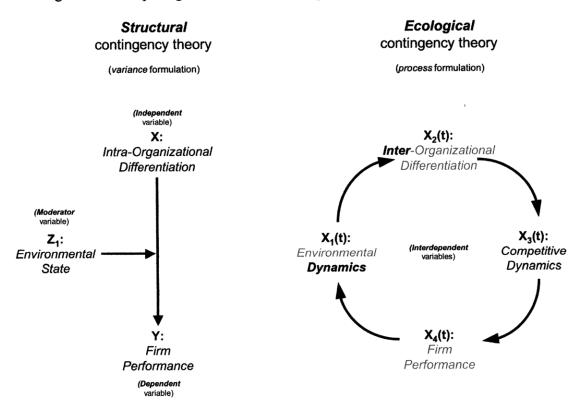


Figure 92: Comparing Structural vs. Ecological Contingency Theories

1.4.4.6.1.2 Differentiation and Integration in Inter-Firm Organizations

This research proposes to extend Lawrence and Lorsch's original ground-breaking research from the analysis of *firms* as "complex organizations" to the analysis of firms and their *extended enterprises* as "complex organizations". In this sense, this proposed extension of Lawrence and Lorsch's research searches for a contingent explanation for differentiation and integration as *inter*-firm as opposed to *intra*-firm phenomena, as shown in Figure 93 below.

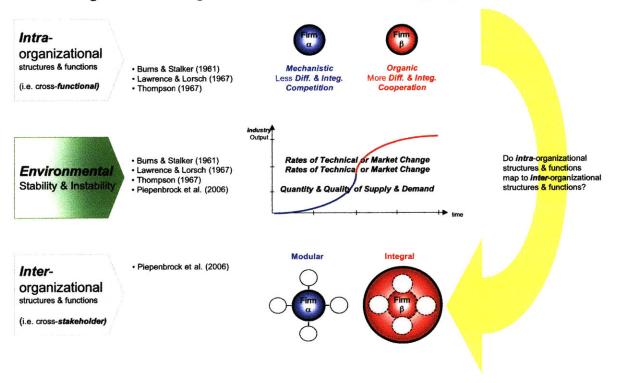
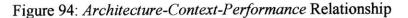
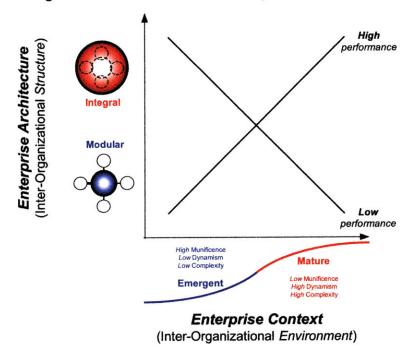


Figure 93: Situating the Framework within the Contingency Literature

1.4.4.6.1.3 Architecture-Context-Performance

At is simplest and most abstract level, this research points to a new form of the traditional *context-structure performance* relationships in contingency theory (Drazin and Van de Ven, 1985). As shown in Figure 94 below, this *architecture-context performance* relationship is hypothesized.²⁰⁰





As will be discussed in greater detail in Part II, an "architect's dilemma" arises from this relationship. To summarize, there appears to be a general trend over time towards increasing pressure on enterprise architectures to "dis-integrate" as well as on environments to become more dynamically complex and thus requiring greater integration. This implies that there is a trend towards lower performance of incumbents, and towards greater opportunity for new firms (late entrants) to become dominant.

²⁰⁰ Note: a more sophisticated version of this matrix discretizes context into three phases instead of two, whereby high performance is associated initially with integral architectures, then modular architectures, and finally integral architectures.

1.4.4.6.2 Framework as Configuration Theory

"People in [the configuration] school, in seeking to be integrative, cluster the various elements of our beast – the strategy-making process, the content of strategies, organizational structures and their contexts – into distinct stages or episodes, for example, of entrepreneurial growth or stable maturity, sometimes sequenced over time to describe the life cycles of organizations."²⁰¹

Configuration theory embraces rich, complex, holistic (not reductionistic) desciptions of organizations and their supporting environments.

"A configuration represents a number of specific and separate attributes which are meaningful collectively rather than individually. [It] represents a unique, tightly integrated, and therefore relatively long-lived set of dynamics."²⁰²

From the previous brief description of the proposed meta-strategic framework, it is clear that our research attempts to build and test archetype or "configuration" theories in strategic management. The proposed archetypes include the enterprise architectures, their structural dynamics and competitive outcomes as well as the environmental characteristics which "grow" them.

"The use of configurations in studies of organizations allows researchers to express complicated and interrelated relationships among many variables without resorting to artificial oversimplification of the phenomenon of interest. Configurations are a means of achieving parsimony while presenting rich, complex descriptions of organizations."²⁰³

Dess et al. (1993) note that strategic management researchers often present their constructs as *gestalts, configurations or archetypes.* This is similar to the way architects present their constructs – with architects defined as "specialists in the simplification of complexity" (Rechtin, 1999).

"Charles Darwin (1887:105) once distinguished 'splitters' from 'lumpers'. Configuration school people are unabashed lumpers: they see the world in terms of nice, neat categories. Nuanced variability is assumed away in favor of overall clustering; statistically speaking, outliers are ignored in favor of central tendencies."²⁰⁴

Such a "lumped" architectural approach is important in the early "fuzzy front end" of theory development, but whose use must be bounded by an appreciation for value and the corresponding limits of parsimony.

"Everything should be made as simple as possible, but no simpler."205

Some researchers also link organizational *transformation* as the logical complement to *configuration* (Mintzberg et al., 1998).

²⁰¹ Mintzberg, H., Ahlstrand, B., and Lempel, J. (1998), pp. 6-7.

²⁰² Dess, G.G., Newport, S. and Rasheed, A.M.A. (1993).

²⁰³ Dess, G.G., Newport, S. and Rasheed, A.M.A. (1993).

²⁰⁴ Mintzberg, H., Ahlstrand, B., and Lempel, J. (1998), pg. 303.

²⁰⁵ Albert Einstein, The Evolution of Physics.

1.4.4.6.2.1 Configuration Theory: beyond Contingency Theory

"The configurational approach makes a clean break from the contingency mainstream, within which researchers have been preoccupied with abstracting a limited set of structural concepts and measuring their relationships with a limited set of abstracted situational concepts."²⁰⁶

At first glance, the multi-domain aspect of configuration theory appears to sound like contingency theory. However a closer inspection reveals that configuration theory is an intellectual advancement beyond contingency theory as it embraces the nonlinear dynamic and evolutionary nature of organizations.

"Our comparison of the assumptions underlying contingency and configuration theories can be likened to [the] distinction between the assumptions of Newtonian physics and those of emerging chaos theories. Like contingency theorists, those taking the Newtonian perspective envision a world where stability, order, uniformity, and equilibrium predominate. The important relationships are linear. In contrast, the configurational approach shares chaos theory's acknowledgement of 'disorder, instability, diversity, disequilibrium, nonlinear relationships, and temporality – a heightened sensitivity to the flows of time' (Prigogine and Stengers, 1984, pp. xvi-xv). A central insight of chaos theory is that patterns lurk beneath systems' seemingly random behaviors. Chaos theorists call these patterns 'strange attractors'; organizational theorists call them configurations."²⁰⁷

1.4.4.6.2.2 Classifications of Organizations

"Naming something," said Alice to the Red Queen, "isn't the same thing as explaining it."208

One of the more important roles of configuration research is to classify organizations, which aides in the development of theories in organization, and especially normative theories in strategic management.

"Classification systems provide a means for defining sets of **homogenous organizations** which should significantly **increase levels of explained variance of key variables** across organizations... By **aggregating** and organizing a large body of facts and data into a meaningful set, propositions and **theories may be developed**."²⁰⁹

The constructs of enterprise architectures developed in this research dissertation are essentially configurations used for the aggregation of attributes and for the classification of homogenous organization types, in order to aid in the development of theories of their long-term competitive performance.

²⁰⁶ Meyer, A.D. et al. (1993), pp. 1176-1177.

²⁰⁷ Meyer, A.D. et al. (1993), pp. 1178-1179.

²⁰⁸ Lewis Carroll's Alice's Adventures in Wonderland, cited in Meyer, A.D. et al. (1993), pg. 1180.

²⁰⁹ Dess, G.G., Newport, S. and Rasheed, A.M.A. (1993).

1.4.4.6.2.2.1 Single Domain Taxonomies and Typologies

In order to distinguish configurations from their "classification cousins" *taxonomies* (empirically-driven) and *typologies* (theoretically-driven), this research dissertation uses the definitions proposed by Dess et al., 1993).

"A typology or taxonomy contains elements or items that represent a single domain or an aspect of organizations, such as environment, structure, or strategy... A configuration contains relationships among elements or items representing multiple domains."²¹⁰

Well-known typologies within the field of organization science include Burns and Stalker's (1961) mechanistic and organic forms, while Woodward (1958, 1965) and Thompson (1967) distinguished organizations based on the technologies they used. Additionally, Miles and Snow (1978) distinguished among four organization types based on their strategies: defenders, analyzers, prospectors and reactors.

1.4.4.6.2.2.2 Multiple Domain Configurations

"The multidimensionality of constructs used to describe strategy phenomena has always posed a challenge for researchers."²¹¹

Although the definition of appropriate *domains* in strategic management is not exact, researchers (Miller, 1987) have offered theoretical justification for the four "imperatives" of: *environment*, *structure*, *strategy*, and *leadership*.

"Configurations exhibit great stability because of their internal logic, integrity, and evolutionary momentum."²¹²

Given these definitions of appropriate domains in strategic management, it will become clear throughout this dissertation that the enterprise architectural configurations will embrace these and others.

1.4.4.6.2.3 Theoretical Issues

When developing configuration theory, Dess et al. (1993) highlight three important theoretical issues which will be addressed in this research dissertation.

1.4.4.6.2.3.1 Dimensional Complexity

"As the number of dimensions of a construct increases arithmetically, the number of combinations increases geometrically... The theorist is forced to simplify by restricting each variable to a dichotomy."²¹³

²¹⁰ Dess, G.G., Newport, S. and Rasheed, A.M.A. (1993).

²¹¹ Dess, G.G., Newport, S. and Rasheed, A.M.A. (1993).

²¹² Miller, D. (1987).

²¹³ Dess, G.G., Newport, S. and Rasheed, A.M.A. (1993).

However, such configuration research is not without its tradeoffs, particularly the costs of parsimony. As will be discussed in essay #1, the construct of enterprise architectures will have many possible variable combinations and therefore a multitude of possible forms. For simplicity, however, the construct will be presented as a continuous spectrum of possibilities, with the dichotomy of modular vs. integral being covered in great detail.

1.4.4.6.2.3.2 Causal Ambiguity

"When additional domains are added to the research question, the difficulty in establishing causal relationships is exacerbated. Typically, however, in the context of configuration research, such causal relationships among multiple variables are stipulated as reciprocal and mutually reinforcing."²¹⁴

As was illustrated previously in the framework summary, the enterprise architecture configuration was shown to ultimately and reflexively cause its own evolution in closed-loop feedback. This will be discussed further in essay #3.

1.4.4.6.2.3.3 Temporal Stability

"Configurations, because of the enduring themes that unify and organize them, are characterized by considerable **temporal stability**... In order to cause a change in a configuration, a 'revolution' would be necessary."²¹⁵

Although it has been posited that configurations are stable through time, this does not mean they are in a state of static equilibrium. In fact, in essay #3, we will contend that they are in a state of dynamic equilibrium.

"Since it is theoretically possible to have more than one successful organizational configuration, even within an industry, an interesting research issue would be: Are certain types of transitions easier for organizations to accomplish than others? In other words, longitudinal studies may reveal certain patterns or favored paths that organizations follow as part of their evolutionary dynamics."²¹⁶

Essay #3 will discuss ecological diversity in which multiple competing enterprise architectures can co-exist, however at any given time, they will not be equally successful.

1.4.4.6.2.4 Methodological Issues

When developing configuration theory, Dess et al. (1993) highlight three important methodological issues which will be addressed in this research dissertation.

1.4.4.6.2.4.1 Construct Specification

"Configurations are inherently multidimensional entities in which key attributes are tightly interrelated and mutually reinforcing. The researcher's prime task involves disentangling these complex relationships and isolation key constructs."²¹⁷

²¹⁴ Dess, G.G., Newport, S. and Rasheed, A.M.A. (1993).

²¹⁵ Dess, G.G., Newport, S. and Rasheed, A.M.A. (1993).

²¹⁶ Dess, G.G., Newport, S. and Rasheed, A.M.A. (1993).

²¹⁷ Dess, G.G., Newport, S. and Rasheed, A.M.A. (1993).

As configurations are made up of component constructs, Dess et al. (1993) identified four major classification of constructs used in the strategy literature:

- environment (e.g. munificence, dynamism and complexity)
- structure (e.g. integration and differentiation)
- strategy process (e.g. rational and consensus)
- strategy content (e.g. differentiation and cost leadership)

"In empirical studies of configurations [researchers] use cross-validation of responses by comparisons between different groups of executives and comparisons with alternate measures derived from secondary data sources."²¹⁸

As will be discussed in Chapter 2, the research methodology will clearly be rooted in a multimethod approach which targets executives of multiple stakeholders within a given enterprise architecture.

1.4.4.6.2.4.2 Data Aggregation

"With the exception of fine-grained research methodologies such as single case studies, the analysis and interpretation of research is dependent upon the aggregation of data collected from many participants across firms. When such data are aggregated, the uniqueness or richness of each firm is compromised."²¹⁹

Again, as will be discussed in Chapter 2, the research dissertation is based on fine-grained research methodologies based on a small theoretical sample of case studies in order to preserve the richness of each firm.

1.4.4.6.2.4.3 Unit of Analysis

"Choices regarding the unit of analysis...could lead to what is often referred to as "ecological fallacy", i.e. attempting to make inferences at a specific level on the basis of data obtained and analyzed at a different level of aggregation."²²⁰

As described in this chapter, the unit of analysis is the firm and its extended enterprise, in order to arrive at the dependent variable of firm performance. In order to mitigate the possibility of ecological fallacy (Datta, 1980), the research methodology described in chapter 2 collects and analyzes data from the firm and it primary stakeholders.

1.4.4.6.2.4.4 Research Methodologies

"Longitudinal research designs or causal modeling techniques...can be helpful in providing insights into multivariate relationships... Longitudinal qualitative analysis of organizations can provide meaningful insights about the evolution of configurations as well as the specific relationships among the construct within a configuration. Through careful comparison of in-depth case studies, it is

²¹⁸ Dess, G.G., Newport, S. and Rasheed, A.M.A. (1993).

²¹⁹ Dess, G.G., Newport, S. and Rasheed, A.M.A. (1993).

²²⁰ Dess, G.G., Newport, S. and Rasheed, A.M.A. (1993).

possible to arrive **inductively** at relationships among environment, strategy, structure, processes and outcomes... Qualitative studies are extremely **labor intensive** and subject to potential problems such as **researcher bias** and **non-replicability**. "221

As described in chapter 2, the research methodology will embrace longitudinal qualitative methods as well as causal modeling techniques in order to capture the relationships between constructs within the enterprise architectural configuration as well as the evolution of the enterprise architectural configurations themselves.

1.4.4.6.2.4.4.1 Inductive development

Ketchen Jr. et al. (1993). Ketchen Jr. et al. (1997).

"Others have deplored the prevalence in the literature of 'armchair typologies' and 'fuzzy frameworks,' which are characterized as 'pseudotheories' formed by causal induction instead of rigorous deduction from theory."²²²

1.4.4.6.2.4.4.2 Deductive development

Ketchen Jr. et al. (1993). Ketchen Jr. et al. (1997).

²²¹ Dess, G.G., Newport, S. and Rasheed, A.M.A. (1993).

²²² Meyer, A.D. et al. (1993), pg. 1179.

1.4.4.7 Framework as Three Essays

The main body of this dissertation consists of three essays, each of which is devoted to the independent variables associated with function, structure and evolution as shown in Figure 95 below. Essay #1 defines a typology/taxonomy of enterprise architectural forms and functions. Essay #2 translates the static architectural properties into a deterministic structure which drives behavior. Finally, essay #3 defines the environmental events and processes which ultimately shape or "grow" the enterprise architectures.

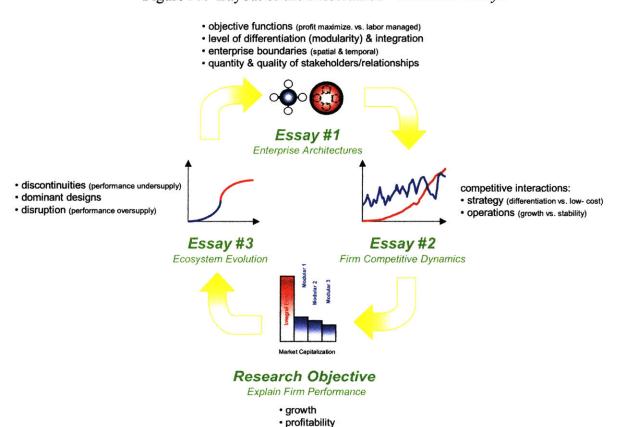


Figure 95: Layout of the Dissertation - the Three Essays

1.4.5 Aspects of Theory

The following discussion briefly discusses the five aspects of theory (Neuman, 2006, pp. 58-77) with respect to the framework proposed. The summary of the five aspects of the proposed theory is shown in Figure 96 below

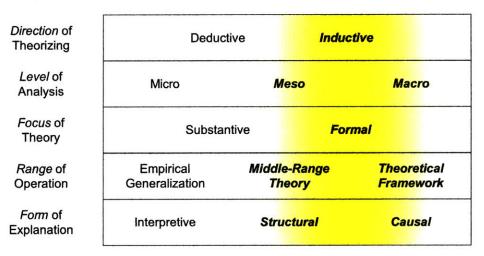


Figure 96: Summary of the Five Aspects of the Proposed Framework

1.4.5.1 Direction of Theorizing

While the theorizing iterates both inductively and deductively, it clearly has an initial strong emphasis on *induction*, whereby concrete empirical evidence was gathered and molded into more abstratct concepts and theoretical relationships. The particular type of inductive social research used, was *grounded theory* (Glaser & Strauss, 1967; Eisenhardt, 1989) which emphasizes *comparison* in empirical observations.

1.4.5.2 *Level* of Analysis

Although much of the research gathers and analyzes data on a *micro*-level, which focuses on the face-to-face interactions among individuals or small groups over short time horizons (measured in days and months)²²³, the primary level of analysis takes place on meso-and macro-levels.

1.4.5.2.1 Meso-level

The analysis is *meso*-level as it focuses on the relations, processes and structures of mid-leveel social phenomena (like organizations and extended enterprises) operating over moderate durations (measured in years, decades).

²²³ One of the more important *micro-level* case studies that this research has uncovered is the process by which individual (or small teams of) leaders endeavored to transform a modular enterprise architecture into an integral enterprise architecture. This work is the subject of later publications.

1.4.5.2.2 Macro-level

Finally, the analysis also approaches *macro*-level as it focuses on social institutions (e.g. international capital and labor markets) operating over long durations (measured in decades and centuries).

1.4.5.3 *Focus* of Theory

The focus of the theory is clearly *substantive*, as it aims to builds theory focused on a particular topic area of social phenomena: competition in business (firm-industry) ecosystems. The theory does begins to reach toward more *formal* theory, which focuses on more general processes or structures that operate across multiple areas of social phenomena: like competition in educational (university) ecosystems or competition in political (party) ecosystems.

Therefore, if the research domain is defined relatively narrowly as "business ecosystems", then the focus of the theory is *formal*, as it extends across mutiple industries (airplane, airline and automotive) and multiple sectors (manufacturing and services). If the research domain is defined more broadly as "social ecosystems", then the focus of the theory is *substantive*, as it explicitly covers business ecosystems but not explicitly educational or political ecosystems.

1.4.5.4 *Range* of Operation

The range at which the theory operates beyond the rather narrow confines of *empirical* generalization and lies between *middle-range theory* and *theoretical frameworks*.

1.4.5.4.1 Middle-Range Theory

The research can be seen as middle-range theory (or more precisely, four middle-range theories). Within each "theory", the research has limited abstraction/range and is in the form of empirically verifyable statements. This is manifested in the linking of the construct sets (e.g. environmental fit, architectural forms, firm functions, and performance) to proposition sets.

1.4.5.4.2 Theoretical Framework

As an integrated theoretical framework, this research is a very general theoretical system with assumptions, concepts and social theories. Like, for example "structural functionalism" which purports that society is a system of interdependent parts that is in equilibrium, and over time it has evolved from a simple to a more complex form, with highly specialized parts, the theory of the evolution of business ecosystems purports that without limits to growth, similar evolutionary processes occur.

1.4.5.5 Form or Explanation

The explanation includes both *causal* and *structural* forms of explanation, and less *interpretative*. Due to the nature of the research as *theoretical framework*, a structural form of explanation is deemed most effective, with attempts at causal explanation also offered.

As the theory of the evolution of business ecosystems is ultimately a theory of evolution (based on Darwin's theory of evolution), it offers high-level process explanations (ased on variation, selection and retention) while not negating the need for individual causal explanations, it merely acknowledges the diffuculty in basing its theoretical explanation on traditional causal means.

"Darwin did not only proclaim that species had evolved, but also pointed to the causal mechanisms of evolution. Darwinism invokes both a theory of natural selection and a universal commitment to causal explanations. Darwin upheld that complex outcomes could be explained in terms of a detailed succession and accumulation of step-by-step causal mechanisms. In a paper of 1874, Huxley elaborated and generalized Darwin's argument as the 'doctrine of continuity'. Under specific conditions, a broad and general version of Darwinism may apply to all complex, open and evolving systems. The possibility of Universal Darwinism suggests that such principles might apply to the social sciences, as well as to biology."²²⁴

Such complex systems can be modeled deterimistically, yet exhibit chaotic or unpredictable outcomes. The theory herein (like Darwinism) is such a deterministic model, in that behavior is not pre-determined (i.e. it can not necessarily be predicted ex-ante), but it can be explained expost, without recourse to stochastic explanations.

"Statistical determination, as expressed in probabilities, does not imply the absense of a cause. As Bertold Brecht [said] 'Their movements are difficult to predict, or cannot be predicted, only because there are too many determinations, not because there are none.' .We now know that non-lineaer systems addressed by chaos theory can simulate stochastic behavior. There are non-linear systems with such a high degree of sensitivity to initial conditions that no amount of accurate measurement of the appropriate parameter values can provide a sufficiently accurate prediction. It does not imply that events are necessarily predictable, or that any one set of events will always lead to the same, regular outcome. Furthermore the principle of determinacy does not imply a 'mechanistic' view... it upholds that intentions are caused."²²⁵

²²⁴ Hodgson, G.M. (2004), pp. 1-7.

²²⁵ Hodgson, G.M. (2004), pp. 3-10.

1.4.5.5.1 Structural Explanations

Structural explanations differ from causal explanations in that they merely note where certain aspects of social life fit within a larger structure. Such *fit* can take the form of temporal fit or "sequential" theories, spatial fit or "network" theories, or "functional" theories.

"A structural explanation is a type of theoretical explanation about why events occur an how things work expressed by outlining an overall structure and emphasizing locations, interdependencies, distances, or relations among positions in that structure."²²⁶

1.4.5.5.1.1 Sequential

Sequential theories communicate *temporal* structure and establish the order that events or stages occur, as in for example an organization's growth and death. It is not a causal explanation, as being in an earlier stage does not cause movement along the trajectory to the next stage.

This theoretical framework therefore goes beyond structural-sequential explanations that "maturity follows emergence" in an industry's life-cycle. Instead it offers causal explanations for the causal mechanisms driving the logistic S-curve (e.g. carrying capacities, reinforcing and balancing feedbacks).

1.4.5.5.1.2 Network

Network theories communicate *positional* structure, which are less central to the theoretical framework proposed herein.

1.4.5.5.1.3 Functional

Stinchcombe (1968, pg. 80) noted that a functional explanation is:

"one in which the **consequences** of some behavior or social arrangement are essential elements to the **causes** of that behavior."²²⁷

Such closed-loop causality sounds like feedback in system dynamics, in which the analyst must identify the causal feedback loops by which the forces maintaining the structure are themselves activated by forces threating the equilibrium (Stinchcombe, 1968, pp. 88). The framework presented herein therefore can be expressed in the structural-functional format where structure (i.e. enterprise architecture) causes function (competitive dynamics), which in turn causes evolution.

"Functional theories often assume long-term system survival or continuity over time, with a need for balance or equilibrium for a system to continue smooth operation."²²⁸

²²⁶ Neuman, W.L. (2006), pg. 69.

²²⁷ Neuman, W.L. (2006), pg. 72.

²²⁸ Neuman, W.L. (2006), pg. 72.

"A functional theory of social change says that, over time, a social system moves through developmental stages, becoming increasingly differentiated and more complex. It evolves a specialized divison of labor and develops greater individualism. These developments create greater efficiency for the system as a whole."²²⁹

1.4.5.5.2 Causal Explanation

In order to establish a causal explanation, three things must be established: temporal order, association, and the elimination of plausible alternatives. This dissertation aims to meet as many of these three as possible, but recognizes that full causal explanation will not be possible. Each will be briefly discussed in turn.

1.4.5.5.2.1 Temporal Order

While most causal relations are unidirectional in terms of cause and effect, the type of causality invoked in this research is recursive or reciprocal, as in the feedback rich models of system dynamics (Forrester, 1961).

"More complex theories specify reciprocal-effect causal relations – that is, a mutual causal relationship or simultaneous causality...or feedback relationships, but these are difficult to test."²³⁰

1.4.5.5.2.2 Association

"Two phenomena are associated if **they occur together in a patterned way** or appear to act together. People sometime confuse correlation with association. Correlation has a specific technical meaning, whereas association hais a more general idea."²³¹

1.4.5.5.2.3 Elimination of Plausible Alternatives (Spuriousness)

"Eliminating all possible alternatives is **impossible**."²³²

²²⁹ Neuman, W.L. (2006), pg. 72.

²³⁰ Neuman, W.L. (2006), pg. 65.

²³¹ Neuman, W.L. (2006), pg. 66.

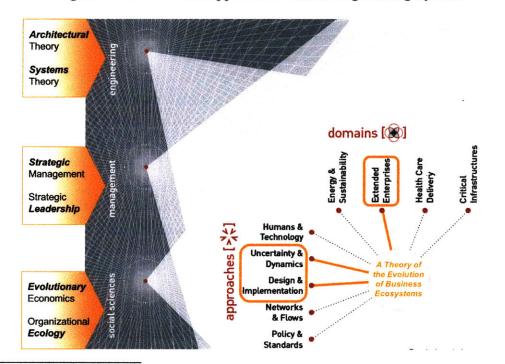
²³² Neuman, W.L. (2006), pg. 66.

1.5 Bridging Intellectual Traditions: Engineering Systems & Strategic Management

1.5.1 Engineering Systems

While the research is designed to engage the academic field of *strategic management*, the intellectual bridges will be drawn from developed as well as emerging disciplines of *engineering systems*. This section therefore briefly outlines the research agenda for a bold new academic division at MIT - the *Engineering Systems Division*, and places this research plan within the context of ESD. It briefly explains why the ESD is uniquely placed to be the natural academic "home" to sponsor and supervise this research.²³³

As the MIT Engineering Systems Division is explicitly set up to embrace the disciplines of Engineering, Management and Social Sciences, this research embraces the respective subfields of Architectural Theory and Systems Theory, Strategic Management and Strategic Leadership, Evolutionary Economics and Organizational Ecology. Within the Engineering Systems Division, the *domain* that this research engages is "Extended Enterprises", and the *approaches* used focus on "Design" and "Dynamics", as summarized in Figure 97 below.²³⁴





²³³ Significant debate has existed regarding the natural academic school or department as the "home" of this doctoral work. The phenomena investigated in this research is clearly the domain of management or business schools (and specifically within a department of strategic management). However, many doctoral programs in management/business schools tend to be discipline-based (e.g. economics or organizational theory). As this research focuses first and foremost on the phenomena (not the methodology), and takes a rather catholic, multi- and inter-disciplinary approach to investigate the phenomena, it has proven to reside more comfortably within a multi-disciplinary "systems division", in this case the MIT Engineering Systems Division.

1.5.1.1 Engineering Systems Defined

"We believe that it is important for industry, government, academia and other stakeholders...to work together to create a new field that we call Engineering Systems to develop a better understanding of the issues surrounding large-scale, complex, technologically enabled systems."²³⁵

The ESD was born out of the increasing demands on the design of complex socio-technical systems (which also have significant socio-economic and socio-political components). The investigation of such complex problems, inevitably involves taking intellectual risks.

"The management of the enterprises that perform design, manufacturing and operational processes is a significant concern in the field. Furthermore, the economic, social and political context in which the engineering systems operate is a significant concern."²³⁶

"We value and accept intellectual risk. This means tackling issues that appear, at least in part, to be non-quantifyable or vague. We have deep respect for all the disciplines we bring together and build upon, including engineering, social sciences and management."²³⁷

It is not a coincidence therefore, that the primary constructs used in this research plan: enterprise *architecture*, enterprise *structural dynamics* and the *industrial evolution* of the enterprise's environment all have their theoretical heritage rooted in "engineering systems".

"Engineering Systems is a field of study taking an integrative holistic view of large-scale, complex, technologically-enabled systems with significant enterprise level interactions and socio-technical interfaces."²³⁸

An "engineering system - as conceived by the ESD - is comprised of the (micro-) product system, the (meso-) enterprise system, and the (macro-) environment system. This research plan therefore focuses on the meso-enterprise system²³⁹ as the unit of analysis, as shown in Figure 98 below.

"The interaction between the designing enterprise and the engineering system is deep. While organizational theorists have well-developed theories of how organizations function and make decisions, this understanding needs to be integrated into the design phase in a quantifiable way."²⁴⁰

²³⁴ These definitions are taken from the MIT Engineering Systems Division's "Strategic Report", 2009.

²³⁵ Moses, J. (2004), pg. 3.

²³⁶ Moses, J. (2004), pg. 2.

²³⁷ MIT Engineering Systems Division, "Strategic Report". (2009).

²³⁸ Hastings, D. (2005), pg. 17.

²³⁹ The enterprise system is sometimes referred to as an "extended enterprise" which includes the firm producing the product system and its key stakeholders, (e.g. customers, suppliers, investors, employees).

²⁴⁰ Hastings. D. (2004), pg. 5.

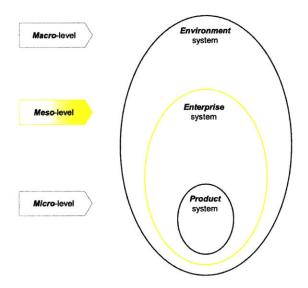


Figure 98: General research focus within the construct of an "engineering system"

1.5.1.2 Engineering Systems approach to Strategic Management

The following characteristics of engineering systems are particularly appropriate to the study of strategic management.

1.5.1.2.1 *Performance* as the Dependent Variable

A common characteristic shared between engineering systems and strategic management is the focus on *performance*, whether of products, product systems, production systems or enterprises performing these functions. When the notion of *relative* performance becomes relevant or important, then *competition* becomes important. This focus on competitive performance will be discussed in more detail later in the section on *enterprise architecting*.

1.5.1.2.2 Holism and Feedback Processes

"A particular feature in the Engineering Systems mode of thought is **holism**. That is, emphasizing the behavior of the whole in contrast to its parts. Holism lends itself to thinking about **appropriate abstractions** for describing and analyzing engineering systems as a whole."²⁴¹

This research dissertation therefore attempts to use holistic, non-reductionist thinking to bring heretofore absent "appropriate abstractions" (e.g. form, function, fit, etc.) to bear on the field of strategic management in order to explain long-term firm performance.

²⁴¹ Moses, J. (2004), pg. 1.

"Much attention is paid in the Engineering Systems mode of thought to certain feedback processes. For example, the organization of an enterprise can influence the architecture of the system it designs. Similarly, the architecture of a system can influence the organization of the enterprise."²⁴²

In addition, this dissertation aims to entertain not a simple correlative approach, nor a linear open loop causal explanation for long-term firm performance, but a closed-loop feedback explanation via the development of an explanation for the evolution of business ecosystems.

1.5.1.2.3 Managing Change and the Life Cycle Perspective

"A key emphasis in the field is on managing change. Large-scale engineering systems tend to change a great deal, especially when we consider long time frames, such as the entire lifetime of the system. Engineering Systems takes a relatively optimistic view of ways of dealing with change. One way of managing change is to consider those aspects of the system that will remain relatively stable. For example, while the overall function of the system may change dramatically over time, its macro-scale architecture may be relatively stable."²⁴³

Unlike many studies in the field of strategic management which tend to be cross-sectional, this research utilizes a longitudinal (including historical) approach examining long time frames in order to examine the entire lifetime of a system (firm and industry). In this way, it is hoped to determine whether or not the "system function" and its associated "macro-scale architecture" changed significantly over the life-cycle. In this way, this research hopes to re-engage the debate of social structure vs. agency in organizational theory.

1.5.1.2.4 The "-ilities"

"From the existing engineering science point of view, there are several traditional properties of engineering systems. These include: function, performance and cost. Engineering Systems emphasizes non-traditional properties or goals of systems, often called 'ilities.' They usually arise from taking a long-term or life-cycle view of systems. These include: flexibility, robustness, etc."²⁴⁴

The tendency of researchers in the field of strategic management is to focus on traditional short term properties of the firm like "profitability" expressed as various efficiency ratios like return on assets, return on equity, return on sales.

This research dissertation takes the long-term or life-cycle view of firms and their enterprise systems by focusing on the "non-traditional" properties of systems including the following "-ilities": flexibility, stability etc.

Therefore, although this research will use the traditional property of "profitability" as the primary dependent variable, it will focus on causal mechanisms which introduce the "-ilities" as independent variables.

²⁴² Moses, J. (2004), pp. 1-2.

²⁴³ Moses, J. (2004), pg. 1.

²⁴⁴ Moses, J. (2004), pp. 6-7.

1.5.1.3 Engineering Systems sub-field: Enterprise Architecture

Within the emerging field of Engineering Systems, it is posited that the notion of "architecture" has theoretical relevance to all systems, whether natural or artificial, whether consciously designed or not. As shown in Figure 99 below²⁴⁵, this doctoral research plan will attempt to contribute to a systems subfield called, *Enterprise Systems Architecture*, or *Enterprise Architecture* for short.²⁴⁶. The research attempts to address the architectures of "intellectual frameworks" on "organizational forms", where the organizations in question are "larger than single companies", namely *business ecosystems* as defined earlier.

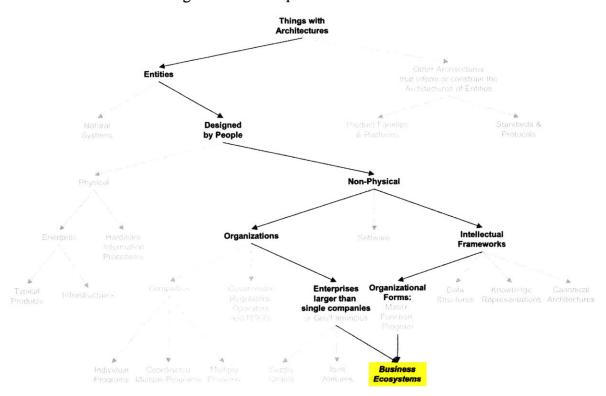


Figure 99: Decomposition of Architectures

"Architecture, especially the architecture of the highest level of an engineering system, is of great interest to Engineering Systems."²⁴⁷

The proposed research will attempt to characterize enterprises at their the highest, most abstract level: i.e. their *form, function, structure* and *behavior* (both transient and steady state).

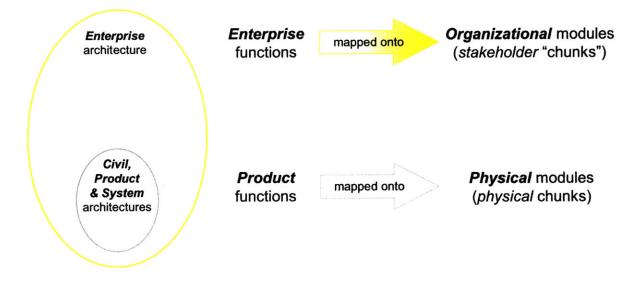
²⁴⁵ Adapted from Whitney, D. et al. (2004), pp. 15-16.

²⁴⁶ The qualifying word "systems" is used to distinguish this endeavor from the growing body of research on "enterprise architecting" which represents a narrower IT space.

²⁴⁷ Moses, J. (2004), pg. 8.

As will be discussed in more detail in Essay #1, this research will posit the construct of an *enterprise* architecture, which will draw concepts from *civil*, *product* and *system* architecture. While these well-developed concepts tend to focus on the mapping of function to physical entities, the notion of enterprise architecture focuses primarily on mapping of function to organizational entities as shown in Figure 100 below.

Figure 100: Enterprise Architecture vs. Civil, Product & System Architectures



Having defined an enterprise architecture, I will begin to explore questions that are central to the emerging field of enterprise architecting relating to the properties of architectures, as expressed by Nightingale and Rhodes (2004) below:

"How do you architect enterprises to optimize around certain properties? What enterprise architecture could maximize long-term stability of the enterprise versus what architecture would maximize the flexibility of the enterprise in regard to its ability to design innovative new products? Can a single enterprise model be 'optimized' for both such properties, or do we need to select for one over another?"²⁴⁸

²⁴⁸ Nightingale, D. and Rhodes, D. (2004), pp. 9-10.

1.5.1.3.1 Enterprise Architecting subfield: Competition

"In enterprise architecting we are faced with an important consideration: How do you architect an enterprise that can most effectively produce a desired 'product system'?"²⁴⁹

By extension, an enterprise that is architected to effectively produce a desired product system, will exhibit higher long-term firm performance than other competing enterprise system architectures. The issue of enterprise architecture for effective product system delivery becomes one of enterprise architecture as an explanatory strategic variable for long-term firm competitive performance.

"Engineering systems are not designed, produced and operated in a vacuum. There are customers of these systems, competing enterprises, societal concerns and governmental policies that also need to be considered."²⁵⁰

One of the primary academic contributions of this research therefore attempts to bridge the heretofore-separate intellectual traditions between *engineering systems* (an in particular, *systems architecting* and *system dynamics*) and *strategic management*.

The research focuses therefore the dynamics of competing meso-enterprise systems, on *complex*, *competitive enterprise architectures*²⁵¹, characterized as having differing architectural forms, as shown in Figure 101 below.

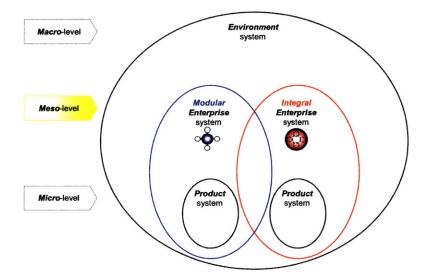


Figure 101: Specific research focus with the construct of an "engineering system"²⁵²

²⁴⁹ Nightingale, D. and Rhodes, D. (2004), pp. 2.

²⁵⁰ Moses, J. (2004), pg. 8.

²⁵¹ ESD Prof. Joe Sussman, furthered this concept in his white paper, "Home Run For LAI", July 8, 2005.

²⁵² Note that the overlap of the competing enterprises is shown to symbolically represent the fact that there are often sharing of key stakeholders among enterprise (e.g. customers, suppliers, investors, etc.).

1.5.1.3.2 Competition case study: Boeing vs. Airbus

"A Boeing-Airbus case study [could be] a 'home-run' [due to its]... high-visibility... international frame of reference... multiple stakeholders interacting in complex and subtle ways... insights applied to other domains."²⁵³

The primary case study in this research plan centers on the competition between *Boeing* and *Airbus*' global enterprises that design and manufacture large-scale, complex, technologically enabled systems. In addition, as these enterprises are embedded in complex economic, social and political contexts, it is appropriate that international faculty whose interests and expertise embrace these "non-engineering" disciplines, as well as engineering systems supervises the research.

1.5.1.4 Mapping Proposed Research onto ESD Intellectual "Topology"

Finally, in order to place this work within existing intellectual traditions, I note that in the spirit of ESD research, the work is intended to build systemic knowledge via bridges between heretofore disconnected academic disciplines.

As is seen in Figure 102 below, the proposed research draws upon - and lies in the intersection of - at least four academic areas identified by ESD^{254} :

- Systems Analysis
- Systems Theory
- Organizational Theory
- Political Economy

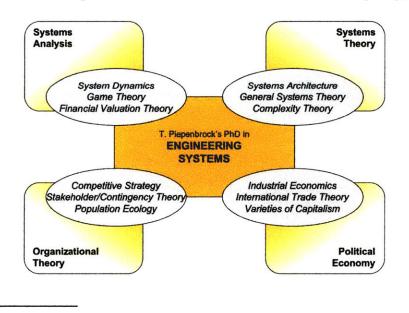


Figure 102: Proposed Research within ESD Intellectual "Topology"

²⁵³ Joe Sussman, ibid.

²⁵⁴ Hastings, D. (2005), pg. 17.

1.5.1.5 Firm-Industry Research Tradition

The research plan described herein builds on the academic tradition of MIT's *Engineering Systems Division* and its predecessor organizations in the scope of its studies of firms and industries as large-scale, complex, technologically-enabled systems with significant enterprise level interactions and socio-technical interfaces. ESD director, Prof. Dan Hastings gives the following examples of engineering systems:

"Examples of Engineering Systems include: automobile production systems, aerospace enterprise systems, air transportation systems..."²⁵⁵.

Figure 103 below shows examples of previous ESD research²⁵⁶ in each of these three domains:

- The International Motor Vehicle Program's (IMVP) study of the automotive industry, uncovered causal mechanisms of the emerging leader, *Toyota Motors*.²⁵⁷
- The *Lean Aerospace Initiative's* (LAI) studies of the aerospace industry²⁵⁸ aim to uncover the causal mechanisms of its emerging leader, *Airbus Industrie*.
- The *Global Airline Industry*'s (GAI) study of the US airline industry, uncovering the causal mechanisms of the emerging leader, *Southwest Airlines*.²⁵⁹



Figure 103: Case Study Building Blocks for Theory Development

As will be discussed later in the research methodology section, these three pieces of *firm-industry* research will form the basis of a theoretical sample upon which the grounded theory is developed and extended.

²⁵⁵ Hastings, D. (2005), pg. 14.

²⁵⁶ As well as *Sloan Industry Studies* research.

²⁵⁷ Womack, Jones and Roos, (1990).

²⁵⁸ Murmann, E. et al. (2002).

²⁵⁹ Hoffer-Gittell, J. (2003).

1.5.2 Strategic Management

Although the field of strategic management has had a rich intellectual history over the past 50 years, more recent critical debates have emerged among some of the field's most pre-eminent scholars which challenge its relevance and epistemological basis (Ghoshal, 2005; Kanter, 2005; Pfeffer, 2005; Hambrick, 2005; Mintzberg, 2005; Donaldson, 2005). This research dissertation is timely in that it attempts to address theses topical discussions.

"Over the last 50 years business school research has increasingly adopted the 'scientific' model – an approach that Hayek (1989) described as the 'pretense of knowledge.' This pretense has demanded theorizing based on partialization of analysis, the exclusion of any role for human intentionality or choice, and the use of sharp assumptions and deductive reasoning (Bailey and Ford, 1996)."²⁶⁰

A recent paper, published posthumously by strategic management professor Sumantra Ghoshal $(2005)^{261}$ triggered an interesting academic debate among some of the leading academics in the field. Ghoshal critiques his own profession - business school academics - as contributing to the development of "bad management theories (which) are destroying good management practices." This research dissertation is designed to attempt to address the concerns articulated by these scholars.

1.5.2.1 The Scientific Model (and the "pretense of knowledge")

"Friedrich von Hayek dedicated his entire Nobel Memorial Lecture to the danger posed by scientific pretensions in the analysis of social phenomena. Because of the very nature of social phenomena, which Hayek described as 'phenomena of organized complexity,' the application of scientific methods to such phenomena' are often most unscientific, and, beyond this, in these fields there are definite limits to what we can expect science to achieve."²⁶²

"Why don't we actually acknowledge that companies survive and prosper when they simultaneously pay attention to the interests of customers, employees, shareholders, and perhaps the communities in which they operate? The honest answer is because such a perspective cannot be elegantly modeled – the math does not exist. Such a theory would not readily yield sharp, testable propositions, nor would it provide simple, reductionist prescriptions. With such a premise, the pretense of knowledge could not be protected. Business could not be treated as a science and we would have to fall back on the wisdom of common sense that combines information on 'what is' with the imagination of 'what ought to be' to develop both a practical understanding of and some pragmatic prescriptions for 'phenomena of organized complexity' that the issue of corporate governance represents. This too is scholarship, but it yields theory that does not pretend to be scientific laws but merely serves as 'walking sticks' – in Fritz Roethlisberger's (1977) terms – to aid sensemaking as we go along, to be used only until a better walking stick can be found."²⁶³

"In describing himself and his work, Sigmund Freud wrote: 'You estimate me too highly. I am not really a man of science, not an experimenter and not a thinker. I am nothing but by temperament a conquistador – an adventurer' (in Jones, 1964, 171). Freud's inductive and iterative approach to

²⁶⁰ Ghoshal, S. (2005), pp. 76-77.

²⁶¹ Professor of strategic management at the London Business School. Ghoshal received dual doctorates in management from the Massachusetts Institute of Technology and the Harvard Business School.

²⁶² Ghoshal, S. (2005), pg. 79.

²⁶³ Ghoshal, S. (2005), pg. 81.

sense making, often criticized for being ad hoc and unscientific, was scholarship of common sense. So indeed was Darwin's, who too practiced a model of research as the work of a detective, not of an experimenter, who was driven by the passions of an adventurer, not those of a mathematician. Scholarship of common sense is the epistemology of disciplined imagination, as advocated by Karl Weick (1989), and not the epistemology of formalized falsification that was the doctrine of Karl Popper (1968)."²⁰⁴

"The trouble with the social sciences is that the **logic of falsification**, which is so very essential for the epistemology of positivism, **is very hard to apply with any degree of rigor and ruthlessness in domain of social theories**. Typically, no theory – which are all, by definition, partial – explains a 'phenomenon of organized complexity' fully, and **many different and mutually inconsistent theories** explain the same phenomenon, often to very similar extents. As a result, nothing can be weeded out nor, given the very different framings, can anything be combined with anything else, except in a very synthetic and ad hoc manner."²⁶⁵

"The answer would help us understand the path toward replacing 'bad theories' with better ones – or perhaps, I should say simpler theories with more complex ones, partial theories with fuller explanations. I don't think ideas such as agency theory/economic man/shareholder rights/incentives as motivators are all wrong, and neither does Ghoshal. They are just too simple and leave out too much."²⁶⁶

1.5.2.2 Solving the Negative Problem (and the "gloomy vision")

"These negative assumptions are manifest in the strong form of determinism in both ecological (e.g. Hannan and Freeman, 1977) and institutional (Di Maggio and Powell, 1983) analysis of organizations; in the denial of the possibility of goal-directed adaptation in behavioral theories of the firm (e.g. Cyert and March, 1963); in the focus on value appropriation rather than value creation in most theories of strategy (e.g. Porter, 1980); and in the assumptions about shirking, opportunism, and inertia in economic analysis of companies (e.g. Alchian and Demsetz, 1972; Williamson, 1975)."²⁶⁷

²⁶⁴ Ghoshal, S. (2005), pg. 79.

²⁶⁵ Ghoshal, S. (2005), pg. 79.

²⁶⁶ Kanter (2005), pp. 93-94.

²⁶⁷ Ghoshal, S. (2005), pg. 82.

1.5.2.3 Self-fulfilling Theories (and the "double hermeneutic")

"All of this would not lead to any negative consequences for management practice but for the distinctive feature of double hermeneutic that characterizes the link between theory and practice in social domains. Unlike theories in physical sciences, theories in the social sciences tend to be self-fulfilling (Gergen, 1973). A theory of subatomic particles or of the universe – right or wrong – does not change the behaviors of those particles or of the universe. If a theory assumes that the sun goes around the earth, it does not change what the sun actually does. So, if the theory is wrong, the truth is preserved for discovery by someone else. In contrast, a management theory – if it gains sufficient currency – changes the behaviors of managers who start to act in accordance with the theory. Whether right or wrong to begin with, the theory can become right as managers – who are both its subjects and its consumers – adapt their behaviors to conform with the doctrine."²⁶⁸

When applying the scientific model to social domains, the object of the research (management *practice*) has the opportunity to implement the subject of research (management *theory*), which can lead to self-fulfillment (Ghoshal, 2005) as shown in Figure 104 below.

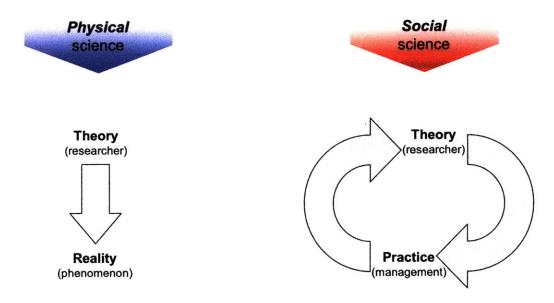


Figure 104: The Theory-Practice Double Hermeneutic in Social Science

"If you do not rest upon the good foundation of **nature**, you will labor with little honor and **less** profit."²⁶⁹

²⁶⁸ Ghoshal, S. (2005), pg. 77.

²⁶⁹ Leonardo da Vinci.

1.5.3 Management / Engineering Knowledge as an Example of the Framework

Before proceeding into a discussion of the framework and its applications to competitive *business* environments, it is interesting to note its application to the competitive *academic* environments, namely the evolution of management / engineering knowledge.

1.5.3.1 Making "Intellectual Bricks" vs. Building "Cathedrals of Knowledge"

"...the one will kill the other ... each mind is a mason."270

As shown in Figure 105 below, theory building can be thought of metaphorically as building buildings. One needs both structurally strong (i.e. rigorously derived and internally valid) components or "bricks" deduced from scientific reductionism as well as functional (i.e. relevant) systems induced from scientific holism. As the previous discussions on the current stalemate in strategic management reveal (Ghoshal, 2005 et al.), the intellectual pendulum has swung back towards the need to begin to reintegrate the bricks of knowledge.

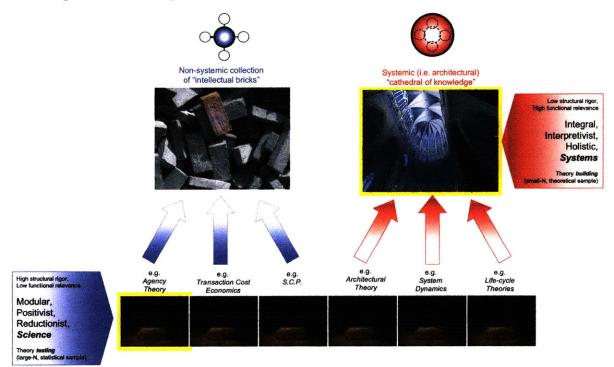


Figure 105: Making "Intellectual Bricks" vs. Building "Cathedrals of Knowledge"

This research takes as a point of departure, a collection of disconnected theories or wellestablished intellectual "bricks", which are each internally-valid enough to venture to assemble a structural system of knowledge which begins to have functional relevance and utility. One of the

²⁷⁰ Hugo, V. (1831) Notre Dame de Paris.

clear difficulties with endeavoring such "systemic" research is that scholars having specialized in building their strong "scientific" brick, are by definition unfamiliar with other scientist's "bricks", and therefore demand a deep, narrow reductionist theory-testing approach to that second "brick". This is precisely why rigorous and relevant theories have yet to be built in complex socio-technical domains. A systemic framework or "cathedral of knowledge" consisting of say 100 bricks can never get beyond the second brick. The following observations from fellow academics reveal the dilemma:

"A PhD at the end of the day is the dedication of five years of your life to scientifically building a small, tight, impenetrable **brick** of knowledge in a very narrow, bounded intellectual domain."²⁷¹

"The frameworks that you suggest, are typically conceived by emeritus professors, near the end of their careers... but come to think of it, we never really get around to it ... looking back on it all, the reality is that probably the most opportune time to conduct such 'big' research was during our PhD years."²⁷²

1.5.3.2 Management / Engineering Science as Modular Enterprise Architecture

The deep and narrow functional specialisms of engineering science have grown up over the past half-century in concert with the "higher, faster, farther" demands of industry and government.

The organizational forms that deliver such *product* innovation tend to be *modular* enterprise architectures.

1.5.3.3 Management / Engineering Systems as Integral Enterprise Architecture

As the industrial and government customers begin to be "over-served" by the deep and narrow functional specialisms of engineering science, the educational ecosystem has evolved a complementary and symbiotically competitive architectural form which serves to integrate such knowledge from management / engineering science and other contextual disciplines in the form of engineering systems to serve the demands for "better, faster, cheaper" knowledge.

The organizational forms that deliver such *process* innovation tend to be *integral* enterprise architectures with long-term trust-based partnership between stakeholders such as academia, industry, government, etc. At MIT over the past 20 years, such separate integral enterprises like: the Technology and Policy Program (TPP), the Leaders for Manufacturing Program (LFM, the System Design and Management Program (SDM) have recently been brought under the umbrella of the integrating mechanism of the Engineering Systems Division (ESD).

This research therefore takes an integral enterprise architectural approach as shown in Figure 106 below, as the environments for knowledge in both the management and engineering fields appear to be more mature and therefore there is a need and opportunity to create innovative knowledge via integration or synthesis using inductive methods and via building long-term trust-based relationships with the phenomena under study.

²⁷¹ MIT Sloan PhD student, spring, 2005.

²⁷² MIT Sloan Professor, fall 2004.

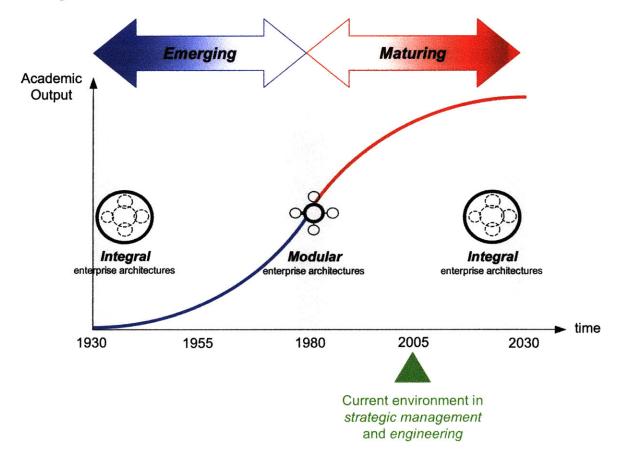


Figure 106: Dissertation as the Evolution of the Dominant Research Architecture

"Our primary endeavor as business school academics over the last half century has been to make business studies a branch of the social sciences (Schlossman, Sedlak, and Wecshler, 1998). Rejecting what we saw as the 'romanticism' of analyzing corporate behaviors in terms of the choices, actions and achievements of individuals (e.g. Andrews, 1980), we have adopted the 'scientific' approach of trying to discover patterns and laws, and have replace all notions of human intentionality with a firm belief in causal determinism for explaining all aspects of corporate performance. Adoption of scientific methods has undoubtedly yielded some significant benefits for both our research and pedagogy, but the costs too have been high. Unfortunately, as philosophy of science makes clear, it is an error to pretend that the methods of the physical sciences can be indiscriminately applied to business studies because such a pretension ignores some fundamental differences that exist between the different academic disciplines."²⁷³

²⁷³ Ghoshal, S. (2005), pg. 77.

1.6 Literature Analysis

"Interesting research reported contrarian findings, disconfirmed established theories and challenged accepted assumptions. The lesson is that researchers should try to develop theories and gather data that disconfirm existing views. Scholars must know the current body of knowledge but not champion it."²⁷⁴

1.6.1 Previous Related Research

There is clearly a considerable wealth of constituent research in the field of strategic management from two schools rooted in microeconomic theory: the Industrial Organization subfield dating back to Bain (1956) advanced the industry structure emphasis and on the resource-based view of the firm dating back to Penrose (1959), with their respective descendant proponents appearing a quarter century later in Porter (1980) and Wernerfelt (1984). Since this time, much research in this field has focused on the refinements of theories in each subfield, including: asset stock accumulation and dynamic capabilities (Dierickx and Cool, 1989; Teece, Pisano and Shuen, 1990).

"We need equally rich models of the firm and the environment that take both organizational and economic modes of explanation seriously."²⁷⁵

Relatively little has been done in studying the longitudinal interactions between the firm and its environment, particularly with respect to developing grounded theory, and particularly with respect to embracing strategic management's primary constituent fields of economics and organizational theory.

"Fortunately, strategy researchers have always been willing to study subjects that cut across existing conceptual boundaries."²⁷⁶

1.6.1.1 Economics and Sociology Literatures

In developing the concept of *enterprise architecture* and tying it to long-term firm performance, this research cuts across economic and sociological boundaries, embracing such diverse sources as: theory of the firm (Coase, 1937; Alchian and Demsetz, 1972; Williamson, 1985), agency theory (Jensen & Meckling, 1976; Fama, 1980), behavioral decision theory (Kahneman et al., 1982, Simon, 1982); organizational contingency theory (Lawrence and Lorsch, 1967), structural functionalism (Selznick, 1948), chaos theory in strategy (Levy, 1994), complexity theory in strategy (Stacey, 1995), structuration theory (Giddens, 1979; Whittington, 1992; Yates, 1997), institutional theory (Fligstein, 2001, Loveridge, 2003), institutional economics (Veblen, 1898; Commons, 1934), mixed duopoly economics (Law & Stewart, 1983; Mai & Hwang, 1989; Horowitz, 1991; Cremer & Crémer, 1992; Futagami & Okamura, 1994), macro- and international economics (Poire and Sabel, 1984; Thurow, 1992; Hall and Soskice, 2001), strategic complementarities (Milgrom and Roberts, 1990, 1995; Whittington et al., 1999),

²⁷⁴ Daft R.L. and Lewin, A.Y. (1990), pp. 5-6.

²⁷⁵ Henderson, R. and Mitchell, W. (1997), pg. 10.

²⁷⁶ Henderson, R. and Mitchell, W, (1997), pg. 12.

stakeholder theory of the firm (Follett, 1918; Freeman, 1984; Evan and Freeman, 1988; Ackoff, 1990; Donaldson and Preston, 1995; Mitchell, Agle & Wood, 1997; Ramirez, 1999; Schilling, 2000; Freeman and McVea, 2006), trust, voice and exit (Hirschman, 1970; Helper, 1990; Sako and Helper, 1998), theory of the growth of the firm (Penrose, 1959; Forrester, 1966), general systems theory (von Bertalanffy, 1962) and systems view of the firm (Ashby, 1956; Forrester, 1961; Simon, 1969).

1.6.1.2 Architecture Literatures

In addition, *enterprise architecture* cuts across the many manifestations of "architecture" in management literature: e.g. complexity in- (Simon, 1962) building- (Alexander, 1964), product-(Ulrich, 1995), systems- (Meier and Rechtin, 2000; Nightingale and Rhodes, 2004), supply chain- (Novak and Eppinger, 1998), organizational- (Sanchez and Mahoney, 1996; Rechtin, 1999), human resource- (Lepak and Snell, 1999), innovation and- (Henderson and Clark, 1990), as well as the various interactions between architectures (Fine, 1998; Sako, 2003).

1.6.2 Placement of Research within the Strategic Management Literature

While the proposed research intends to engage the strategic management intellectual community, it attempts to do so via multi-disciplinary means, bridging both the economics and sociology literatures.

Appendix C illustrates this placement by highlighting those works of the 50 most cited publications in strategic management (Ramos-Rodriguez and Ruiz-Navarro, 2004) that have had the greatest impact on this dissertation.

1.6.3 Placement of the Proposed Framework within the Literatures

1.6.3.1 Framework as *Typology* (capturing the *internal-external* debate)

The framework proposes a typology of organizational sets, which has closest links to the following typologies:

- Political Economy: "Varieties of Capitalism" (e.g. Hall and Soskice, 2001)
 - Liberal Market Economy (LME) vs.
 - Coordinated Market Economy (CME)
- Economics: "Mixed Duopoly" (e.g. Lambertini and Rossini, 1998)
 - Profit Maximizer (PM) vs.
 - Labour Managed (LM)
- Sociology: "Contingency Theory" (e.g. Burns and Stalker, 1961)
 - Mechanistic vs.
 - o Organic

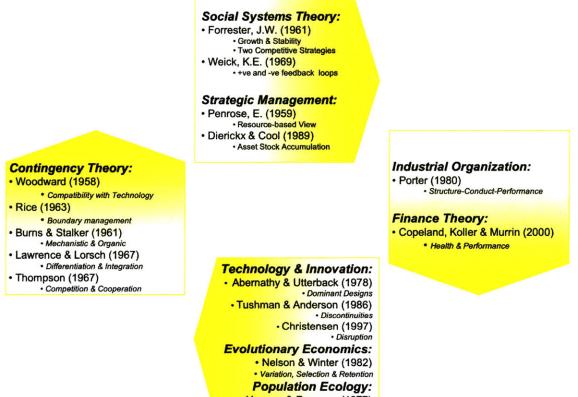
1.6.3.2 Framework as *Evolution* (capturing the *adaptation-determinism* debate)

The framework proposes a theory of the evolution of the organizational sets, which has closest links to the following theories:

- Population / Community Ecology (e.g. Hannan and Freeman, 1977)
- Evolutionary Economics (e.g. Nelson and Winter, 1982)

In order to begin to place the research and its proposed framework within the academic literatures, Figure 107 below summarizes in stylized form a sample of some of the main influences at the intersections between the key constructs.

Figure 107: Placement of the Framework within the Academic Literatures



Hannan & Freeman (1977)
 Structural Inertia

1.6.4 Gaps in Literature

"Unfortunately there is **relatively little research** that explicitly considers how capabilities and environments jointly shape each other... Clearly, **far more work remains** to explore the reciprocal relationship between capabilities and competition."²⁷⁷

"I scoured the literature of the theory of the firm in theoretical economics for discussions of [the growth of the firm] with increasing frustration." 278

While each of the aforementioned references represents well-developed areas of domain knowledge, the interconnections among them have not yet been seriously explored. It is the space in between existing disciplines that this research attempts to exploit. If any research innovations are to be found in this research dissertation, they would lie in a framework which connects the disconnected, which re-members the dismembered, which integrates the disintegrated.

"Each of the research programs [in strategic management] has focused on a different element of the strategy picture: environment, resources, and organizational structure. This division of labor between programs of research has facilitated scientific progress – but at a price."²⁷⁹

While there is a clear wealth of research from diverse theoretic sources - each providing different explanations for long-term firm performance - there is relatively little research in the strategic management literature providing more systemic, meta-theoretical frameworks which capture the plurality and complexity of performance causality into a unifying meta-strategic framework.

"This loudly divided counsel on the best strategy...reflects a certain troubling inadequacy in both perception and understanding. Of course, we do not mean that a good case cannot be made for some of these remedies. We mean, rather, that the sheer cacophony of prescription is itself evidence of a broad-based failure of interpretation, an inability or unwillingness to see that [long-term firm performance] defies the standard categories of analysis and discussion."²⁸⁰

Gaps in the strategic management literature therefore exist in the synthesis and reconciliation of existing competing theories, as well as in bringing existing theories from other non-strategy (and in fact, non-management) sources like *systems architecting*.

"Much exciting theoretical and empirical work remains in coupling dominant designs and technology cycles to environmental conditions and organizational evolution."²⁸¹

[Miller, 1986] "...represented an early attempt to apply the approach of configuration to the field of strategy. Now, 10 years later, we still have far to go. What is often lacking from the configurational literature is the search for the configuration itself: for complex systems of interdependency and their core orchestrating themes."²⁸²

²⁷⁷ Henderson, R. and Mitchell, W. (1997), pp. 10 and 11.

²⁷⁸ Penrose, E.T. (1985).

²⁷⁹ Farjoun, M. (2002), pp. 566.

²⁸⁰ Abernathy, W., Clark, K. and Kantrow, A., *Industrial Renaissance: Producing a Competitive Future for America*, Basic Books Inc., New York, 1983, pp. 3-4.

²⁸¹ Tushman, M. and Murmann (1998).

²⁸² Miller, D. (1996), pg. 505.

1.6.5 Contributions to Literature

The primary contribution that this research aims to make is in bridging two heretofore separate and distinct academic and theoretical fields: strategic management and the emerging field of engineering systems, and in particular, systems architecting and system dynamics.

"In addition to the integration gained by the increased recognition of reciprocal causation, integrative frameworks have offered more eclectic views of concepts and phenomena, linked previously disconnected constructs and levels of analysis, and attempted to further the bridging of fragmented models."283

The innovations that this research attempts to bring to the field of strategic management include:

- The notion of architecture applied to the extended enterprise.
- The notion that these enterprise architectures cause firm dynamics.
- The notion that these firm dynamics cause long term firm performance
- The notion of a "dominant design" applied to the extended enterprise architectures in the • evolution of the industry.
- The development of and distinction between two types of organizational inertia: architectural and structural.

1.6.5.1 *Theoretical* Contributions to Literature

The three primary theoretical contributions to the strategic management and emergent engineering systems literatures are:

The first is the introduction of the heretofore-absent theoretical construct of enterprise architecture as an explanation for long-term firm performance. This construct acts both to unify other disconnected theories as well as to simplify the complexity of long-term firm performance.

"The architecture is the form of the system and is the dominant factor in its behavior."284

The second theoretical contribution is the linkage of enterprise architectural form to the enterprise structural dynamics of stability and growth, which in turn impact long-term performance. In this sense, it is a modest theoretical extension and generalization of Edith Penrose's seminal work on the growth of the firm.²⁸⁵

Finally, the third theoretical contribution is the feedback linkage between architectural form, structural dynamics and firm performance to the dynamic evolution of the industrial environment.

²⁸³ Farjoun, M. (2002), pp. 569.
²⁸⁴ Whitney D. et al, (2004), pg. 26.

²⁸⁵ Penrose, E.T. (1959).

1.6.5.2 *Empirical* Contributions to Literature

"Considerable attention has recently been devoted to understanding behavior in large organizational systems. Although some of this work has been based on research, it has more typically been general theorizing with **little support from research data**. Our interest in examining complex organizations is to study **more systematically and empirically** their **internal** functioning in relation to the demands of the external environment on the organization and the ability of the organization to cope effectively with these demands, contributing to a theory of the functioning of large organizations based on empirical research."²⁸⁶

As discussed previously, this research dissertation attempts to validate and extend the ground breaking research performed by Lawrence and Lorsch (1967). Nearly forty years after their work, there is still little empirical data to support theories on large organizational systems.²⁸⁷

Like their original work, this dissertation is based empirically in building grounded theory. However, unlike their original research, this dissertation is interested in the phenomenon of the *external* (i.e. *inter*-firm) functioning of large organizational systems (or "extended enterprises"), as opposed to the internal functioning (i.e. *intra*-firm) functioning of large organizational systems (or "firms").

As will be discussed later, the theoretical framework will be grounded empirically. As such, it is envisaged that there will be empirical contributions to be made, particularly in support of the theoretical work surrounding the shareholder vs. stakeholder debate – particularly by explaining how, when and why each model seems to be more competitively dominant.

The following is a partial list of some of the empirical contributions that this dissertation begins to make to the existing theoretical literature:

- Empirical evidence to begin to validate and extend Lawrence and Lorsch's (1967) structural contingency theories regarding differentiation and integration as *intra*-firm mechanisms to *inter*-firm mechanisms.
- Empirical evidence to begin to *endogenize* Lawrence and Lorsch's (1967) contingency theory namely to explain what drives the dominance of differentiation and intergration and when this dominance switches between the two.
- Empirical evidence to begin to identify and explain variation of enterprise architectural *forms* in population ecology (Hannan and Freeman, 1977) and to demonstrate that certain *late entrants* do not have high mortality rates as the theory suggests, but not only do they survive, they go on to dominate the industry.
- Empirical evidence to begin to support Pfeffer and Salancik's (1978) claims of resource dependence. As the authors themselves lament, 25 years after the publishing of their influeitial work:

²⁸⁶ Lawrence, P.R. & Lorsch, J.W. (1967), pg. 2.

²⁸⁷ Lawrence, P.R. & Lorsch, J.W. (1967), pg. 2 cite the studies by: Burns & Stalker (1961), and Rice, A. (1965).

"The image presented is one of dynamic interaction and evolution of organizations, environments, and interorganizational relations over time as the various actors maneuver for advantage. Again the limits of both authors' methodological training and the available empirical methods and data did not result in explicitly dynamic models showing the evolution of both environments and ourganizational decisions and structures over time...Yet there is a limited amount of empirical work explicitly extending and testing resource dependence theory and its central tenets."²⁸⁸

- Empirical evidence to begin to contextualize and revese the findings Arthur's (1992) and Delery and Doty's (1996) research in Strategic Human Resource Management that "*high commitment*" workforces tend to have *differentiation* strategies.
- Empirical evidence to begin to lend support to Penrose's (1959) theoretical hypotheses that firms have a *stakeholder* approach will differ in competitiveness, commitment, and strategic flexibility from firms that maximize *stockholder* wealth.
- Empirical evidence to begin to lend support to Forrester's (1961) theoretical hypotheses regarding the existence of firm strategies centered around attracting a particular portion of the underlying market demand.
- Empirical evidence to begin to validate the work on strategic complementarities (e.g. Milgrom and Roberts, 1990 and 1995).

"We are hopeful that empirical work will provide evidence of distinctly separated clusters of firm characteristics as support for our theory. Given our assumptions about time trends in prices, we also expect to find an increasing proportion of manufacturing firms adopting the modern manufacturing strategic cluster that we have described."²⁸⁹

- Empirical evidence to begin to validate the recent work in mixed duopoly economics (e.g. Lambertini & Rossini, 1995) which models the strategic interaction between profit-maximizing (PM) and labor-managed (LM) firms.
- Empirical evidence to demonstrate that *intra*-market economy variation can exist and in fact dominate an industry, supporting the "Varieties of Capitalism" theory (Hall and Soskice, 2001) that international political-economic convergence is not occuring as "Corporatism" would suggest. The case study of *Southwest Airlines* (a *Coordinated market firm*) exists within a *Liberal market economy* (LME).
- Empirical evidence and theoretical framework to demonstrate the concept of "Sustainable" Corporate Social Responsibility (CSR).
- Empirical evidence to support the claims of Lenox, Rockart and Lewin's (2006) numerical simulation models which postulate a relationship between environmental interdependencies and firm and industry profitability.

²⁸⁸ Pfeffer and Salancik, (1978), pgs. xii and xvi.

²⁸⁹ Milgrom and Roberts, (1990), pg. 527.

1.6.5.3 Research Methods Contributions to Literature

As will be discussed in detail in chapter 2, this research aims to contribute to the literature on appropriate and innovative research methods when studying complex socio-technical systems.

Few research designs in strategic management incorporate longitudinal field studies across several organizations that comprise the firm and its extended enterprise, as well as those of its competitor.

In addition, few research designs in strategic management view the phenomenon simultaneously from strategic, political and cultural lenses, which entails a combination of both unobtrusive ethnographic and obtrusive clinical methods.

1.6.6 *Publication Plan*

It is envisaged that this research would form the basis for both academic and practitioner publications both in book and journal article forms.

1.6.6.1 Journal Articles

1.6.6.1.1 Academic Journals

"The journals of strategic management are potentially fruitful territory for the kind of interdisciplinary conversation we believe is a key step in making progress on understanding why firms undertake the actions that we observe and how those actions affect their performance."²⁹⁰

It is envisaged that each of the essays of Part II would form the basis for a different stream of publications in academic and practitioner journals. The likely traditional target academic journals which have been most influential in the field of strategic management would be the *Administrative Science Quarterly, Academy of Management Review, Academy of Management Journal* and the *Strategic Management Journal.*²⁹¹ In addition, some of the more recent academic management journals would include *Industrial and Corporate Change* and *Organization Science*.

1.6.6.1.1.1 Paper #1: Defining an Enterprise Architectural Typology

Paper #1 would introduce the concept of *enterprise* architectures and define a modular-integral typology (and possible taxonomy) within the context of various academic literary traditions. Although the paper would cite empirical archetypal examples ranging from *Boeing-Airbus* to *GM-Toyota* to *United Airlines–Southwest Airlines*, its purpose would not be to explicitly tie enterprise architectures to long-term performance. Its purpose would be to merely establish

²⁹⁰ Henderson, R. and Mitchell, W. (1997), pg. 13.

²⁹¹ In a recent bibliographic study of the most influential literature in strategic management from 1980-2000 (Ramos-Rodriguez and Ruiz-Navarro, 2004, pg. 987), these journals were observed to be the most cited in the *Strategic Management Journal*. Other research studies on the most influential journals (Tahai and Meyer, 1999) revealed similar results.

definitions in the tradition of Ulrich's (1995) definition of *product* architectures and to advance a social science framework like social network theory in the tradition of Uzzi (1997).

The likely target academic journals for Article #1 would be the Academy of Management Review, Administrative Science Quarterly, Organization Science or Research Policy.

1.6.6.1.1.2 Paper #2: Competitive Dynamics of Enterprise Architectures

Paper #2 would present empirical evidence from the five-year *Boeing-Airbus* case study illustrating the mechanisms of how position and capabilities interact within the construct of the previously-defined construct of enterprise architecture. This article would be in the tradition of Hall (1976).

The likely target academic journals for Article #2 would be the *Strategic Management Journal*, *Academy of Management Journal*, *Administrative Science Quarterly* or *Organization Science*.

1.6.6.1.1.3 Paper #3: The *Evolution* of Enterprise Architectures

Paper #3 would present historical empirical evidence illustrating the mechanisms of how environmental states shape the previously-defined construct of enterprise architecture, and how competitive dynamic interactions contribution to the co-evolution of the environment which ultimately shape the evolution of the enterprise architectures. This article would be in the tradition of Tushman and Anderson (1986), Anderson and Tushman (1990 and 2001), Utterback and Suárez (1993) and Suárez and Utterback (1995).

The likely target academic journals for Article #3 would be the Academy of Management Review, Administrative Science Quarterly, Organization Science or Industrial and Corporate Change.

1.6.6.1.1.4 Paper #4: The Evolution of *Business Ecosystems*

Paper #4 would integrate the previous three papers into a coherent theory. As such, it would be a summary of this dissertation. A pure theoretical paper in the tradition of Schilling (2000) would target the *Academy of Management Review*, while an empirically-based paper would target *Administrative Science Quarterly, Academy of Management Journal* or *Industrial and Corporate Change*.

1.6.6.1.2 *Practitioner* Journals

The likely target practitioner journals would be the Harvard Business Review, Sloan Management Review, California Management Review and Long Range Planning.

1.6.6.2 Books

It is hoped that this document (and the subsequent dissertation) will form the basis for two different book audiences: academic and practitioner/general audience.

1.6.6.2.1 Academic book

Due to the inherent complexity and multivariate nature of strategic management, it is not unsurprising that of the 20 most influential publications in the field, 18 are in book form (Ramos-Rodriguez and Ruiz-Navarro, 2004).²⁹² As this research aims to bring a holistic systems/enterprise view to the academic field of strategic management, by definition it will be less effective and potent to decompose the work into separate coherent journal articles.

Although these books were based on empirical/theoretical research and were intended for academic audiences (i.e. as textbooks), their relevance to practitioners allowed their cross-over to more mainstream practitioner audiences (e.g. Porter, 1980 & 1985).

1.6.6.2.2 Practitioner book

In addition, a book primarily aimed at practitioners is planned along the conceptual lines of various academic cross-over authors covering multi-industry studies like Christensen (1997), Collins and Porras (1994), Dertouzos, Lester and Solow (1989), Fine (1998) and Utterback, (1994) as well as those covering single-industry studies like Dyer (2000), Hoffer-Gittell, (2003), Murmann et al. (2002) and Womack, Jones and Roos (1990).

A representation of the publication plan is shown in Figure 108 below against the proposed framework.

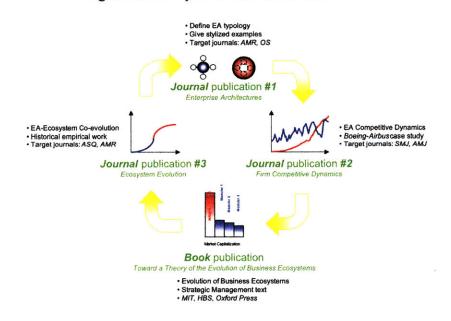


Figure 108: Proposed Publication Plan

²⁹² Interestingly, the only two journal articles in the top 20 most influential publications in strategic management (Wernerfelt, 1984 and Barney, 1991) re-ignited the resource-based view debate initiated 25-30 years earlier in the 16th-ranked publication, *The Theory of the Growth of the Firm*, by Edith Penrose (1959).

1.7 Research Importance

"Longitudinal studies that explicitly focus on the nature of these organizational and environmental interactions as they evolve over time, and that pay particular attention to the ways in which capabilities and environmental conditions shape each other, are thus likely to be particularly fruitful for both theory and practice."²⁹³

"The models of firm decision making have not gone beyond the static implications of the fact that firms are political coalitions. They do not attempt to reflect shifts in coalitions per se. The later task – leading to a more general theory of coalition development – has hardly been touched except conceptually. The significance of such a theory to a theory of the business firm and its growth is obvious."²⁹⁴

If successful, the importance of the proposed research will lie in the value of the meta-theoretical framework as exceeding the value of the sum or the existing theoretical models. Instead of merely connecting heretofore disconnected models, it is hoped that the research will reveal a new way of viewing the interaction of firms and their environments for competitive advantage.

As this research attempts to answer the recent calls from the strategic management academic community to build systemic *theory* grounded in *practice*, it should prove to be important to leaders of firms and strategy consultants who are primarily concerned with- and responsible for delivering firm performance, long-term or otherwise.

"The practitioner and researcher are doubly-linked: the researcher supplies the insights, relationships, and theory for the practitioner. But the practitioner supplies puzzles, ideas, judgments, and priorities for the researcher."²⁹⁵

It is hoped that the importance for practitioners of understanding when and why different enterprise architectures produce superior performance, will be matched by the importance for academic theorists in understanding which ontological and epistemological lenses are needed to understand each architecture.

Finally, for enterprise architects including CEOs and Strategy VPs, this work endeavors to assist in advancing the understanding of how and why firms grow.

"The goal GE has set for sustained organic growth – two to three times the growth of global GDP – translates to about 8% today. Few companies have achieved the kind of growth GE is seeking, and none on a revenue base of \$150 billion."²⁹⁶

As General Electric CEO, Jeff Immelt recently lamented:

"We're now in a slow growth world. Things were different 25 years ago. The business book that can help you hasn't been written yet."²⁹⁷

²⁹³ Henderson, R. and Mitchell, W. (1997).

²⁹⁴ March, J.G. (1962), pg. 678.

²⁹⁵ Bowman, E. H. (1990), pg. 27.

²⁹⁶ Stewart, T.A. and Immelt, J. (2006), pg. 62.

²⁹⁷ Stewart, T.A. and Immelt, J. (2006), pg. 62.

Chapter 2 Research Methodology

Having described in chapter 1 what questions are to be tackled, and why they are important and worthy of research, this chapter discusses how the research questions are to be approached, namely it will answer the "how?", "where?" and "when?" questions.

2.1 Fit between Research Methods and the State of Existing Theory

Recently, researchers have posited a contingent relationship between the state of the existing theory in a field, and the appropriate research method (Carlisle and Christensen, 2004; Edmondson and McManus, 2006). Hoskisson et al. (1999) propose such an evaluation for the strategic management field.

Figure 109 below attempts to map the state of the field from the "double helix" discussed in the previous chapter to the appropriate research methods that I plan to use for this research.

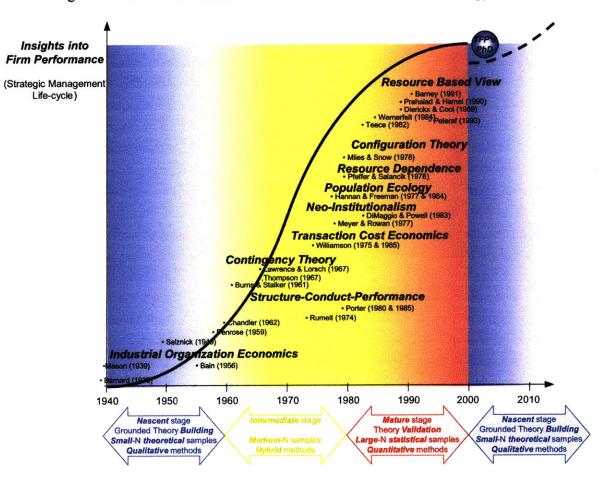


Figure 109: Fit between Research Methods and the State of Strategy Research

2.2 Overview of Research Methodology

"Given the overwhelming changes taking place in organizations and their environments, how can scholars contribute to knowledge? We believe that scholars who have been following traditional research paradigms need to adopt a new mindset for research into the new organizational forms. We believe that at this stage of theory development, research on new forms of organization requires a new approach, quite different from research typically found in academic journals. This work will be characterized by midrange theory and method, grounded research, and research that does not presume to test hypotheses empirically."²⁹⁸

In recent years, organizational scholars have noted rapid and radical changes to traditional organizational forms as a result of significant changes in the environment including increased volatility and hyper-competition in an interdependent global economy (Daft and Lewin, 1993). These scholars have called for a new research paradigm and in fact have founded new research journals.²⁹⁹

"The point of heretical research methods is to find new channels through which to obtain organizational insights and to change the mix of research methods. Although no method is truly heretical, researchers should be encouraged to do whatever it takes to learn about organizations."³⁰⁰

As organizational theorists see organizational form as a strategic variable, such calls for new research have found their way into the more mainstream strategic management journals.

"Strategy researchers are particularly well positioned to conduct the complex, multidimensional, multilevel longitudinal studies that we suspect are necessary if we are to fully understand the interactions between competence and competition."³⁰¹

In order to answer the stated research questions, the philosophy that guides this research design and execution is in-depth, fine-grained (i.e. case-based as opposed to large data base) grounded theory building, using multi-method, multi-level, multi-industry longitudinal studies described in this section.³⁰²

"Strategy research can benefit from using multiple time frames, comparative (historical) research, simultaneous exploration of different levels of analysis, and multiple theoretical lenses. Clearly, such a research agenda is more demanding and therefore it may be better approached in research programs, [and] in large, book-length studies."³⁰³

²⁹⁸ Daft, R.L. and Lewin, A.Y. (1993), pg. ii.

²⁹⁹ For example, Organization Science in 1990.

³⁰⁰ Daft, R.L. and Lewin, A.Y. (1990), pg. 6.

³⁰¹ Henderson R. and Mitchell W., (1997).

³⁰² A good introduction to theory-building research (which has proved influential in my research design) is the October 1989 special issue of the *Academy of Management Review*, dedicated to theory building.

³⁰³ Farjoun, M. (2002), pg. 585.

2.2.1 Grounded Theory Building

2.2.1.1 Motivation

As this research endeavored to solve a rather perplexing substantive problem regarding *Boeing* and *Airbus'* competitive advantages, I decided to take a more (initially) inductive approach to the problem, by building theory from data, taking a fresh look at the phenomena of long-term firm performance, unencumbered with the prevailing concepts, constructs, propositions and theories of the day, and oblivious (initially) to the prevailing theoretical debates in the fields of strategy and organization science.

"Glaser and Strauss criticized the 'overemphasis in current sociology on the verification of theory, and a resultant de-emphasis on the prior step of discovering what concepts and hypotheses are relevant for the area that one wishes to research' (Glaser & Strauss, 1967, pp. 1f) and bemoaned 'that many of our teachers converted departments of sociology into mere repositories of 'great-man' theories' (Ibid, p. 10) leading to an antagonism between 'theoretical capitalists' and a mass of 'proleteriat testers' (p. 11)."³⁰⁴

As this research plan has highlighted gaps in the existing literature pertaining to the questions posed, the research design was guided by the need to build grounded theory (Glaser and Strauss, 1967; Eisenhardt, 1989; Dougherty, 2002). In other words, this research approach focuses on building new theory and only indirectly on testing or verifying existing theories.

"Grounded theory building "reaches into the 'infinite profusion' of social action in organizations in order to tease out, identify, name, and explicate themes that capture the **underlying dynamics and patterns** in the blooming, buzzing confusion that is... management. Grounded theory building tries to understand why and how structures, conditions, or actions might arise, to ferret out generative mechanisms, to explore conditions under which these effects might vary or not, and to qualify their temporary and emergent aspects."³⁰⁵

"In fact, inductive and deductive logics are mirrors of on another, with inductive theory building from cases producing new theory from data and deductive theory testing completing the cycle by using data to test theory."³⁰⁶

As grounded theory building is inherently iterative, the research design unfolds longitudinally over time visiting and revisiting various case history sites over and over as will be described later in this chapter.

"Knowledge begins and ends in experience; but it does not end in the experience in which it began."³⁰⁷

³⁰⁴ Kelle (2005), pg. 2.

³⁰⁵ Dougherty (2002), pg. 851.

³⁰⁶ Eisenhardt, K.M. and Graebner, M.E. (2007), pg. 25.

³⁰⁷ Lewis, C.I. (1929).

2.2.1.2 Varieties of Grounded Theory

It should be noted that by "grounded theory", I do not restrict my methods to those defined by its original authors, Glaser & Strauss (1967); nor do I wish to engage in the subsequent debate between the Glaserian and Straussian schools over the split in methodology (Kelle, 2005). I merely take a more catholic approach to grounded theory, as espoused by Eisenhardt (1989, 2007).

2.2.1.2.1 Glaser & Strauss (and Glaser vs. Strauss)

Although Glaser & Strauss (1967) were among the first to give a clear articulation of grounded theory in the social sciences, they later disagreed as to how to best create grounded theory (Kelle, 2005).

"Grounded theory according to Glaser emphasizes induction or emergence, and the individual researcher's creativity with a clear frame of stages, while Strauss is more interested in validation criteria and a systematic approach."³⁰⁸

The primary distinction lies in the ability of the researcher to "architect" theory (abstractly and conceptually) vs "engineer" theory (concretely and precisely).

"Strauss and Corbin's coding paradigm is linked to a perspective on social phenomena prevalent in micro-sociological approaches emphasizing the role of human action in social life. Researchers with a strong background in macro-sociology and system theory may feel that this approach goes contrary to their requirements and would be well advised to construct an own coding paradigm rooted in their own theoretical tradition. Glaser's approach of 'theoretical coding' whereby researchers introduce ad hoc theoretical codes and coding families which thay find suitable for the data under scrutiny provides a strategy applicable for a greater variety of theoretical perspectives. However, as has been said before following this strategy is much more challenging expecially for novices since it lacks a readymade conceptual framework like Strauss and Corbin's coding paradigm. Experienced researchers with a broad knowledge in social theory would clearly benefit from the advantages of theoretical coding – having at their disposal not only one possible axis of developing theory but being able to construct such an axis by themselves through the combination of theoretical concepts from different schools of thought."

2.2.1.2.2 Eisenhardt

Eisenhardt (1989) moved the debate forward for organizational theorists by embracing a catholic approach used by this research design.

"Glaser and Strauss (1967) and more recently Strauss (1987) have outlined pieces of the process, but theirs is a prescribed formula, and new ideas have emerged from methodologists...."³¹⁰

"A more subtle challenge arises from confusion about the meaning of 'grounded theory building.' For some scholars, grounded theory building simply means creating theory by observing patterns within systematically collected empirical data. This view often includes some notion of recursively

³⁰⁸ Wikipedia: "Grounded Theory".

³⁰⁹ Kelle, U. (2005), pg. 9.

³¹⁰ Eisenhardt, K.M. (1989), pg. 532.

iterating between (and thus constantly comparing) theory and data during analysis, and theoretically sampling cases (as described earlier). As Langley (1999) noted, this is a widely held view of grounded theory building. In this view, the quality of the theory and the strength of its empirical grounding are more central to research quality than the specifics of the theory-building process. But for other scholars, grounded theory building has a more precise meaning that stems from the original focus of Glaser and Strauss (1967) on the interpretation of meaning by social actors. For example, Suddaby described grounded theory building as 'most suited to efforts to understand the process by which actors construct meaning out of intersubjective experience' (Suddaby, 2006: 634). Others go further to emphasize elaborate processes (and terminology) for how researchers should gather field data and discover theory using a hierarchical structure of categories (Corbin & Strauss, 1990). Constant comparison and theoretical sampling take on precise meanings: 'constant comparison' means simultaneous collection and analysis of data, and 'theoretical sampling' means that decisions about which data to collect next are determined by the theory in progress (Suddaby, 2006). In this view, adherence to specific grounded theory building processes is important in judging research quality. But strict adherence can also result in theory with limited generalizability (Langley, 1999) and idiosyncratic path dependence on the particular empirical starting point. As when coping with the multiple meanings of 'qualitative research,' it is often helpful to deal with the multiple meanings of 'grounded theory building' by avoiding the term unless one is actually using the Glaser and Strauss (1967) approach. theory. "311

This research uses Eisenhardt's eight-step research process (Eisenhardt, 1989) as a point of departure for building theory from case studies.³¹² Below is a brief summary description of the research process planned and/or executed thus far. Note that although this is described sequentially, the approach taken was actually iterative in a "spiral development" process, typical of theory-building or design exercises in general. Each point is explained in more detail in the body of this document.

1. Getting Started

In order to broadly focus research efforts at the outset, the research question was defined as: determining sources of firm competitiveness and long-term performance.

In order to provide better grounding of future construct measures, the following main a priori constructs were used at the outset: enterprise *architectural form*, enterprise *competitive dynamics* and the *industrial evolution* of the enterprise's environment.

In order to retain theoretical flexibility going into the research project, neither theory nor hypotheses connecting constructs were developed at this early stage.

2. Selecting Cases

In order to constrain extraneous variation and sharpen external validity, the specified population was limited the global duopoly in the large commercial aircraft industry, comprising *Boeing Commercial Airplanes* and *Airbus Industrie*.

³¹¹ Eisenhardt, K.M. and Graebner, M.E. (2007), pg. 30.

³¹² Note that although quotation marks have been omitted in this section, the theoretical justification for the use of each of the eight points is taken verbatim from Eisenhardt's paper to ensure sharpness and adherence to her methodology is retained.

More descriptively, the case represents the evolutionary trajectories of one relatively high-performing firm and one relatively low-performing firm. At the beginning of the longitudinally-based research project, *Boeing* was the "market leader", and by the end of the research, they had been overtaken by their rival, *Airbus*.

In order to focus research efforts on theoretically useful cases (i.e. cases that replicate theory by filling conceptual categories), a theoretical (not random) sample was used which covered the diametrically opposed archetypal constructs: *modular* enterprise architecture (i.e. *Boeing*) and *integral* enterprise architecture (i.e. *Airbus*).

3. Crafting Instruments and Protocols

In order to strengthen grounding of theory by triangulation of evidence, multiple data collection methods were used, including: archives, interviews, experiment and observation.

In order to provide a synergistic view of the evidence, both qualitative and quantitative data were combined as typified by the interviews and observations, as well as by the use of numerical archival data used to quantify the performance trajectories.

"For while systematic data create the foundation for our theories, it is the **anecdotal data** that **enable us to do the building**. Theory building seems to require rich description, the richness that comes from anecdote. We uncover all kinds or relationships in our hard data, but it is only through the use of this soft data that we are able to explain them."³¹³

In order to foster divergent perspectives and strengthen grounding, evidence surrounding each firm was taken from multiple stakeholder perspectives including: the firm itself, its customers, its suppliers, its employees, and its investors.

Also, multiple investigators were used in the data collection, analysis and theory building. This included an active research group of professors and researchers at MIT's *Lean Aerospace/Advancement Initiative*, which was set up explicitly to tackle this class of problem.³¹⁴ In addition, an active and diverse on-site case-study team was assembled for the same purposes.³¹⁵

4. Entering the Field

In order to speed-up the analyses and reveal helpful adjustments to data collection activities, a concurrent (as opposed to sequential) approach was taken in which there was an overlap of data collection and analysis.

³¹³ Henry Mintzberg (1979), quoted in Eisenhardt, K.(1989), pg. 538.

³¹⁴ The LAI's *Enterprise Architecting* research team was headed by Prof. Deborah Nightingale and Dr. Kirk Bozdogan.

³¹⁵ Boeing's research team was lead at various times by Sherry Carbary (VP of Strategy), Carolyn Corvi (VP of Airplane Production), Tim Meskill, Adam Kohorn, and Dan Wheeler.

In order to take advantage of emergent themes and unique features of the case, there were flexible and opportunistic data collection methods employed such as: the establishment of an informal and semi-permanent "strategy discovery" discussion series with senior leaders within *Boeing* and its stakeholders. Although the general research topic and timing of the "data-collection" opportunities were held fixed, the participants and themes were kept flexible to attract committed people and issues relevant to the topic at the time.³¹⁶

5. Analyzing Data

In order to gain familiarity with the data and to generate preliminary theory, analysis of the data was restricted initially *within*-case (i.e. *Boeing-Airbus*).

In order to look beyond initial impressions and see evidence through multiple lenses, *cross*-case pattern searches were undertaken of theoretical samples using the enterprise archetypes in industries like automotive (*GM-Toyota*) and airlines (*United-Southwest*).

6. Shaping Hypotheses

In order to sharpen construct definition, validity and measurability, the research design iteratively tabulated evidence for each construct through the longitudinal re-exploration of the constructs with the stakeholders as the hypotheses (i.e. the relationships between the constructs) were evolving. Constructs were continually revisited as hypotheses were emerging, and concurrently, hypotheses were continually revisited as constructs were reviewed.

In order to confirm, extend and sharpen the theory, replication of observations (as opposed to further sampling for new observations) became the modus operandi as the research progressed, particularly across cases.

In order to build internal validity, the research searched for evidence for the "why" behind the construct relationships by building simulation models using dynamic causal mechanisms via the system dynamics method.

7. Enfolding Literature

In order to continue to build internal validity, raise the theoretical level and sharpen construct definitions, an effort was made to compare the theory with *conflicting* literature. Examples include apparent conflicts with the theory of product and supply chain architectural fit (Fine, 1998), the theory of organic-mechanistic firm structures (Burns and Stalker, 1961), and the population ecology theory of firm exit (Hannan & Freeman, 1984).

³¹⁶ An important role of the researcher in these settings was to act as the research "gate-keeper" to maintain focus on the research question, and defend a rigor to the methodological approach defined in this document.

In order to sharpen generalizability, improve construct definition and raise the theoretical level, a significant effort was made to compare the theory with *similar* literature. This is described in more detail in the section of this document entitled: "Previous Related Research & Literature Gaps".

8. Reaching Closure

In order to end the process to ensure "theoretical saturation", the results of iterations were monitored to determine when marginal improvements become small. This tended to occur when the collection of additional supporting and/or dissenting data diminished.

A summary of the research process is illustrated in Figure 110 below. As can be seen, the process is highly iterative; it begins with an inductive focus but progresses toward inductive/deductive regimes; it begins with gathering confirmatory evidence, but progresses toward anomalous evidence.

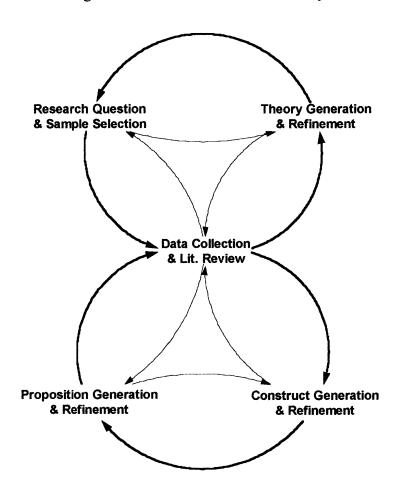


Figure 110: Research Process Summary

2.2.1.3 Small-N Intra-Case and Medium-N Inter-Case Inference

As this research can be described as the search for "outliers" (in both long-term performance) as well as the underlying causes (e.g. species), the case study method is well suited to examine nonobvious phenomena. For example, while *Toyota, Soutwest* and *Airbus* seem on the surface to be "modal" firms, a more intimate study reveals that they may in fact be outlier forms of organizations or a "black swan" in a lake of white swans (or in my heuristic, a "red swan" in a lake of blue swans, as shown in Figure 111 below.³¹⁷

Figure 111: Search for Outliers via In-Depth Case Studies



"You cart a pig into my living room and tell me that it can talk. I say, 'Oh really? Show me.' You snap your fingers and the pig starts talking. I say, 'Wow, you should write a paper about this.' You write up your case report and send it to a journal. What will the reviewers say? Will the reviewers respond with 'Interesting, but that's just one pig. Show me a few more and then I might believe you'? I think we would agree that that would be a silly response. A single case can be a very powerful example."³¹⁸

A first-order, architectural (or "special") explanation for high long-term variance in firm performance may be viewed as far-fetched, however the fact that we attempt to demonstrate its feasibility in only one case study (or in fact in a small set of case studies) does not diminish the theory's validity. The small set of case studies, however may be a powerful example, which serves to stimulate other research in this vein.

"Research involving case data can usually get much closer to theoretical constructs and provide a much more persuasive argument about causal forces than broad empiricial research can. One should use this advantage. However, one will not be able to say, 'You should believe my theory that A leads to B, because I show you an example here.' That is asking too much of a single case study, or even a few cases. The theory should stand on its own feet. One needs to convince the reader that the conceptual argument is plausible and use the case as additional (but not sole) justification for one's argument."³¹⁹

³¹⁷ Note the ironic reference to Karl Popper's falsification proof in which he notes that the observation of a single black swan would falsify the proposition that "all swans are white." See Flyvbjerg, B. (2006).

³¹⁸ Siggelkow, N. (2007), pg. 20.

³¹⁹ Siggelkow, N. (2007), pp. 22-23.

Management research has become increasingly positivist and reductionist, relying on large-N statistical samples to prove an existing theory. This fact, however, does not diminish the importance of small-N theoretical samples from which to build theory in an exploratory mode.

"Since writers of papers based on case research do not have recourse to the canonical statement 'results are significant at p < 0.05' that helps assuage readers' skepticism of empirical papers, researchers usuing case research often feel they are fighting an uphill battle to persuade their readers."³²⁰

While the majority of research using small-N, in-depth case studies, usually claims that the state of existing knowledge is nascent, meriting exploratory research in defining appropriate constructs, this research admits a more naïve, and emergent justification: namely, when the phenomenon was first studied, the researcher entered the field, relatively blind to the existing state of the art of strategic management and organizational theory, and instead, entered equipped with the tools and frameworks of an allied field – architecture and engineering.

"The near-ubitiquous claim that 'not much is known, hence we engage in grounded theory building,' does not seem to me a necessary condition for the justification of case research. Moreover, such claims of existing ignorance at times do not ring true. It can also get writers tied up in knots about professing to have entered the field with no preconceptions. In my view, an open mind is good; an empty mind is not. It is true that one wants to retain the capacity to be surprised, but it seems useful (and inevitable) that our observations be guided and influenced by some initial hunches and frames of reference."³²¹

As will be discussed in more detail later, this research proposes to build grounded theory both from a small-N theoretical sample with *intra*-case inference (namely the *Boeing-Airbus* duopoly in the large commercial airplane industry), as well as extended to include a medium-N theoretical sample with *inter*-case inference (namely the *GM-Toyota* and *United-Southwest* rivalries in the automotive and airline industries respectively).³²²

The extension to medium-N theoretical sample uses quasi-statistical modes of inference across cases, with pure randomization of a true statistical sample being sacrificed for extreme high-performers of a theoretical sample.

³²⁰ Siggelkow, N. (2007), pg. 20.

³²¹ Siggelkow, N. (2007), pg. 21.

³²² MIT ESD and Political Science Professor Ken Oye characterizes such research as "Blue Cluster", as opposed to large-N statistical samples coupled with formal models of the "Red Cluster".

2.2.1.4 Empirical vs. Conceptual Theory Building

"My rule of thumb is that the grander the theoretical claims, the more free-standing the theory has to be. In other words, even of the reader were only to read the conceptual part of the paper, he or she would be convinced of the internal logic of the conceptual argument."³²³

As the theory developed herein has broad ambitions, it has been critiqued as having grand theoretical claims. This, coupled with the fact the theory was grounded in a small-N theoretical sample of comparative case studies, makes the internal logic of the argument, paramount.

Nonetheless, the theory building proposed herein can be categorized both as "empirical" as well as merely "conceptual". Although the very nature of grounded theory building implies theory generated inductively from empirical data, the strategic management community has put a further restriction on the definition of "empirical" theory building – namely that single case studies are insufficient (Saunders and Thompson, 1980). As will be discussed later, this research is based primarily upon in-depth case studies of both firms (and their extended enterprises) in a global duopoly.

"...empirical papers were separated from conceptual papers according to the test that the former had to display an empirically-oriented research design and had to promise (at least) to utilize studies of a number of organizations. Papers based on generalized or non-specific experience or evidence and those drawn from a single case-study were not deemed 'empirical' under this regimen."³²⁴

As an aside, it is interesting to note that one of the most influential pieces of grounded theory building (Penrose, 1959), which ultimately inspired the resource-based view (Wernerfelt, 1984), was based on only one in-depth case study inside the *Hercules Powder Company* (Penrose, 1960).³²⁵ Although Penrose may argue that the origin and purpose of her ground-breaking research was empirically-motivated, by today's definitions, it would be "marginalized" to conceptual theory building due to its focus on one firm.

In addition, the theory building proposed herein can be categorized as "conceptual" as its is also constructed from the aggregation or synthesis of other existing theories and datasets, as was discussed previously under the notion of "logical compound synthesis."

Within both empirical and theoretical bases, the detailed method of theory building includes exploration, concept development and hypothesis generation (Saunders and Thompson, 1980).

"Case-based research is more at the level of an existence proof: Here is one example of how A leads to B. If the reader can reply, 'I'm not really that surprised that you can find in the world at least one example of A leading to B,' the value of the contribution of the paper can be in doubt."³²⁶

The value of the contribution of the theory developed herein will lie in its explanation of an existence proof, which may be used to guide further empirical research.

³²³ Siggelkow, N. (2007), pg. 21.

³²⁴ Saunders and Thompson, (1980), pp. 123-124.

³²⁵ Rouse and Daellenbach, (1999), pp. 489-490.

³²⁶ Siggelkow, N. (2007), pg. 23.

2.2.2 Multi-method

The goal of the research design is to bridge the more qualitative traditions of case study with the more quantitative traditions of numerical modeling. This inherently requires a multi-method approach.

"Studying variations over time in organ izational forms requires not only longitudinal research designs but also knowledge of historical trends and changes in political systems, modes of economic production, law, patterns of international trade, and other topics often neglected in case studies and surveys of isolated organizations."³²⁷

Solid research methodology in strategic management is based on four important components: (1) mathematical models; (2) statistical data analysis; (3) logical compound synthesis; and (4) indepth case studies (Itami and Numagami, 1992). This research design proposes to embrace multiple methods, working backward from the qualitative case studies, incorporating logical compound synthesis, and finally due to the high levels of dynamic complexity inherent in longitudinal multi-stakeholder research, ends with the development of nonlinear dynamic numerical simulation models.

"I do not believe that formal modeling should be the only style of organizational research. To the contrary, I think the most successful literatures are those that blend detailed description, informal theory and formal modeling."³²⁸

As shown in Figure 112 below, these three methods form an integrated approach toward building and testing grounded theory. The developed framework is grounded *empirically* via comparative case studies, *theoretically* via synthesis of a broad literature of empirical and theoretical research ranging from economics to sociology, as well as being grounded *analytically* via nonlinear dynamic numerical simulation modeling.

³²⁷ Aldrich, H. (2006), pg. xii.

³²⁸ Gibbons, R. (1999), pg. 146.

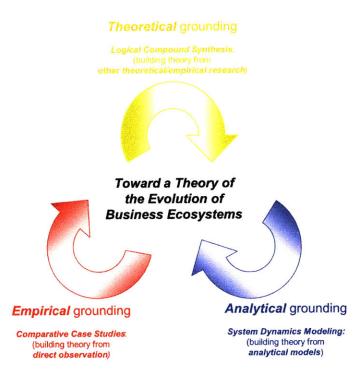


Figure 112: Integrated and Triangulated Research Design

It is important to note that these three approaches were not applied in a purely linear, sequential fashion. In order to capture the rich potential of emergence in grounded theory building, the three approaches were applied integrally, concurrently and iteratively and are therefore mutually reinforcing. Justification of the theory developed solely from any one approach would be incorrect and misleading.

Figure 113 below summarizes conceptually how the three approaches unfold longitudinally, combining a pre-determined linear sequential plan, with superimposed iterative cycles. From this figure, it is observed that although the majority of the impact (not necessarily time spent) from each approach took place within the approach's allotted time frame, time spent iterating both before and after the allotted phase contributed significantly to the final theory developed.

"Indeed, after having laboriously worked out for myself what I took to be an important and 'original' idea, I have often had the disconcerting experience of subsequently finding the same idea better expressed by some other writer. I try always to mention such earlier expositions; I am sure that there are many that I have overlooked, for which I offer advance apology."³²⁹

Finally, note that although the theory developed was generated initially from field-based empirical research, subsequently supported and refined by existing research literatures, and finally refined and extended by analytical modeling, it is estimated that the impact of the three approaches over the life cycle of the theory development is approximately equal (e.g. 33%).

³²⁹ Penrose, E.T. (1959), pg. 2, footnote 2.

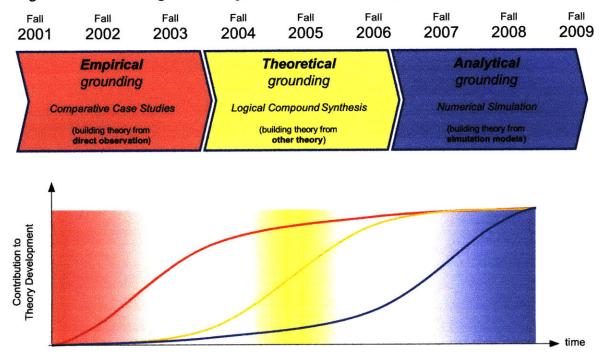


Figure 113: Combining Linear Sequential and Nonlinear Spiral Development Processes

Figure 114 below summarizes the proposed multi-method dissertation in three phases, terminating in the balanced objective of mid-level theory. Note that while this philosophy is broadly inductive, the actual process was certainly iterative between deduction-induction. Each of the phases will be summarized in the following subsections.

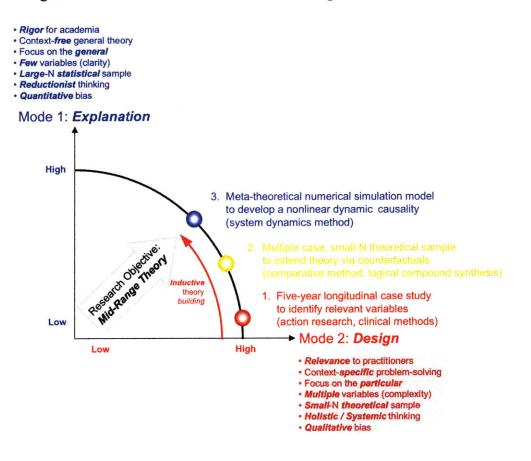


Figure 114: Multi-Method Research and the Rigor-Relevance Tradeoff

2.2.2.1 Case-studies (Field-based & Historical)

The research plan attempts to initially build grounded theory inductively from the qualitative comparative case study described above (Eisenhardt, 1989).³³⁰ Eisenhardt's research process, which is used as a template for the research design is summarized in Appendix D.

"Academic journals have traditionally not accepted or encouraged the deep examination of case studies, but the nature of strategy requires it. The greater use of case studies will be necessary for real progress at this stage of the field's development. I am convinced that more research of this type will be needed to address the dynamics of strategy."³³¹

While the purpose of the case studies aim initially at *exploration* and *description*, the ultimate objective is *explanation*, as it attempts to explain how events occurred and predict how they might qualitatively unfold via cause-effect relationships. As the research plan also calls for multiple case studies, this is the most ambitious, comprehensive and potentially rich use of the case study method (Yin, 2003).³³²

³³⁰ Eisenhardt specifically notes the centrality of inductive process and the role of literature in successfully building theory from cases.

³³¹ Porter, M.E. (1991).

³³² Yin (2003) refers to this as "Type 6" case study research.

Whereas case studies are often dismissed as too qualitative for real science, this is a clear misunderstanding of the reality of grounded theory building is quite different:

"Case histories of firms and industries that were instrumental to the field's early development are sometimes labeled 'prescientific' (e.g. Rumelt et al., 1994). However, a renewed interest in historical and clinical research is not a sign of regression but of the field's maturity. The benefits of such an approach are too great to be ignored by strategy researchers."³³³

"Although sometimes seen as 'subjective,' well-done theory building from cases is surprisingly 'objective,' because its close adherence to the data keeps researchers 'honest.' The data provide the discipline that mathematics does in formal analytic modeling."³³⁴

The research design is modeled after those that produced some of the most influential and frequently cited works in the strategic management literature, like the longitudinal case studies of Penrose (1959), Chandler (1962) and Lawrence & Lorsch (1967).³³⁵

"Whereas Chandler (1962) conducted case histories and classified them to reveal patterns, subsequent researchers have measured strategic and structural variables and used statistical variables to test for connections."³³⁶

2.2.2.2 Comparative Method

"To find answers to our major question, we made a comparative study of competing organizations in each of several industries."³³⁷

Like Lawrence and Lorsch's classic 1967 work, *Organization and Environment: Managing Differentiation and Integration*, this research dissertation uses a comparative approach of studying pairs of competing organizations in each of several industries.

"... the intensive comparative analysis of a few cases may be more promising than a more superficial statistical analysis of many cases. In such a situation, the most fruitful approach would be to regard the comparative analysis as the first stage of research, in which hypotheses are carefully formulated..."³³⁸

The comparative method is one of the basic methods for establishing general empirical propositions, along with experimental and statistical methods. All three methods have been demonstrated to have the objective of scientific explanation, which comprises the establishment of empirical relationship among at least two variables, while all others are held constant (Lijphart, 1971).³³⁹ As will be discussed later in the sample selection process, the small-N theoretical sample of case studies, will form the basis of the comparative method to generate the hypotheses.

³³³ Farjoun, M. (2002), pg. 585.

³³⁴ Eisenhardt, K.M. and Graebner, M.E. (2007), pg. 25.

³³⁵ See Ramos-Rodriguez & Ruiz-Navarro, (2004) for a good bibliometric analysis.

³³⁶ Donaldson, (2001), pg. 78.

³³⁷ Lawrence and Lorsch (1967a), pg. 19.

³³⁸ Liphart, A. (1971), pg. 685.

³³⁹ Note that the method has been criticized for being deterministic in its causality (Lieberson, 1991, 1994; Savolainen, 1994), a charge similarly brought against systems dynamics.

2.2.2.3 Logical Compound Synthesis

"If I have seen farther; it is by standing on the shoulders of giants."340

In addition to building theory inductively from the empirical data, this research also builds theory from existing theories and their associated empirical data sets.

"Just like chemists synthesize various materials into some chemical compounds that are new to the world, researchers of this approach pick up various theoretical concepts and empirical findings as materials and synthesize them into a plausible logical story."³⁴¹

An important part of the grounded theory building is the supplementing of comparative case studies with a rich survey of theoretical concepts and empirical findings within the strategic management literatures as well as in other academic disciplines, including but not limited to: economics, sociology and architecture. To this end, each of the three essays will commence with a summary of these relevant theories and how they contribute (or conflict) with the theory developed herein.

"Gems in isolation are worth far less than when they are strung together in a necklace. They all gain greatly by being **compared and contrasted** in an **orderly fashion**, even if we can not yet weld them together by means of a single, over-arching theory."³⁴²

Researchers however have cautioned against the premature and excessive integration of theoretical models – particularly contingency findings – in the quest for a holistic midrange theory of organizations (Moberg and Koch, 1985, pg 110).

"This approach derives its plausibility from the robust coherence among its component stories and reveals logical connections among conceptual constructs."³⁴³

One of the most influential publications in the field of strategic management itself, Thompson's 1967 classic, *Organizations in Action* (Ramos-Rodriguez and Ruiz-Navarro, 2004) was not based upon original empirical work, but on the synthesis of a multitude of empirical studies within the contingency theory field. As Thompson, himself noted in the preface to his classic:

"I have written this book to call attention to some of [those] developments, which tend to go unnoticed because we are encouraged to converse within disciplines, while organizations are multidisciplinary phenomena. A central purpose of this book is to identify a framework which might link at important points several of the now independent approaches to the understanding of complex organizations."³⁴⁴

Thompson's 1967 classic represents a powerful example of what part of this research dissertation aims towards, effective logical compound synthesis, which in Thompson's case led to 100 testable propositions.

³⁴⁰ This quotation is taken from my doctoral dissertation committee co-chair, Prof. Charles Fine, who used the reference in his book, Clockspeed (Fine, 1998). The saying was originally attributed to Sir Isaac Newton.

³⁴¹ Itami and Numagami (1992), pg. 133.

³⁴² Landsberger, quoted in Magnusen K. (1973), pg. 17.

³⁴³ Itami and Numagami (1992), pg. 133.

³⁴⁴ Thompson, J.D. (1967), pg. xxv-xxvi.

"This book might be considered a conceptual inventory. I assume merely that the concepts relevant to important relationships exist, and once having identified some, I hope to generate potentially significant propositions. We lack the systematic evidence that eventually must come, but there are illustrative studies to indicate that the propositions are plausible. Illustrations are drawn from a variety of fields; and concepts from a variety of disciplines. I have carried concepts from one discipline into fields not typically studied with those concepts. I have tried to say more, using some concepts, than has typically been said with them. At the same time, I have said considerably less, using those same concepts, than has been said. The economist, sociologist, political scientist, or social psychologist will each find that I overlooked refinements and intricacies in concepts he knows well. I hope, however, that I have avoided outright distortion of concepts."

2.2.2.4 Numerical Simulation Modeling

"But how to 'test' that theory, or at least demonstrate its plausibility? The vehicle used in this article is the design and running of a 'history-friendly' model. 'History-friendly' models are intended to enhance understanding of particular interesting and important economic phenomena, in this case the swings in vertical integration and disintegration in the American computer industry. History-friendly models generally are simulation models. The aim of history-friendly modeling is not to explain, in the sense of closely matching through a simulation, the quantitative values observed in the historical episode under investigation, nor in the specification of the model parameters driven by the objective of getting as close as possible to actual empirical values of variables in the actual context being modeled. Rather, the objective is to explore whether the particular mechanisms and forces built into the model can generate, and in that sense explain the patterns in question. The design of a historyfriendly model is guided by the theories, generally verbal, that informed observers and empirically oriented economists hwo have analyzed the phenomena have put forth as their causal explanations, and which the model builders find plausible and interesting. History-friendly modelers believe that much of productive economic theorizing is presented as explanations of particular empirical phenomena by those who know a lot about the empirical details. However, we also believe that it is difficult sometimes impossible, to check out the logic and the explanatory power of such verbal qualitative theorizing, without formalizing the argument. A history-friendly model is built on a simplified formal representation of the theory being considered, and aims to test the consistency and power of that theory by exploring the performance of the model."346

One of the key tenets of theory development in this research is the translation of a qualitative theoretical framework from its qualitative and quantitative empirical grounding to a more precise formal model as Malerba, Nelson, Orsenigo and Winter (2008) argue.

"Simulation modeling provides a powerful methodology for advancing theory and research on complex behaviors and systems, yet it has been embraced more slowly in management than in some associated social science disciplines. Because organizations are complex systems and many of their characteristics are often inaccessible to researchers, especially over time, simulation can be a particularly useful research tool for management theorists. Simulation is a legitimate, disciplined, and powerful approach to scientific investigation, with the potential to make significant contributions to management theory."³⁴⁷

"We... position simulation in the 'sweet spot' between theory-creating methods, such as multiple case inductive studies and formal modeling, and theory-testing methods. Simulation strengths include internal validity and facility with longitudinal, nonlinear, and process phenomena. Simulation's primary value occurs in creative experimentation to produce novel theory."³⁴⁸

³⁴⁵ Thompson, J.D. (1967), pg. xxvi-xxvii.

³⁴⁶ Malerba, F., Nelson, R., Orsenigo, L. and Winter, S. (2008), pp. 204 and 205.

³⁴⁷ Harrison, J.R., Lin Z, Carroll, G.R. and Carley, K.M. (2007), pp. 1229 and 1243.

³⁴⁸ Davis, J.P., Eisenhardt, K.M. and Bingham, C.B. (2007), pg. 480.

The meta-theoretic framework proposed by this research is as interested in *states* as it is in *paths* – that is in an enterprise's *architecture* and its complementary *evolution*. As a result, a formal modeling technique is proposed to capture these dual and complementary interests.³⁴⁹

Due to the systemic coupling between firm competence and industry competition, the dynamic hypotheses that are generated will be converted into more formal nonlinear simulation models via the *system dynamics* method (Forrester, 1961; Sterman, 2000), in an attempt to bring some *explanatory* power to the theory.³⁵⁰

System Dynamics "is a quantitative and experimental approach for relating organizational structure and corporate policy to industrial growth and stability."³⁵¹

System Dynamics is well suited to representing social change processes of growth and stability, and has already been used for testing macro-sociological theories (Jacobsen, Bronson and Vekstein, 1990).³⁵² Regarding the use of system dynamics, its originator, Jay Forrester ambitiously called for "courage" in its use:

"The solutions to small problems yield small rewards... One does not achieve innovation and creativity by being timid... The attitude must be one of enterprise design. The expectation should be for major improvement in the systems."³⁵³

As shown in Figure 115 below, the tripartite research design is superimposed on a longitudinal time-history of the phenomenon under consideration.

³⁴⁹ A similar discussion is given by Farjoun (2002), pp. 575.

³⁵⁰ Note that due to the relatively small sample sizes employed in this research design, quantitative methods like structural equation modeling may not be appropriate due to low statistical confidence issues.

³⁵¹ Forrester, J.W. (1961), pg. 13.

³⁵² As noted by Sastry A. (1997).

³⁵³ Forrester, J.W. (1961), pp. 449-450.

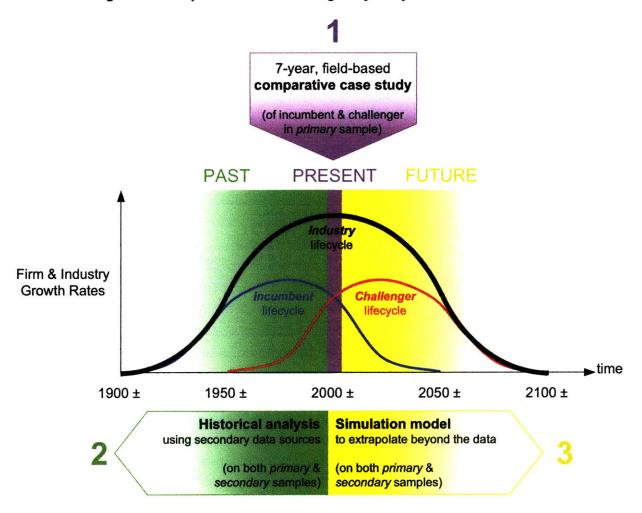


Figure 115: Tripartite Research Design Superimposed on Phenomenon

2.2.3 Multi-level

This research draws empirical data from multiple levels: *micro*-level (i.e. individuals alone or in groups), *meso*-levels (i.e. organizational learning, culture, etc.) and *macro*-level (i.e. clusters of organizations, extended enterprise).

2.2.3.1 Micro-level

The *micro*-level perspective is developed through the in-depth, qualitative exploration of the decision heuristics of the most senior leaders of each firm. While there are over 70 different terms used to describe individual cognition used in organization studies (Walsh, 1995), the most common are *frames, mental models* or *cognitive maps*.

2.2.3.2 Macro-level

The *macro*-level perspective is developed through the modeling of these decision heuristics in the complex dynamic feedback interactions of each extended enterprise as well as their competitive interactions within the ecosystem.

2.2.3.3 Meso-level

By investigating the *micro*-level practices of individuals and groups as they perceive, react to, and (possibly) shape *macro*-level environmental change, this research occupies the "*meso*-domain" (Hall, 1995) where action and structure converge.³⁵⁴

³⁵⁴ This aspect of the research design was influenced by Kaplan, S. (2004).

2.2.4 Multi-lens

Research within complex socio-technical systems requires a multiplicity of "frames" or "lenses" through which to observe the phenomenon, in order to ensure the internal validity of findings. It is important to note that each researcher has certain ways of look at the world which may bias what they see and how they analyze it. It is equally important to note that each class of research problem is best viewed through a particular "lens" and most often through multiple lenses. As such, this research dissertation is designed first to solve the problem defined in chapter 1, and second to utilize lenses which this researcher has most comfort and skill and to acknowledge the potential associated biases.

Ancona et al., (1999) posits three different complementary theoretical lenses for analyzing organizations: the *strategic design*, the *political* and the *cultural* as shown in Figure 116 below.³⁵⁵ Additionally, Ancona et al. (2001) more recently posits an additional organizational lens, the *temporal* which encompasses and integrates the others. This section briefly summarizes each, and how they specifically inform the research dissertation.

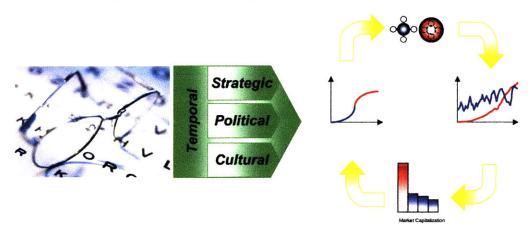


Figure 116: The Three (+ one) Theoretical Lenses

2.2.4.1 The Strategic Design lens

"This perspective asserts that by understanding the **basic principles of organization design**, by aligning the organization's design with its strategy, and by making sure that both strategy and design fit the environment in which the organization is operating, managers can make their organizations successful."³⁵⁶

This perspective looks at the flow of tasks, how people are assigned to these tasks, and how the organization can be *rationally optimized* to achieve its goals.

³⁵⁵ Ancona et al. (2001) actually posit the existence of a fourth lens: the temporal lens. Note that this will be considered in essay #2.

³⁵⁶ Ancona, D. et al. (1999), module 2, pg. 12.

Within the enterprise architectural framework presented in this dissertation, the strategic design lens helps to define the mechanisms of *differentiation*, *integration* and *fit* within the organization and between the organization and its environment. However, as the notion of an enterprise architecture embraces a stakeholder view of the firm, it is by definition a power-sharing entity, which explicitly must also take a political view.

As will be discussed later in this chapter, the research methods required to successfully access and analyze the data include traditional desk-studies of company documents and other secondary data sources as well as ethnographic methods.

"If only it weren't for the people, the goddamned people," said Finnerty, "always getting tangled up in the machinery. If it weren't for them, earth would be an engineer's paradise."³⁵⁷

Although the strategic design lens undoubtedly captures the preponderance of observations in the strategic management literature, the following subsections summarize other points of view of at least equal importance dealing explicitly with human and organizational effects.

2.2.4.2 The *Political* lens

The Political lens can be used on both micro- and macro-phenomena (Mintzberg et al., 2008). Micro-politics arises on the individual actor level, while macro-politics arises social aggregates.

2.2.4.2.1 Micro-politics

The most important aspect of the research design was to ensure high-fidelity micro-data from the most senior decision-makers of each organizational set. As such, it was imperative to treat each data source as having high behavioral complexity -i.e. as having a local politic.

"Fancy what a game of chess would be if all the chessmen had passions and intellects, more or less small and cunning; if you were not only uncertain about your adversary's men, but a little uncertain also about your own; if your knight could shuffle himself on to a new square by the sly; if your bishop, in disgust at your castling, could wheedle your pawns out of their places; and if your pawns, hating you because they are pawns, could make away from their appointed posts that you might get checkmate on a sudden. You might be the longest-headed of deductive reasoners, and yet you might be beaten by your own pawns. You would be especially likely to be beaten, if you depended arrogantly on your mathematical imagination, and regarded your passionate pieces with contempt."³⁵⁸

While the influence of the political lens can dominate the quest for scientific truth in complex enterprises, the exist little academic theory in this domain, and the precious little theory (Machiavelli, 1515) that exists is highly controversial, no matter how influential.³⁵⁹

"One of the pervasive, really significant reasons for application of Machiavellianism in today's organizations centers around **the ugly problem of loyalty**. Loyalty here refers to dedication or commitment to persons, to task, and to organization. Loyalties today are at odds with one another.

³⁵⁷ Vonnegut, (1952).

³⁵⁸ From George Eliot's, *Felix Holt, The Radical* (1980, pp. 237), as quoted in Mintzberg, H. et al. (1998), pg. 234. ³⁵⁹ In fact, one of the building blocks of Williamson's Transaction Cost Economics theory is "opportunistic behavior with guile" (1985).

Of the various forces affecting loyalty, self-interest is perhaps the most powerful, influencing both those who employ Machiavellianism and the recipients thereof."³⁶⁰

2.2.4.2.2 Macro-politics

"A political perspective views an organization as composed of multiple 'stakeholders' i.e. individuals and groups who contribute important resources to an organization and depend on its success but who also have different interests and goals and bring different amounts and sources of power to bear in organizational interactions."³⁶¹

This perspective looks at how power and influence are distributed and used within the firm and its constituent stakeholders.

"A political perspective defines power as the ability to get things done when goals conflict." 362

As discussed above, the very definition of an enterprise architecture as being a collection of stakeholders, implies that the political lens will have at least as much influence as the traditional strategic design lens.

"Machiavellian concepts are much more germaine to the 'guts' of interactions in business than social scientists and/or management analysts care to recognize."³⁶³

As will be discussed later in triangulation methods to ensure theoretical validity, controlling for "political" effects can be important. To this end it is important to recognized when and how the powerful forces of self-interest may be at play.

As will be discussed later in this chapter, the research methods required to successfully access the data differ from those of the strategic design lens.³⁶⁴ These methods include clinical methods.

"The clinician has the license to ask embarrassing questions, to elicit confidential information, and to ask for the airing of organizational 'dirty laundry'. They are licensed to encourage their informants to 'confess', to tell what is 'really going on' as they see it, and, in this sense to gain a 'deeper' dynamic understanding of what is happening and why it is happening."³⁶⁵

2.2.4.3 The Cultural lens

"The cultural perspective rejects claims that strictly structural, **rational** or **interest** factors best explain human behavior. People are thus more than **cogs in a machine or self-interested political actors**. They are also **meaning makers** and through interaction with one another, they continually create, sustain, and modify organizations."³⁶⁶

³⁶⁰ Calhoon, R.P. (1969), pg. 211.

³⁶¹ Ancona, D. et al. (1999), module 2, pg. 40. Paul Carlile was acknowledged as developing the material.

³⁶² Dahl, R. (1957), pg. 203.

³⁶³ Calhoon, R.P. (1969), pg. 205.

³⁶⁴ References to Machiavelli (1515), are made in management: Calhoun (1969) and Feaver (1984).

³⁶⁵ Schein, E. (1987), pg. 41.

³⁶⁶ Ancona, D. et al. (1999), module 2, pg. 64.

This perspective looks at how history has shaped the meanings of different people within an organization.

As discussed above, an enterprise architecture is rooted in both the strategic design and the political lenses. However, as this research endeavors to discover how such rational and yet political systems have evolved over time, as well as the forces which have shaped such evolution, it is important to view such architectures through the cultural lens to determine how history has shaped inertia.

"Inasmuch as culture is a dynamic process within organizations, it is probably studied best by action research methods, qualitative research approaches that combine field work methods from ethnography with clinical and consulting work."³⁶⁷

As will be discussed later in this chapter, the research methods required to successfully access this data differ from those of the strategic design and political lenses. These methods include action research.

2.2.4.4 The *Temporal* lens

"Management science has only begun to deal with the time dimension in business."³⁶⁸

As discussed above, researchers (Ancona et al., 2001) have recently posited the need for a fourth lens through which to view organizations: the *temporal* lens. They acknowledge however that such a point of view for research is difficult:

"It is hard enough to gain organizational access. It is even harder to capture events over time using multiple measures. This not only takes time but additional resources and lots of cooperation. We are accustomed to getting in and out of organizations quickly. These additional considerations preclude the use of a temporal lens. There are also broader, institutional reasons for the lack of focus on time. Doctoral dissertations are planned around short rather than longer stays. We [must] (1) rethink how we do our research (e.g., we need to create new 'contracts' with firms that will let us explore important temporal issues), (2) rethink some of our institutional arrangements, such as encouraging more time-based research in theses and journals, and (3) experiment with new forms of data collection and analysis."³⁶⁹

³⁶⁷ Schein, E. (1990).

³⁶⁸ Forrester, J.W. (1961), pg. 3.

³⁶⁹ Ancona et al. (2001), pg. 647.

2.2.5 Multi-temporal (longitudinal)

"Over the last decade, longitudinal and dynamic analyses of organizations and populations have come to dominate empirical work in organizational sociology."370

As discussed above, researchers (Ancona et al., 2001) have recently posited the need for a fourth lens through which to view organizations: the temporal lens. They acknowledge however that such a point of view for research is difficult:

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This research dissertation therefore attempts to answer the recent calls from reputable academic researchers for a more serious and dedicated research design approach in order to capture the heretofore absent richness of organizations that a temporal lens might provide.

"Longitudinal field studies across several organizations offer another promising approach. In general these are large-scale projects, and the participation of organizations is based on a close relationship between senior managers and the researchers."³⁷²

As will be discussed in more detail in subsequent subsections, this research dissertation aims to establish new longer-term contracts with closer trust-based relationships with multiple firms which simultaneously occupy the same competitive space.

One of the fundamental characteristics of this research dissertation, therefore is the study of organizations across time, as the causal mechanisms driving long-term performance unfold longitudinally.

"... it will be necessary for researchers to place themselves into the manager's temporal and contextual frames of reference. Presumably, this would initially involve conducting a retrospective case history to understand the context and events leading up to the present strategy being investigated. However the major focus of the study would entail conducting real-time observations of the events and activities in strategy development while they occur in time, and without knowing a priori the outcomes of these events and activities."373

In addition, a longitudinal approach will enable the observation that both change has taken place within the organizations, as well as how such change occurred (Van de Ven, 1992).

³⁷⁰ Romanelli, (1991), pp. 99-100.
³⁷¹ Ancona et al. (2001), pg. 647.

³⁷² Daft, R.L. and Lewin, A.Y. (1990), pg. 6.

³⁷³ Van de Ven A.H. (1992), pg. 181.

"... there is a need to supplement regularly scheduled data collection with intermittent real-time data. For example, this would involve observing key committee meetings, decision or crisis events, and conducting informal discussions with key organizational participants."³⁷⁴

The research therefore takes a longitudinal approach towards data collection and analysis. This allows the developed theory to take an *ex ante* perspective (i.e. before the outcomes are known). Such a longitudinal approach is important to develop and test theories on organizational change, development or evolution. The *ex ante* perspective allows the opportunity to understand the direction of causality.³⁷⁵

"... it is widely recognized that prior knowledge of the success or failure of a strategic change effort invariably biases a study's findings... it is generally better, if possible, to initiate historical study before the outcomes of a strategic change process become known. It is even better to undertake realtime study of strategic change processes as they unfold in their natural field settings."³⁷⁶

³⁷⁴ Van de Ven A.H. (1992), pg. 181.

³⁷⁵ This aspect of the research design was influenced by Kaplan, S. (2004).

³⁷⁶ Van de Ven A.H. (1992), pg. 181.

2.2.6 Complementary Qualitative & Quantitative Methods

Researchers (e.g. Jick, 1979) have advocated the use of "hybrid designs" which embrace both quantitative and qualitative methods in order to achieve triangulation to enhance the internal validity of the theories being developed.³⁷⁷ The evolution from *qualitative* case studies towards *quantitative* mathematical models requires a rigorous research methodology described herein (Luna-Reves, 2003).

"The coupling of [the case study] and system models would preserve the richness of [the case study] and allow more generalization of the findings."³⁷⁸

In particular, as the primary problem with the qualitative case study is generalizing beyond the particular case, researchers have argued for complementing case studies with simulation.³⁷⁹

"Although system dynamics models are mathematical representations of problems, it is recognized that most of the information available to the modeler is not numerical in nature, but qualitative."³⁸⁰

Forrester (1994) points out that the progression from the qualitative to the quantitative accesses a different *quantity* and *quality* of data, as shown in Figure 117 below.

"The amount of available information declines, probably by many orders of magnitude, in going from mental to written information and again by another similar large factor in going from written to numerical information. Furthermore, the character of information content changes as one moves from mental to written to numerical information. In moving down the diagram, there is a progressively smaller proportion of information about structure and policies."³⁸¹

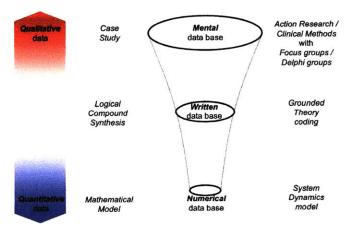


Figure 117: Quantity and Quality of Data³⁸²

³⁸² Source: Forrester, J.W. (1994).

³⁷⁷ My thanks goes to Prof. Amy Edmondson who pointed this out in her PhD course at the Harvard Business School on the *Design of Field Research Methods*.

³⁷⁸ Atkinson, G. (2004), pg. 282.

³⁷⁹ Radzicki, M (1988), pp. 634-637 and (1990), pp. 58-60.

³⁸⁰ Luna-Reyes and Andersen (2003), pp. 271.

³⁸¹ Forrester, J.W. (1994), pp. 72.

2.2.7 Induction-Deduction iteration

"This dialectic of the double-loop learning approach to building strategy theory can help in reconnecting strategy theory with the realities faced by managers in dynamic environments."³⁸³

In the quest for creating new 'bisociation' (i.e. connecting things that were not formerly seen to be connected), the research aims to use both inductive and deductive reasoning. Using purely deductive reasoning, new theory development is unlikely, while using purely inductive reasoning (i.e. without identifying assumptions, constructs and interrelationships between them), only description of the phenomena might result.

As shown in Figure 118 below, the research attempts to build theory by cycling inductively and then deductively in creating and testing constructs, frameworks (or typologies) and ultimately models. Equally, this process moves between informal correlative models towards formal causal models as it endeavors to move from *descriptive* theory towards normative theory.³⁸⁴

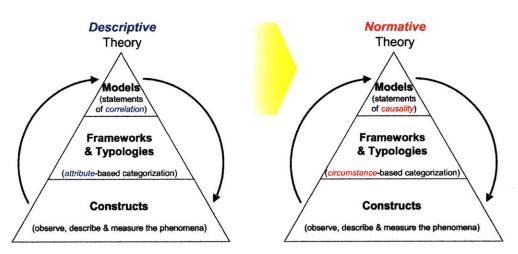


Figure 118: Process used for Theory Building³⁸⁵

Regarding the question of what are the sources of hypotheses, this research design is modeled after the approach taken by Penrose for her classic book, "Theory of the Growth of the Firm". In particular, the research aspires to use the same rich sources, namely: interviews with managers pragmatically rooted in real-world problems, conversations with students and professors, research on economic and sociological theories of architecture and growth, studies of business history, research on business literature and annual reports, extended company visits and observations (Kor and Mahoney, 2000).

While the dissertation itself is likely to be written deductively, the logic of discovery comes inductively from managerial practice. Again, as inspired by Penrose, the aim is to connect the

³⁸³ Mahoney, J. T. and Sanchez, R. (1997). "Competence Theory Building: Reconnecting Management Research and Management Practice." In Heene, A. and Sanchez, R. (Eds.) *Competence-Based Strategic Management*. Chichester: John Wiley, 43-64.

³⁸⁴ Carlile and Christensen, (2004).

³⁸⁵ Source: Carlile and Christensen, (2004).

reconstructed logic of deductive sociology and economics with the theories-in-use of management (Kor and Mahoney, 2000).

"We argue that Penrose's knowledge-creation process can be facilitated if strategic management researchers become engaged in an interactive, reciprocating process. Such rich connections are the stuff that classic management books and research creativity are made of."³⁸⁶

³⁸⁶ Kor Y. Y. and Mahoney J. T. (2000).

2.3 Research Metaphysics

"Darwinism is not a testable scientific theory but a metaphysical research programme. And yet, the theory is invaluable. I do not see how, without it, our knowledge could have grown as it has done since Darwin. In trying to explain experiments with bacteria which become adapted to, say, penicillin, it is quite clear that we are greatly helped by the theory of natural selection. Although it is metaphysical, it sheds much light upon very concrete and very practical researches. It allows us to study adaptation to a new environment (such as a penicillin-infested environment) in a rational way: it suggests the existence of a mechanism of adaptation, and it allows us even to study in detail the mechanism at work. And it is the only theory so far which does all that. "³⁸⁷

With these words, Karl Popper "the father of the philosophy of science", situated Darwin's theory of evolution within science, and characterized the general criticisms weighed against the research in this dissertion. Yet even Popper (1978) changed his mind later upon reflection:

"This is an immensely impressive and powerful theory. The claim that it completely explains evolution is of course a bold claim, and very far from being established. All scientific theories are conjectures, even those that have successfully passed many severe and varied tests. However. Darwin's own most important contribution to the theory of evolution, his theory of natural selection, is difficult to test. The fact that the theory of natural selection is difficult to test has led some people, anti-Darwinists and even some great Darwinists, to claim that it is a tautology. A tautology like 'All tables are tables' is not, of course, testable; nor has it any explanatory power. I mention this problem because I too belong among the culprits. Influenced by what these authorities say, I have in the past described the theory as 'almost tautological', and I have tried to explain how the theory of natural selection could be untestable (as is a tautology) and yet of great scientific interest. My solution was that the doctrine of natural selection is a most successful metaphysical research programme. It raises detailed problems in many fields, and it tells us what we would expect of an acceptable solution of these problems. I still believe that natural selection works in this way as a research programme. Nevertheless, I have changed my mind about the testability and the logical status of the theory of natural selection; and I am glad to have an opportunity to make a recantation. My recantation may, I hope, contribute a little to the understanding of the status of natural selection.. "388

The problem with most forms of evolutionary theory - from Darwin's to this research - lies in the underlying metaphysics: the ontology and epistemology.

"All social scientists approach their subject via explicit or implicit assumptions about the nature of the social world and the way in which it may be investigated. First there are assumptions of an **ontological** nature – assumptions which concern **the very essence of the phenomena** under investigation. Associated with this ontological issue, is a second set of assumptions of an **epistemological** nature. These are assumptions about **the grounds of knowledge** – about how one might begin to understand the world and communicate this as knowledge to fellow human beings."³⁸⁹

This section briefly describes the philosophy of the research methodology, including both its underlying *ontological* (philosophy of *existence* or *reality*) assumptions as well as its overriding *epistemological* (philosophy of *knowledge*) assumptions.

³⁸⁷ Popper, K. (1976), pg. 151, 171-172.

³⁸⁸ Popper, K. (1978).

³⁸⁹ Burrell and Morgan (1979), pg. xiii.

"The distinction between **methodology** and **method** is not a trivial one. A method is a tool or a technique used in the process of inquiry. In contrast, a methodology may be regarded as an 'intricate set of **ontological** and **epistemological** assumptions that a researcher brings to his or her work' (Prasad, 1997, pg. 2)."³⁹⁰

2.3.1 Positivism and Organizational Science

"This article describes the **deficiencies of positivist science** for generating knowledge for use in solving problems that members of organizations face. There is a **crisis in the field of organizational science**. The principal symptom of this crisis is that as our research methods and techniques have become more sophisticated, they have also become increasingly less useful for solving the practical problems that members of organizations face."³⁹¹

This section briefly summarizes the difficult intellectual journey of an avowed positivist (originally trained academically and professionally to understand and design complex technical systems) toward a more interpretivist paradigm, as the nature of the phenomenon to be understood and "designed" (i.e. complex social systems) became more exceedingly more "wicked", rendering my positivist inclinations a hindrance in the quest for the "truth".

"Normal science is concerned with internal validity, experimental rigor, planning, control of confounding variables, and to a lesser extent, external validity. Understanding the phenomenon beforehand makes for clean, tidy research, but the actual knowledge return will be incremental. If a researcher understands the phenomenon well enough to predict and control what happens, why ask the question? The significant discoveries, the best science, require us to be more venturesome and heretic in research design, and to explore fundamental questions without knowing the answer in advance. The worth of the research outcome is measured by surprise. The greater the surprise, the more interesting the result, and the greater the new knowledge about organizations."³⁹²

Leading organizational scientists have recently called for a break from the straitjacket imposed by normal science (Daft and Lewin, 1990, 1993). They have based their arguments on the fact that the phenomenon of effective organizations is so dynamic and complex, that researchers need to explore build theory outside the established confines of the positivist, normal science. This is where this research dissertation takes its que.

"Frameworks can be challenged because their complexity makes it difficult to falsify arguments."³⁹³

Finally, as this dissertation develops a multivariate framework, this inherently makes positivistic falsification difficult (Popper, 1963).

2.3.2 Constructivist Methodology in Strategic Management

"While realists conceive of the research process as **excavation**, where the terrain of phenomena is mined for valuable nuggets of naturally occurring insight, constructivists view the process more as an

³⁹⁰ Mir, R. and Watson, A. (2000), pg. 944.

³⁹¹ Susman G.I. and Evered R.D. (1978), pg. 582.

³⁹² Daft, R.L. and Lewin A.Y. (1990), pg. 7.

³⁹³ Porter, M.E. (1991), pg. 98, footnote 7.

act of sculpting, where the theory-base of the artist interacts with the medium of the phenomena to create a model of reality which we call knowledge." 394

In the linear causal world of natural science where the *realist* paradigm dominates, researchers (subjects) study natural phenomena (objects) without modifying- or being modified by them. In the nonlinear causal world of organizational science, where the *constructivist* paradigm may begin to dominate, researchers (subjects) reflexively shape and are shaped by the phenomena (objects) they are studying as shown in Figure 119 below.

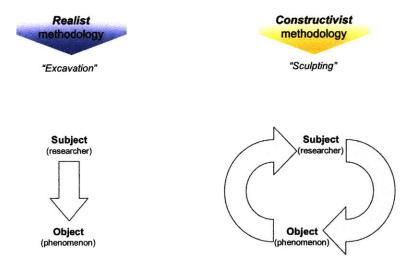


Figure 119: Realist vs. Constructivist Paradigms

While research in the field of strategic management is currently dominated by the *realist* paradigm, this dissertation takes a slightly different *constructivist* approach, which has been argued to be more logical and appropriate for the field of strategic management (Mir and Watson, 2000).

"Constructivism occupies a methodological space characterized by **ontological realism** and **epistemological relativism**. Ontological realism is an important cornerstone of **a field as applied as strategy**, while epistemological relativism helps us explore the constructed nature of the field, where the **researcher is an active participant** rather than a reactor or information processor."³⁹⁵

As shown in Figure 120 below (derived from Mir and Watson, 2000), constructivism is not a polar or binary opposite of realism, but an intermediate form of methodology which is grounded in the reality of realism, while embracing the "messiness" of highly complex social systems, as particularly the higher-level, more "architectural" and power-laden echelons (as will be discussed in a later methods section on "Action Learning / Clinical Methods").

³⁹⁴ Mir, R. and Watson, A. (2000), pg. 943.

³⁹⁵ Mir, R. and Watson, A. (2000), pg. 941.

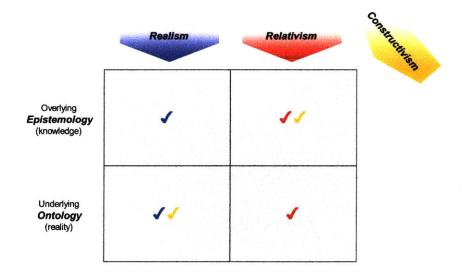


Figure 120: The "Construction" of Constructivism

Such a constructivist approach helps to explain the logic behind the necessity of spending time living, studying and researching in the academic and professional environment of each of the two firms in the primary case study (which will be discussed later in chapter 2). While the *existence* ontologically of an enterprise is not in socially-constructed, the goals, utility etc. of an enterprise is socially-constructed, requiring immersion in and participation with the society a necessary act of creating the knowledge about the phenomenon.

2.3.3 Pragmatist Epistemology in Strategic Management

Finally, a note regarding the philosophical and epistemological approach taken to both the research design and the subsequent theory development is warranted. In the spirit of the practical and applied nature of strategic management research, this work supports a *pragmatist* epistemology (Powell, 2001). It therefore stands in contrast to the purely positivist views that no theory can ultimately satisfy its demands, and the purely anti-positivist views that any theory would satisfy its demands. The criterion used for evaluation is the theory's capacity to solve human problems.

"Truths in strategy are neither certain nor final. The better theory is the one that stimulates better research, better teaching, better practice."³⁹⁶

Under this pragmatist epistemology, the hypotheses developed will be justified through the method of 'abduction' (O'Hear, 1989), which acknowledges the ability to withstand competition among rival theories.

³⁹⁶ Powell, T. (2002), pg. 879.

2.4 Research Settings

The research setting(s) were selected to strengthen the *internal* and *external* validity of the theory developed. As will be discussed in the following sections, internal validity was strengthened by using multiple lenses (i.e. those of different enterprise stakeholders) through which the case study firms were observed. External validity was strengthened by applying the theory developed in multiple industrial settings.

2.4.1 Primary Sample Selection

"Examining outliers departs from accepted methods because the range is restricted and outliers may represent sampling error, a misspecified model, or measurement error. This view of errors of course is based on a premise that normal science 'proof' is the research goal. But outliers are a powerful source of new ideas. Significant insights can arise from studying the best or the worst of a population."³⁹⁷

"A particularly important theoretical sampling approach is 'polar types,' in which a researcher samples extreme (e.g. very high and very low performing) cases in order to more easily observe contrasting patterns in the data."⁸⁹⁸

Given that the primary focus of this research is on building grounded theory, a *theoretical* sample is created.³⁹⁹ The theoretical sampling was designed to build theories of relative competitive performance based on in-depth field-based research of "polar" types of enterprise architectural forms, representing different "strategic groups" within the same industry (Porter, 1981).

"Industry-specific groups create heterogeneity. Firms in different strategic groups within an industry may react differently to environmental disturbances and competitive patterns."⁴⁰⁰

Although the typical model for much of the strategic management research consists of selecting a large 'N' *statistical* sample consisting of many firms competing within a given industry, this research centers on a small 'N' *theoretical* sample which consists of the remaining two large firms in a mature global duopoly.⁴⁰¹ This duopolistic situation presents a unique opportunity to control for industry effects by empirically investigating the strategic trajectories of all (i.e. both) the firms within their industry (Dess, Ireland and Hitt, 1990).⁴⁰²

Multiple firms will be used as data sources however, as the sample will embrace the stakeholders in the extended enterprise of each of the two main members. This is done to give a rich systemic view of the firm's competing enterprises.

³⁹⁷ Daft, R.L. and Lewin, A.Y. (1990), pg. 6.

³⁹⁸ Eisenhardt, K.M. and Graebner, M.E. (2007), pg. 27.

³⁹⁹ With small 'N' theoretical samples, "plausible rival hypotheses" (threats to validity) must be ruled out which make research findings tentative and ambiguous.

⁴⁰⁰ Dess, G.G., Ireland, R.D. and Hitt M.A. (1990), pg. 20.

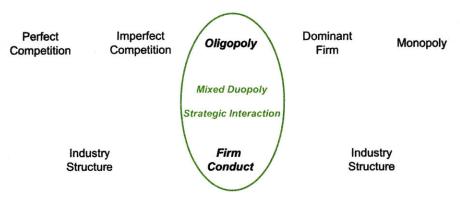
⁴⁰¹ See March, J.G. et al. (1991) on learning from samples of one or fewer.

⁴⁰² Firm "survivor bias" is present as the data set contains only those firms that survived during the time period.

The theory developed herein attempts to understand and predict the competitive dynamics of firms throughout the lifecycle of an industry, from birth to maturity. As a result, the theoretical sample is designed to contain an early entrant firm (which is now the incumbent) and a late entrant firm (which is now the challenger). By definition therefore, the theoretical sample focuses on large, mature firms.⁴⁰³

As this research attempts to understand the co-evolution of firms and industries, datasets in which industries have gone through most of their lifecycle are important. In addition, as industries mature, they tend to shake-out towards oligopoly. By definition, therefore, a large-n statistical sample of the firms in a mature industry becomes difficult. In addition, in the SCP paradigm, firm *conduct* is deemed to govern over industry *structure* in oligopoly settings. This fact allows us to examine the highly important firm conduct in oligopoly settings (as shown in Figure 121 below), provided that a set of well-conceived theoretical samples can be assembled.

Figure 121: Influence of Industry Structure and Firm Conduct on Sample Selection⁴⁰⁴



Spectrum of Industry Structure

Determinants of Firm Performance

This discussion specified the constraints for the selection of the primary theoretical sample:

- Oligopolistic industry structure to ensure relevance of firm conduct (preferably duopoly).
- Mature (post-dominant design) stage of industry evolution with clear *incumbent* and *challenger*.
- Firm objective functions representing both *shareholder value* and *stakeholder surplus* focus (i.e. "mixed duopoly").
- Enterprise architectural forms representing both modular and integral.
- Firms belonging to different "strategic groups" with strategies representing both *differentiated* and *cost-leadership*.

Given these constraints, only one industry and one firm set met all of the above criteria.

⁴⁰³ The focus on large, mature firms is also found in Penrose (1959) and Porter (1980).

⁴⁰⁴ Source: Saloner, G., Shepard, A., and Podolny, J. (2001).

2.4.1.1 Spatial setting

2.4.1.1.1 *Industrial* setting

Spatially, the primary research is confined to a particular global industry: the large commercial airplane industry⁴⁰⁵.

2.4.1.1.2 Incumbent and Challenger

*"The distinction between entrants and incumbents is critical to future studies of performance variation within and across industries."*⁴⁰⁶

After nearly 100 years of intense competition in this industry, the population of competing firms has gone through the various evolutionary stages of variation, selection and retention, resulting in a global duopoly comprising: the US incumbent, *Boeing Commercial Airplanes*, and the EU challenger, *Airbus Industrie*.

For parsimony, the incumbent firm will be referred to as "Firm α ", while the challenger will be referred to as "Firm β " in all industries.

2.4.1.1.3 Firms and their *Extended Enterprises*

Beyond the two firms in the large commercial airplane industry, this research will additionally study their extended enterprises – on multiple dimensions. While there will be tendencies to draw conclusions about the two firms based on the historical trajectories of their respective ownership structures, this research will attempt to enrich this description.

"Airbus was a 'groupement d'intérêt économique', a form of commercial partnership established in French law in the mid-1960's, which was mainly intended to help wine growers. A GIE, as it is known, is a **flexible** and user-friendly **form of corporate structure**, although it tends to baffle Anglo-Saxons – and Americans in particular – used to the **rigid structure of the limited company**."⁴⁰⁷

As shown in Figure 122 below, it is tempting to declare that *Airbus* possesses a modular enterprise architecture based on the observation that it is a loose collection of national companies⁴⁰⁸, while *Boeing* is largely a monolithic or integral enterprise architecture which designs and manufacturers more within the confines of one nation's borders and within one company's logo.

⁴⁰⁵ Standard Industrial Classification, SIC as follows: Division D: Manufacturing; Major Group 37: Transportation Equipment; Industry Group 372: Aircraft and Parts; Industry 3721: Aircraft. "Large" airplanes being defined as those having over 100 seats.

⁴⁰⁶ Walker, G., Madsen, T. L., and Carini, G. (2002). "How does Institutional Change Affect Heterogeneity Among Firms?" *Strategic Management Journal*, 23: 89-104.

⁴⁰⁷ Lynn, M. (1997), pg. 113.

⁴⁰⁸ Airbus is the collection of French (Aérospatiale), German (DASA), Spanish (CASA) and UK (BAE Systems) companies.

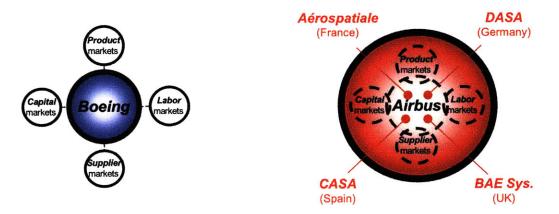


Figure 122: Modular or Integral Enterprise Architectures?

As will be discussed in greater detail in Essay #1, systems or enterprises require both differentiation and integration, with effective enterprises having: a) levels of structural differentiation which are suitable to the demands of the environment, and b) levels of structural integration which match the levels of differentiation.

All complex systems are de-composed in to parts, whether visible or not. Just because one enterprise (*Airbus*) is composed of four visible "modules", namely French, German, Spanish and British companies, does not mean that the enterprise has a "modular" architecture – it depends on the quality of interaction between modules. Conversely, just because another enterprise (*Boeing*) is composed of one visible "module", does not mean that the enterprise has an "integral" architecture.

As will be defined and discussed later, we will need much richer definitions to extract structure from behavior – definitions that transcend the low-level explanations of geographical location and asset ownership. Once these are established, one can then proceed to posit relationships between organizational architectures and the architectures of the products and services they produce.

2.4.1.2 *Temporal* setting

2.4.1.2.1 Industry Clockspeed

"Fruit flies are what I call a fast-clockspeed species. That is, they have an extremely brief life cycle. Mammals, such as elephants and humans live by much slower clockspeeds. They measure their lives in decades, not days. Even slower are reptiles. The hardy sea turtle, whose life span can exceed a century, has evolved little since its terrestrial cousins, the **dinosaurs** roamed the earth... But my work [on researching business evolution], focused primarily on the **dinosaur-like metal bending industries**, **proceeding slowly – painfully so**... For all the supply chain dynamics on view, I might as well have been **watching glaciers advance**... At the slowest end of the clockspeed scale – up there with the sea turtles and the California redwoods – are the **manufacturers of aircraft**."⁴⁰⁹

Recently, researchers have begun to study the dynamic and simultaneous evolution of products, processes and organizations in terms of their "clockspeeds" (Fine, 1998). In an effort to dramatically increase the productivity of such research, Fine cleverly compressed time by choosing to focus his research on the study of those industries and portions of value chains having fast-clockspeeds. In this way he could observe their evolution over a large number of lifecycles, and develop theories which may extend to a more generalizable range of clockspeeds.

While he laments the difficulties of studying corporate "dinosaurs", like *Boeing* (i.e. those having slow product, process or organizational clockspeeds), he recognizes the merit of doing so in order to validate the "dynamic laws of the extended enterprise" that he derived from the fast-clockspeed species. This research dissertation represents one such effort.

The benefit of researching a slow-clockspeed firm like *Boeing* is that one can slowly and carefully observe, dynamically develop and test hypotheses and analyze in real time the movements of the species, as it is locked in a competition with another slow-moving species, *Airbus*. While the benefits are apparent, the costs are high in terms of required resources (e.g. time, money, access, etc.). In addition, the long, extended periods of field observation must inevitably be supplemented and complemented with historical research methods, as even a 5-7 year field-based participatory research program captures only a small fraction of the lifecycle of the products, processes and organizational lifecycles inherent in the industry.

2.4.1.2.2 Time span

Temporally, the longitudinal *quantitative* research spans the 36-year period from the birth of the challenger, *Airbus* in 1970 up to today, where it has recently overtaken the incumbent, *Boeing*.⁴¹⁰ In addition, the longitudinal *qualitative* field-based research is designed to occur over six years. The past four-and-a-half years, spanning from January 2002 to June 2006, documented the managerial cognitive frames of *Boeing* and its enterprise stakeholders. In the three years from 2005-2008, the managerial frames of *Airbus* and its enterprise stakeholders are being researched and documented.

⁴⁰⁹ Fine, C.H. (1998), pp. 4-7.

⁴¹⁰ As measured by annual airplane deliveries (in 2003-2005) and annual airplane orders (in 1998-2005).

The historical milestones of the main competitors within the primary case study industry are shown in Figure 123 below.

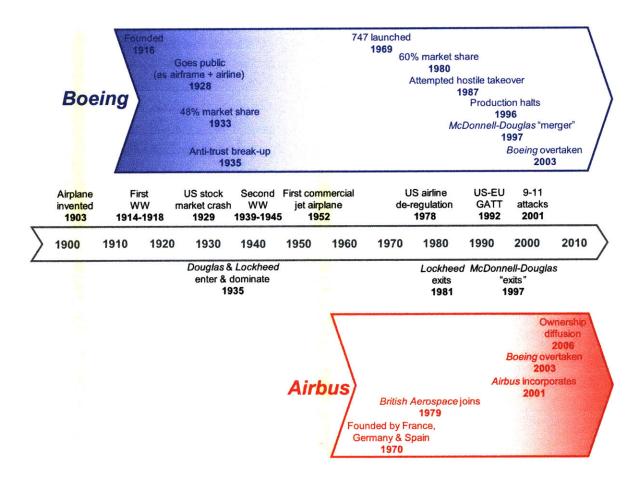


Figure 123: Historical Milestones of Main Competitors in Commercial Airplane Industry

2.4.1.2.3 "Critical Event" / Temporal Discontinuity

"If there was ever a stress test for a good business, this is it."411

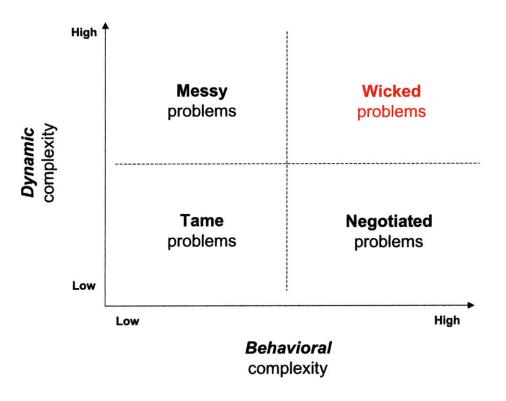
In addition, this research uses the exogenous industry discontinuity of the September 11, 2001 terrorist attacks in the US as a "critical situation" within which to examine firm strategic response.

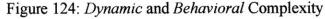
⁴¹¹ Presentation by Kevin Murphy, airline industry analyst for *Morgan Stanley* at MIT Sloan School of Management, October 2001 (as reported in Hoffer-Gittell, 2003, pg. 236).

2.4.1.3 Industrial idiosyncrasies

2.4.1.3.1 "Wicked" problems

The industry chosen for the primary case study has a high degree of complexity measured on two distinct (but coupled) dimensions: *dynamic* complexity, and *behavioral* complexity (Ackoff, 1974; Roth and Senge, 1995). As shown in Figure 124 below, each will be discussed briefly in the following subsections.





2.4.1.3.1.1 Messy problems: high dynamic complexity

Dynamic complexity occurs when cause and effect are distant in space and time (Senge, 1990, pg. 71). This tends to arise within integral enterprise architectures. Ackoff (1974) refers to such problems as "messes". Sterman (2000, pg. 22) notes that such problems tend to be nonlinear, whereby effect is not proportional to cause.

"The real leverage in most management situations lies in lies in understanding dynamic complexity, not detail complexity."⁴¹²

⁴¹² Senge, P. (1990), pg. 73.

Senge (1990) differentiates *dynamic* complexity from *detail* complexity, which is merely the existence of many variables.⁴¹³ Focus on *detail* complexity often results in "laundry lists"⁴¹⁴ of important variables, but does not reveal sources of *dynamic* complexity. Later in chapter 3, a multitude of plausible explanations for long-term firm performance (or lack thereof) will reveal a focus on detail complexity, and a lack of understanding of dynamic complexity.

2.4.1.3.1.2 *Negotiated* problems: high *behavioral* complexity

Behavioral complexity arises when many diverse agents (or stakeholders), each with conflicting goals and or values have decision-making power. Solution of this class of problem tends to require negotiation, as various zero-sum behavioral games are played among stakeholders, whereas positive sum results would benefit all as in the case of integral enterprise architectures.

For example, when shareholders attempt to value firms, they often rely on "research" conducted by investment bank anaylsts. The potential conflicts of interest and subsequent objectivity of such "research" is clearly disclosed by such investment banks. The extent to which this warning is observed and heeded is a worthy research question.

"[Investment Bank X] does and seeks to do business with companies covered in [Investment Bank X Research]. As a result, investors should be aware that [Investment Bank X] may have a conflict of interest that could affect the objectivity of [Investment Bank X Research]. " 415

2.4.1.3.1.3 *Wicked* problems: Examples

The classic example of the "mildly wicked" problem is the Beer Game or the simple stylized supply chain. Here cause and effect are distant in space and time, and various agents have conflicting local goals and behave as if locked in a zero-sum game. Note that the problem is "wicked" even in the presence of low detail complexity.

As will be argued later, the global commercial airplane industry is "clearly wicked", as cause and effect are very distant in space and time due to the reasons explained below (e.g. high fixed costs, economies of scale, strong learning curve-experience effects, long-development times, long-lived products, etc.).

Finally, "extremely wicked" problems include the Cold War, the Israeli-Palestinian conflict, the U.S. war on terror, etc.

⁴¹³ Sterman, J. (2000), pg. 21, refers to detail complexity as "combinatorial complexity".

⁴¹⁴ Senge, P. (1990), pg. 130.

⁴¹⁵ Anonymous financial services / investment bank research report.

2.4.1.3.2 Economies of Scale & Barriers to Entry

Other industry structural factors include the tend towards *natural monopoly*, i.e. the minimum efficient scale is rather large, given the high fixed production costs, the relatively small annual volumes of sales and the high inherent market and technological risks associated with launching a \$10 billion project, for which there will only be around 1,000 units sold over 20 years (i.e. 50 units per year).⁴¹⁶ In most natural monopoly settings, such an environment makes regulation an expected part of the competitive enterprise dynamics.

As competition tends more and more towards cost-leadership as the modus operandi, production volumes and therefore economies of scale and learning curve effects are a crucial source of cost leadership. It is for these reasons that market share (i.e. delivery share) is an unusually, important metric or proxy for long-term competitive performance.

"International high-technology industries are typically characterized by structural mobility barriers such as irreversible commitments and product differentiation; static and dynamics economies of scale, scope and learning that create increasing returns to scale; and path dependencies and R&D races with high uncertainty and potential first mover benefits. These structural characteristics are viewed as creating imperfectly competitive markets in which supernormal profits or rents, may be possible, and in which time becomes a fundamental dimension of competition."⁴¹⁷

Various research studies have investigated the commercial aircraft industry, including *The MIT Commission on Industrial Productivity* (Dertouzos et al., 1989).

"The argument in the **MIT study**, that many of the difficulties of American firms are having are selfinflicted, is quite persuasive."⁴¹⁸

2.4.1.3.3 Increasing Returns & Imperfect Competition

"Aerospace is afflicted with many of the classic cases of market failure."419

Economist Paul Krugman (1987) argued for free-trade in all but a few rare instances, notably where increasing returns and imperfect competition dominate (e.g. in commercial airplanes).

"If increasing returns and imperfect competition are necessary parts of the explanation of international trade, however, we are living in a second-best world where government intervention can in principle improve on market conditions."⁴²⁰

2.4.1.3.4 Strategic Trade (Industrial) Policy

"As businessmen have always said and economists have usually denied, a protected domestic market can – under some circumstances! – promote rather than discourage exports, and possibly raise national income."⁴²¹

⁴¹⁶ This point was recently reiterated in *The Economist*, June 25th, 2005, pg. 89.

⁴¹⁷ Braham, R. (1995), pg. 73.

⁴¹⁸ Nelson, R.R. (1991), pg. 63.

⁴¹⁹ Neven, D. Seabright, P. and Grossman, G.M. (1995), pg. 316.

⁴²⁰ Krugman, P. (1987), pg. 134.

2.4.2 Secondary Sample Selection: Counterfactuals

"This work was carried out in two distinct, but related phases. The first was a detailed study of...firms operating in one industry. The second phase was a study of a highly effective organization (by conventional economic and commercial standards) and a less effective competitor in each of two other industries."⁴²²

Like Lawrence and Lorsch's classic 1967 work, *Organization and Environment: Managing Differentiation and Integration*, this research dissertation uses a two-phase comparative approach between highly effective and less effective competitors in three different industry settings. The first phase was described in the previous section. The second phase covering competitors in two other industries will be presented in this section.

In an attempt to extend the generality of the proposed theoretical framework (i.e. to ensure external validity of the theory), the research will test from a longitudinal quantitative perspective using panel datasets, the applicability of the theory to *archetypal* competitive spaces in both manufacturing and services: *General Motors* and *Toyota Motors* in the global automotive industry from 1970-2005 and *United Airlines* and *Southwest Airlines* in the US airline industry from 1970-2005.

"Since accurate evidence is not so crucial for generating theory, the kind of evidence, as well as the number of cases, is also not so crucial. A single case can indicate a general conceptual category or property; a few more cases can confirm the indication."⁴²³

The following subsections briefly describe how the theoretical sample will be selected to "control" for various variables by seeking counterfactual case studies.

2.4.2.1 Control for *Industry* effects

"Adequate controls for potential industry effects have not been used in many strategic management studies."⁴²⁴

Many of the most influential empirical studies in strategic management have been demonstrated not to use sufficient controls for industry effects, resulting in erroneous conclusions (Dess et al., 1990). For example, it was observed that firms sampled across multiple industries that use related diversification performed better than firms that used unrelated diversification (Rumelt, 1974). Careful re-analysis of this research revealed that the high firm performance was due to the high profitability of the firm's industries, and those successful industries tended toward related diversification (Rumelt, 1977 and 1982).

"Single industry studies are a relatively straightforward approach to control for industry effects."425

⁴²¹ Krugman, P. (1987), pg. 136.

⁴²² Lawrence and Lorsch (1967a), pg. 19.

⁴²³ Glaser, B.G. and Strauss, A.L. (1967), pg. 30.

⁴²⁴ Dess, G.G., Ireland, R.D. and Hitt, M.A. (1990), pg. 7.

⁴²⁵ Dess, G.G., Ireland, R.D. and Hitt, M.A. (1990), pg. 20.

The logic of the sample selections therefore is to use *single industry studies* (Dess et al., 1990) which investigate an incumbent and its primary challenger. However, to extend the generalizability of the theory while maintaining control for industry effects, the sample will be expanded to include a collection of single industry studies.

As more industries are added, the logic of the sample selection is to use *stratified samples by industry* (Dess et al., 1990), in which the samples are consistent with the variables and relationships being measured. All industries investigated would therefore share fundamental characteristics: (e.g. high consolidation, high entry/exit barriers) as well as share fundamental environmental characteristics (e.g. mature stage).

2.4.2.2 Control for *Environmental* effects

"Use of a single dimension of an industry's environment to build theory and to test proposed relationships empirically may result in a failure to investigate alternative plausible explanations of observed relationships."⁴²⁶

Even though a set of firm pairs operating in the same industry will be analyzed, it is important that the environmental state is controlled. The study therefore proposes to look at firm pairs (an incumbent and challenger), each having been established in different environmental regimes (e.g. emerging and maturing industries), and both competing in an industry that has run its full course to maturity. As will be described later in essay #3, the environment will be characterized using multiple dimensions (e.g. quantity and quality of output) to capture the essence of the environmental state (e.g. munificence, dynamism, and complexity).

2.4.2.3 Control for *Sector* effects

In addition, the sample is intended to begin to control for sector effects, i.e. to determine if the methodology can apply to both manufacturing as well as service industries. It is for this reason that a world-class manufacturing firm (i.e. *Toyota Motors*) and a world-class service firm (i.e. *Southwest Airlines*) are used.

2.4.2.4 Control for International and Socio-Economic effects

Finally, these two case studies, taken together with the primary case study of *Boeing* vs. *Airbus*, form a collection of three cases each representing an incumbent US firm against a challenger representing the three "triad" economic powers: the US (*Southwest Airlines*), EU (*Airbus*) and Japan (*Toyota*). In other words, they were selected to begin to control for national and socio-economic effects - to determine if integral enterprise architectures, which tend to dominate in the mature industries, are not just a product of "socialist societies". The small theoretical sample is not intended to be statistically robust, but merely to present a counterfactual example.

⁴²⁶ Dess, G.G., Ireland, R.D., and Hitt, M.A. (1990), pg. 16.

2.4.2.5 Selection Criteria for Incumbent and Challenger

As the primary sample comprises an industry in a state of duopoly, having a clear incumbent (firm α) and a clear challenger (firm β), the selection criteria need not be very explicit. However, in the secondary and tertiary theoretical samples, clearer definitions are required.

The incumbent (firm α) is defined as the acknowledged leader in the industry, typically measured as having the largest market share at one time in its history.

The challenger (firm β) is defined as having been founded sometime after the current incumbent, and on a clear and sustained trajectory towards displacing the incumbent – regardless of whether or not it has surpassed the incumbent.

2.4.3 Tertiary Sample Selection

Finally, in an effort to further extend the validity and generality of the theory, other case studies are recommended for future in-depth analysis. These are meant to control for other effects like industry clockspeed, and state of industrial evolution. Figure 125 below summarizes the key attributes of the theoretical sample used in this research.

			Independent variable X ₁ (t)	Independent variable X ₂ (t)	Independent variable X ₃ (t)	Variable Y(t)
	Industry	Incumbent /	Enterprise	Structural	Industrial	Firm
	(Sector)	Challenger	Architecture	Dynamics	Evolution	Performance
Primary Case	Com. Airplane	Boeing (US)	Modular	Incumbent	Post-	Incumbent
for theory building	(manufacturing)	Airbus (EU)	Integral	less stable	dominant design	overtaken
Services	Airline	United (US)	Modular	Incumbent	Post-	incumbent
Archetype Case	(services)	Southwest(US)	Integral	less stable	dominant design	overtaken
Manufacturing	Automotive	GM (US)	Modular	Incumbent	Post-	Incumbent
Archetype Case	(manufacturing)	Toyota (JPN)	Integral	less stable	dominant design	being overtaken
Control for	Computer	<i>IBM</i> (US)	Modular	Incumbent	Post-	Incumbent
Clockspeed	(manufacturing)	<i>Dell</i> (US)	Integral	less stable	dominant design	overtaken & exits
Control for Industry Maturity	Comp. Chip (manufacturing)	Intel (US) ???	Modular		<i>Pre-</i> dominant design	Incumbent leads
	Com. Airplane (manufacturing)	Bombar. (CN) Embraer (BR)	Modular Integral	Incumbent less stable	Post- dominant design	Incumbent being overtaken
	Air Cargo (services)	Fedex (US) UPS (US)	Modular Integral	Incumbent less stable	Post- dominant design	Incumbent being overtaken
	Retail (services)	Walmart (US) Costco (US)	Modular Integral	Incumbent less stable	Post- dominant design	Incumbent being overtaken

Figure 125: Proposed Theoretical Sample

Indexendent Indexendent Indexendent Dependent

2.4.4 Addressing Sample Selection Bias

Selection bias occurs when the non-random selection of cases results in inferences based on the resulting sample, that are not statistically representative of the population. The sample selection, therefore (whether large-N or small-N) can bias the theory. We review some of the more frequent concerns and evaluate them in the final chapter.

2.4.4.1 Survivor Bias

"One limitation of the data is that all the firms examined were survivors. As Freeman (1986) noted, studying only surviving firms can create biases if survivors vary from nonsurvivors on critical dimensions being studied. Unfortunately, as a practical matter, it is nearly impossible to obtain accurate historical measures of business strategy for... firms that have failed, particularly those that failed some time ago."⁴²⁷

2.4.4.2 Sampling on the Dependent Variable

A confirmatory bias, like sampling on the dependent variable (or "front-runners bias") can be important source of spuriousness in theory-building. In the case of this research the "dependent variable" can be argued to be long-term firm performance.

⁴²⁷ Boeker (1989), pg. 498.

2.5 Data Sources

Both qualitative and quantitative data were gathered from both primary and secondary sources which allowed the establishment of construct validity.

As summarized in Figure 126 below, in light of the three essays of this proposed research, both primary and secondary data sources are important to define the *structure* of enterprise architectures (Essay #1); primary data sources, in terms of cognitive mental models of the most senior decision makers, gathered longitudinally are important in Essay #2 in order to define how the enterprise architectures *function*; finally secondary data sources, in terms of archival documents are important in Essay #3, in order to define how enterprise architectures *evolve*.

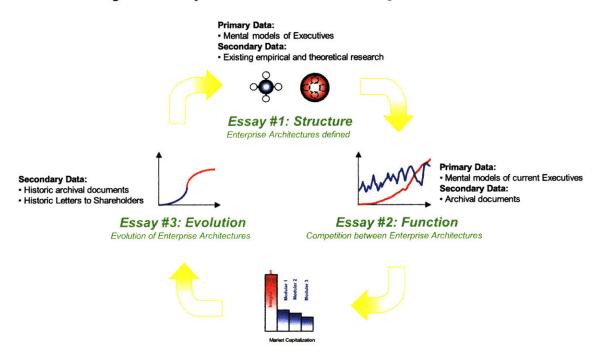


Figure 126: Important Data Sources for each part of the Framework

2.5.1 Primary data sources

As will be discussed in more detail in the subsequent sections, the primary data sources consisted of senior decision makers (informants) at each stakeholder within a given firm's extended enterprise, namely the firm, its customers, suppliers, investors, unions and competitors. The data collection methods and techniques will be discussed in the following section.

2.5.2 Secondary data sources

Examples of secondary data sources included archival documents including published company annual reports as well as interview transcripts from published trade and news journals.

By way of example, longitudinal analysis of *The Boeing Company* alone required the acquisition and review of over 75 years of annual reports totaling over 2,200 pages of text.

Additionally, review of the ongoing dynamics of the *Boeing-Airbus* rivalry included analysis of over 10 news sources per day (from sources like *Factiva*) over the past seven years, totaling over 5,000 pages of text.

In order to begin to piece together the respective histories of *Boeing* and *Airbus*, numerous texts documenting their development were consulted (e.g. Lynn, 1997).

2.6 Data Collection Methods and Techniques

2.6.1 Executive Summary

The plan is simply to work with the most senior leaders of both competitor firms as well as the leaders of their key stakeholders to solve their most difficult strategic problems using whatever methods and techniques are most effective for the situation at hand. Repeat this process periodically over time until theoretical saturation occurs and/or financial and temporal resources expire. Beyond that, there is no more specific plan - there can not be - as the nature of the problem that one is asked in "solving" is continually changing, as well as the composition of the leadership in the enterprises.

2.6.2 Methods

The best way to describe the data collection process is the author led an intensive 6-year longitudinal group model building, critiquing and testing exercise primarily with the senior leaders of the major stakeholders of both enterprises in a global duopoly. The purpose of the model (or grounded theory) development focused on understanding the competitive dynamics within the industry. The resulting model is ultimately then transformed into a more formal simulation model.

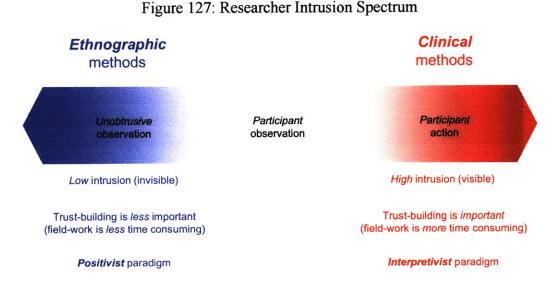
"The specific methods appropriate for this kind of research do exist but are relatively rarely applied to strategy process research - longitudinal studies, action science, the ethnographic approach, and clinical methods."⁴²⁸

As shown in Figure 127 below, the approach taken to data collection is highly pluralist and fullcycle (Chatman and Flynn, 2005), and the primary methods of data collection span the spectrum of researcher presence, ranging from "invisible" ethnographic techniques (Van Maanen, 1988) to the more "visible" techniques of participatory action research (Heron and Reason, 1997), and in particular, *action learning* (Clark, 1972; Pedler, 1991; Revans, 1980, 1982) and ultimately *clinical methods* (Schein, 1987). These will be compared and contrasted in the following sections and implications will be drawn for this research plan.

"We advocate a full-cycle approach to conducting organizational behavior research. Full-cycle research begins with the observation of naturally occurring phenonema and proceeds by traveling back and forth between observation and manipulation-based research settings, establishing the power, generality, and conceptual underpinnings of the phenomenon along the way. Compared with more traditional approaches, full-cycle research offers several advantages, such as specifying theoretical models, considering actual and ideal conditions, and promoting interdisciplinary integration."⁴²⁹

⁴²⁸ Stacey, R. (1995).

⁴²⁹ Chatman, J.A. and Flynn, F.J. (2005), pg. 434.



"As the relationship with the organization develops, it is perfectly possible, indeed quite likely that (ethnographic and clinical) roles will merge more and more. Clinicians find opportunities to 'wander around' and 'observe'...and thus are able to gather the kind of data that the ethnographer is seeking. Ethnographers are likely to be thrust increasingly into clinical roles as they come to be taken for granted and build up trust."⁴³⁰

As we transition the discussion of the research methods used in this dissertation from the more passive towards the more active role of the researcher, it is important to observe the *continuity* of theoretical legitimacy not *discontinuity*.

"Open-ended interviews and participant observation... are ways of discovering how economic participants think about the world. They are means, in other words, of identifying toe model of that portion of the socioeconomic world which the participants themselves use in making decisions. The conventional interpretation is captured in what at MIT is called Robert Hall's law: You can never believe the answer to a direct question about behavior, or more crudely, 'businessmen always lie.' This intrpretation, however, suggests that this law misses the point: what interviews can reveal is not a set of specific answers to specific questions, individual bits and pieces of information. What they reveal are patterns of responses. Each answer, whether true or false, is a piece of that pattern. Individual responses cannot be interpreted in isolation. But the responses grouped together, and taken as a whole, are clues to the mental processes of the economic participants."

⁴³⁰ Schein, E. (1987), pg. 24.

⁴³¹ Piore, M. (1979), pg. 566.

Finally, it is instructive to compare this approach to methods with those from previous influential researchers in the intellectual domains that this research aims to contribute, for example the original contingency theorists. This description of Burns & Stalker's research method bears a strong resemblance to the methods employeed herein.

"The methods of study we have followed are those common to what is called field sociology and to social anthropology. These are simply directed towards gaining acquaintance, through conversation and observation, with the routines of behavior current in the particular system being studied, and trying thereafter to reach an appreciation of the codes of conduct which are supposed by the members of the system to underlie behaviour. All this emerged fairly slowly in the course of the interviews, meetings, lunch-time conversations, and the like. At the same time we, as outside observers, have tried to construct some systematic explanatory description of what we have been told and have observed.

All this is very far removed from any method of investigation which could possibly be called scientific. It does not share the principal advantage of anthropological field method, which lies in a lengthy period of residence in the community being studied. Everything has had to depend on what ability we had to appreciate the significance of the things and happenings we saw during out spells inside factories, and to elicit information in interviews and conversations. We had also to learn to distinguish the tones and additives which were occasioned by our roles as outsiders, as academic people, as confidants, as critics.

Our usual procedure, after the first interview with the head of a firm, was to conduct a series of interviews with as large a number of persons as possible (some 300 persons) in managerial and supervisory positions. Such interviews lasted anything from one hour to a whole working day.

It was during this stage that it proved possible to create a more productive relationship than can be constructed on the basis of one person's seeking information from another. The conventions governing such interviews and the limits of of information regarded as admissible or relevant are nowadays prescribed fairly strictly. To go beyond these limits, it is not enough to demonstrate interest or even sympathy; in the writers' experience, an informant will get to the point of formulating and presenting his experience, beliefs, opinions, anxieties, and criticisms only when there has been established a relationship which is reciprocal in some genuine sense; when there is some point for the informant in going further than the needs of courtesy, and compliance with an undertaking by the firm to co-operate with the researcher, seem to require of him. Thus the researcher has to make the relationship 'real'; one in which he is prepared to behave on his side as what he declares himself to be. This can be done only by showing how he is making use of the information he is receiving; by the occasional interpretation of a situation in terms which are both derived from his perception of the situation as an outsider and as a sociologist or psychologist, and which are also appropriate to his informant's ability or preparedness to comprehend it. From then on, whether the interpretation is accepted or not, there is a freer, more satisfactory quality about the interview, a stronger desire to recruit and present facts, examples and views. There are no interpretations and appraisals contained in any part of this report which have not been communicated at some time or other to persons involved in the situations at issue. Invariably, also, we have found our own ideas being amended, extended or corrected by such traffic.

After we had become acquainted with the general structure and functioning of the organization, we sought opportunities of observing how people dealt with each other, and also of pursuing, by further interviews, some of the problems of description and interpretation which by this time had appeared. In their simplest and most significant form, these problems were presented as discrepancies between the account of the same functions or parts of the organization given us by different people concerned in them. Such discrepancies, in our experience, are always present, and provide the most direct introduction to the analysis of a situation or social system in sociological terms."⁴³²

⁴³² Burns, T. and Stalker, G.M. (1961), pp. 12-15.

2.6.2.1 Ethnographic Methods

"The goal is to reveal the **underlying structure** that is out there, and the assumption dominates that if the ethnographer had **sufficient time** to **observe passively** it would eventually **reveal itself**."⁴³³

Nearly all of the initial fieldwork began as a series of unobtrusive ethnographies at multiple enterprise stakeholder sites. Various techniques such as observation, participant observation, archival documentation review, unstructured, semi-structured and structured interviews, and focus groups⁴³⁴ were employed in order to build empirically valid, albeit relatively shallow data sets.

Within strategic management, recent interest in studying firm heterogeneity with an industry via the resource-based view tradition, has lead to calls from academic to employ more obtrusive methods (Rouse and Daelenbach, 1999).

"Ethnographic methods include those that range from the low-intrusion types such as semi-structured and unstructured interviews, and unobtrusive observation, to high-intrusion methods such as participation observation... Generally speaking, the higher level of intrusion, involvement or participation in an organization, the higher level of understanding, the greater the degree of sensemaking, and the richer the descriptive and analytical possibilities for the data. Participant observation, because it permits trust relations to develop, allows the researcher to collect data that are different in kind and quality from data produced by any other method. It is hard to imagine survey respondents, for example providing sensitive, confidential, or highly consequential data. Similarly, interviewers who do not spend sufficient time within an organization are unlikely to gain access to data that would be exchanged only among trusted insiders within the culture."⁴³⁵

As the next step for the research problem, therefore was to gain focus and sharpness, the opportunity began to slowly emerge to evolve the data collection towards more depth via clinical methods described next.

"It may be true that until the ethnographer becomes 'helpful', he or she will not truly be accepted into the group and given access to the data he needs."⁴³⁶

⁴³⁴ Luna-Reyes, L.F. (2003), pp. 281-282.

⁴³³ Schein, E. (1987), pg. 30.

⁴³⁵ Rouse and Daellenbach (1999), pg. 490.

⁴³⁶ Schein, E. (1987), pg. 28.

2.6.2.2 Action Research / Clinical Methods / Policy Research

"The relationship between the analyst and the client has significantly evolved with the analysis being more often used as a platform for dialog between stakeholders with very different objectives and problem views, rather than a simple delivery of a best solution."⁴³⁷

"While the analyst him/herself may not be neutral, the analysis must be with extensive tradeoff analyses and even game playing to show the interrelationships between different objectives. We are just beginning here but this is a **major paradigm shift** from the analyst, problem definer and solution provider to the analyst aiding in a **complex stakeholder consensus building process** providing neutral information and convening – but not dominating – the debate."⁴³⁸

Academics have begun to question the role of analysts in research (Marks, 2003), leaning toward a more clinical approach, employing action research methods.

"This article describes the **deficiencies of positivist science** for generating knowledge for use in solving problems that members of organizations face. Action research is... a method for correcting these deficiencies. When action research is tested against the criteria of positivist science, action research is found not to meet its critical tests. The appropriateness of positivist science is questioned as a basis for judging the scientific merits of action research. Action research can base its legitimacy as science in philosophical traditions that are different from those which legitimate positivist science."⁴³⁹

In order to capture the depth and complexity of the phenomenon under study, this research dissertation aims to complement the traditional low-intrusion methods of ethnography with the higher-intrusion methods of action research.⁴⁴⁰ In order to understand *how* strategic change processes occur, Argyris (1968, 1985) has argued that significantly new research methods of action science are required.

"...it implies significant researcher commitment and organizational access, which few researchers have achieved to date. As a consequence, very few developmental studies of strategy formulation and implementation have been conducted. One reason why gaining organizational access has been problematic is because researchers seldom place themselves into the manager's frame of reference to conduct the studies."⁴⁴¹

"Pettigrew's book is based on eight years of research. In fact, two of the eight years of research were funded directly by ICI. In the worst case, organizations that pay the costs of becoming the subject of advanced research will try to manipulate the researcher, either by socializing him or her into their value systems or by making cooperation dependent on 'useful' results or at least the display of a 'reasonable' attitude. It is a disturbing proposition that the theory of organization may have finally approached a point where methodological requirements make further advances dependent on the good will of powerful insiders."⁴⁴²

⁴³⁷ Marks, D.H. (2003), pg. 2.

⁴³⁸ Marks, D.H. (2003), pg. 5.

⁴³⁹ Susman G.I. and Evered R.D. (1978), pg. 582.

⁴⁴⁰ I am indebted to Prof. Sarah Kaplan for coaching me through the use and validity of clinical methods research, and in particular for pointing me towards the work of Prof. Ed Schein.

⁴⁴¹ Van de Ven, A. H. (1992), pg. 181.

⁴⁴² Streeck, W. (1986), pg. 92.

Action research is known under various names with slightly different meanings in a variety of contexts. These include: "clinical methods" (Schein, 1987), "policy research" (Etzioni, 2006), and "Collaborative Interactive Action Research" (Rapoport et al., 2002).

"Policy research requires a profoundly different methodology from that on which basic research relies, because policy research is always dedicated to changing the world while basic research seeks to understand it as it is." ⁴⁴³

The following subsections each briefly discuss the focus of action research on: strategic capability-building, organizational change and theory building.

2.6.2.2.1 Focus on Strategy Process (not Content)

"In the clinical model, an important distinction is between process consultation that highlights helping the client solve his or her own problems, and expert consulting that puts the clinician into a doctor or expert role from which he or she prescribes solutions."⁴⁴⁴

As previously discussed, this research is designed to establish long-term trust-based relationships with the most senior leaders of both *Boeing* and *Airbus* as well as with the senior leaders of their respective key stakeholders, namely their customers, suppliers, investors and employee unions.

"I have learned much from my teachers, even more from my colleagues, but I have learned the most from my students."⁴⁴⁵

The primary stance of the researcher is as an independent in-house strategy *process* consultant⁴⁴⁶ and executive education provider to the most senior leaders of firms comprising both enterprises. The stated objective of the researcher is to build each enterprise's strategic thinking capabilities, which is broadly achieved by facilitated group model-building exercises, with representatives of each enterprise's key stakeholders. The concurrent participation with both enterprises has been acknowledged a priori, with the obvious stipulation that there would be no exchange of sensitive or proprietary information.⁴⁴⁷ As will be discussed later, the data collection methods range from action learning/clinical methods to ethnography.

"To understand architecture and its impact one needs to understand the **political and cultural** dimensions of leadership and architecting, as Ted Piepenbrock described. [When considering] Ted Piepenbrock's efforts at Boeing, the audience is the Board of Directors, who are trying to make architectural decisions about the Boeing enterprise. Ted's role is not to be an outside architect; rather he is operating as a kind of facilitator in the board's own thinking about its architecture. He does, however, carry out his own research in the firm – this gives him credibility with the audience and helps him elucidate the key choices and consequences facing them in their architecting (i.e. modular versus integral enterprise)."

⁴⁴³ Etzioni, A. (2006), pg. 833.

⁴⁴⁴ Schein, E. (1987), pp. 37-38.

⁴⁴⁵ From the Talmud / Book of Proverbs.

⁴⁴⁶ As opposed to a strategy content provider, which implies no exchange of sensitive or proprietary information.

⁴⁴⁷ Non-disclosure agreements (NDA) as well as non-compete agreements (NCA) without express written consent, were obviously part of the research contracts.

⁴⁴⁸ Comments and critiques of this framework by graduate students in the Spring 2006 MIT ESD class, *Enterprise Architecting*.

In order to integrate information from across intra-firm functions as well as external inter-firm stakeholders, the organizational development literature has acknowledged the importance of boundary-spanning "boundary objects". In this tradition, the process consulting described above resembled a "boundary object" – in as much as a conversation, or a trust-based relationship can be seen as an invisible boundary object.

2.6.2.2.2 Focus on Intervention and Change

"One can not understand a human system without trying to change it. The essential dynamics of the system are assumed to remain invisible to the passive observer."

Unlike, the ethnographer who takes great care not to disturb or contaminate the human system that they are observing, the clinician's aims are the opposite – to purposefully disturb the human system via an intervention designed to change and ultimately improve the organization. While clinical data tends to be deeper and richer than ethnographic data, it may suffer from experimental validity. The research design recognized these trade-offs, and was customized to fit the situation as described below.

"Clinical fieldwork demands a long-term, open-ended, give-and-take commitment to bringing about organizational change."⁴⁵⁰

The use of clinical methods, focused on organizational change requires special characteristics of both the researcher as well as the organization itself. Sterman notes that the researcher requires a unique multidisciplinary set of skills:

"You have an ethical responsibility to carry out your work with rigor and integrity. You must 'speak truth to power', telling the clients that their most cherished beliefs are wrong... even it if means you will be fired. If your client's minds are closed...you must quit. Get yourself a better client. [This requires] both first-rate analytical skills and excellent interpersonal and political skills."⁴⁵¹

Throughout this intensive longitudinal field study, in order to maintain ethical responsibility and integrity, I opted to terminate the fieldwork on multiple occasions. This served to maintain the appearance objectivity in the relationship with the informant organizations, as well as to counter the claims from academics in the ethnographic tradition (but not in the clinical methods tradition) who are concerned with the observer "going native".

The use of clinical methods varied from across firms in the case study depending upon the firm's perceived needs or organizational change. For example, *Boeing*, the incumbent under attack from the challenger, *Airbus*, felt more urgent need at high organizational levels to initiate organizational change. For this reason, clinical methods emerged from initial ethnographic methods at *Boeing*, while the ethnographic methods were more appropriate at *Airbus*. In the quest for sharp methodological fidelity, the clinical phase at *Boeing* was a long-term⁴⁵², open-ended endeavor with "pull" coming from the highest levels of management.

⁴⁴⁹ Schein, E. (1987), pg. 29. Also in Starbuck and Nystrom (1981).

⁴⁵⁰ Schein, E. (1987), pg. 5.

⁴⁵¹ Sterman, J. (2000), pp. 85 and 105.

⁴⁵² A brief survey of recent field-based doctoral research in management reveals that duration of field-based data collection ranges from approximately 6-12 weeks (e.g. W. Orlikowski, 1990; S.Kaplan, 2003).

"The clinician, unlike the ethnographer, is welcome in the halls, meeting rooms and corner offices occupied by those in high position." 453

Finally, Schein (1987) differentiates between *process* consultation and *expert* consultation in clinical fieldwork.⁴⁵⁴ As process consultation focuses on helping the client to solve their own problems (as opposed to expert consultation, which solves the client's problems), this research design focused primarily on the use of process-oriented clinical methods. In this way, managerial frames were more readily revealed through the process of guided joint-discovery or co-creation of knowledge. To this end, the primary technique used was the development of scenarios as strategic conversations (van der Heijden, 1996; Hodgkinson and Wright, 2002).

2.6.2.2.3 Focus on Theory Development

"The clinical perspective is oriented towards the dynamics of change and improvement. It is therefore normative in its orientation and requires underlying theories that provide normative direction – concepts of health, effectiveness, growth, innovation, integration, and the like."⁴⁵⁵

As clinical methods tend to generate normative theory, it fits well within the aims of strategic management scholarship.

"The best use of clinical data is in the construction of variables and theoretical models. The clinician learns about some of the most fundamental dynamics that operate in an organization, and it is often very clear, even though not provable, what those dynamics are."⁴⁵⁶

As will be discussed later, in the *analytical techniques* section, the use of nonlinear dynamic numerical simulation via the system dynamics method relies greatly on clinical data for the development of solid theories and the subsequent robust policy design.

"The power of clinical work... under the label of 'action science'... is that such work provides better variables and better understanding of the system dynamics than other research methods and thus must be utilized more in building useful and parsimonious theory."⁴⁵⁷

One of the more influential theories developed in organizational science is Contingency Theory as developed by researchers like Lawrence and Lorsch (1967). While numerous criticisms of the theory abound, particularly surrounding the adequacy of their concepts and measures (Aldrich, 2006: 126), Lawrence and Lorsch defend their theory by noting the inherent qualitative, clinical nature of their methods.

"As Lawrence and Lorsch (1973) pointed out in reply to their critics, they conducted a clinical study rather than a highly quantitative, rigorously-controlled field study, and their conclusions owe as much to their clinical and professional insight as to the rudimentary data analysis presented."⁴⁵⁸

⁴⁵³ Schein, E. (1987), pg. 5.

⁴⁵⁴ Schein, E. (1987), pp. 37-38.

⁴⁵⁵ Schein, E. (1987), pg. 40.

⁴⁵⁶ Schein, E. (1987), pg. 54.

⁴⁵⁷ Schein, E. (1987), pg. 55.

⁴⁵⁸ Aldrich, H. E. (2006), pg. 127.

2.6.3 Techniques

2.6.3.1 Temporal (longitudinal)

The research program is designed to span the social, economic, cultural, institutional and academic environments within which the two enterprises of the case study are embedded. As the theoretical construct of "enterprise architecture" compares the efficiency-based mass production *firm* (e.g. *Boeing*) and its counterpart, the value-infused lean *institution* (e.g. *Airbus*)⁴⁵⁹ the research program is based out of two leading universities in the US and Europe, with their notable strengths rooted in each tradition: MIT and the University of Oxford.

As shown in Figure 128, the research was designed to take place over a nearly eight-year period, being broken down roughly into the following three two-and-a-half-year periods:

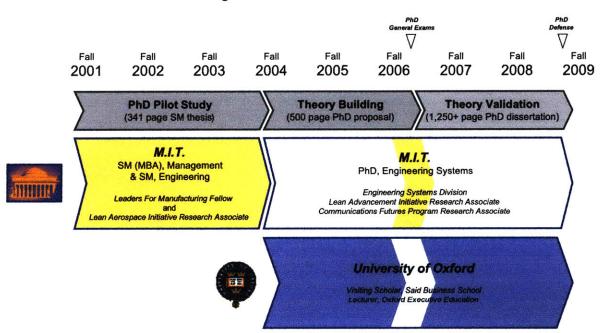


Figure 128: Research Timeline

• Phase I consisted of an initial three-year pilot study was conducted at (*Boeing*) the primary case study site under the academic auspices of the joint MBS/MS *Leaders for Manufacturing* program of the *Engineering Systems Division*. The purpose of the pilot study was to clearly define the research problem, develop preliminary grounded theory and secure a platform (e.g. doctoral funding, doctoral committee, industrial commitment and access) for a doctoral research plan. The results of this pilot study is summarized in the document, "Enterprise Design for Dynamic Complexity: Architecting and Engineering Organizations using System and Structural Dynamics" (Piepenbrock, 2004).

⁴⁵⁹ The "Organization-Institution" dichotomy was first discussed by Selznick, 1957.

- Phase II consisted of another two-year block which was designed to more fully develop grounded theory from empirical field-based case studies by establishing and validating theoretical constructs and propositions.
- Phase III will consist of a final two-year block which is designed to validate and extend the theory developed using two means: first, an via analysis of other firms and industries; second, via extensive multidisciplinary review of theoretical literature. If Phase II built theory grounded in empirical data, Phase III will build meta-theory from existing theories, as well as extend and validate the theory.

As shown in Figure 129, the field-based data collection has been executed from January 2002 to July 2009. Typically, three-month visits were conducted every twelve months for over seven years at *Boeing* and the sites of its constituent stakeholders. The total field contact time thus far exceeds 4,000 hours, including approximately 500 hours of action learning based interviews and discussions with stakeholders described below.

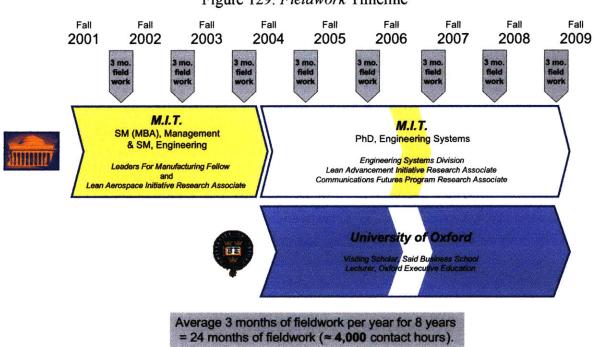


Figure 129: Fieldwork Timeline

Also as is shown in Figure 130 below, the 4,000 hours of fieldwork at both competitors in the global airplane duopoly took place over the time period that the incumbent (*Boeing*) was overtaken by the challenger (*Airbus*). This was an opportune time to capture the complex dynamics of managerial cognitive frames as the reality changed for the first time in such a slow clockspeed industry.

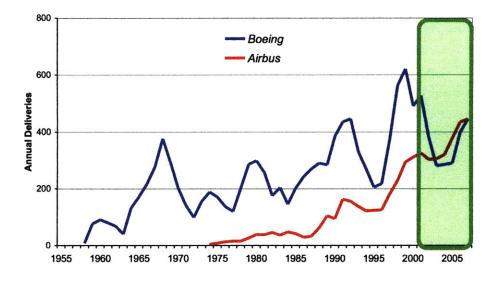
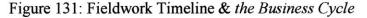
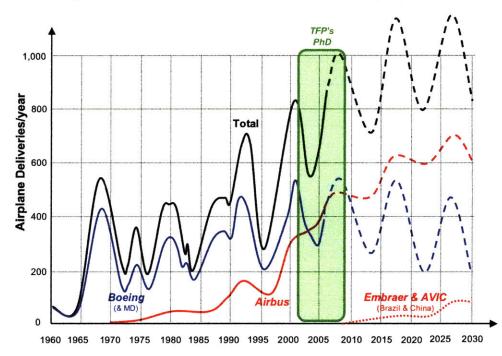


Figure 130: Fieldwork Timeline & Competitive Duopoly Dynamics

In addition, as the industry produces capital goods, it is subjected to well-known oscillations (Sterman, 2000), having a period of approximately ten years. As shown in Figure 131 below, The research therefore took place over one full-cycle in order to capture the dynamics first during the downturn, where integral enterprise archiecture was expected to outperform the modular enterprise architecture, as well as during the upturn, where the converse occurs.





2.6.3.2 Spatial (triangulation)

"Interviews often provoke a 'knee-jerk' reaction that the data are biased in which impression management [by image-conscious informants] and retrospective sensemaking are deemed the prime culprits. The challenge of interview data is best mitigated by data collection approaches that limit bias. A key approach is using numerous and highly knowledgeable informants who view the focal phenomena from diverse perspectives. These informants can include organizational actors from different hierarchical levels, functional areas, groups, and geographies, as well as actors from other relevant organizations and outside observers such as market analysts. Another approach to mitigating bias is to combine retrospective and real-time cases (Leonard-Barton, 1990)."⁴⁰⁰

In addition to the collection of data temporally across time, this research plan calls for spatial collection of data both "horizontally" across the key stakeholders of the enterprise, as well as "vertically" within each stakeholder's hierarchical structure. In this sense, the goal is to map the *micro*-frames of key decision makers across the *macro*-enterprise of key stakeholders.

2.6.3.2.1 Horizontal (Inter-firm) triangulation

"The theory that we are developing together represents the exact opposite way we that currently see our strategy... [it] challenges the conventional wisdom and power structure of the highest levels of this company. Having relentlessly discussed [it] over and over again over the past few years, with people who have a strong vested interest in disproving it, has been given the theory a 'baptism by a hundred fires' – it certainly has been 'pressure-tested'".⁴⁶¹

In order to ensure internal validity of the theory, the research design included triangulation of the data sources. To this end, the above-described data collection techniques were applied internally within *Boeing* at senior leadership levels across multiple functions such as marketing, engineering, manufacturing and supplier management as well as externally to *Boeing's* stakeholders such as its customers, suppliers, labor unions, etc., as shown in Figure 132 below.

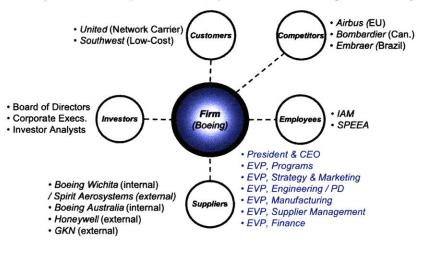
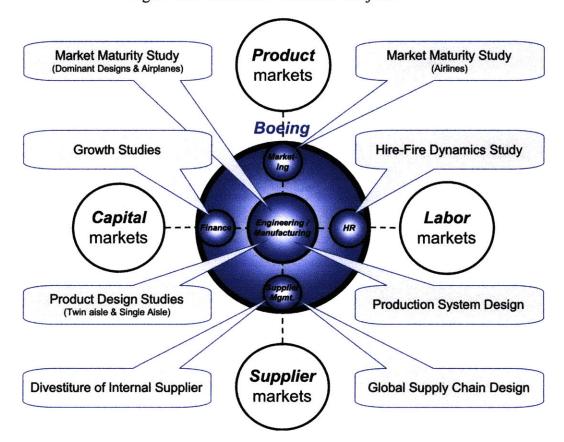


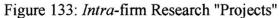
Figure 132: Empirical "Triangulation" of Boeing Case Study

⁴⁶⁰ Eisenhardt, K.M. and Graebner, M.E. (2007), pg. 28.

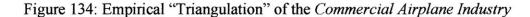
⁴⁶¹ Quotation from *Boeing* director, Summer 2005.

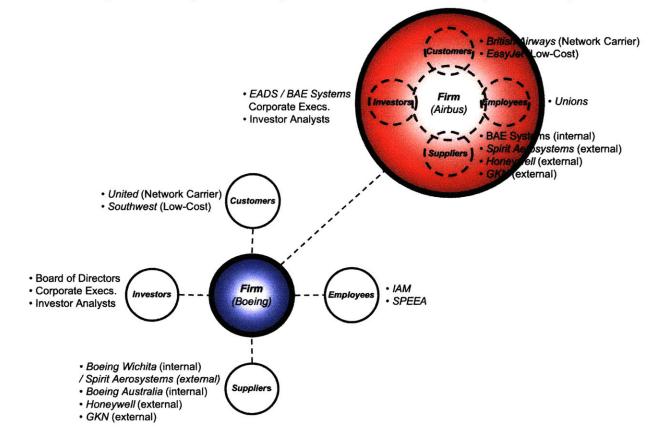
The research was designed to sample a number of the 'internal" functional problems. Examples of the types of intra-firm research studies performed for the functional leaders are shown below in Figure 133.





For the second phase based out of the University of Oxford, a similar schedule and approach is envisaged for *Airbus* and its constituent European stakeholders. In this way, triangulation of data from interconnected sources can begin to paint a systematic picture of the global commercial airframe industry ecosystem which may share common stakeholders like customers or suppliers as shown in Figure 134.





2.6.3.2.2 Vertical (Intra-firm) triangulation

"I have the **biggest risk profile** and the **broadest time horizon** in the company. I can bring to bear the right risk-taking and time horizon trade-offs." *462

In order to further increase internal validity, data collection methods took place a multiple levels with each stakeholder organization. As shown in Figure 135 below, as one ascends an organization vertically, the level of power, control and integration (or "architectural design authority") increases, facilitating the need for different approaches in accessing reliable data. At these levels, as meaning and reality are more socially-constructed, this makes accessing the data more difficult via conventional positivist methods, and easier via more constructivist methods.

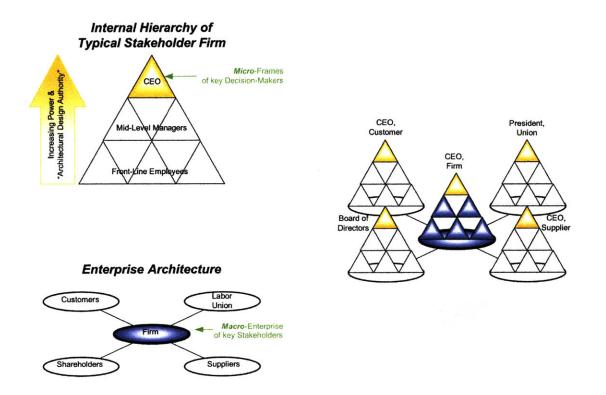


Figure 135: Mapping Micro-Frames Across the Macro-Enterprise

Note that this vertical triangulation within the organization's hierarchy is supported by Thompson's (1967) claims that organizations operate more like closed-systems (i.e. rational, strategic design lens) at lower levels and more like open-systems (i.e. satisficing, political design lens) at higher levels. Thompson refers to three levels: *technical, managerial* and *institutional*. While this research engages all three levels, it particularly emphasizes the open-systems institutional levels where the formal design authority of the "architect" resides.

⁴⁶² General Electric chairman and CEO, Jeffrey R. Immelt, interviewed by Thomas A. Stewart in the Harvard Business Review, "Growth as a Process," June 2006, pg. 69.

2.6.3.2.3 Political, Cultural and Temporal triangulation

Research designs dominated by the *strategic design* lens, view organizations as objective, rational optimizers. As such research methods like survey questionnaires are deemed as logical vehicles to access valid data. The researcher is able to treat the data sources and the data itself as "commodities" in that precious research time and resources are not "wasted" nurturing long-term, trust-based relationships with the data sources, the answers received represent truths or valid data, and that any researcher (given a proper specification of how the original data was collected) can go back to the same data sources, issue the same surveys and get broadly similar "truths" (controlling obviously for longitudinal effects).

This approach may in fact be valid for research in organizations under certain conditions. However, as this research dissertation aims to access data across multiple external stakeholders as well as across multiple internal functions, divisions and levels, as well as longitudinally across multiple time frames, it is by definition crossing important political, cultural and temporal boundaries, requiring the research lenses to incorporate these points of view.

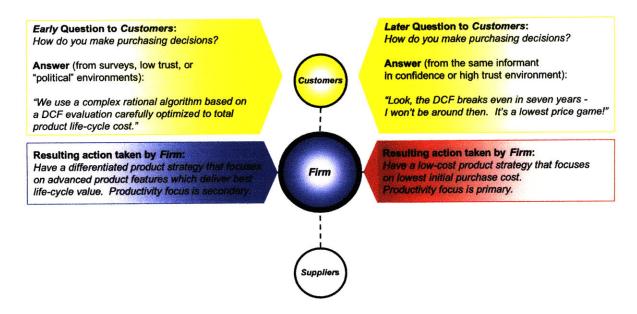
"You have an ethical responsibility to carry out your work with rigor and integrity. You must 'speak truth to power', telling the clients that their most cherished beliefs are wrong... even it if means you will be fired. If your client's minds are closed...you must quit. Get yourself a better client. [This requires] both first-rate analytical skills and excellent interpersonal and political skills."⁴⁶³

Viewed from these lenses, the researcher sees that the data and data sources can not be treated as commodities in that research time and resources must be spent nurturing long-term, trust-based relationships with the data sources, understanding their local objectives and conflicts of interest both within the firms and between firms. In addition to time and resources, this requires specific skill on the part of the researcher to build these relationships with the data sources. As failure to consider these organizational complexities could result in invalid data.

The following examples taken from early phases of this research dissertation illustrates that failure to control for such political, cultural and temporal effects results in significantly different data and theoretical models. Figure 136 below illustrates the significance of not controlling for "political effects" when collecting and analyzing data from the customer stakeholder group.

⁴⁶³ Sterman, J. (2000), pp. 85 and 105.

Figure 136: Data from the Customer stakeholder with and without "political controls"



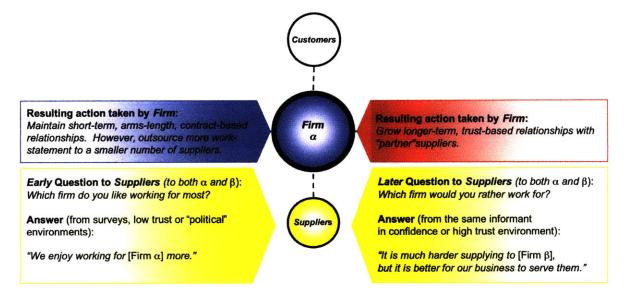
As can be seen, the conventional wisdom of the firm, of the research community at large, and in fact from the initial data acquisition exercises from the research program described in this document, is that customers for the firm's products make purchasing decisions base on complex, yet rational decision algorithms which minimize total long-term costs to the customer. It is interesting to note that this answer from senior managers from the customer stakeholder triangulated consistently with senior managers in the firm and by senior leaders within the investor stakeholder group. This "truth" led the firm, to launch differentiated high-performance products which could balance the initial purchase cost of their product with the long-term operations costs of owning the product.

After spending over three years and over 1,500 hours of research time with the firm and its key stakeholders, and importantly building long-term trust and political capital, when the same data sources were sampled again for longitudinal validity checks, the data was found to be significantly different. This time, in a high-trust, apolitical environment, the same customer informant indicated that although company policy was as he had initially indicated, he was not at liberty to share "the truth" of how he really made decisions, which were ultimately based on lowest initial acquisition costs. This "truth" would lead the firm to precisely the exact opposite product strategy (in fact to that of its competitor) which focused on maximizing productivity so that initial price could be minimized, even at the expense of lower product capabilities and life-cycle costs.

What had changed in this dramatic turn-around in the quality of the data? It appears that the quality of the relationships with the data sources matter significantly. As will be discussed later in Essay#1, there may be a fundamental systemic characteristic of the architecture of the enterprises under study (including the academic community) that encourage short-term, arms length commodity treatment of data sources to make decisions.

Another one of dozens of potential examples is shown below in Figure 137 regarding the supplier stakeholder group.

Figure 137: Data from the Supplier stakeholder with and without "political controls"



2.7 Data Analysis Methods and Techniques

Having discussed the techniques for data collection, this section briefly summarizes the techniques for the analysis of the data. That is, the process in taking written data and transforming it into numerical data suitable for numerical simulation.

"Since 'linking' is at the heart of system dynamics, grounded theory speaks to the same goal of drawing relationships among factors in a targeted system."⁴⁶⁴

Two primary methods (and associated techniques) for analyzing data are briefly discussed: grounded theory and simulation modeling. While these have occasionally been seen as complementary (Burchill and Fine, 1997; Perlow, Okhuysen and Repenning, 2002; Luna-Reyes and Andersen, 2003; Laws and McLeod, 2004), it is the purpose of this section – and in fact this research design – to integrate them into a unified method contributing in a coherent way to the broader research design.

"We used a combination of ethnography and causal loop diagrams. The resulting model is both tightly grounded in our data and provides a logical and internally consistent explanation of how the micro-level interactions involved in decision making combined to create the more macro-level changes we observed. The utility of our approach lies not in the direct transferability of our findings, but in the ability to produce grounded theory that could not be identified with a broader-brush data-collection method. Further, by using causal loop diagrams to specify our emerging theory, we have made it easier for scholars to mathematically formalize and empirically test our results."⁴⁶⁵

2.7.1 Qualitative Analysis Methods

The primary two broadly qualitative analysis methods used for data analysis were: grounded theory and linguistic analysis. Each will be discussed in turn.

2.7.1.1 Grounded Theory

Grounded theory consists not only of a set of techniques to identify major concepts across texts, but more importantly it links the concepts together to generate meaningful theories.

The "texts" used in this research range from first-hand interview transcripts, to second-hand magazine interviews and letters to shareholders. Through the process of "memoing", the concepts and categories that arise through textual analysis are likely to become the stocks and flows of the system dynamics model, described in the next section.

For this research thus far, memos were composed each night summarizing the emerging themes of the day's interview, meetings and discussions. Approximately two hours of off-site work was spent coding and analyzing the field data for every one of the approximately 500 hours of facilitated action-learning / group model building exercises.

⁴⁶⁴ Luna-Reyes and Andersen (2003), pp. 284-285.

⁴⁶⁵ Perlow, Okhuysen and Repenning (2002), pg. 932 and 934.

Based on this information, a conceptual model was built by inferring hypotheses from the field data about causal structural relationships that led to observed patterns of behavior.

"Accurate description and verification are not so crucial when one's purpose is to generate theory. This is especially true because evidence and testing never destroy a theory (of any generality), they only modify it. A theory's only replacement is a better theory."⁴⁶⁶

2.7.1.2 *Linguistic* Theory

"The linguistic turn in the social sciences prompted calls for more complex understandings of organizations that would emphasize language not only as enabling information exchange but also as constructing social and organizational reality (Dandridge, Mitroff & Joyce, 1980; Pondy & Mitroff, 1979). This linguistic approach has led to increased interest by organization theorists in such issues as the intimate relationship between language and organization (Daft & Wiginton, 1979)."⁴⁶⁷

Linguistic analysis has taken an increasing role in the analysis of organizations (Heracleous and Barrett (2001). Multiple methods have emerged which capture the richness of organizational exchange (Suddaby and Greenwood, 2005). This research focuses on using two such accepted approaches: *discourse* analysis and *textual* analysis.

"Semiotics (Barley, 1983), hermeneutics (Philips and Brown, 1993), and discursive (Kilduff, 1993) and narrative analyses (Boje, 1995) have each been introduced as a method for understanding organizational phenomena."⁴⁶⁸

At the core of the theory presented herein, is an organizational (or relational) construct, namely, are enterprise architectures modular or integral. In order to observe this empirically, the chances for success in arriving at a truth (to the extent that such a quest is epistemologically possible) is to observe such relational quantities as "trust" and "patience." This is not a trivial activity. Can one observe these quantities, and if so, how can one communicate these observations as "truths".

"There is a tradition in the analysis of social life that treats the social world as an independently perceivable phenomenon, something that observers delineate, describe, and make coherent. Observation and the observer stand removed. Recent trends in social philosophy challenge this subject-object distinction, viewing as isomorphic the seer and the seen, the knower and the known (Ryan, 1970). The correspondence theory of thuth is rejected, for within a phenomenological perspective, there is no single 'correct' reading of the 'external world.' The problem of qualitative analysis based on fieldwork is that of avoiding solipsism on the one hand and avoiding positivism on the other. One approach to this problem is to make language the locus of analysis and not to confuse the language system used to 'explain' or formulate the world with the objects of study."⁴⁶⁹

2.7.1.2.1 Discourse Analysis

"The concept of 'deep structures' is essential to a fuller understanding of social and natural systems at all levels of analysis (Gersick, 1991; Light, 1979). Deep structures can be defined as relatively

⁴⁶⁶ Glaser, B.G. and Strauss, A.L. (1967), pg. 28.

⁴⁶⁷ Heracleous and Barrett (2001), pg. 755.

⁴⁶⁸ Suddaby and Greenwood (2005), pg. 39.

⁴⁶⁹ Manning (1979), pg. 660.

stable, largely implicit, and continually recurring processes and patterns that underlie and guide surface, observable events and actions. Accounts of deep structure vary indifferent theoretical domains. In the domain of discourse, we hae approached deep structure as persistent features of discourse that transcend individual texts, speakers, authors, situational contexts, and communicative action as a whole and over the long term."⁴⁷⁰

This research seek to reveal the underlying "deep structures" within the discourse of competing enterprise architectures.

2.7.1.2.1.1 *Rhetorical* Analysis

Within the analysis of deep structures in discourse between stakeholders within an enterprise architecture, this research focuses on a particular type of discourse, that of rhetoric, which focuses on political or interest-laden discourse between stakeholders. A table with the chronological listing of the inter-stakeholder discourse (for primary and secondary firms in the theoretical sample) is given in Appendix I.

"Rhetoric, or the art of persuasion, has a long history in the humanities (Richards, 1936; Burke, 1969, Aristotle, 1991) and, at one time, supersceded logic as a mode of assessing truth (Zald, 1993)... Rhetorical analysis shares this interest in the role of language in structuring social action but is distinguished by a very specific focus on suasion and influence. In this context, rhetoric forms a subset of discourse analysis... Rhetoric restricts its focus to explicitly political or interest-laden discourse and seeks to identify genres or recurrent patterns of interests, goals, and shared assumptions that become embedded in persuasive texts (Freedman and Medway)."⁴⁷¹

2.7.1.2.2 *Textual* Analysis

Although much of the linguistic analysis in this research captures stakeholder discourse broadly, it focuses also on capturing language used in texts in more formal texts, like annual reports to shareholders.

⁴⁷⁰ Heracleous and Barrett (2001), pg. 758.

⁴⁷¹ Suddaby and Greenwood (2005), pp. 39-40.

2.7.2 Quantitative Analysis Methods

2.7.2.1 Simulation Modeling

"Grounded theory approaches are used to develop variables which have significant explanatory power and are intimately tied to the data. The cause and effect relationships among these variables are then shown using causal-loop diagramming techniques from the field of system dynamics."⁴⁷²

Having transformed the empirical case data into concepts and categories via memoing, the concepts and categories are then assembled into a causal model with multiple feedback relationships in a method recently described as *Inductive System Diagrams* (Burchill and Fine, 1997).

"The Inductive System Diagram method builds on the strengths of accepted coding practices for variable development and causal-loop diagramming for variable integration."⁴⁷³

This causal model is then transformed into a nonlinear dynamic simulation model via the identification of state variables (stocks or levels) and decision heuristics (flows or rates) which change the states of the system. This method is known as system dynamics (Forrester, 1961, Sterman, 2000).

"Unlike many formal models in the social science literature, ours was not deduced from general principles but, using the methods of grounded theory, was induced from a range of domains. While commonly used to build theory from raw data using qualitative analysis, the grounded theory approach is not limited to this activity. Strauss and Corbin (1994) advocated the development of formal (or general) theories grounded in previously generated domain-specific (what they call substantive) analyses. They remind the reader that Glaser and Strauss (1967) not only urged the use of grounded theory in conjunction with quantitative analysis but also recommended its use to generate theory from theory."⁴⁷⁴

2.7.2.2 Philosophical Stance on Modeling Complex Enterprises

"Chaos theory provides a useful theoretical framework for understanding the dynamic evolution of industries and the complex interactions among industry actors... which exhibit both unpredictability and underlying order."⁴⁷⁵

When modeling complex socio-technical enterprises, this research takes the epistemological view that the range of behavior in question can be best understood via nonlinear dynamic deterministic methods (including, but not limited to chaos theory).

"All nonlinear feedback systems, including human organizations, can be expressed in terms of lawful rules and relationships: that is, such systems are deterministic in the same fundamental sense as Newton's laws or the laws of supply and demand in neoclassical economic theory."⁴⁷⁶

⁴⁷² Burchill and Fine (1997), pg. 469.

⁴⁷³ Burchill and Fine (1997), pg. 476.

⁴⁷⁴ Rudolph, J.W. and Repenning, N.P. (2002), pg. 3.

⁴⁷⁵ Levy, D. (1994), pg. 167.

While Beer (1959) classified the firm or the economy as an "exceedingly complex, probabilistic system", this research takes its philosophical queue from one of Beer's contemporaries in feedback thinking, Forrester (1961) who believed that firms and economies could be modeled as "exceedingly complex, deterministic systems", a space that Beer deemed pointless.⁴⁷⁷

"Patterns of... the evolution of industries can be depicted but there is novelty in each... industry."⁴⁷⁸

System dynamics does not model in order to predict, but in order to understand the underlying structure driving dynamic behavior. It is a pattern-modeling process.⁴⁷⁹

2.7.2.3 Modeling Epistemology

A note of clarification is warranted regarding the use of simulation methods to simulate nonlinear dynamic structure-behavior relationships. As the problem being posed in this research contains high degrees of dynamic complexity⁴⁸⁰, conventional methods of *positivist* science are challenged. A different epistemology is necessary - one rooted in *generative* science is better suited.⁴⁸¹ As Sterman (2000) points out, this is not without its caveats:

"Engineers and econometricians have long struggled with the problem of **uniquely identifying** the **structure and parameters** of a system from its **observed behavior**. In practice the data are too scarce and the plausible alternative specifications are too numerous for statistical methods to discriminate among competing theories."⁴⁸²

The structure and parameters may be *sufficient* to describe the observed dynamics, but may not *necessarily* be the right structure and parameters.

2.7.2.4 Developing Causal Structures form Empirical Data

"Interview data is rich, including descriptions of decision processes, internal politics, attributions about the motives and characters of others, and theories to explain events." 483

Sterman (2000, pg. 141) notes the importance of ensuring that correlative relationships are not mistaken for causal structures. In addition, Sterman (2000, pg. 157) also notes that the ability of gathering rich contextual data is important in developing system dynamics models. Therefore survey data tends not to be as effective as semi-structured interviews.

"The modeler must **triangulate** by using as many sources of data as possible to gain insight into the structure of the problem situation and the decision processes of the actors in it... People have only a

⁴⁷⁶ Stacey, R.D. (1995), pg. 481.

⁴⁷⁷ Richardson, G.P. (1990), pp. 170-171.

⁴⁷⁸ Atkinson, G. (2004), pg, 282.

⁴⁷⁹ Radzicki, M. (2003), pg. 151.

⁴⁸⁰ Senge, P. (1990), pp. 71-72.

⁴⁸¹ Epstein, J.M. (1999).

⁴⁸² Sterman, J.D. (2000), pp. 26.

⁴⁸³ Sterman, J.D. (2000), pg. 157.

local, partial understanding of the system, so you must interview all relevant actors, at multiple levels, including those outside the organization (customers, suppliers, etc.)"⁴⁸⁴

Finally, Sterman (2000, pg. 157) notes that interviewees have the potential to share much less as well as much more than they really know, making the development of internally consistent causal structures extremely difficult requiring both scientific rigor as well as artful skill.

2.7.2.5 Model Complexity

Regarding model complexity, Repenning (2003) notes that there are two interdependent considerations: the state of the existing theory, and the modeler's ability to develop their audience's intuition for how the model's structure drives its behavior.

"For areas of inquiry where there have been few attempts to understand dynamics in a systematic fashion, simple models are needed, not because the phenomenon is simple, but because there is little on which to build."⁴⁸⁵

In the field of strategic management, while many calls have been to understand the dynamics, relatively little has been done. Therefore, simple models utilizing "generic structures" (Senge, 1990) are expected to be the most effective, and will therefore be the focus of this research plan. Such simple models can be rigorous provided that the underlying assumptions for the relatively few variables used are justified using field data.

"In almost every field of science, a tension has existed constantly between the experimentalists and the theorists. Certainly some of the difficulties between the two groups stem from basic misunderstanding on both sides, of the **nature and function of mathematical models**. Models are too often considered simply as predictors, and any inability to predict accurately is accepted as prima facie evidence of the uselessness of the technique. Actually, only those engineering models designed to fit a particular set of circumstances are even moderately successful as predictors. The more general models of theoretical biology are used to **deduce the form of the possible solutions, rather than to predict future states** of the system being modeled."⁴⁸⁶

2.7.2.6 Proposed System Dynamics Modeling within Framework

Having defined the conceptual properties of the archetype enterprise architectures in Essay #1, it is envisaged that high-level system dynamics models would be built or adapted for each of the remaining two essays in order to capture different dynamics aspects behavior implicit in the framework.

As shown in Figure 138 below, Essay #2 would focus on the medium-term competitive dynamics between two firms in a "mixed" duopoly setting where each firm had diametrically-opposed objective functions, enterprise architectural forms, structural dynamic strategies. In this model, the architectures are assumed to remain constant throughout the simulation i.e. while there may be evolution in the market environment, there will be no "disintegration" and exit of incumbents or re-integration and appearance of new entrants. It is envisaged that the model

⁴⁸⁴ Sterman, J.D. (2000), pg. 157.

⁴⁸⁵ Repenning, N. (2003), pg. 314.

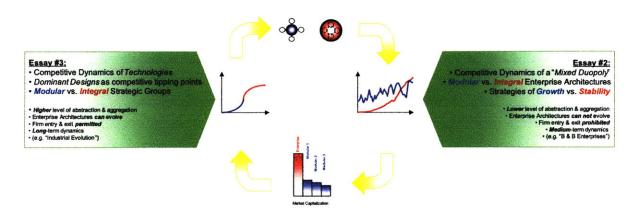
⁴⁸⁶ Wangersky, P.J. (1978), pg. 189.

would take on a simplified version of existing market growth and competition models in the system dynamics literature (Sterman, J.D. 1991; Paich, M. and Sterman, J.D. 1993; Sterman, J.D., Henderson, R. Beinhocker, E.D. and Newman, L.I. 1995; Langley, P., Paich, M. and Sterman, J.D., 1998).⁴⁸⁷

"As a maturing industry adjusts to slower growth... companies' orientations towards adding capacity and personnel must fundamentally shift...these shifts in perspective rarely occur in maturing industries."⁴⁸⁸

Finally, Essay #3 would focus on the higher-level, more abstract, long-term competitive dynamics in a market in which firms can enter and exit. Here competition occurs primarily between competing technologies serving a mass market, as individual competitor firms are aggregated. In this model, dominant designs form tipping points between archetypal strategic groups. "Mixed" duopoly therefore occurs at an aggregated "strategic group" level. The enterprise architectures are permitted to "evolve" throughout the simulation i.e. there could be "disintegration" and exit of incumbents or re-integration and appearance of new entrants. It is envisaged that the model would take on a simplified version of existing industrial evolution models in the system dynamics literature (Weil and Utterback, 2005; Sterman, J.D., Henderson, R. Beinhocker, E.D. and Newman, L.I. 2005).





⁴⁸⁹ Note it is possible that a high-level conceptual model synthesizing the models in Essays #2 and #3 could be added to Chapter 7.

⁴⁸⁷ These system dynamics models are all centered around the core "B&B Enterprises" model of Mark Paich's MIT PhD.

⁴⁸⁸ Porter, M.E. (1980), pg. 239.

2.8 Research Dissertation Critique

"Your doctoral proposal is rather **ambitious** – it is what a senior tenured faculty member would propose at the end of a long and distinguished career."⁴⁹⁰

"This is just a doctoral dissertation. It's not like you are Charles Darwin, trying to develop a theory of evolution...," "491

This work aims to develop a theory of evolution - not of organisms, but of organizations – which although ambitious, will inevitably fall short of the classic work of Charles Darwin. Like Darwin's field research while aboard the *HMS Beagle* from 1831-1836, this research involved intensive longitudinal field work, documenting, analyzing and theorizing about a variety of species in their natural habitats.

"'It is simplistic in its obsession with a few types, it's dogmatic in style, and it contains not one shred of empirical evidence. Reputable academics will hate it.""⁴⁹²

The following briefly summarizes some of the major perceived strengths and weakness of the research design which are evaluated against the perceived norms established within the academic fields that the research aims to impact, namely strategic management and engineering systems.

2.8.1 Research Tradeoffs

As this dissertation aims to build theory, it will inevitably come up against the "postulate of commensurate complexity" (Thorngate, 1976), which asserts that social theories cannot simultaneously maximize the goals of generalizability (external validity), accuracy (internal validity) and simplicity.

"As noted by Weick (1979), the research process involves the **inevitable tradeoffs** among generalizability, accuracy and simplicity."⁴⁹³

It is clear that by design, the theory generated by this dissertation will differ from the norm of most research in the strategic management literature. If well executed, the theory is likely to be above the norm on *accuracy*, near the norm on *simplicity* (relative to the level of complexity of problem addressed), and below the norm on *generalizability*.

By way of an example of one such tradeoff, due to the high level of detail and effort expended on the study of two firms (a duopoly) in one industry, the gains in accuracy come at the inevitable cost of generalizability and potentially parsimony.

⁴⁹⁰ Comment on research from a senior Professor at a renowned university (2004).

⁴⁹¹ Comment on research from a senior Professor at a renowned university (2007).

⁴⁹² Miller, D. (1996), pg. 505. Quotation is feedback that Miller received from an SMJ reviewer on his paper on 'configurations'. Note that ten years later, Miller writes: "It was therefore a wonderful surprise to win the 1995 Strategic Management Society SMS Award for my article."

⁴⁹³ Dess, G.G., Newport, S. and Rasheed, A.M.A. (1993).

"Given growing interest in the evolution of organizational communities, some scholars have also deployed a multi-population census, which tracks a number of interdependent populations simultaneously. **Resource limitations** may require **limited temporal coverage** and **less precise** measurement of vital events (Ruef, 2000)."⁴⁹⁴

2.8.1.1 Accuracy (internal validity)

Merriam (1998, pp. 204-205) notes that internal validity can be strengthened by a number of strategies that have been incorporated in this research design: triangulation in time, space and organizational level (Denzin, 1970); long term observation of the same phenomenon, continuously and at discrete intervals; peer examination in which comment on findings is solicited among both academic and practitioner groups; and participative or collaborative modes of research in all phases of the research design.

These and other strategies are employed to ensure that the theory built by this research is empirically grounded in the data, which has been studied intensely through multiple lenses over considerable spatial and temporal variables. To this end, the accuracy is anticipated to be relatively high and therefore above the norm.

2.8.1.2 Generalizability (external validity)

"No useful theory can rest on the assumption that everything is unique. It is probably inevitable that the early history of a scientific endeavor will be characterized by the opposite assumption, and by the search for universals. I believe it is a sign of relative maturity when a field begins to focus on patterned variations."⁴⁹⁵

This proposed research, like that of contingency theory, acknowledges partial uniqueness in theory development. It recognizes the relative maturity of the strategic management field and therefore seeks "patterned variations" and not fully generalizable universals.

The fact that a theoretical sample of multiple case studies were used across a variety of industry and geographic settings, establishes some initial degree of external validity. This is however far from the traditional statistical sample approaches to the positivist branches of both the strategic management and engineering systems fields. As such, it is likely that external validity would be deemed below the norm – a consequence of the high internal validity tradeoff.

Recall also, that this research does not make claims for grand theory, and aims only for the contingent modes of explanation that can be expected when building theory on complex socio-technical systems.

2.8.1.3 Simplicity (parsimony)

"Construction of a simulation model involves a **tension between simplicity and elaboration**. We we give talks on our simulations, a frequent (perhaps the most frequent) question we get is 'Why don't you

⁴⁹⁴ Aldrich and Ruef (2006), pg. 268.

⁴⁹⁵ Thompson, J.D. (1967), pg. xxv.

add variable X to the model?' For theory development purposes, the objective is to construct a model based on a simplified abstraction of a system – guided by the purpose of the simulation study – that retains the key elements of the relevant processes without unduly complicating the model (Burton & Obel, 1995)."⁴⁹⁶

Finally, although this research aims to cover multiple variables, across multiple strategy domains, covering the inputs of multiple levels of multiple stakeholders in the quest for building *configuration* research in strategic management, the resulting theory is potentially very simple at the highest level of abstraction – which is the level at which this research intends to be evaluated.

Of course, more internal validity is gained by using the lower levels of abstraction into the mechanics of architectural properties, structural dynamics, financial valuation and industrial evolution as this research strives to do, which necessarily makes the work far from parsimonious. As such, it is likely that the simplicity would be at or near the norm on aggregate.

"Artful simplification is the hallmark of skillful modeling." "497

2.8.2 Research Strengths and Limitations

Due to the nature of this research design, which uses case-based theoretical sampling, the resulting theory, although potentially rich in accuracy and ecological validity, is bound to be limited both in its generalizability and the confidence in its causality (Hammersley, 1990).

2.8.2.1 Accuracy (internal validity)

Due to the robustness of the research design, particularly with respect to the longitudinal primary case study, the constructs and propositions generated are likely to have relatively high internal validity.

Determination of causality in complex systems is by definition, problematic, particularly if some of the main "input" causal variables are difficult to observe and measure directly (e.g. enterprise goals, boundaries, interfaces). The "output" variables (e.g. enterprise production output) tend to be easier to observe and measure. Simulation modeling is used therefore to lend indirect support to claims of difficult to measure and specify variables.

"Even if some variables in the computational model cannot be easily observed, the output variables often can be. Empirical confirmation of a simulation's predictions provides indirect support for the theory embodied in the model of the underlying (unobserved) processes." ⁴⁹⁸

⁴⁹⁶ Harrison, J.R., Lin, Z., Carroll, G.R., and Carley, K.M. (2007), pg. 1238.

⁴⁹⁷ Nelson and Winter (1982), pg. 402.

⁴⁹⁸ Harrison, J.R., Lin, Z., Carroll, G.R., and Carley, K.M. (2007), pg. 1238.

2.8.2.2 Generalizability (external validity)

"One strength of building theory from cases is its likelihood of generating **novel theory**... [a weakness is that it] may result in narrow and **idiosyncratic theory**. Such theories are likely to be testable, novel and empirically valid, but they do lack sweep...they are essentially theories about specific phenomena. "499

While the creation of a theoretical sample, which consists of *single industry studies* does avoid the problems inherent in much strategic management research of controlling or industry effects, it does suffer from generalizability of the results (Dess et al., 1990).

"Generalizability is based on the **uniqueness of the industry's environment**...clearly the more unique the environment, the less generalizable the results."⁵⁰⁰

The theoretical sample selected was a *collection* of single industry studies, designed to extend the generalizability of the theory. However, it is important to characterize the uniqueness common to of all the industries studied, which share among other traits relatively high industry concentration, entry/exit barriers, and some degree of product and service differentiation – the imperfect competition of oligopolies.

As the research was not designed to cover the cases of perfect competition for commodities, but to focus on firms in oligopolies where firm conduct is more relevant, the resulting theory is not expected to extend to such a general class of firms.⁵⁰¹

2.8.2.3 Simplicity (parsimony)

"A surprising challenge can arise from readers who are disappointed by parsimonious theory. Single cases can enable the creation of more complicated theories than multiple cases, because single-case researchers can fit their theory exactly to the many details of a particular case. In contrast, multiple-case researchers retain only the relationships that are replicated across most or all of the cases. Since there are typically fewer of these relationships than there are details in a richly observed single case, the resulting theory is often more parsimonious (and also more robust and generalizable)."⁵⁰²

The use of multiple-cases (i.e. the primary and secondary cases) in this research allowed for a more parsimonious (as well as more generalizable) theory to emerge than would have been generated from only one case, due to the removal of "degrees of freedom" inherent in theorizing across phenomena.

⁴⁹⁹ Eisenhardt, K. (1989), pp. 546-547.

⁵⁰⁰ Dess, G.G., Ireland, R.D. and Hitt, M.A. (1990), pg. 13.

⁵⁰¹ An independent survey-based sample of critiques of this research is summarized in Appendix J. It is the result of teaching the material to senior executives in the *Wharton-Oxford Gateway to Strategic Leadership* program from 2005-2006.

⁵⁰² Eisenhardt, K.M, and Graebner, M.E., (2007), pg. 30.

2.8.3 Towards "Good" Theory

"We suggest that if the field is serious about producing stronger theory, journals need to reconsider their empirical requirements. We argue that journals ought to be more receptive to papers that test part rather than all of a theory and use illustrative rather than definitive data."⁵⁰³

The goal of this research of developing grounded theory is hoped to be evaluated against criteria as established by writers and evaluators of theory in organizational theory (Sutton and Staw, 1995; Weick, 1995).

"People's natural inclination is to require greater proof of a **new or provocative idea** than one they already believe to be true. Therefore, if a theory is particularly interesting, the **standards** used to evaluate how well it is tested or grounded need to be **relaxed**, **not strengthened**. We need to recognize that major contributions can be made when **data are more illustrative than definitive**."⁵⁰⁴

"Not everything discussed in the introduction of a manuscript need be operationalized in the method section nor show up in a set of regression equations. If theory building is a valid goal, then journals should be willing to publish papers that really are stronger in theory than method. Authors should be rewarded rather than punished for developing strong conceptual arguments that dig deeper and extend more broadly than the data will justify."⁵⁰⁵

"We have even counseled our graduate students to leave out portions of their theory that are not measured well and to delete otherwise interesting data that did not directly relate to their theoretical argument. The result of these omissions is that the craft of manuscript writing becomes an art of fitting concepts and arguments around what has been measured and discovered."⁵⁰⁶

"Consider whether the evidence provided by people such as **Freud**, **Marx**, or **Darwin** would meet the empirical standards of the top journals in organizational research. When theories are particularly interesting or important, there should be greater leeway in terms of empirical support. A small set of interviews, a demonstration experiment, a pilot survey, a bit of archival data may be all that is needed to show why a particular process **might be true**."⁵⁰⁷

⁵⁰³ Sutton, R.I. and Staw, B.M. (1995), pg. 371.

⁵⁰⁴ Sutton, R.I. and Staw, B.M. (1995), pg. 382.

⁵⁰⁵ Sutton, R.I. and Staw, B.M. (1995), pg. 382.

⁵⁰⁶ Sutton, R.I. and Staw, B.M. (1995), pg. 381.

⁵⁰⁷ Sutton, R.I. and Staw, B.M. (1995), pg. 383.

2.8.4 Future Research

"We need perhaps contingent theories of explanation...we would not expect a single unified theory to emerge from such efforts, because such a unified explanation is clearly a long way off, even if it is a desirable goal, but we would expect that it would produce fruitful and novel generalizations."⁵⁰⁸

Therefore, in the quest to discover the deep underlying foundational nature of long-term firm competitive performance and the evolutionary systemic interactions between the firm's capabilities and its environment, this research will necessarily be bounded by contingent theories of explanation, however novel and fruitful they may aim to be.

"Perhaps 'grand' theory requires **multiple case studies** – an accumulation of both theory-building and theory-testing empirical studies."⁵⁰⁹

In order to more deeply validate and extend the generalizability of the mid-range theory developed by this research plan, another concurrent doctoral research plan has been proposed (and is being undertaken by the author) which is grounded in more traditional, deductive, correlative, statistically quantitative, hypothesis-based, theory-testing methods.

⁵⁰⁸ Henderson R. and Mitchell W., (1997).

⁵⁰⁹ Eisenhardt, K. (1989), pg. 547.

Part II: THEORETICAL CONSTRUCTS & PROPOSITIONS

Chapter 3 Firm Performance

We begin decomposing the theory, by examining what we are trying to explain: superior long term firm performance.

3.1 Shareholders vs. Stakeholders: The Counterintuitive Puzzle

"How do firms that have a stakeholder approach differ in competitiveness, commitment, and strategic flexibility from firms that maximize stockholder wealth?"⁵¹⁰

The primary purpose of this investigation is to explore the sources of firm competitive advantage and specifically on the relatively narrow metric of maximization of shareholder value.

3.1.1 Market Value

As shown in Figure 139 below, the market capitalization of two "world-class" firms, one representing manufacturing (*Toyota Motors*) and one representing services (*Southwest Airlines*) greatly exceeds that of the sum of their major competitors. And yet as will be argued in chapter 4, this is a not metric which they are trying to maximize, while ironically it is the prime goal of their competitors.

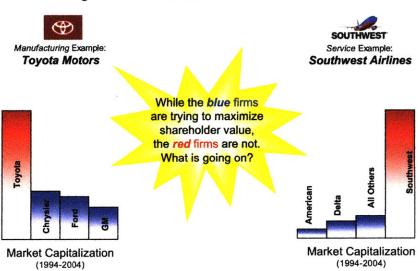


Figure 139: Dominant Firm Performance

Instead of illustrating the shareholder value performance as a static or averaged snapshot as shown above, we will explore most dependent and independent variables in this research as longitudinal time histories. Figure 140 illustrates the trajectories of market capitalization for the incumbent-challenger pairs in the global automotive industry: *General Motors & Toyota Motors*.

⁵¹⁰ Rugman, A. M. and Verbeke A. (2002).

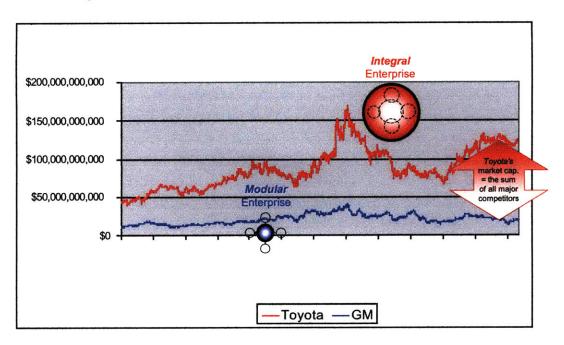


Figure 140: GM vs. Toyota Market Capitalization Trajectories

Similarly, Figure 141 illustrates the trajectories of market capitalization for the incumbentchallenger pairs in the US airline industry: *United Airlines* and *Southwest Airlines*.

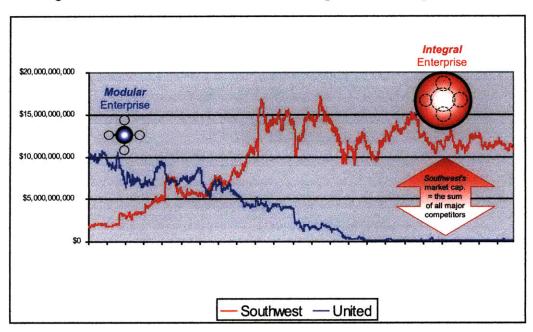


Figure 141: United vs. Southwest Market Capitalization Trajectories

3.1.2 Market Value Decomposition: The Income Statement

One of the determinants of stock market value is the firm's past performance, as is evidenced by the residual cash flows which are deconstructed on the firm's income statement: i.e. its *top-line* revenues, its *bottom-line* net income or profits and the hypothesized *enabling system properties* which feedback to transform top-line revenue growth into bottom-line profit growth and then back into top-line revenue growth again.

This dissertation will therefore review the performance of dominant incumbent "market-makers" (growth *and* productivity) as being top-line driven, and the challenger "market-takers" (growth *through* productivity) as being bottom-line driven as shown in Figure 142 below. In the following subsections, we will examine evidence of each type of enterprise architecture as revealed on the income statements.

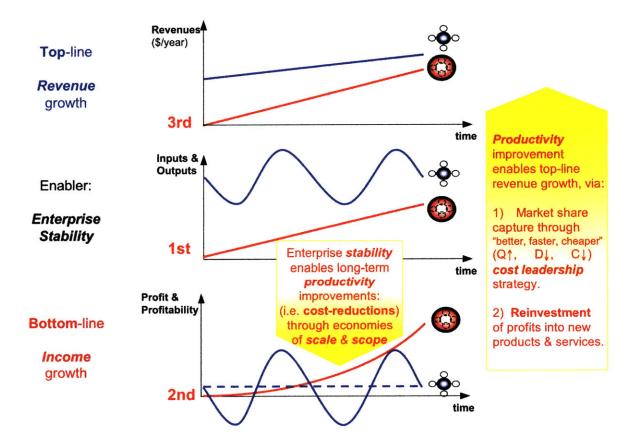


Figure 142: Architectural Imprint on the Income Statement

3.1.2.1 Top-line Revenues

"The goal GE has set for sustained organic growth – two to three times the growth of global GDP – translates to about 8% today. Few companies have achieved the kind of growth GE is seeking, and none on a revenue base of \$150 billion."⁵¹¹

3.1.2.1.1 Auto Industry

25-year time histories of revenues for major competitors in the automobile industry are shown in Figure 143 below.

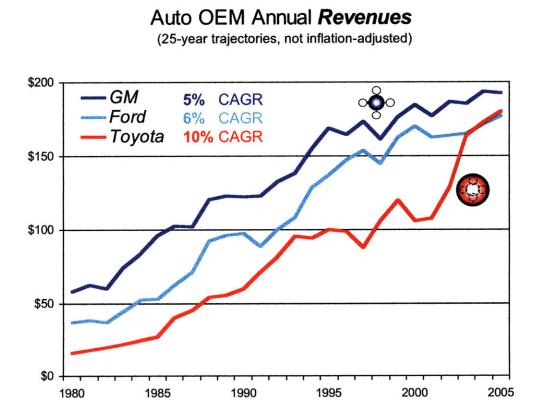


Figure 143: Top-line Revenues: Auto Industry

As can be seen, the late entrant *Toyota* has grown its top-line revenues at compound annual growth rates that are approximately twice their major competitors, GM and Ford.⁵¹² While their output has grown, they have achieved this by more than just volume, but on generating premium prices, especially in the last decade or so. From this evidence, *Toyota* may be a company that *GE* wishes to learn from if they want 8% organic growth on a revenue base of \$150 billion.

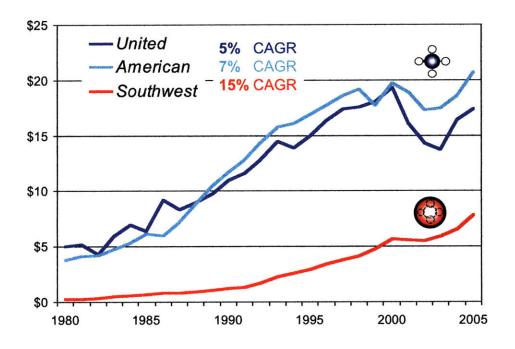
⁵¹¹ Stewart, T.A. and Immelt, J. (2006), pg. 62.

⁵¹² Note that Japan's "lost decade" (1992-2002) adversely affected *Toyota's* revenue growth as domestic sales were still significant.

3.1.2.1.2 Airline Industry

25-year time histories of revenues for major competitors in the U.S. Airline Industry are shown in Figure 144 below.

Figure 144: Top-line Revenues: Airline Industry



Airline Annual Revenues

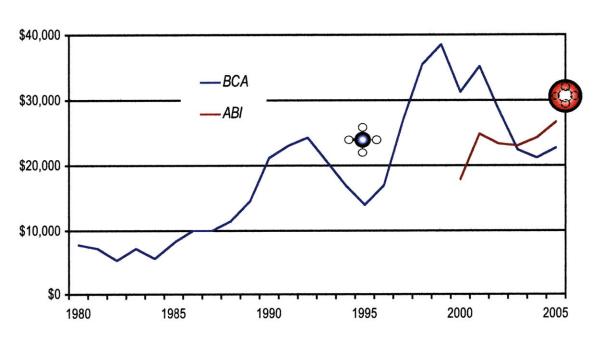
(25-year trajectories, not inflation-adjusted)

As can be seen, the late entrant *Southwest* has grown its top-line revenues at compound annual growth rates that are approximately twice their major competitors, *United* and *American*. It is interesting to note the relative stability of revenue growth of *Southwest*, especially under extreme exogenous events like 9-11, which affected all three carriers.

3.1.2.1.3 Airplane Industry

25-year time histories of revenues for major competitors in the Large Commercial Airplane Industry are shown in Figure 145 below.⁵¹³

Figure 145: Top-line Revenues: Airplane Industry



Commercial Airplane OEM Annual Revenues (25-year trajectories, not initiation-adjusted)

More refined data reveal that *Airbus's* revenue growth (which broadly tracks its market share growth) has outpaced *Boeing's* by a factor of two.

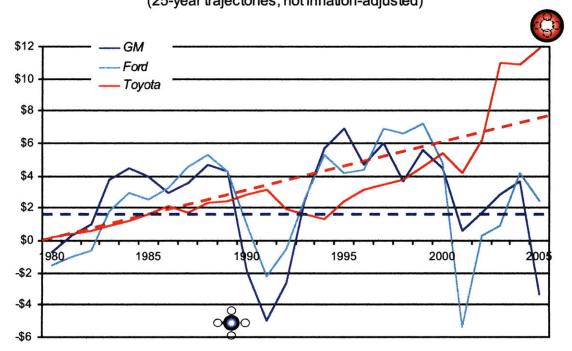
⁵¹³ Note that the data for *Airbus* are scarce because it has only existed as (a subsidiary of) a publically listed company, *EADS* since 2000.

3.1.2.2 Bottom-line Profits

3.1.2.2.1 Auto Industry

25-year time histories of profit for major competitors in the automobile industry are shown in Figure 146 below.

Figure 146: Bottom-line Profits: Auto Industry



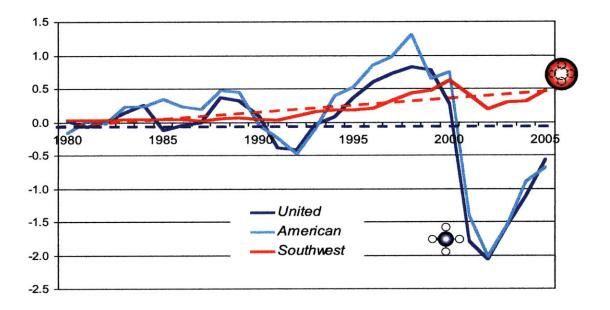
Auto OEM Net Income (25-year trajectories, not inflation-adjusted)

Note that while GM and Ford's profits appear to oscillate, Toyota's profits are more stable. Also note that the trajectory of GM and Ford's profits remain flat with no growth, while Toyota's trajectory is one of clear growth.

3.1.2.2.2 Airline Industry

25-year time histories of profit for major competitors in the U.S. Airline Industry are shown in Figure 147 below.

Figure 147: Bottom-line Profits: Airline Industry



Airline Annual Net Income

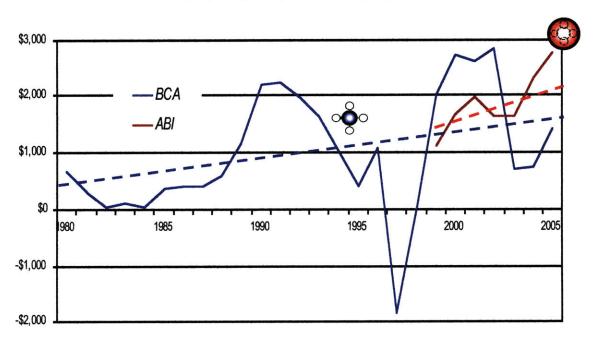
(25-year trajectories, not inflation-adjusted)

Again, note that while *United* and *American's* profits appear to oscillate, *Southwest's* profits are more stable. Also note that the trajectory of *United* and *American's* profits remain flat with no growth, while *Southwest's* trajectory is one of clear growth.

3.1.2.2.3 Airplane Industry

25-year time histories of profit for major competitors in the Large Commercial Airplane Industry are shown in Figure 148 below.

Figure 148: Bottom-line Profits: Airplane Industry



Commercial Airplane OEM Annual Operating Profit (25 year trajectories, not inflation-adjusted)

Again, although the data are limited for *Airbus*, we see a higher, less volatile, faster growing profit trajectory.

3.1.2.3 Profit-ability

In order to determine the relative profitability, one must normalize profits with respect to revenues, which results in an efficiency metric.

3.1.2.3.1 Auto Industry

25-year time histories of profitability for major competitors in the automobile industry are shown in Figure 149 below.

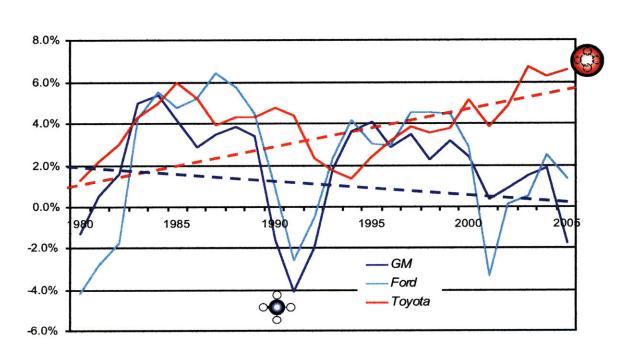


Figure 149: Profit-ability: Auto Industry

Auto OEM Annual Profit <u>ability</u> (25-year trajectories)

Here we see the trajectory of the ability of *GM* and *Ford* to translate revenues into profits actually decreasing over time. One might expect that in the not-to-distant future, these companies might need to seek bankruptcy protection, especially under an exogenous deleterious shock.

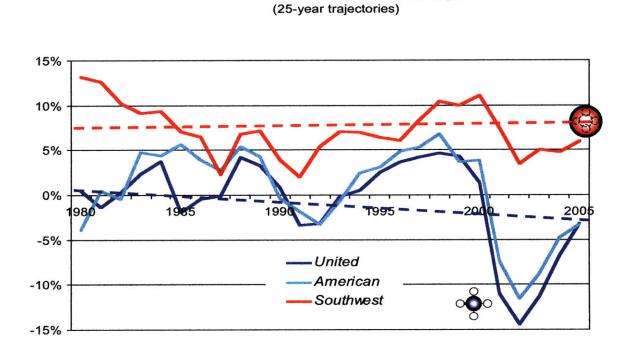
From *Toyota's* upward profitability trajectory, one might infer that they would be able to survive deleterious shocks without resort to bankruptcy.

3.1.2.3.2 Airline Industry

25-year time histories of profitability for major competitors in the U.S. Airline Industry are shown in As shown in Figure 150 below.

Figure 150: Profit-ability: Airline Industry

Airline Annual Profit ability



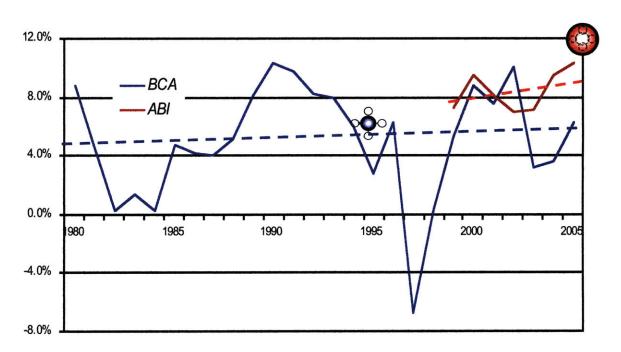
Again, we see the trajectory of the ability of *United* and *American* to translate revenues into profits actually decreasing over time. One might expect that in the not-to-distant past or future, these companies might need to seek bankruptcy protection, especially under an exogenous deleterious shock, like 9-11.

From *Southwest's* stable profitability trajectory, one might infer that they would be able to survive deleterious shocks without resort to bankruptcy.

3.1.2.3.3 Airplane Industry

25-year time histories of profitability for major competitors in the Large Commercial Airplane Industry are shown in Figure 151 below.

Figure 151: Profit-ability: Airplane Industry



Commercial Airplane OEM Annual Profit <u>ability</u> (25 year trajectory) <u>ability</u>

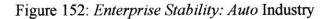
Again, although the data are limited for *Airbus*, we see a higher, less volatile, faster growing profitability trajectory.

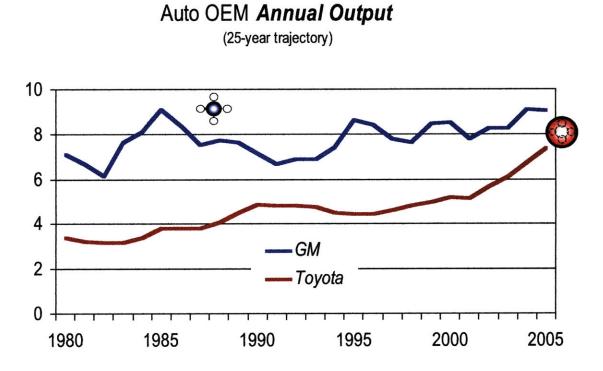
3.1.2.4 Enabling Enterprise Stability

Having presented some evidence of the financial trajectories of the firms in the theoretical sample, we now postulate what system properties might contribut to the underlying long-term superior performance. We have noted that stability might be such a system property. Although this will be discussed in more detail in Chapter 5, we briefly make some initial observations here.

3.1.2.4.1 Auto Industry

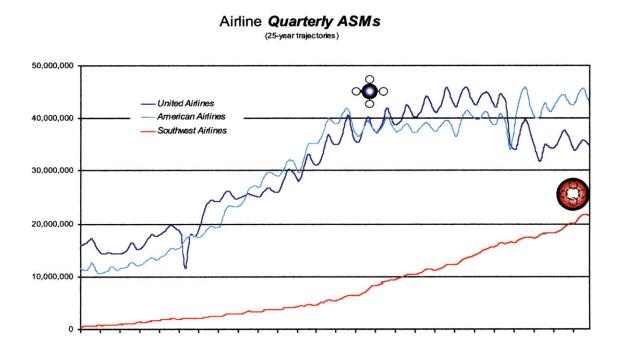
25-year time histories of output for major competitors in the automobile industry are shown in Figure 152 below.





3.1.2.4.2 Airline Industry

25-year time histories of output for major competitors in the US airline industry are shown in Figure 153 below.





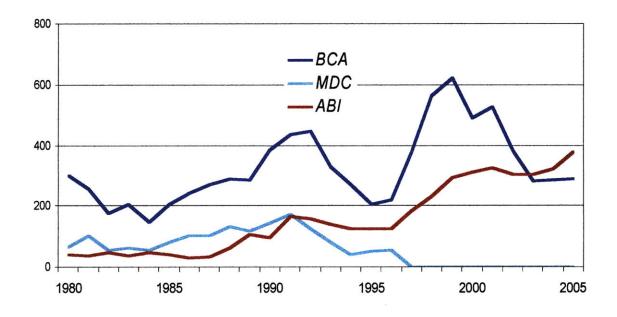
Note that from a macro-temporal perspective, *United* and *American* have plateaued, while *Southwest* contiues its near-exponential growth. On a more micro-temporal perspective, United and American appear to have a more amplified (less dampened) second order oscillation, having a period of vibration of one year, matching the seasonal cycles of air travel, while Southwest appears to dampen this response.⁵¹⁴

⁵¹⁴ Also note in an extremely micro-temporal perspective (i.e. daily) United and American have greater output variability as they serve business travelers who want to travel around 8am and 5pm, while Southwest have flights evenly spaced throughout the day, which has lower operating costs and attracts price-sensitive travelers.

3.1.2.4.3 Airplane Industry

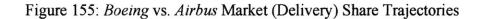
25-year time histories of output for major competitors in the large commercial airplane industry are shown in Figure 154 below.

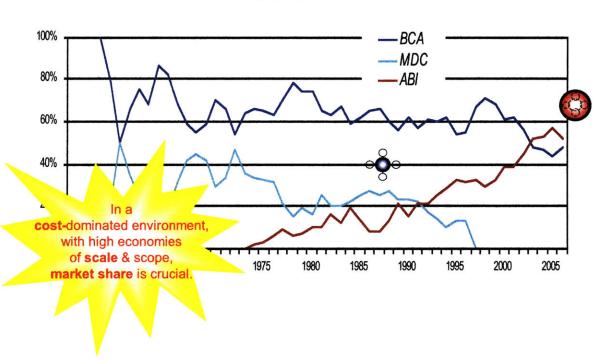




Commercial Airplane OEM Annual Deliveries (25-year trajectories)

Finally, we return to the long-term firm performance in the global large commercial airplane industry between the incumbent, *Boeing* and the challenger, *Airbus*. As *Airbus* only recently became a publicly listed incorporated firm, a long-term longitudinal comparison of its share price or market capitalization vis a vis *Boeing* is unfortunately not possible. As an initial proxy to determine an indication of the relative longitudinal performance of the two firms, we can observe market share time histories in Figure 155 below. Note we will later look at a richer matrix of financial and operational performance metrics including profitability, R&D investment, etc.





Commercial Airplane OEM % Delivery Share (50-year trajectories)

"For the past 30 years, we **didn't worry about Airbus** because we consistently held 60% market share and we thought they were just taking market share from McDonnell Douglas. Now that Douglas is gone and Airbus continues to grow, it turns out that there may be **something deeply different in Airbus**, and something inherently similar in Boeing and McDonnell Douglas."⁵¹⁵

⁵¹⁵ Boeing Senior Executive, Summer 2005.

3.1.3 Market Value Decomposition: Balanced (top- and bottom-line) Growth

Total Return to Shareholders (TRS) has been demonstrated to be correlated with concurrently high rates of both top-line revenues growth and bottom-line income growth.

Modular enterprise architectures assign a functional decomposition resulting in a clear separation and of ownership (by principals, typically shareholders) and management (their agents). This "efficiency" results in the classic principal-agent problem (Jensen and Meckling, 1976). Agency Theory posits that managers are typically interested in maximization of top-line revenues, as their pay and influence is tied to expanding the size of the firm, while investors are typically interested in maximization of bottom-line profits. Recent research has begun to support these claims (Cannella and Monroe, 1997; Gray and Cannella, 1997).

Integral enterprise architectures on the other hand assign a less clear functional separation of ownership and management, alleviating some of the problems and costs of agency. Resolution of these functional conflicts occur above at system or architectural level. Researchers have referred to this as Stewardship Theory (Donaldson and Davis, 1990).

3.2 Explanations for Firm Success

3.2.1 Popular Explanations

Toyota Motors is seen as having a "lean" production model (Womack, Jones and Roos, 1990). Porter has noted that Japanese firms do not have strategy, but have excellence in operations (Porter, 1996).

Southwest Airlines is seen as having a successful operational model. Porter extended this explanation to include an "activity network" (Porter, 1996).

Airbus Industrie is seen as "cheating" in the sense that they are not playing on a level field, largely due to the presence of government subsidies.

All these explanations tend to focus on tactical or operational issues, as opposed to some higher level strategic or architectural explanation.

3.2.2 Plausible Rival Hypotheses

"The persuasiveness of the arguments is greatly strengthened if serious attention is given to *alternative explanations* – and why these alternative are unlikely to hold. It is hard to overdo this part of the paper. The more robustness checks one can offer, the more convinced readers will become of the newly proposed mechaninsms."⁵¹⁶

The proposed framework takes a decidedly *systemic* view of explaining long-term firm performance. Typically these non-systemic explanations can be summarized under the following two mental models:

3.2.2.1 Explanations based on *Detail* Complexity

"We have the right strategy...we just need better execution."

The preponderance of senior executive reasons for inadequate firm performance lies in the explanation of poor execution of strategy, rather than on poor strategy itself or even more abstractly, architectural misfit with environmental conditions. This class of plausible rival hypothesis is embedded in the focus on increasing *efficiency*, given a fixed strategy or architecture. Such hypotheses tend to focus on "laundry list" thinking, and consist of a series of disconnected causes, which typically persist over time.

By way of example, *General Motors* – after suffering the systematic 30-year decline of market share – boldly exclaimed on the inside cover of its recent annual report:

"Here's what's new about GM's strategy this year: Nothing."517

⁵¹⁶ Sigglekow, N. (2007), pg. 23.

⁵¹⁷ From General Motors' 2003 annual report, pg. 3.

These hypotheses are difficult to disprove using traditional reductionist approaches, due to their focus on *detail* complexity. An alternative means of disproving this class of plausible rival hypotheses lies in the observation of the longitudinal persistence of the problem, which may point to deeper underlying systemic explanations, of the stylized observation: If a firm consistently and persistently is not able to execute its strategy over the long term, then maybe it has a strategy that is fundamentally not implementable, or which is simply out of synch with the demands of the environment.

A means to attempt to counter such plausible hypotheses, is to conduct longitudinal research in order to question whether poor long-term performance is in fact due to continued poor execution (in which case, one might question if an un-executable strategy is in fact a good one), or is it due to a series of disconnected deleterious exogenous events, or is something more systematic and structural happening?

3.2.2.2 Explanations based on *Dynamic* Complexity

The largest class of plausible rival hypotheses are non-systemic in space and time (i.e with narrow time horizon and local or functional explanations).

"No one could have predicted this terrible event which was obviously beyond our control."

The other class of plausible rival hypothesis is based on explanations invoking dynamic complexity (i.e. cause and effect are distant in space and time, and are outside of the firm's control). As discussed later, these are valid explanations, given a firm's enterprise architecture, but they are not robust when one relaxes this architectural constraint.

3.2.2.3 Example: International Trade Subsidies

"In high-technology industries, which typically are characterized by economies of scale and learning curve effects, subsidized challengers who are expanding will gain a reduction in net costs as a direct result of the subsidy, and a secondary efficiency gain from the increasing returns to scale as they expand output. As a result, the profit-maximizing option for the incumbents typically would appear to be to adopt an 'accommodating' or 'submissive' response." ⁵¹⁸

In order to illustrate both types of explanations, we shall turn to the example from the primary case study of the *Boeing-Airbus* global duopoly. By far, the most popular explanation for *Airbus*' recent dominance of *Boeing* is the "subsidies" that it receives from the French, German, Spanish and British governments. This will be demonstrated in the course of this research dissertation not to be incorrect, but in fact an incomplete explanation in terms of *detail* complexity as well as boundedly rational in terms of *dynamic* complexity.

As is shown in Figure 156 below⁵¹⁹, aircraft manufacturers find it difficult to "close the business case" on developing a new commercial airplane, with \$10-\$15 billion dollars in non-recurring development costs front-loaded 5-7 years before any potential future revenue stream. With even

⁵¹⁸ Brahm, R. (1995), pp. 79-80.

⁵¹⁹ Developed from Piepenbrock, T.F. (2004). Note: money is shown in green flowing counter-clockwise, while products / services are shown in yellow flowing clockwise.

the most conservative investment hurdle rates, the NPV of the cash flow is low and often negative. Secondly, even if firms could secure financing on such low-return and risky projects, their customer's governments often mandate industrial participation in the form of offset agreements. Both of these scenarios give rise to the solution that *Boeing* and *Airbus*' suppliers' governments ultimately take on the development costs under "risk-sharing partnerships".

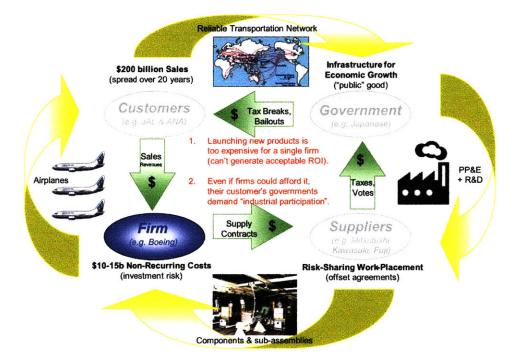


Figure 156: "Wicked" Problems in the Commercial Airplane Industry

Note how cause and effect are very distant in space and time (i.e. high *dynamic* complexity), and multiple stakeholders with differing objectives are playing (i.e. high *behavioral* complexity). The result is a very "wicked" problem.

Within the international and macroeconomic trade theory literature, comparative advantage is deemed to be the mechanism driving international trade. This is based on the assumption of constant returns to scale and perfect competition. However as Krugman (1987) points out, *economies of scale* - which is based on the assumption of increasing returns to scale and imperfect competition - is a cause of trade separate from *comparative advantage*.

"If increasing returns and imperfect competition are necessary parts of the explanation of international trade, however, we are living in a second-best world where government intervention can in principle improve on market outcomes."⁵²⁰

It may be that in certain industries under certain conditions, that government subsidies are not only necessary, but rational and intelligent; or more generally, in certain ecosystems, at certain times in it's evolutionary development, broader system boundaries will produce better system performance that the converse.

⁵²⁰ Krugman, P.R. (1987), pg. 134.

3.2.3 Intra-species vs. Inter-species Explanations

Explanations for competitive advantage – as posited in this methodology - can arise from two sources: differences *within* a competitor species, and differences *between* species of competitors.

Intra-species competitive advantage is a survival of the "fittest", where here "fit" means in the best shape (i.e. most efficient).

Inter-species competitive advantage is a survival of the "fittest", where here "fit" means the most responsive or adaptive to change (i.e. most effective environmental fit). It is this second explanation that this research will focus on. In other words:

- The competitive ecosystem will be composed of *heterogeneous* genotypes.
- The competitor exhibiting the greatest "efficiency-fitness" will not necessarily win the survival of the fittest competition. The winner in the long-run is posited to be the one which has best "environmental fitness".
- As a result, this research does not seek to advance traditional efficient-fitness theories of explanation, but to advance effective-fitness theory.

Before we leave this chapter which has been focused on the primary "dependent" variable of long-term superior firm performance, we want to briefly introduce the next chapter, which is focused on describing the primary "independent" variable of enterprise architecture – the underlying explanation of an inter-organizational species.

3.3 Notes from the Field: On Observing a Rare Species

After many years of intense adaptation and selection which saw the rise and fall of numerous and diverse species, a rich global ecosystem was reduced to only two competitors, locked in a fierce battle for survival as their environment grew ever colder.

Although they shared many similar characteristics - most scientists classified these competitors as belonging to the same species - I had a hunch that there were far greater hidden differences than visible similarities. In fact, the differences were so profound that I believed they could not in fact be rival cousins within the same species, but rather wildly different species fighting over the same territory. Outwardly they both looked like wild jackals, but inwardly one behaved more like a tame turtle, with very different internal DNA *structure* that drove wildly different outward *behavior*. Like the tale of the tortoise and the hare, the outcome of this struggle was far from obvious – in fact it was counterintuitive to scientists and children alike with the weaker of the two - the tortoise - appearing in fact to be slowly overtaking the stronger. In this battle of survival of the *fittest*, it was in fact the least "fit" competitor (in terms of strength or health) that was winning, because it appeared to be the competitor with the best "fit" with its harsh environment.

I was delighted therefore to be given the opportunity to live with each species in their respective lairs, observing them, testing them, getting to know them, their habits, their rituals, their "personalities", and their relationships with their environment, in an attempt to decode their respective DNA. It was a rare opportunity indeed for an aspiring scientist interested in studying how ecosystems evolve to spend extended periods of time over a number of years with every competitor of an ecosystem, especially during the crucial time when the "weaker" challenger competitor began to overtake the stronger incumbent. In fact, as the data unfolded, there appeared an interesting irony – the weaker challenger appeared to be defeating the stronger incumbent by employing the same behavior (derived from the same structure) that was seen in the ancestors of the incumbent itself. A strange cycle of DNA renewal appeared to be taking place on a population level over many generations.

Of course having been trained like most aspiring scientists, I was anxious to isolate a few variables in which to study in large numbers of diverse species in many ecosystems to test other scientist's theories, but this unique situation presented a very different opportunity. I had the "constraint" not of studying countless diverse species under controlled experiments in the laboratory, but of studying two apparently polar opposite species in the complex richness of their own entire ecosystem, watching (and in fact, helping) each try to dominate the other.

This opportunity led me not to test existing theories, but to try to build a new theory appropriate for a new phenomenon: the description of a new species and an explanation for the counterintuitive ways in which it competes. The goal therefore is not a narrow, generalized truth about some specific aspect of competition common in all ecosystems, but a broader systemic understanding of the evolution of the underlying forms and structures that drive the behavior and performance of diverse species.

3.3.1 Common Characteristics, Traits and DNA

Figure 157 below is a brief initial list of the common characteristics, or traits of the DNA of the three companies that form the basis of our initial theoretical sample.

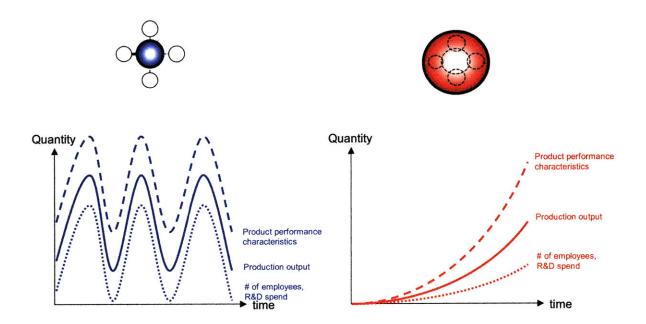


Figure 157: Common Characteristics of Dominant Competitors

One of the more important characteristics of each species is the quality of growth - or level of enterprise stability - which has many dimensions. As shown in

Figure 158 below, enterprise stability can be expressed in terms of high-level aggregate variables like production output, production input or product performance characteristics. Stylistically, modular enterprise architectures tend to exhibit time-histories which oscillate in the prime enterprise variables, while integral enterprise architectures tend to exhibit time-histories which possess more stability.

Figure 158: Stylized Enterprise Stability



3.3.2 Defining and Measuring Each Species

In the following three essays, a framework will be developed which enables qualitative and quantitative description of each "species", allows for their competitive dynamics and finally observes how the outcomes of these dynamics shape the evolution of the larger ecosystem in which they inhabit.

In essay #1, it will be argued that each species can be described *a priori* using qualitative descriptions of their high-level "input" forms and functions. These will be presented in a typology / taxonomy format.

In essay #2, it will be argued that each species can be defined *a posteriori* (i.e. inferred from observing their high-level "output" behaviors) using quantitative descriptions. These quantitative descriptions will allow for numerical simulation of competitive dynamics between the two species.

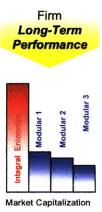
In essay #3, it will be argued that the dynamics arising from competition between species results in an evolution of the larger ecosystem.

3.4 Chapter Summary

This chapter introduces three subsequent essays which form an integrated framework which attempts to explain long-term firm performance. In this chapter, we defined the nature of the problem, namely the maximization of shareholder value.

The context for this construct within the framework is shown below in Figure 159. In the following chapter, we will next discuss how enterprise architectures provide the highest level explanations for the performance of the firm.

Figure 159: Firm Performance within Framework



Chapter 4 Enterprise Architectures

4.1 Introduction

4.1.1 Definition of Purpose, Precision and Accuracy

"Some of the concepts used here are not defined with great **precision**, largely because no highly refined definition is required for my **purposes**; a more detailed or more precise application of the analysis may well justify further effort in this direction."⁵²¹

"There is no advantage (and much error) in making definitions of words more precise than the subject matter they refer to."⁵²²

As an enterprise architecture is a high-level, abstract and conceptual notion of complex social phenomena, its precise definition can not and need not be articulated precisely.

"A nonlinear vision loses accuracy when it is converted into propositions. Theorists start with a vision for a theory an change it 'from entwined ideas at the edge of words to a linear order in which the ideas are unraveled and set forth in the form or a propositional argument' (TenHouten and Kaplan, 1973, pg. 147)."⁵²³

In addition, as an enterprise architecture is complex, nonlinear, and emergent, the development of a theory built around such a notion is likely to lose its accuracy in the translation to more linear definitions.

"I am not aware of any social scientists who claim to have a theory that precisely predicts human behavior. Instead, we correctly speak in terms of 'tendencies,' 'inclinations,' and 'propensities.' In empirical tests, we consider it a big success if our preferred theory explains just 10% of variance in human or organizational behavior. Most social scientists, I believe, marvel at how little grasp we have – after decades of trying – on the factors that influence human behavior."⁵²⁴

4.1.2 Construct of Architectural Form

Based on this, the primary construct - which is borrowed from product design theory (Ulrich, 1995) and supply chain design theory (Fine, 1998) - is the notion of an *architecture*, which if extended outward towards a firm's ecosystem, is termed herein as an *enterprise architecture*. Note that this *inter*-firm architecture, is to be distinguished from the classical *intra*-firm architecture, that is common in the organizational design literature.⁵²⁵

"Building on the product architecture concept enables development of the construct of supply chain architecture, a **richer concept** than that of traditional make/buy or vertical integration, which focuses primarily on ownership of assets in the supply chain."⁵²⁶

⁵²¹ Penrose, E.T. (1959), pg. 3.

⁵²² Robinson, J. (1956), pg. 361, cited in Penrose, E.T. (1959), pg. 3, footnote 1.

⁵²³ Weick (1995), pg. 386. 1.

⁵²⁴ Hambrick, D.C. (2005), pg. 105.

⁵²⁵ The idea for this distinction came from Prof. Michael Tushman.

⁵²⁶ Fine, C.H. (1998), pg. 136, referring to work by Novak, S. (1998).

Although reference is made to a *product* architecture, an *enterprise* architecture – being a socioeconomic construct - is not seen statically, but dynamically (or more accurately, as evolutionary). It is a social construct, "built" by humans for social purpose. Like humans and human organizations, it evolves whether by design or otherwise.

4.1.2.1 Basic definition of "Enterprise Architecture": Genotypes

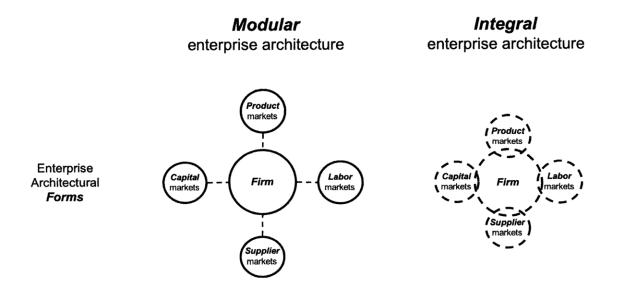
The enterprise (or ecosystem) is broadly defined as the firm and its relevant stakeholder groups. Drawing from the stakeholder theory of the firm (Mitchell, Agle & Wood, 1997), the architecture in question focuses primarily (but not exclusively) on the fundamental stakeholders of: customers, suppliers, employees and investors.

"Typologies at their best are memorable, neat and evocative." ⁵²⁷

"Taxonomic development is a critical element in the future health of organization science."528

This construct characterizes a *typology* of enterprise architectural forms or "archetypes", which are fundamental basis for the underlying dynamic capabilities of the enterprise. While the typology of enterprise architectures is a *continuum*, the extreme archetypal cases (fully modular and fully integral)⁵²⁹ are presented in their discrete binary form in Figure 160 below, and will be described in detail in the dissertation. It must be stressed that various *hybrid* architectural forms exist between these binary extremes, each having slightly different properties and structural dynamics. These subtleties will also be discussed in the theoretical framework.

Figure 160: Simple definition of "Enterprise Architecture"



⁵²⁷ Miller, D. (1996), pg. 506.

⁵²⁸ McKelvey, B. (1975), pg. 509.

⁵²⁹ Note, in software architecting, the notions of open modular and proprietary integrated are additional distinctions.

4.1.2.2 Contingent definition of "Enterprise Architecture": Phenotypes

"The world consists of two kinds of people: those who divide everything into two groups and those who don't."⁵³⁰

The enterprise architectures shown previously are generic, they are the genotypes. This framework, however endeavors to provide an environmental context within which such architectures thrive and grow, these are the phenotypes. In Essay #3, we will discuss in more detail the environmental conditions which support these architectures, but for now, the following color convention will be used ass shown in Figure 161 below.

- Blue signifies an architecture that grows in a growing market environment.
- Red signifies an architecture that grows in a maturing market environment.

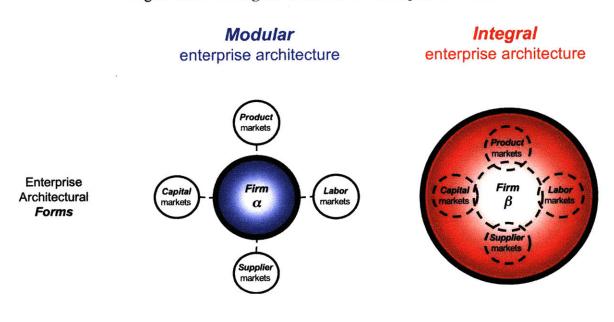


Figure 161: Contingent definition of "Enterprise Architecture"

⁵³⁰ Anonymous.

4.1.3 Construct as Continuum

A qualitative view of the primary case study companies is shown in Figure 162 below, in order to illustrate that the while the constructs are represented as discrete theoretical binary archetypes, they are at the ends of a spectrum or continuum of enterprise architectures.

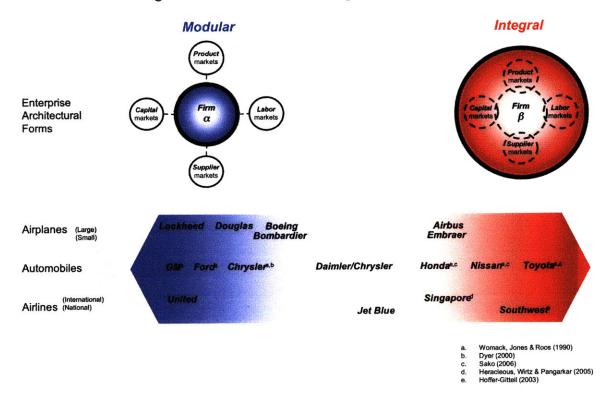


Figure 162: Continuum of Enterprise Architectures

As an explanatory construct, the enterprise architecture is likely to yield stronger and more accurate predictions in the cases of *GM* vs. *Toyota*, and *United* vs. *Southwest* Airlines as they represent clearer cases of archetypal extremes, given a state of environmental evolution. By contrast, it will be argued that *Boeing* and *Airbus* represent both more moderate archetypal forms, and therefore the enterprise architecture, while fundamental and primary in its explanatory power, must concede to traditional explanations of efficiency etc.

It is fitting therefore to use the notion of architecture to describe complex social systems, as it is a *systemically complete*, yet *imprecise* notion that captures "tendencies". As shown in Figure 163 below, an architecture neither predetermines choice, nor over-constrains action. It does however enable and give tendencies. Within an enterprise architecture, firms can have a wide variation of modular to integral tendencies in the components that make up their architectures. For example, modular enterprise architectures can and certainly do have "Theory Y" managers (McGregor, 1960), they can and certainly do have low cost strategies in certain market segments (Porter, 1980), however this does not take-away from the mean properties of "Theory X" pre-dominance and differentiated product strategy focus, which will be discussed in subsequent sections, particularly as the environmental state defines the architecture.

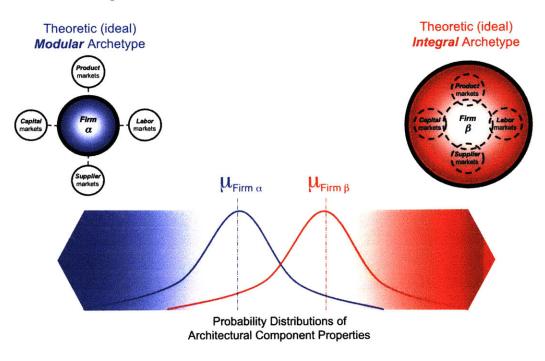


Figure 163: Architecture as Continuum of Probabilities

4.1.4 Construct as Mediator...

Recalling from chapter 1, Astley and Van de Ven's (1983) characterization of key debates in organizational theory was parsed along two axes: level of analysis and role of human agency. The construct of enterprise architecture therefore attempts to address and unify both debates.

4.1.4.1 ... between Firm and Environment

In an attempt to answer the primary research question: "Is firm performance due to the characteristics of the firm or the environment?", the answer is hypothesized to lie in *how the firm interacts with the environment* - in other words, the nature of the *architecture of the firm's extended enterprise*.

4.1.4.2 ... between *Determinism* and *Choice*

"Nothing is more **fundamental** in setting our research agenda and informing our research methods than our view of the nature of human beings whose behaviors we are studying... it makes a difference to research, but it also makes a difference for the proper design of ... institutions."⁵³¹

An enterprise architecture is primarily a social (not a physical) construct. Like physical architecture, it both enables and constrains, but does not determine activity or human action.

⁵³¹ Simon, H. (1985), pg. 293.

"We shape our buildings; thereafter, our buildings shape us."532

While most people think of physical architecture as static and unevolving, the truth is that it does on a rather slow and punctuated timeframe. An enterprise architecture, as a social construct is more obviously dynamic and evolving. It is emergent, as its invisible structure must be recreated every day in every new human interaction (Giddens, 1979).

"When does a building actually become built?."533

4.1.5 Construct as Embedded Enabler of Strategic Change

The construct of enterprise architecture also serves as a pedagogical tool embedded within the ongoing process of enacting an existing architecture to create a means of self-reflexive analysis and enterprise (re)design.⁵³⁴

"To understand architecture and its impact one needs to understand the political and cultural dimensions of leadership and architecting, as Ted Piepenbrock described. [When considering] Ted Piepenbrock's efforts at Boeing, the audience is the Board of Directors, who are trying to make architectural decisions about the Boeing enterprise. Ted's role is not to be an outside architect; rather he is operating as a kind of facilitator in the board's own thinking about its architecture. He does, however, carry out his own research in the firm – this gives him credibility with the audience and helps him elucidate the key choices and consequences facing them in their architecting (i.e. modular versus integral enterprise). It is, I would argue, more sophisticated in its understanding of enterprises as enacted systems and enterprise architecture as a practice that requires embedding. This isn't to say that implementation will be successful – Ted himself thinks it will be near impossible for a modular enterprise to become integral. But he is putting the possibility of implementation at the center by locating the architects and audience in the same, very powerful people and using himself and his expertise as provocation and facilitator."

⁵³² Attributed both to architect, LeCorbusier (1887-1965) and to Sir Winston Churchill in a speech in 1943.

⁵³³ LeCorbusier (1887-1965).

⁵³⁴ I am indebted to fellow MIT PhD student, Jason Jay for helping me clarify this concept.

⁵³⁵ Comments and critiques of this framework by graduate students in the Spring 2006 MIT ESD class, *Enterprise Architecting*.

4.1.6 Heuristics associated with Architectural Form

Heuristic 1a:

The architecture is the *form* of the system, and is the dominant factor in its *behavior*.⁵³⁶ The architectural *form* of an enterprise (modular or integral) defines the enterprise's *effectiveness*. Enterprise *effectiveness*, together with enterprise *efficiency*, define an enterprise's performance capability. (Note: the more effective enterprise structure may not exhibit the highest performance in the short term.)

Heuristic 1b:

The architectural *form* of an enterprise is defined by the *boundaries* and *interfaces* between the key stakeholders or input providers (i.e. those who significantly affect the firm's costs and/or revenues). These are in turn defined by the *quantity* of stakeholders within a group and by the *quality* of relationships with stakeholders. The boundaries are characterized both *spatially* (near vs. far) and *temporally* (short-term vs. long-term).

Heuristic 1c:

The architectural *form* of an enterprise can be defined either by its *inputs* (i.e. the quantity and quality of relationships with key stakeholders), or by its *outputs* (i.e. the growth and stability characteristics). Given either inputs or outputs, one can infer the enterprise's architectural form.

Heuristic 1d:

The power and influence distribution of the stakeholder space is not homogeneous with respect to driving structural dynamics of growth and stability. (For example, the shareholders in a modular enterprise contribute relatively more influence to enterprise growth requirements).

The enterprise architecture concurrently and reflexively defines and is defined by managerial cognitive frames, which influence their behaviors and strategic choices and modes of operation. In addition, the enterprise architecture defines the participant firm's robustness to various environmental threats.

⁵³⁶ D. Whitney et al. (2004), pg. 26.

4.2 Theoretical Foundations

The notion of *inter-firm* enterprise architectures - while not explicitly found in the management literature - can be constructed from a variety of eclectic theoretical traditions. The following briefly summarizes a few of the threads in various fields.

4.2.1 Economic *theories*

The discussion of economic theories is divided into micro- approaches, focusing on the firm and markets, as well as macro- approaches, focusing on national and international economies.

4.2.1.1 Micro-economics

4.2.1.1.1 Specialization and the Division of Labor

One of the first important contributions to the discussion of enterprise architectures, lies in one of the original theoretical justification for liberal free-market economics by Adam Smith (1776).

The notion of efficiencies based on specialization of tasks and the division of labor will loom large in our later exploration of modular enterprise architectures. This focus on "division" (or differentiation) lies in juxtaposition to the focus on "multiplication" (or integration) in integral enterprise architectures.

Finally, note that Smith's work will also form the basis of a later discussion on craft, mass and lean production.

4.2.1.1.2 New Institutional Economics

The definition of an enterprise architecture relies on some fundamental economic theory, which questions the reasons why firms exist at all – and which hypothesize that firms arise when markets fail.⁵³⁷ This line of theory, embedded in *new institutional economics*, attempts to characterize a spectrum of economic production ranging from markets to hierarchies (Coase, 1937; Alchian and Demsetz, 1972; Williamson, 1985).

4.2.1.1.2.1 Theory of the Firm

"A firm is likely to emerge in those cases where a very short-term contract would be unsatisfactory." 538

"It seems improbable that a firm would emerge without the existence of uncertainty."539

The mechanisms of markets are quite different from those creating hierarchies, and in fact from those of intermediate networks. Understanding this distinction will be fundamental in defining the spectrum between modular and integral enterprise forms. From the above quotations from Nobel laureate, Ronald Coase (1937), one might conjecture that while firms emerge due to the presence of long-term contractual demands and uncertainty, integrated enterprises may emerge due to the presence of even longer-term contractual demands as well as greater uncertainty.

4.2.1.1.2.2 Transaction Cost Economics: Markets, Hierarchies & Hybrids

In addition to the classical distinctions between markets and hierarchies, this work will advance the recent theories which have characterized a form between market and hierarchy: the *network* (Powell, 1990) or *hybrid* organization (Ahmadjian and Lincoln, 2001).

As shown in Figure 164 below, Gibbons (2004) posits that the transaction costs of nonintegration between firms in the form of rent-seeking/haggling (e.g. with the supplier stakeholder) are similar to the costs of non-integration within firms in the form of politicking (e.g. with the labor stakeholder).

"I am fully persuaded that **rent-seeking between organizations** is an important **transaction cost of non-integration**. I will define rent-seeking as individually optimal (but socially destructive) **haggling** over appropriable quasi-rents. **Politicking within firms** seems to be the inescapable internalorganizational analog of haggling between firms."⁵⁴⁰

⁵³⁷ Putterman and Kroszner, (1996), pp. 1-31.

⁵³⁸ Coase, R. (1937).

⁵³⁹ Coase, R. (1937).

⁵⁴⁰ Gibbons, R. (2004), pp. 25 and 30.

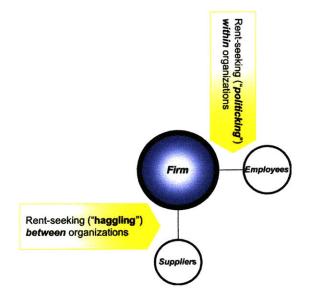


Figure 164: Transaction Costs of Non-Integration between and within Organizations

The traditional focus on contracting between the firm and its employees (Alchian & Demsetz, 1972), was broadened by Jensen & Meckling (1976) to include other stakeholders:

"Contractual relations are the essence of the firm, not only with employees but with suppliers, customers, creditors, and so on. The problem of agency costs and monitoring exists for all of these contracts, independent of whether there is [team] production. [As a result], it makes little or no sense to try to distinguish those things that are 'inside' the firm (or any other organization) from those things that are 'outside' of it. There is in a very real sense only a multitude of complex relationships (i.e. contracts) between the legal fiction (the firm) and the owners of labor, material and capital inputs and the consumers of output."⁵⁴¹

4.2.1.1.2.3 Agency Theory

Jensen & Meckling (1976) observed that when interests diverge between principals and their agents, losses may be incurred by the principals. These losses however can be minimized by imposing various controls on the agents.

The complementary viewpoint to agency theory has been suggested as "stewardship theory" (Donaldson and Davis, 1989 and 1991), in which the interests of principals and agents are aligned.

⁵⁴¹ Jensen and Meckling (1976), pp. 310-311.

4.2.1.1.3 Economics of Profit-Maximizing and Labor-Managed Firms

4.2.1.1.3.1 Terminology

Even within the academic discipline of economics, numerous names have been used to describe the two different economic firm types as shown in Table 8 below. For the sake of simplicity, this research uses the following terminology: *profit maximization* (PM) and *labor managed* (LM).

Economic	Profit	Labor
Firm Type	Maximizing	Managed
Alternative Terminologies and Contexts	Capitalist, Entrepreneurial, Private	Cooperative, Employee-controlled, Illyrian, Public State-Owned Welfare-maximizing

Table 8: Terminologies for Economic Firm Types

4.2.1.1.3.2 Objective Functions

"The force driving this outcome is the strategic asymmetry between the PM and the LM firm in terms of their respective objective functions."⁵⁴²

One of the most striking differences between PM and LM firms lies in their objective functions. In the following subsections, each will be briefly discussed in turn. In subsequent sections, the *objective* functions will be translated into *reaction* functions to investigate competitive interactive games.

4.2.1.1.3.2.1 Profit Maximizing (PM)

The objective function of the PM firm has been represented (Cremer and Crémer, 1992; Delbono and Rossini, 1992).

4.2.1.1.3.2.2 Labor Managed (LM)

The objective function of the LM firm has been represented (Lambertini and Rossini, 1998, pg. 15) as the maximization of the profit per worker, V:

$$V = (\text{revenues} - \text{costs}) / \text{labor}$$
$$V = (pq - rk) / L$$

Where p is the market price, q is the quantity sold by the firm, r is the price of capital, k is the quantity of capital used in the production process, and L is the quantity of labor used.

⁵⁴² Lambertini and Rossini (1998), pg. 20.

4.2.1.1.3.2.3 Mixed Objective Functions

"The objective of a capitalist firm that engages in cooperative bargaining with its workforce can be represented as a weighted function of profit-maximization and the typical LM objective."⁵⁴³

While the objective functions of PM and LM firms vary, various researchers have noted that there may be mixed objective functions (Law, 1977; Svenjar, 1982; Aoki, 1984; Miyazaki, 1984).

⁵⁴³ Neary and Ulph (1996), pg. 2.

4.2.1.1.3.3 Homogeneous Duopoly competition

While much has been written about homogeneous duopoly competition between PM firms, the literature on duopoly competition between LM firms is more rare and recent. Each type of homogeneous duopoly will be briefly examined below with respect to either quantity or price competition under simultaneous or sequential conditions.

4.2.1.1.3.3.1 Cournot (Quantity) competition

As shown in Figure 165 below, Lambertini and Rossini (1998) develop the reaction functions for an LM duopoly as upward-sloping, in contrast to the reaction functions for a PM duopoly as downward sloping.

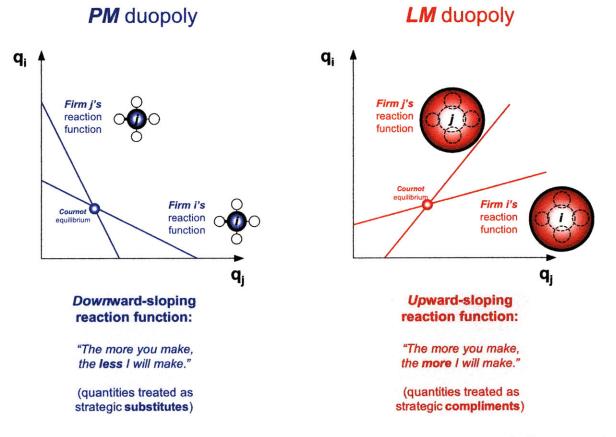


Figure 165: Reaction Functions for PM and LM Duopolies in Quantity Space

For the PM's downward-sloping reaction functions, quantities are treated like strategic substitutes, while for the LM's upward-sloping reaction functions, quantities are treated like strategic compliments, as first introduced by Bulow et al, 1985).

Lambertini and Rossini (1998) then summarize the responses of homogeneous duopolies with respect to capital commitment investments as shown in Figure 166 below.

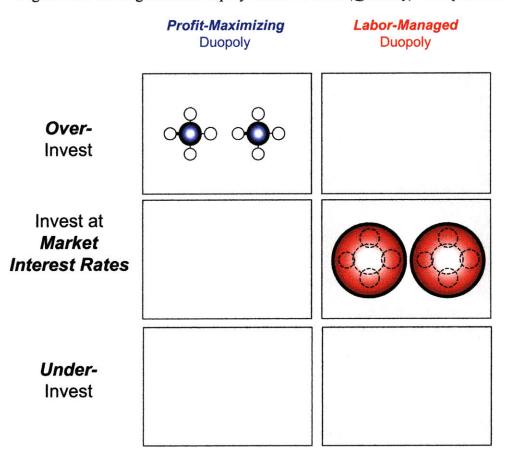


Figure 166: Homogeneous Duopoly under Cournot (Quantity) Competition

Zhang (1993) and Haruna (1993) discuss the use of excess capacity to deter entry in LM industries and economies.

4.2.1.1.3.3.1.1 Stackleberg (sequential) competition

The issue of choosing roles in a sequential duopoly is summarized by Lambertini (1995), and summarized in Figure 167 below.

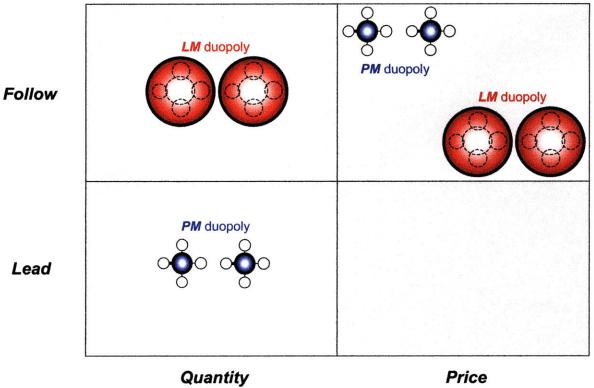


Figure 167: Sequential Games in a Homogenous Duopoly

Quantity competition

Price competition

4.2.1.1.3.4 Heterogeneous ("Mixed") Duopoly competition

"The analysis of the behaviour of mixed markets, where firms with different objective functions coexist, started at the end of the last decade [the 1980s] and still continues."⁵⁴⁴

While the literature on the economics of homogeneous duopolies is extensive, the literature on the economics of heterogeneous or "mixed" duopolies is more recent and more sparse (Law & Stewart, 1983; Mai & Hwang, 1989; Horowitz, 1991; Cremer & Crémer, 1992; Futagami & Okamura, 1994; Neary & Ulph, 1996; Lambertini & Rossini, 1998; De Fraja & Delbono, 2002). See Appendix H for a summary.

This "mixed' duopoly characterizes the situation where each competitor has a different objective function, namely *profit maximization* and *labor managed*. It is the contention of the framework developed in this research dissertation that the *modular* enterprise architecture is characterized by the PM objective function, while the *integral* enterprise architecture is characterized by the LM objective function.

"Conventional wisdom suggests that firms deviating from profit-maximization will suffer forced exit in the long run. We reverse this conclusion. Empirical evidence is consistent with this prediction of relatively robust market survivability of LM firms" ⁵⁴⁵

The empirical work undertaken in this research dissertation tends to support much of this relatively recent theoretical work, which predicts the robustness of the LM form.

"The upshot is that the LM firm is relatively more aggressive than the PM firm in its investment behaviour. This combined with the LM firm's relatively accomodatory behaviour in choosing output levels at given levels of the capital stock, results in the LM firm being a more robust market competitor over an extensive subset of the parameter domain." 546

If this theoretical result holds true, supported empirically by evidence in this research dissertation, then one is confronted with the question, "why if LM firms are so robust, are there apparently so few of them?" Leading hypotheses (Neary & Ulph, 1996) center around the difficulty in formation of LM firms as opposed to their survivability once established.

"The LM firm is not able to survive competition with a PM firm, when starting from scratch. The LM firm is so 'prudential' that it doesn't enter the market."⁵⁴⁷

Finally, as will be discussed more in chapter 6, the birth rates of various enterprise architectures will be argued to be contingent upon the nature of the architectures of the existing competitors. Specifically, it will be posited that integral enterprise architectures (or LM firms) will find it to be very difficult to "grow" in the early environment, rich with modular competitors (or PM firms).

⁵⁴⁴ Lambertini, L. and Rossini, G. (1998), pg. 14.

⁵⁴⁵ Neary and Ulph (1996), pp. 1.

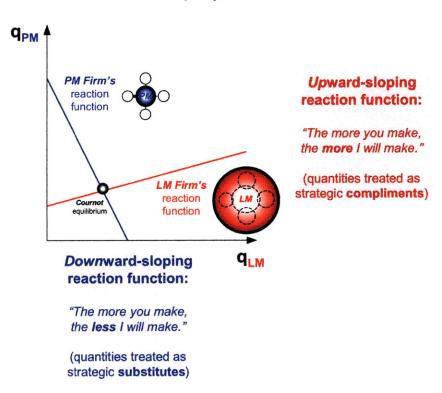
⁵⁴⁶ Neary and Ulph (1996), pp. 20.

⁵⁴⁷ Lambertini, L. and Rossini, G. (1995), pg. 11.

4.2.1.1.3.4.1 Cournot (Quantity) competition

In order to investigate the equilibrium of a mixed duopoly under Cournot competition, one must first begin with the reaction functions which is downward-sloping for the PM firm and upward-sloping for the LM firm as shown in Figure 168 below.

Figure 168: Reaction Functions for a Mixed Duopoly in Quantity Space



Mixed duopoly

Lambertini and Rossini (1996) investigated the responses of homogeneous duopolies with respect to capital commitment investments as shown in Figure 169 below. The key to understanding the seemingly counter-intuitive results lies in understanding the respective firm's reaction functions.

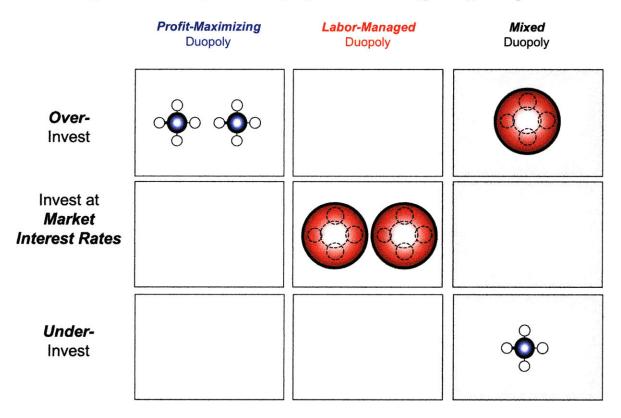


Figure 169: Heterogeneous Duopoly under Cournot (Quantity) Competition

As will be discussed in more detail in chapter 5, not only does the LM firm keep expanding output ("the more you make, the more I will make") more than a PM firm ("the more you make, the less I will make"), but it relentlessly expands capacity more *slowly* than the PM firm.

4.2.1.1.3.4.2 Bertrand (Price) competition

When we model mixed duopoly competition in Chapter 7, we will take a rather severe "winnertakes-all" competitive assumption is akin to Bertrand (price) competition, rather than the weaker form of Cournot (quantity) competition where the market is shared in proportion to relative firm growth rates.

4.2.1.1.4 Strategic Complementarities

"...doing more of one thing increases the returns of doing more of another..." ³⁵⁴⁸

Milgrom & Roberts (1990 and 1995) argued within an economics framework the benefits of integrated and interdependent activities. In fact later, Porter (1996) referred to such complementarities as "activity networks". Later Whittington et al. (1999) empirically demonstrated that such complementarities (while rare) are linked to increased performance. As will be discussed later, the presence of such complementarities signal the presence of an integral enterprise architectures.

While Hedlund (1994) and Whittington et al. (1999) posit that such complementarities are part of a "new" and more successful form of organization, this research posits that they are note necessarily new in an *absolute* sense, but they are new in a *relative* sense, that is new relative to the state of the evolution of the industry in which firms are embedded.

⁵⁴⁸ Milgrom and Roberts (1995), pg. 181.

4.2.1.2 Macro-Economics and Political Economy

"Some Western economists and organization theorists go to great length to formulate theories of the firm in terms of opportunism, moral hazard, incentive compatibility, and monitoring. Work in the transaction cost tradition following Coase (1937) and Williamson (1975), agency theory (for example Jensen and Meckling, 1976), and property rights (for example Alchian and Demsetz, 1972) all share the preoccupation with opportunism obstructing the achievement of efficiency in given, specified tasks or transactions. Aoki (1990) stresses the shortcomings of such models for understanding the Japanese firm."⁵⁴⁹

The literature in macro- and international economics has tended to focus on the Anglo-Saxon vs. the German/Japanese models (Piore and Sabel, 1984). In fact, Aoki and Jackson (2008) use a micro-economic game theoretic approach to define various equilibria in the linkages between organizational architectures and corporate governance, which are reflected in the the Anglo-American, German and Japanese models. The following subsections give examples of how each of these models are characterized.

4.2.1.2.1 Varieties of Capitalism

The Varieties of Capitalism (VoC) perspective (Crouch and Streeck, 1997; Hall and Soskice, 2001) is a national level explanation of integral enterprise architectures driven by institutional complementarities (Goyer, 2006). At the core of these varieties of capitalism, expressed herein as enterprise architectures, lies the constructs of trust and equity in interorganizational relationships (Scheer, Kumar and Steenkamp, 2003).

"The VoC perspective emphasizes the critical importance of patterns of institutional complementarities across the various sub-spheres (finance and corporate governance, industrial relations, innovation system, and inter-firm relations) of the economy that lead to diverging forms of behavior on the part of economic actors."⁵⁵⁰

While rooted in political economy, it focuses on the firm as the center of analysis (Hall and Soskice, 2001; March, 1962).

"It brings the firm back into a central position in our understanding of the political economy."551

The VoC literature has been characterized in a number of theoretical and empirical ways. The theoretical characterizations have occured as *liberal market economies* vs. *coordinated market economies*, as *consumer economics* vs. *producer economics* or as economic *statics* vs. *dynamics*. The empirical charactizations have taken the form of Anglo-Saxon model vs. the German-Japanese model. Each will be discussed briefly in turn.

⁵⁴⁹ Hedlund, G. (1994), pg. 80.

⁵⁵⁰ Goyer, M. (2006), pg. 401.

⁵⁵¹ Hall, P.A. and Soskice, D. (2001), pg. v.

4.2.1.2.1.1 Liberal Market Economies vs. Coordinated Market Economies

The Liberal Market Economy (LME) and Coordinated Market Economy (CME) represent the ideal types at the extremes of the spectrum of a continuum of varieties of capitalism, as presented by Hall and Soskice (2001). Figure 170 below qualitatively summarizes select nations on the VoC spectrum. Note that this provides the macro-institutional context for firms operating within these political economies. It does not, however, necessarily predetermine firm or enterprise architectures, as a LME could support an enterprise architecture that has strong CME tendencies as is the case of *Southwest Airlines* in the US LME.

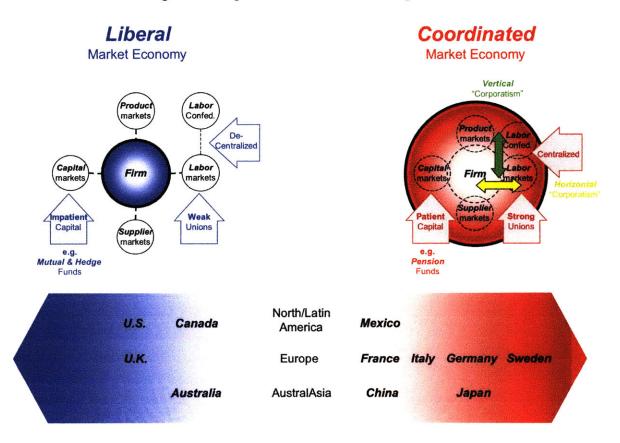


Figure 170: Spectrum of Varieties of Capitalism

Finally, Hall and Soskice (2001) posited that each variety of capitalism was better suited to different forms of innovation: LME's produce *radical* innovation, while CME's produce *incremental* innovation.

"In short, the institutional frameworks of **liberal** market economies provide companies with better capacities for **radical** innovation, while those of **coordinated** market economies provide superior capacities for **incremental** innovation."⁵⁵²

⁵⁵² Hall and Soskice. (2001), pg. 41.

4.2.1.2.1.2 Consumer vs. Producer Economics

This dialogue within the field of macro- and international economics has tended to classify the Anglo-Saxon model as *profit* maximizing based on *consumer* economics, while the German/Japanese model is *market share* maximizing based on *producer* economics (Thurow, 1992).

It is interesting to note that while *profit* maximizing firms tended to grow-up in *mass* production economies where the power was in the "*producer* push" world, and yet this is based on macroeconomic *consumer* economics.

Conversely, *market share* maximizing firms tended to grow-up in *lean* production economies where the power is in the "customer pull" world, and yet this is based on macroeconomic *producer* economics.

Heuristic 1e:

The architectural *form* of an enterprise is governed by the *institutional environment*. While it will be possible to find both integral and modular enterprise architectures within a given institutional environment (e.g. U.S. capitalism), there are clear national tendencies. General:

"Anglo-Saxon firms are profit maximizers; Japanese business firms play a game that might better be known as 'strategic conquest'. Americans believe in 'consumer economics'; Japanese believe in 'producer economics."⁵⁵³

"While firms in producer economics and consumer economics both want profits, the role played by profits is very different. In the profit-maximizing firm, profits are the goal – the objective function. In the empire-building firm, profits are the means to the end of a larger empire – a constraint. The goal is market share."⁵⁵⁴

"The time scale of what the Japanese mean by profit maximizing is so long that it isn't what Anglo-Saxons mean by profit maximizing."⁵⁵⁵

"Firms based on the principle of producer economics are clearly on the offensive in international markets, while those based upon profit maximizing are on the defensive. But perhaps this is just the ebb and flow of economic battle. In the 1950s and 1960s the profit maximizing firms of the United States put their competitors on the defensive."⁵⁵⁶

Key Stakeholders:

"The United States has organized a system that is the exact opposite of that of Germany and Japan. Those countries have organized a system (business groups) to minimize the influence and power of impatient shareholders, while the United States has organized a system (fund dominance) to maximize the influence of impatient shareholders."⁵⁵⁷

⁵⁵³ Thurow, L. (1992), pg. 32.

⁵⁵⁴ Thurow, L. (1992), pp. 124-125.

⁵⁵⁵ Thurow, L. (1992), pg. 131.

⁵⁵⁶ Thurow, L. (1992), pp. 149-150.

⁵⁵⁷ Thurow, L. (1992), pg. 136.

"If the executives of profit-maximizing American firms are asked to state the order in which they serve various constituencies, **shareholders come first**, with customers and employees a distant second and third. Most managers will argue that the sole purpose of the company is to maximize shareholder wealth. Customers and employees are only important to the extent that they contribute to this goal. If Japanese firms are asked the same question, the order of duty is reversed – employees first, with customers second and shareholders third."⁵⁵⁸

4.2.1.2.1.3 Profit maximization (Consumer economics)

General:

"The Anglo-Saxon model is not wrong. Individualism and the desire for consumption and leisure are all parts of human nature. But they are not all of human nature. Individualistic consumer economics is not wrong! It merely explains only part of what needs to be explained! Man is not just a consumption-leisure-maximizing machine. He or she is also a producer."⁵⁵⁹

Market Share:

"If one examines the American consumer electronics industry, it is a history of profit-maximizing strategic retreat into oblivion. But at every point in time, they made their demanded rate of return. Being rational, they would go out of business before they would accept a below-market rate of return."⁵⁶⁰

"Fighting for greater market share is **irrational** to the rational profit maximizer. He would rather surrender than fight. Fighting lowers one's consumption. Since his theories tell him that he can always go work for the winner, going out of business is the rational thing to do. Who one works for is not important. The consumption maximizer is a mercenary who would rather switch than fight."⁵⁶¹

Labor:

"The United States is in a statistical class by itself when it comes to **labor-force turnover**. From an income-maximization perspective, this is a sign of **efficiency**. Workers are dismissed when they aren't needed."⁵⁶²

Investment:

"In the United States, private research and development spending falls in recessions and rises in booms. In Europe and Japan, it does not. To an American firm, cutting R&D is a technique for maintaining profits during a period of declining sales. In Europe and Japan, R&D is not cut, since it is seen as the source of long-run competitive strength."⁵⁶³

"In American accounting conventions, since **R&D** is expensed, cutting R&D spending leads to higher bottom-line profits immediately. In Japan, where **R&D** is capitalized, it does not. The Japanese accounting system is set up to discourage short-term behavior. The American counterpart is set up to encourage it."⁵⁶⁴

⁵⁵⁸ Thurow, L. (1992), pg. 137.

⁵⁵⁹ Thurow, L. (1992), pp. 118 & 120.

⁵⁶⁰ Thurow, L. (1992), pg. 133.

⁵⁶¹ Thurow, L. (1992), pg. 133.

⁵⁶² Thurow, L. (1992), pg. 139.

⁵⁶³ Thurow, L. (1992), pp. 141-142.

⁵⁶⁴ Thurow, L. (1992), pg. 142.

"Private time horizons are believed to be too short. **Private hurdle rates used in business-investment** calculations are always far above the economy's long-term rate of return on assets. In the United States, the private hurdle rate is 15 to 20 percent, while the historical rate of return on business assets is 7 percent. Banks such as the Japanese Development Bank or the Long-Term Credit Bank are designed to finance the long-term investments that normal banks and firms avoid."⁵⁶⁵

4.2.1.2.1.4 Market-Share maximization (Producer economics)

General:

Japanese practices "should make Japanese business firms **inefficient**, yet when facing American or European competition, **they always seem to win**. Their market share always goes up, never down. What are handicaps for others are strengths for them. Are the Japanese just better as individuals – playing the same game but just doing it better by working harder, saving more, and being smarter than everyone else – or does their success spring from **having organized a different system**, playing the game differently? Is Japan just better, or is it exceptional?"⁵⁶⁶

"Germany, the dominant European economic power, sees itself as having a 'social-market' economy and not just a 'market' economy. Codetermination is required to broaden the ranks of corporate stakeholders beyond that of the traditional capitalistic owners to include workers."⁵⁶⁷

Goals & Objectives:

"Their goal is market-share maximization (strategic conquest) and value-added maximization (a measure that includes profits and wages), not simple profit maximization."⁵⁶⁸

Investment:

"Empires overinvest relative to profit-maximizing firms, since they plan to last forever. Their aim is future expansion, not maximizing current consumption."⁵⁶⁹

"To lengthen time horizons and accept a lower rate of return, impatient consumption-oriented stockholders must be kept under control. The Japanese or German business groups have been organized to do just that. With interlocking ownership, impatient consumption-oriented shareholders can be held at bay."⁵⁷⁰

Labor:

"The empire-building firm sees labor as a strategic asset to be nurtured. One wants the highest quality and best-fed soldiers."⁵⁷¹

⁵⁶⁵ Thurow, L. (1992), pp. 145-146.

⁵⁶⁶ Thurow, L. (1992), pp. 114.

⁵⁶⁷ Thurow, L. (1992), pg. 36.

⁵⁶⁸ Thurow, L. (1992), pg. 118.

⁵⁶⁹ Thurow, L. (1992), pg. 129.

⁵⁷⁰ Thurow, L. (1992), pg. 134.

⁵⁷¹ Thurow, L. (1992), pg. 138.

4.2.1.2.1.5 Economic (comparative) Statics vs. Economic Dynamics

One of the key issues of competitive advantage is short-term efficiency vs. long-term dynamic capabilities, as captured by the economic concepts of "comparative statics" (i.e. getting onto the maximum place on the production possibilities curve) and "economic dynamics" or moving the production possibilities curve out.

"The theoretical advantages of profit maximization were in fact mathematically derived under the assumptions of what economists call 'comparative statics'. In comparative statics, a stable no-growth environment, firms prove their effectiveness by becoming efficient. The cost minimizer wins. Japanese lifetime employment and seniority wages should, for example, be a handicap. In economic dynamics, the central problem is rapid growth. In reaching this growth goal, many of the cost-cutting advantages of comparative statics may be liabilities... a short-run static advantage that turns out to be a long-run dynamic handicap. "⁵⁷²

4.2.1.2.1.6 National Examples: Anglo-Saxon vs. German-Japanese models

"The German/Japanese model is one of close co-operation between banks and enterprises, a paternalistic state and a communitarian view of management-worker relations. This model translates into a long-term view of strategy, a readiness to invest in equipment and training and a respect for the hands-on skills required for technology and production."⁵⁷³

"The Anglo-Saxon model, associated with turbulent financial markets and impatient lenders, hostile takeovers and a hire-and-fire approach to labour... an emphasis on short-term financial results, an aggressive external orientation to strategy, and a high valuation put on speed and flexibility."⁵⁷⁴

⁵⁷² Thurow, L. (1992), pg. 150.

⁵⁷³ Albert (1991).

⁵⁷⁴ Albert (1991).

4.2.2 Sociology & Organizational theories

Much of sociological and organizational theories are predicated on the organization as an open system which exchanges with the environment and therefore may or may not adapt to the environment. Three broad schools of thought fall into this "fit" category with differing emphases on the level of change and adaptation, as shown in Figure 171 below.

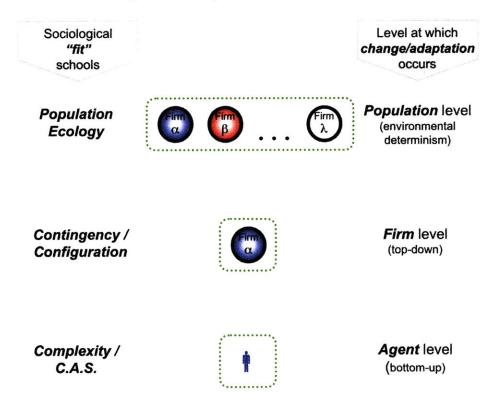


Figure 171: Organizational Theories of "Fit"

4.2.2.1 Theories of Bureaucracy

4.2.2.1.1 Division of Labor vs. Centralization of Authority (Weber)

In his exploration of the ideal type of bureaucracy, Weber (1952) noted two primary and opposing forces acting in all organizations: the division of labor and the centralization of authority (or coordination).

4.2.2.1.2 Conflict vs. Order

Sociologists have different assumptions about the nature of society, with one of the key debates surrounding the dichotomy of order-conflict, also known as "regulation-radical change." Cohen (1968) presents two models of society with competing sets of assumptions:

"Commitment, cohesion, solidarity, consensus, reciprocity, co-operation, integration, stability and persistence. Coercion, division, hostility, dissensus, conflict, malintegration and change."⁵⁷⁵

Burrell and Morgan (1979) simplify and summarize the work of and another prominent sociologist, Dahrendorf's (1959).

"The order view of society emphasizes: stability, integration, functional co-ordination and consensus. The conflict view of society emphasizes: change, disintegration, conflict and coercion."⁵⁷⁶

These concepts will form the theoretical underpinnings of the grounded theory that is being developed herein.

4.2.2.1.3 Theory X and Theory Y (McGregor)

McGregor (1960) was one of the first to acknowledge two very distinct styles of management which are summarized in Table 9 below.

Enterprise Architecture	Modular	Integral		
Managerial Style	Theory X	Theory Y		
Characteristics	Authoritarian, directive, coercion, control	Flexible, open, democratic, motivating, delegation, trust and intrinsic job satisfaction		

Table 9: Contrasting Managerial Styles: Theory X & Theory Y

⁵⁷⁵ Cohen (1968), pp. 166-167.

⁵⁷⁶ Burrell and Morgan (1979), pp. 12-13.

4.2.2.2 Social Systems Theories

The following theories encompass a series of major threads in sociology and organizational theory from General System Theory (with the focus on physics and biological metaphors), Structural Functionalism (with the focus on the biological metaphor) and Contingency Theory.

4.2.2.2.1 Structural Functionalism

As was discussed in Part I, the framework presented herein can be expressed in terms of structural functionalism. This sociological paradigm based its theories on biological analogies and sought to explore morphology, physiology and development in social systems. As a result, Essay #1 will confine itself to the exploration of morphology or form and structure without reference to function.

4.2.2.2.1.1 Cooperative Systems

Barnard (1938).

4.2.2.2.1.2 Cooptation

As a structural functionalist, Selznick (1948) posited a sociological mechanism for ensuring stability, called "cooptation".

"Cooptation is the process of absorbing new elements into the leadership or policy-determining structure of an organization as a means of averting threats to its stability or existence. This is a defensive mechanism..."⁵⁷⁷

⁵⁷⁷ Selznick, P. (1948), pg. 34.

4.2.2.2.2 General Systems Theory

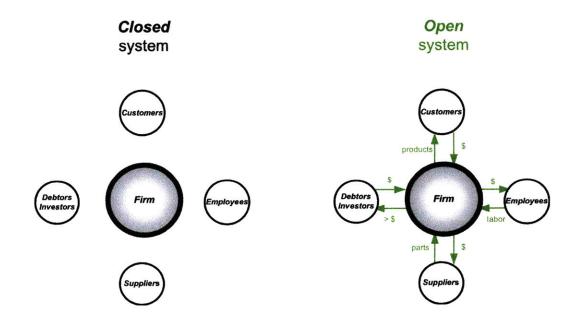
"General system theory seeks to classify systems by the way their components are organized (interrelated) and to derive the 'laws,' or typical patterns of behavior, for different classes of systems singled out by the taxonomy."⁵⁷⁸

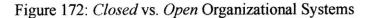
"Certain methods of studying behavior apply to all organized systems, namely structure, function and evolution. Any organized system can be seen from these three perspectives which encompass the broadest scope of a general system theory."⁵⁷⁹

Foundational theorists in General Systems Theory included von Bertalanffy (1962), Boulding (1956), and Rappoport (1968).

4.2.2.2.2.1 Open vs. Closed Systems

Closed systems are characterized by isolation from their environment, while open systems are characterized by an exchange with their environment. Within organizational systems, this exchange might include information, material, energy, etc. While closed systems characterize phenomena like physics, it was also used to characterize organizations up until the general systems theorists (von Bertalanffy, 1950). Figure 172 below summarizes this distinction.⁵⁸⁰





⁵⁷⁸ Rapoport, A. (1968), pg. xvii.

⁵⁷⁹ Rapoport, A. (1968), pg. xx.

⁵⁸⁰ Ackoff, R. (1990), draws a similar diagram of an open systems (stakeholder) view of the corporation.

4.2.2.2.2.2 Open-Closed Systems vs. Open-Closed Causality

"von Bertalanffy may have confused the concept of a closed loop of circular causality with his own notion of a 'closed system.' The later is a system that exchanges no material or energy with its environment, an entirely distinct and independent idea from the notion of a closed sequence of causes and effects."⁵⁸¹

Richardson (1990) presents a compelling history of feedback thought in the social sciences. As a fundamental part of his thesis, he chronicles the historical uses (and misuses) of the notion of firms as "open" systems.

"A 'closed system' in general systems theory is a system that experiences no interchange of material, energy, or information with its environment. In contrast, Forrester's concept represents a system that is not 'materially closed,' but rather 'causally closed' – the closed boundary separates the dynamically significant inner workings of he system from the dynamically insignificant external environment. The two views of closed systems – materially closed and causally closed – are related but are significantly different. No serious system dynamics model is closed in the general system theory sense. Every one exchanges material with its environment. Because of such exchanges, Forrester's 'closed boundary' systems are, in von Bertalanffy's terms, 'open systems."³⁵²

This point is very important to the theory developed in this dissertation, as although most strategy research embraces firms as open systems which exchange material etc. with their environments, the preponderance of this research implicitly assumes that firms' while openly exchanging things with their environments have little active role in determining collectively with their environments *what* is to be exchanged, *how much, how often* and *why* it is exchanged. This is shown in Figure 173 below.

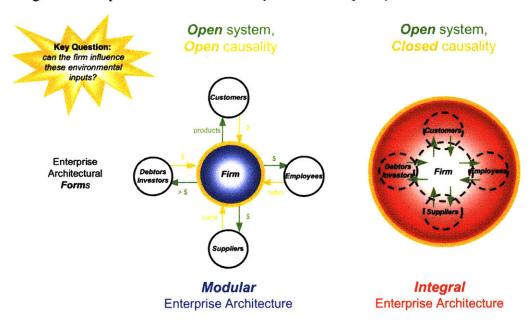


Figure 173: Open and Closed Causality within an Open Systems Framework

⁵⁸¹ Richardson, G.P. (1990), pg. 122.

⁵⁸² Richardson, G.P. (1990), pp. 297 and 298.

4.2.2.2.3 Structural Contingency Theory

Structural contingency theory (Burns and Stalker, 1961; Woodward, 1965; Lawrence and Lorsch, 1967; Thompson, 1967; Blau, 1970) has left an important mark on organizational theory in that it specifies that the most effective organizational structural designs are contingent upon environmental (Burns and Stalker, 1961), technological (Woodward, 1965) and size (Blau, 1970) factors. Table 10 below summarizes the primary research contributions of the contingency theorists.⁵⁸³

Year	Author	Research Setting	Claims
1954	Gouldner	1	Differences in work structuring reflected degree of
		(gypsum company)	danger and uncertainty in production.
1958	Woodward	92	Differences in structural features reflect complexity of
		(industrial firms)	technology employed.
1958	Rice	1	There are three environmental imperatives that must be
1963		(Indian textile firm)	satisfied: technological, social and economic.
1961	Burns &	20	More simple & stable environments yield mechanistic
	Stalker	(industrial firms)	structures vs. organic structures.
1967	Lawrence	6	More complex environments demand more
	& Lorsch	(firms)	differentiation & integration.
1967	Thompson	0	Different levels within organizations are more open to
		(theoretical)	the environment than others.
1971	Blau et al.		Effects of size and environmental complexity on
			structure.
1973	Galbraith		Related task complexity and structural complexity.
1978	Pfeffer &		Power / dependence relations among organizations.
	Salancik		

Table 10: Contingency Theory Research Summary

As shown in Figure 174 below, contingency theory can be thought of as explaining variation in two ways: between organizations and within organizations.⁵⁸⁴

⁵⁸³ Source: W. Richard Scott in Introduction to Thompson (1967), pg. xix-xxi.

⁵⁸⁴ Source: W. Richard Scott in Introduction to Thompson (1967), pg. xix-xx.

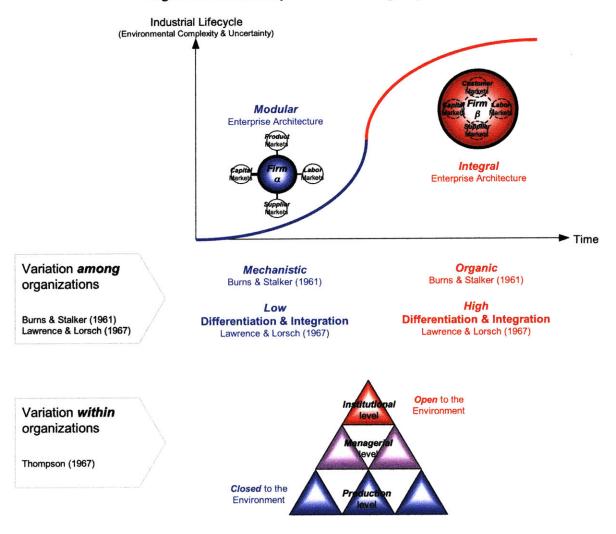


Figure 174: Summary of Two Contingency Models

4.2.2.2.3.1 Mechanistic vs. Organic (Burns & Stalker)

Burns and Stalker (1961) identified environmental *variability* (characterized as "stable" and "unstable") as a critical contextual factor in organizational design. They hypothesized two corresponding organizational designs: formal "mechanistic" and informal "organic" which would produce more effective performance in the respective environments of stability and instability.

Classical organizational theorists tended to view organizations - no matter how complex they are - as *deterministic*. To the contrary, modern organizational theorists tend to view organizations as *probabilistic*. Burns and Stalker (1961) captured this dichotomy using the terms "mechanistic" and "organic".

Table 11 below summarizes the mechanistic and organic archetypes.

"We are now at the point at which we may set down the outline of the two management systems which represent for us the two polar extremes of the forms (or 'ideal types') which such systems can take when they are adapted to a specific rate of technological and commercial change."⁵⁸⁵

Characteristic	Mechanistic	Organic
a. Knowledge & experience	The specialized differentiation of functional tasks	The contributive nature of special knowledge & experience
b. Nature of the individual tasks	Abstract, with purposes distinct from those of the organization as a whole	Realistic, with tasks set by the total situation of the organization
c. Means of task definition & reconciliation	Immediate superiors	Interaction with others
d. Definition of rights, obligations & methods	Attached to each functional role	A limited field (shedding of 'responsibility')
e. Translation of rights, obligations & methods	Responsibilities of the functional position	Spread of commitment to the organization
f. Structure of control, authority & communication	Hierarchy	Network
g. Location of technical & commercial knowledge	Exclusively at the top of the hierarchy	Anywhere in the network
h. Direction of communication & interaction	Vertical	Lateral
i. Content of communication	Instructions & decisions (command)	Information & advice (consultation)
j. Condition of membership	Loyalty to the organization & obedience to superiors	Commitment to organization's tasks & ethos of progress & expansion
k. Sources of importance & prestige	Internal (local) knowledge, experience & skill	Affiliations & expertise external to the firm

Table 11: Mechanistic and Organic Organizational Archetypes (Burns & Stalker)⁵⁸⁶

4.2.2.3.2 Small & Large Batch and Process Technologies (Woodward)

Woodward (1965) observed that there were more effective organizational designs depending upon the type of production technologies employed.

4.2.2.3.2.1 Craft, Mass and Lean Production

A quarter century later, researchers at MIT's *International Motor Vehicle Program* (IMVP) studying the global automobile industry identified similar production technologies with implications for organizational design (Womack, Jones and Roos, 1990; MacDuffie, 1991).

"This dissertation examines the thesis that flexible production systems are supplanting mass production systems because of their superior manufacturing perfomance. The dissertation argues that flexible production systems follow a different 'organizational logic' than mass production. This logic has two dimensions: structural and cultural. The 'structural logic' of a production system is identified in terms of the deployment of resources, the link of core production activity to the market, the structure

⁵⁸⁵ Burns, T. and Stalker, G. M. (1961), pp. 119 and xi..

⁵⁸⁶ Burns, T. and Stalker, G. M. (1961), pp. 120-122.

of authority relations, and the link between conception and execution. The 'cultural logic' is identified as a way of thinking about production activities that emphasizes their integration with innovation activities."⁵⁸⁷

In our research, we take a more macro-enterprise view of such "organizational logic." In addition, we define external environmental contingencies (as well as internal organizational contingencies) which enable the success of mass and flexible production systems.

4.2.2.3.3 Uncertainty Reduction (Thompson)

Thompson (1967) argued that much of organizational action can be explained by the need to reduce uncertainty, which originates in the environment (Kamps and Polos, 1999). He articulated much of his theory through 95 propositions.

⁵⁸⁷ MacDuffie, J.P. (1991), abstract.

4.2.2.3.4 Differentiation and Integration (Lawrence & Lorsch)

From a systems theory point of view, Stacey (1995) notes that the forces of integration lead to stable equilibrium via negative feedback, while the forces of division lead to instability via positive feedback.

This "division of labor – centralization of authority" dichotomy would later be reiterated by Lawrence and Lorsch, in their 1967 classic, *Organization and Environment: Managing Differentiation and Integration.*⁵⁸⁸ They demonstrated that organizational subunits adapted separately to their own specific environments. Therefore, organizations which face dynamic (or unstable) and diverse (or heterogeneous) environments, must possess a greater degree of structural differentiation and integration in order to be effective.

4.2.2.2.3.4.1 Critiques

4.2.2.3.4.1.1 Invalid & Inconsistent Claim

Lawrence and Lorsch's claim that higher levels of environmental dynamism and diversity are best met with higher levels of organizational differentiation is supported by the empirical data in this research. However, their subsequent claim that these higher levels of organizational differentiation are matched by corresponding higher levels of organizational integration, is neither supported by empirical data in this research, nor in fact by the empirical data in their original seminal research.

From an assessment of their original empirical data (albeit a small-N theoretical sample used for building grounded theory), the first claim indeed seems plausible, as high-performing firms in increasingly dynamic and diverse environments indeed do have higher levels of organizational differentiation. See Table 12 below.⁵⁸⁹

Table 12: Inter-Industry	Differentiation and	Integration Comparison
--------------------------	---------------------	------------------------

Industry	Organization Performance	Avg. Differentiation	Avg. Integration
Plastics	High Performer	10.7	5.6
Foods	High Performer	8.0	5.3
Containers	High Performer	5.7	5.7

Note, however, that the second claim indeed seems implausible, as high-performing firms in increasingly dynamic and diverse environments indeed have *lower* levels of organizational differentiation. This finding is broadly in line with the empirical data gathered in this research.

⁵⁸⁸ This connection between Weber and Lawrence and Lorsch was originally made by Scott and Mitchell (1972), pp.

⁵⁸⁹ Taken from Lawrence and Lorsch (1967a), pg. 103.

Finally, from their own theorizing, they seem to indicate the incompatibility of these opposing forces:

"The findings of this study indicate that, other things being equal, differentiation and integration are essentially antagonistic, and that one can be obtained only at the expense of the other." ^{\$90}

"Our findings have also indicated that the states of differentiation and integration are **inversely** related. The more differentiated an organization, the more difficult it is to achieve integration."⁵⁹¹

"Integration is a better single predictor of performance than differentiation alone."592

Presumably, if the two are as incompatible and as hard to achieve as they suggest, then one might expect that performance would suffer if firms didn't focus on one or the other, as the environment dictates.

4.2.2.3.4.1.2 Longitudinal Discontinuity

Finally, while Lawrence and Lorsch's first claim of contingency appears to be supported by this research, it is limited in that it represents a cross-sectional slice. They are able to make *inter*-industry comparisons between high performing firms:

"In any case, the contrast between the plastics and the container organizations is very sharp. In a sense, the represent opposite ends on a continuum, one dealing with a very dynamic and diverse environment, where innovation is the dominant issue, while the other is dealing with a very stable and homogeneous environment, where regularity and consistency of operations were important."⁵⁹³

Conversely, the data represented by this research is longitudinal, and therefore allows for intraindustry heterogeneity to be compared over time. This allows us to make *intra*-industry comparisons between high performing firms.

⁵⁹⁰ Lawrence and Lorsch (1967b), pg. 47.

⁵⁹¹ Lawrence and Lorsch (1967a), pg. 157.

⁵⁹² Lawrence and Lorsch (1967b), pg. 46.

⁵⁹³ Lawrence and Lorsch (1967a), pg. 155.

4.2.2.2.4 *Political* Theories of the Firm

As an extension of social system and contingency theories, political coalition theory sees the interaction of the environment as a political process, with power relationships being contingent on resource dependence. March (1962) was one of the first to articulate the case for the business firm being a "political coalition".

"Basically we assume that a business firm is a **political coalition** and that the executive in the firm is a **political broker**. The **composition** of the firm is not given; it is **negotiated**. The **goals** of the firm are not given; they are **bargained**. We assume that there is a set of potential participants in the firm. At least initially, we think of such classes of potential participants as **investors (stockholders)**, **suppliers**, **customers**, **governmental agents**, and various types of employees." ³⁹⁴

March (1962) characterizes the differences between economic theories of the firm and political theories of the firm.

"The focus of attention shifts from the owners (and their objectives) to the actual, operating organizers of the coalition – whoever they may be. In general, we view **stockholders** much as a theory of political systems might view **citizens**. Their demands form loose constraints on the more active members of the coalition. Their initiative in policy formation and in determining the nature of the coalitions is small."⁵⁹⁵

"The theory [of the business firm as a political coalition] does not solve the problem of conflict by simple payments to participants and agreement on a superordinate goal. Rather it emphasizes the importance of policy demands and payments and of sequential rather than simultaneous mediation of demands." ⁵⁹⁶

4.2.2.2.4.1 *Resource Dependence* Theory (Pfeffer & Salancik)

The resource dependence theory looks at the ways in which organizations reduce environmental uncertainty (Thompson, 1967; Pfeffer and Salancik, 1978; Pfeffer, 1982). These include either internal "buffering" or external "bridging".

Recent theorists have noted the limitations of Pfeffer and Salancik's formulation, by disaggregating the notion of interdependence into two dimensions: power imbalance and mutual dependence (Casciaro and Piskorski, 2005).

4.2.2.2.4.2 Stakeholder Theory of the Firm

Much of the establishment of a theoretical construct of an enterprise architecture is based on the relatively new theoretical notion that the firm is not necessarily designed specifically to advance the unitary profit interests of the owners or shareholders. There are other types of firms driven by different "objective functions", namely those who are trying to balance the plural objectives

⁵⁹⁴ March, J.G. (1962), pg. 672.

⁵⁹⁵ March, J.G. (1962), pg. 674.

⁵⁹⁶ March, J.G. (1962), pg. 674.

of multiple stakeholders. Within the strategic management field, Whittington (2000) identifies this range of objective functions or "profit motives" as a primary classification of firms.

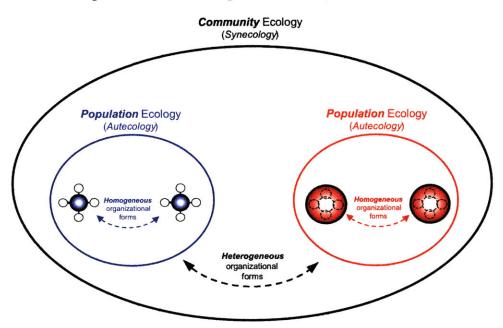
The stakeholder view of the firm is a relatively new theoretical perspective within the fields of economics and organizational theory (Follett, 1918; Freeman, 1984; Evan and Freeman, 1988; Ackoff, 1990; Donaldson and Preston, 1995; Mitchell, Agle & Wood, 1997; Ramirez, 1999). While the major works have proliferated in the past 25 years, the thread can be traced back to the ideas of Mary Parker Follett in the field of political science in 1920's (Schilling, 2000).

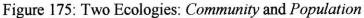
As will be discussed later in Essay #2, the stakeholder view of the firm implies a formal recognition of a series of exchanges with entities or stakeholders outside the firm. This relationship with the firm's environment is seen as an "open" system, however it may not be seen as causally open, depending on how the causal mechanisms are constructed.

As will be discussed in the following section, this recognition of firms with differing objective functions has been made recently within the field of economics under the heading of "mixed" duopolies.

4.2.2.3 Ecological View

The ecological view of organizations and organizational change takes an evolutionary perspective. Borrowed from the intellectual domain of biological ecosystem science, which is divided into "synecology", which is the study of multiple, interdependent populations within communities and ecosystems, and a subset called "autecology", which is the study of individual organisms within single populations (Whittaker, 1975, pp. 4-5) as shown in Figure 175 below.





While much work in organizational sociology has focused on autecology (known as "population" or "organization" ecology), relatively little work has focused on synecology (known as "community" ecology). The framework developed herein is an attempt with this higher, more general analysis of ecosystems.

"The perspectives adopt different levels of analysis and produce contrasting views of the characteristic mode and tempo of organizational evolution. Population ecology limits investigation to evolutionary change unfolding within established populations, emphasizing factors that homogenize organizational forms and maintain population stability. Population ecology thus fails to explain how populations originate in the first place or how evolutionary change occurs through the proliferation or heterogenous organizational types. Community ecology overcomes these limitations: it focuses on the rise and fall of populations as the basic units of evolutionary change, simultaneously explaining forces that produce homogeneity and stability within populations and heterogeneity between them."

This research postulates that if intra-species structural inertia were zero, then variation would take place within species, and population heterogeneity would not exist.

⁵⁹⁷ Astley, 1985, pg. 224.

4.2.2.3.1 *Population* Ecology (Autecology)

The first definitions of population ecology is the organizational unit and its environment, that is, the organizational *form* and the organizational *niche*.

4.2.2.3.1.1 Organizational Form

Population ecologists define populations as the collection of organizations exhibiting the same structural form (Carroll, 1984). *Form* is defined as a "blueprint for organizational action" (Hannan and Freeman, 1977, pg. 935) that a number of organizations share. In this sense, an organizational form can be expressed as a typology or taxonomy as will be suggested later in this chapter under the categorization of *architectural form*.

"Form serves as the organizational ecologist's analogue to the biological ecologist's species. Form summarizes the core properties that make a set of organizations ecologically similar. Oranizational populations are specific time-and-space instances of organizational forms."⁵⁹⁸

Note that while *ecologists* define *populations* as organizations exhibiting the same structural form, *economists* define *industries* as including all organizations serving the same demand or function, which could include quite diverst types of providers of substitutable products (Scott, 2003, pg. 127, footnote 2). This framework therefore defines multiple populations of organizational forms serving an industry (or niche).

Hannan and Freeman (1989, pg. 51) identify four properties of organizations which can be used to classify them into forms:

- Stated goals (i.e. *objective functions*)
- Forms of authority (i.e. *modular* vs. *integral*)
- Core technology (i.e. growth vs. stability)
- Marketing strategy (i.e. *differentiated* vs. *cost-leadership*)

4.2.2.3.1.2 Organizational Niche

We will consider explicitly and formally the niches (and niche overlap) in the mathematical modeling in Chapter 7.

4.2.2.3.1.3 Structural Inertia

In chapter 6, we will present empirical evidence of the existence of structural (or architectural) inertia, which facilitates the downfall of incumbent architectures and enables the late entry and survival of challenger architectures.

⁵⁹⁸ Hannan and Carroll, 1995, pg. 29.

4.2.2.3.2 Community Ecology (Synecology)

"The organization field can be viewed as encompassing the other levels: the individual organization, the organizational set, and two or more populations of interdependent organizations."⁵⁹⁹

Synonymous with inter-organizational *community* is the organizational *field* (Scott, 2003, pp. 129-132).

Much of the focus of organizational ecology research has focused on populations of organizations – otherwise known as "population" ecology – while relatively few references exist in the management literature on multiple populations or "community" ecology (e.g. Astley, 1985; Beard and Dess, 1988). It is however at the community level, that populations of organizations adapt to form new species of populations.

"That the community is the essential adaptive mechanism may be taken as the distinctive hypothesis of ecology."⁶⁰⁰

4.2.2.3.2.1 Verhulst Population Growth in Finite Environment

In order to define how populations grow, we can determine the key variables which enable and constrain their growth.

4.2.2.3.2.2 Species Archetypes: r-strategists and K-strategists

Birttain and Freeman (1980) adapted these concepts from organisms to organizations. We will develop these further in Chapter 7.

4.2.2.3.2.3 Lotka-Volterra (Predator-Prey) Inter-species Competition

Although the Lotka-Volterra Predator-Prey equations are famous for their potential to generate chaotic oscillation through a balancing loop between predator and prey, we will focus on the reinforcing behavior between competitors in Chapter 7.

⁵⁹⁹ Scott, 2003, pg. 131.

⁶⁰⁰ Hawley, 1950, pg. 31.

4.2.2.4 Institutional and Neo-Institutional Theory

4.2.2.4.1 Institutional Theory

We note that the actors in the enterprise architectures may in fact not conform to rationality assumptions of classical economics, and instead rely on informal mechanisms espoused by Institutional Theory (Selznick, 1949). Selznck's work on co-optation will be particularly relevant when we explore how an (integral enterprise architecture) organization engages the environment for its survival.

4.2.2.4.2 *Neo-Institutional* Theory

As one of the "bit four" theories to grow out of the 1960's contingency theory, neo-institutional theory was launched by the works of Meyer and Rowan, in1977 and DiMaggio and Powell in 1983.

"What makes organizations so similar? Once a set of organizations emerges as a field, a paradox arises: rational actors make their organizations increasingly similar as they try to change them."⁶⁰¹

While much of the new debate in economics and strategic management in the past two decades has focused on what are the sources of firm *heterogeneity* (Barney, 1991), the debate in sociology has been just the opposite: what are the sources of firm *homogeneity* or institutional isomorphism (Meyer and Rowan, 1977; DiMaggio and Powell, 1983).

⁶⁰¹ DiMaggio and Powell, 1983, pg. 147.

4.2.2.5 Social Network Theory

This section deals with an important subset of social network theory, namely *inter-firm* network theory.

4.2.2.5.1 Embeddedness

"Research on embeddedness is an exciting area in sociology and economics because it advances our understanding of how social structure affects economic life."⁶⁰²

Some of the original research on "embeddedness" within inter-firm networks was done by Schumpeter (1950) and Granovetter (1985), and was subsequently developed by researchers like Uzzi who focus specifically on "structural embeddedness" or on how the "network architecture of exchange relationships influence economic activity" (Uzzi, 1997, pg. 36).⁶⁰³

4.2.2.5.1.1 Under-embedded network

Uzzi (1997) characterizes a continuum of exchange relationships with the neoclassical form as follows:

"In the ideal-type atomist market, exchange partners are linked by **arms-length** ties. **Self-interest** motivates action, and actors regularly switch to new buyers and seller to take advantage of new entrants or avoid dependencies. Personal relationships are **cool and atomistic**."⁶⁰⁴

4.2.2.5.1.2 *Over*-embedded network

Conversely, the embedded form has the following characteristics:

"Embedded actors satisfice rather than maximize on price and shift their focus from the narrow economically rational goal of winning immediate gain and exploiting dependency to cultivating long-term, co-operative ties. The basic conjecture of this literature is that embeddedness creates economic opportunities that are difficult to replicate via markets, contracts or vertical integration."⁶⁰⁵

"In an embedded logic of exchange, trust acts as the primary governance structure. Joint problemsolving arrangements promote voice rather than exit. On a microbehavioral level, actors follow heuristic and qualitative decision rules, rather than intensely calculative ones. These factors furnish an alternative mechanism for matching customer demand to production."⁶⁰⁶

Uzzi (1997) then goes on to demonstrate empirically the competitive advantages of embeddedness, but notes some economic limitations, particularly with regard to adaptability:

- ⁶⁰⁴ Uzzi, 1997, pg. 36.
- ⁶⁰⁵ Uzzi, 1997, pg. 37.

⁶⁰² Uzzi, 1997, pg. 35.

⁶⁰³ Uzzi does not consider the other three forms of embeddedness put forth by Zukin and DiMaggio (1990): cognitive, political and cultural.

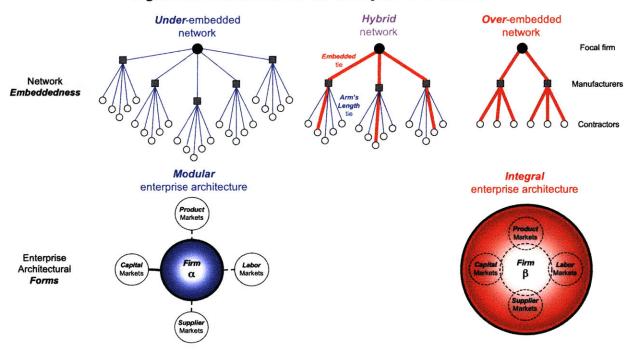
⁶⁰⁶ Uzzi, 1997, pg. 61.

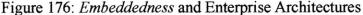
"Embeddedness is a logic of exchange that promotes economies of time, integrative agreements, Pareto improvements in allocative efficiency, and complex adaptation. These positive effects rise up to a threshold, however, after which embeddedness can derail economic performance by making firms vulnerable to exogenous shocks or insulating them from information that exists beyond their network."⁶⁰⁷

"The same processes by which embeddedness creates a fit with the current environment can paradoxically reduce an organization's ability to adapt." ⁵⁰⁸

4.2.2.5.1.3 Hybrid network

Figure 176 below illustrates the concept of embeddedness with respect to the enterprise architectural theory presented in this research.⁶⁰⁹





⁶⁰⁷ Uzzi, 1997, pg. 35.

⁶⁰⁸ Uzzi, 1997, pg. 57.

⁶⁰⁹ Note that Uzzi's work appears to focus on the supply or value chain axis only. Note unfortunately that Uzzi refers to the hybrid network as "integrated". This unfortunately is confusing with respect to the terminology used in this dissertation.

4.2.2.5.2 Socialization

Granovetter 's (1985) theories of socialization echo a typology of under-socialized behavior underpinned by much of economics (modular enterprise architecture) and over-socialized behavior underpinned by much of sociology (integral engerprise architectures).

4.2.2.5.2.1 Under-socialization

With price as the integrating mechanism, socialization processes are less relevant, and more in line with the demands of modular enterprise architectures.

4.2.2.5.2.2 *Over*-socialization

When plural objective functions exist, adherence to the stability of social norms become more relevant, which is in line with integral enterprise architectures.

4.2.2.5.3 *Keiretsu* as *Inter*-firm Networks

Various threads have emerged, including the empirical observation of social forms like Japanese "keiretsu" (Lincoln, Gerlach and Ahmadjian, 1996).

4.2.2.6 Behavioral Decision Theory

4.2.2.6.1 Bounded Rationality

Much of the work on bounded rationality, (e.g. Simon, 1958; Cyert and March, 1963) will be extended in an enterprise architectural setting, where decision makers will be subjected to making decisions that are boundedly rational in stakeholder space and time.

4.2.2.6.2 Exploitation vs. Exploration

The tradeoff between exploitation and exploration (March, 1991) will be made apparent as is the fundamental tradeoff between modular and integral enterprise architectural forms.

4.2.2.6.3 Loose vs. Tight Coupling

When Simon⁶¹⁰ speaks of loosely-coupled systems as being more "stable", he is referring to their "survivability" or "damage-tolerance", as they are able to localize disruptions. Later, I shall argue that loosely-coupled systems correspond to the notion of modular architectures, which generate greater degrees of *in*stability - with stability meaning in this case variablility.

⁶¹⁰ See Weick, K (1976) also.

4.2.2.7 Complexity / Complex Adaptive Systems Theory

More recently, sociological contingency theory has taken a new form, that of complex adaptive systems.⁶¹¹ This has begun to find its way into the strategic management literature (Levy, 1994; Stacey, 1995; Lengkick-Hall and Wolff, 1999; Caldhart and Ricart, 2004). Researchers have explored evolutionary biological⁶¹² phenomena (Kauffman, 1993) and mapped them onto business phenomena (Levinthal, 1997; Rivkin, 2000; Sigglekow, 2002).

4.2.2.7.1 NK Model of Interdependencies

Kauffman's (1993) NK model defines interdependencies between activities, where each of N total activities interacts with K other activities. The NK model has been transported to the strategic management domain by Levinthal (1997) and Rivkin (2000). In management research, the NK model can be thought of as a complex production function, which is comprised of these activities as well as the traditional capital and labor (Lenox, Rockart and Lewin, 2006). In this way, the NK model captures interdependencies between activities in a more general way than Milgrom and Roberts' (1990, 1995) complementarity concept which invokes the power and simplicity of supermodularity.

The presence of *low* interdependencies between parts, chunks, or stakeholders (i.e. N=1) signals a *modular* enterprise architecture, whereas the presence of *high* interdependencies between parts, chunks, or stakeholders (i.e. N \approx K) signals an *integral* enterprise architecture, as shown in Figure 177 below.

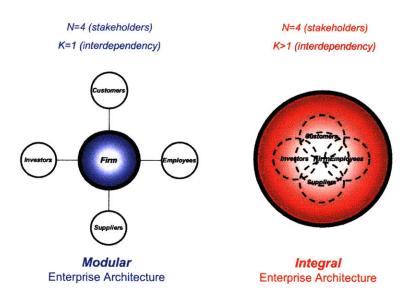


Figure 177: NK Model and Enterprise Architectures

 ⁶¹¹ I am indebted to Dr. Felix Reed-Tsochas of the University of Oxford for assisting me in developing this.
 ⁶¹² Note that the notion of a *fitness* function in evolutionary biology is simply the negative of a *potential* function in the nonlinear physics of attractors and basins.

Modular enterprise architectures therefore possess a rather simple objective function or "landscape", which is a single concave globally optimal peak. Integral enterprise architectures on the other hand possess a more complex objective function or landscape, which consists of multiple local optima, having the appearance of a rugged surface (as will be summarized in the next section).

4.2.2.7.2 Fitness Landscapes

A fitness landscape is simply the representation of genotype similarity on the horizontal axis and fitness or reproductive / business success on the vertical axis.

In applying this concept to the framework presented herein, it is posited that fitness or business success in an emerging market is characterized by competition between enterprises having similar genotypes / phenotypes in a *stable* landscape. Conversely, fitness or business success in a maturing market is characterized by competition between enterprises having different genotypes / phenotypes in a *rugged* landscape as shown in Figure 178 below.

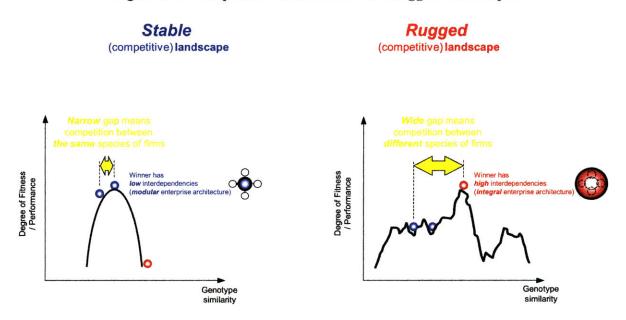


Figure 178: Competition within Stable and Rugged Landscapes

4.2.2.7.2.1 Part-Whole Relationships

In biology, the part-whole relationship is the relationship between an organism's *genetic* structure (or internal interdependencies) and its phenotype (or *overall* structure), which is in turn related to the organism's fitness with its environment (or external interdependencies).

4.2.2.7.2.2 Rugged Landscapes

Kauffman (1993) modeled the selection dynamics in the biological domain with heterogeneous interdependent traits. He found that as the number of interdependent elements increases, the fitness landscape presents an increasing number of local optima (Dosi et al. 2003, pg. 105-106).

"In the presence of strong interdependencies (as is often the case in many complex products), the system can not be optimized by separately optimizing each element from which it is made. Indeed, in the case of strong interdependencies, it might well be the case that some, or even all, solutions obtained by tuning each component 'in the right direction' yield a worse performance than the current one." 613

4.2.2.7.3 Competition vs. Cooperation

Political scientist, Robert Axelrod, in *The Evolution of Cooperation* (1984) used game theoretic research with the iterated Prisoner's Dilemma results in a TIT-FOR-TAT as optimal. This was followed up more recently with agent based modeling in *The Complexity of Cooperation* (1997).

"Fool me once, shame on you. Fool me twice, shame on me!"614

"Toyota has two faces. It is a stern father and a compassionate mother."⁶¹⁵

⁶¹³ Dosi et al. (2003), pg. 106.

⁶¹⁴ Ancient Chinese proverb.

⁶¹⁵ Shogo Tsuru, former chairman of Nippon Oil Seal, as quoted in Hino, S. (2006), pg. 59.

4.2.3 Strategic Management *theories*

4.2.3.1 SCP vs. RBV

There is clearly a considerable wealth of constituent research in the field of strategic management from two schools rooted in microeconomic theory: the Industrial Organization subfield dating back to Bain (1956) advanced the industry structure emphasis and on the resource-based view of the firm dating back to Penrose (1959), with their respective descendant proponents appearing a quarter century later in Porter (1980) and Wernerfelt (1984). Since this time, much research in this field has focused on the refinements of theories in each subfield, including: asset stock accumulation and dynamic capabilities (Dierickx and Cool, 1989; Teece, Pisano and Shuen, 1990).

It will be demonstrated theoretically later in this chapter that different enterprise architectures will be built and operated by people and institutions having different mental models or who operate a different "core logic" (Lengnick-Hall and Wolff, 1999) regarding the nature and purpose of strategy.

In fact, it will be hypothesized that *modular* enterprise architectures operate a core logic, which is more closely aligned with the SCP paradigm and the hypercompetitive and high-velocity perspectives that embody "guerilla logic" (Lengnick-Hall and Wolff, 1999).

In contrast, it will be hypothesized that integral enterprise architectures operate a core logic, which is more closely aligned with the RBV paradigm and the ecosystem/chaos perspectives that embody "complexity logic" (Lengnick-Hall and Wolff, 1999).

4.2.3.2 Flexibility vs. Comittment

Ghemawat, (1992), Pacheco-de-Almeida, G., Henderson, J.E., and Cool, K.E. (2008).

4.2.3.3 Profit-Maximizers vs. Profit-Seekers

Each of these two schools can be seen to represent the assumptions behind *modular* enterprise architectures (SCP) and *integral* enterprise architectures (RBV). The SCP school assumes firms as profit-*maximizers*, while the RBV school (including Schumpter-Penrose-Nelson/Winter) assumes firms as profit-*seekers*.⁶¹⁶

4.2.3.4 *M*-Form vs. *N*-Form

Hedlund (1994) was one of the first to move from the multi-divisional form (Chandler, 1962) to the network form. This has implications for the modular and integral enterprise architectures respectively.

⁶¹⁶ Cantwell, (2002), pp. 13.

4.2.3.5 Strategic Groups

The notion of "strategic groups" was asserted by Porter (1980, 1981), in an effort to discretize heterogeneity of firms within an industry. As will be discussed later, enterprise architecture configurations of modular vs. integral will be seen to belong to different strategic groups.

4.2.4 Architectural theories

The notion of *enterprise architecture* cuts across the many manifestations of "architecture" in management literature: e.g. complexity in- (Simon, 1962) building- (Alexander, 1964), product-(Ulrich, 1995), systems- (Meier and Rechtin, 2000; Nightingale and Rhodes, 2004), supply chain- (Novak and Eppinger, 1998), organizational- (Sanchez and Mahoney, 1996; Rechtin, 1999), human resource- (Lepak and Snell, 1999), innovation and- (Henderson and Clark, 1990), as well as the various interactions between architectures (Fine, 1998; Sako, 2003).

Although, civil, product and system architecting are focused primarily on technological systems, the concepts can be extended along the spectrum towards socio-technical systems and ultimately towards social systems. As shown in Figure 179 below, this is a matter of increasing both behavioral and dynamic complexity (Rittel and Webber, 1973; Senge, 1990).

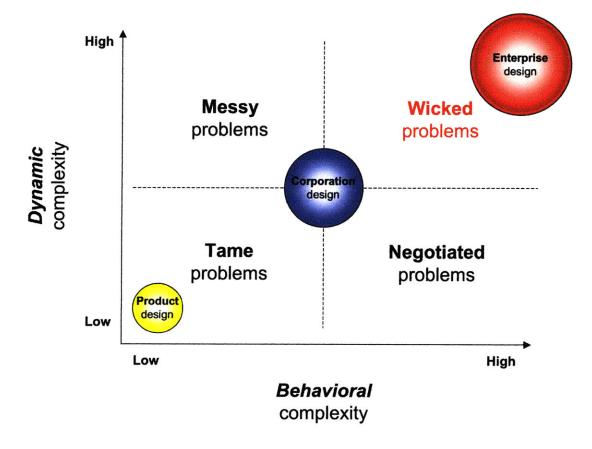


Figure 179: From Technical, to Socio-Technical, to Social Systems

4.2.4.1 Civil Architecture

4.2.4.1.1 Form (and Structure)

"Form: The shape and structure of an object. The essence of something."⁶¹⁷

"Structure: Something made up of a number of **parts** that are held or put together in a **particular** way."⁶¹⁸

4.2.4.1.2 Function

"Function: the action for which a person or thing is particularly fitted or employed."⁶¹⁹

In classical architectural theory, the relationship between architectural form and function is important and explicit. A similar relationship can be seen to drive the business enterprise's architectural form, namely the business objective function.

"Form follows function."620

Heuristic 1f:

The architectural *form* of an enterprise will be governed by the objective *function* of the enterprise (or at least by the "keystone" firm). Modular enterprises are driven by the maximization of *economic value*, while integral enterprises are driven by the creation and distribution of *stakeholder surplus*.

"The starting point for the book is therefore Chandlerian: How does strategy determine structure, and what are the complex ways in which structure and strategy interconnect? Here strategy may be defined as the planning and carrying out of the growth of organizations, and structure is understood to mean the organizational form devised to administer activities and resources (Chandler, 1962, pg. 13)."⁶²¹

This is a modification of Chandler's classic *Strategy and Structure* (1962), which explored *intra*firm design (focusing on the evolution of the multi-divisional "M-form") as opposed to *inter*firm design. Chandler asserted that the firm's *internal structure* should follow its strategy. In comparison, this framework is asserting that a firm's *external architecture* should follow its *objective function*. It is important to note that the concepts of both form and function are higher level and more abstract notions than Chandler's.

"Form and function are one."622

Finally, in the spirit of systems thinking and feedback causality, Frank Lloyd Wright (1939) argued for the integration of form and function as existing in a concurrent duality.

⁶¹⁷ From "Dictionary.com".

⁶¹⁸ From "Dictionary.com".

⁶¹⁹ From "Dictionary.com".

⁶²⁰ Louis Sullivan (1896).

⁶²¹ Sako, M. (2006), pp. 1-2.

⁶²² Frank Lloyd Wright (1939).

4.2.4.1.3 Fit

The notion of "fit" is well established in civil architectural terms (Wright; Alexander, 1964; etc.) This topic will be taken up again in more detail in chapter 6, where the environment is explored in more detail.

4.2.4.2 *Product* Architecture

While the focus of *civil* architecture was largely on environmental fit, as well as form following function, the focus of *product* architecture lies in decomposing functions and mapping them onto structures to achieve the desired performance.

The following briefly summarizes and attempts to disentangle the various definitions and uses of "architecture" in the product development and management literatures.

4.2.4.2.1 Building Blocks, Components, Chunks, Modules

Product architecture is broadly defined as the mapping of function to form. Most researchers in product development use different terms to express form (or components of form) ranging from "building blocks" or "chunks", (Ulrich, 1995; Ulrich and Eppinger, 1995) and "modules" (Baldwin and Clark, 2000).

"Product architecture is the assignment of the functional elements of a product to the physical building blocks of the product."⁶²³

"Product architecture is the scheme by which the function of the product is allocated to physical components."⁶²⁴

"The architecture of the product is the scheme by which the functional elements of the product are arranged into **physical chunks** and by which the chunks interact."⁶²⁵

"An architecture specifies what modules will be part of the system, and what their functions will be." 626

While *product* architecture is defined in both functional and *physical* terms, *enterprise* architecture is defined in both functional and *organizational* terms as will be discussed in later sections.

4.2.4.2.2 Interfaces

"In management literature, more than in the engineering literature, there is a tendency to home in on *interface* specification as an important feature of modularity."⁶²⁷

⁶²³ Ulrich, K. and Eppinger, S. (1995), pp. 182-183.

⁶²⁴ Ulrich, K. (1995), pg. 419.

⁶²⁵ Ulrich, K. and Eppinger, S. (1995), pg. 183.

⁶²⁶ Baldwin, C. and Clark, K. (2000).

⁶²⁷ Sako, M. (2003), pg. 231.

4.2.4.2.3 Typology of Product Architectures

4.2.4.2.3.1 Modular

According to Ulrich and Eppinger (1995, pg. 183), modular product architectures:

- have functions assigned to one chunk;
- therefore, a chunk executes only one function;
- interactions between chunks are clearly-defined;

4.2.4.2.3.2 Integral

According to Ulrich and Eppinger (1995, pg. 184), integral product architectures:

- have functions assigned to more than one chunk;
- therefore, a chunk executes more than one function;
- interactions between chunks are ill-defined;

"An integral architecture allows for redundancy to be eliminated through function-sharing."⁶²⁸

An example of the range of product architectures employed is shown in Figure 180 below. In this example, a passenger airplane can be seen to have two primary functions, providing lift for flight, and providing a cabin for the passengers.

A conventional modular one-to-one mapping of function to form would entail an architectural solution in which separate physical "chunks" or modules would be separately designed, built and operated to accommodate each function. In this example, the wings (with their special airfoil shape) would serve to create lift, while the tubular fuselage would house the payload or passengers.

Conversely, an integral many-to-one mapping of function to form would entail an architectural solution in which one "chunk" or module would be integrally designed, built and operated to accommodate both functions. In this example, the fuselage would become the lifting device, or put another way, the wings would house the payload or passengers.

⁶²⁸ Ulrich, K. and Eppinger, S. (1995), pg. 188.

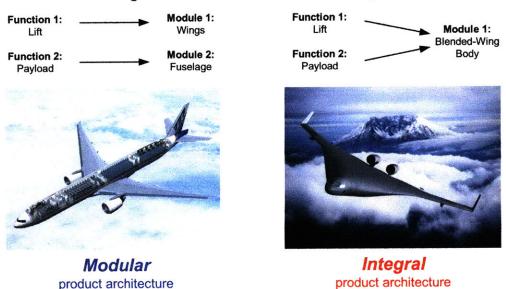


Figure 180: Product Architecture Example

"Conventional aircraft comprising separate wings and fuselages accomplish the functions of providing lift, carrying fuel, and housing passengers using separate portions of the aircraft. Typically wings and fuselages are designed by different engineers and made in different factories. The Airbus Consortium was structured to take advantage of this architecture. Wings are made in the UK, fuselage barrel sections in Germany, tail sections in Spain, and final assembly and integration takes place in France. But there are some disadvantages in terms of coordination as well as transportation of large subassemblies. For example, the International Space Station may have suffered from certain mismatches between physical and organizational architectures."

As will be discussed in subsequent sections, product architectures may have an influence on the design of organizational architectures. Because an integral product architecture like an airplane (Fine, 2005), can have its product and organization chunked in an apparently "modular" fashion, does not necessarily make the enterprise architecture modular. In fact, by the definitions provided herein, Airbus is an integral enterprise architecture which enables it to decompose the product into apparent "modules" designed and produced by apparently "modular" entities in distant geographic locations. However, it maintains high-level integration between the organizational chunks, thus delivering the intgeral product (and more importantly, the integral product portfolio) in an integral way. Just because a complex organism has more functions performed in different locations, does not necessarily make it more modular than a single-celled organism. Both Boeing and Airbus have broadly similar functional decompositions in their products (wings, fuselage, engines, avionics) and their enterprise architectures (customers, suppliers, investors, employees). The differences lie in how the objectives, boundaries and interfaces are managed ultimately define modularity or integrality. We are interested in function as well as structure.

⁶²⁹ Whitney, D. et al. (2004), pg. 10. Also noted in "Airbus' Jigsaw Plane", BusinessWeek, March 14, 2006.

4.2.4.2.4 Design Rules

"Design rules allocate functions to modules, identify operating principles, and set interfaces among modules that determine how organizations evolve."⁶³⁰

Helper and Khambete (2006, pg. 10) note that Baldwin and Clark (2000) emphasize the *location* of interfaces as opposed to the ways of *governing* the interfaces:

"Baldwin and Clark define a modular architecture as one which has few interdependencies between modules (and more interdependencies within modules). Their book focuses on the impact of the **location** of these interfaces (what happens if modules are split, recombined, etc.) They argue that a modular architecture promotes innovation by allowing more division of labor. They pay little attention to ways of governing interfaces (interdependencies) between components; mentioning only two: **Design rules (highly structured)** and **Discussion (loosely structured)**."⁶³¹

4.2.4.2.4.1 Three Types of Modularity

Modularity in design, manufacturing and use. (Baldwin and Clark, 2000). (Brusoni and Prencipe, 2006).

4.2.4.2.4.1.1 Modularity in Design

4.2.4.2.4.1.2 Modularity in Manufacturing

4.2.4.2.4.1.3 Modularity in Use

⁶³⁰ Brusoni and Prencipe (2006).

⁶³¹ Helper and Khambete (2006), pg. 10, footnote 6.

4.2.4.2.5 Product Performance

"I define product **performance** as how well the product implements its **functional** elements. Product performance **excludes economic performance**, except to the extent that it arises from the product's technical performance, because economic performance is also highly dependent on the firm's production, service, sales and marketing activities."⁶³²

Having defined the spectrum of product architectures, the obvious question is: "Which architecture performs better?" The answer is obviously, "It depends."

"Arguments for the integral design are often largely technical or performance-based, whereas arguments for modular tend to be based on business concerns such as cost and time to market."⁶³³

4.2.4.2.5.1 *Modular* performance

In general, modular product architectures are designed for *local* high performance (Ulrich, 1995, pg. 432). In addition, modular architectures tend to exhibit lower acquisition cost, which must be balanced against higher relative life-cycle costs.

4.2.4.2.5.2 Integral performance

"A product embodying an integral architecture will often be designed with the highest possible performance in mind."⁶³⁴

In general, integral product architectures are designed for *global* high performance (Ulrich, 1995, pg. 433) defined for narrow and specific environmental conditions. In addition, integral architectures tend to exhibit lower life-cycle costs, in spite of their higher acquisition costs.

⁶³² Ulrich, K. (1995), pg. 432.

⁶³³ Fine, C.H. (1998), pg. 136, acknowledging D. Whitney's contribution.

⁶³⁴ Ulrich, K. and Eppinger, S. (1995), pg. 184.

4.2.4.3 System Architecture

While the focus of *product* architecture was largely on decomposing functions and structures to achieve the desired performance, the focus of *system* architecture lies in greater detail and dynamic complexity, as well as design for emergence.

The following two sub-sections articulate two very different and potentially complementary processes for architecting systems.⁶³⁵

4.2.4.3.1 Top-down Deterministic Mechanistic Reductionism

"*Reductionism* relies on the assumption that a *divide-and-conquer* strategy will really work, that understanding the behavior of each element and defining each interface correctly and completely will assure a properly working system. This assumption brings with it a host of other attitudes and methods, generally called **top-down**, that assume that things can be **preplanned and scripted**, and that following the script is the way to get a successful result."⁶³⁶

As we have discussed in other social science literatures, this top-down approach is reminiscent of Theory X (McGregor, 1960), hierarchical command and control organizational structures. The reductionist divide-and-conquer strategy is reminiscent of the efficiencies of division of labor (Lawrence and Lorsch, 1967). The deterministic preplanned and scripted approach is reminiscent of the mechanistic traditions (Burns and Stalker, 1961).

4.2.4.3.2 Bottom-up Emergent Organic Holism

"In contrast to top-down is **bottom-up**, in which requirements and system design are expected to **emerge** over time and by means of **trial and error**. Under these assumptions, no complete script can be written, not all of the events and decisions can be anticipated or scheduled, and the final result is not known."⁶³⁷

As we have also discussed in other social science literatures, this bottom-up approach is reminiscent of Theory Y (McGregor, 1960), flat and empowered organizational structures. The holist strategy is reminiscent of the effectiveness of integration (Lawrence and Lorsch, 1967). The emergent and unscripted approach is reminiscent of the organic traditions (Burns and Stalker, 1961).

⁶³⁵ Weick, K. (1993) refers to the two types of organizational design as: formal and emergent.

⁶³⁶ Whitney et al. (2004), pg. 4.

⁶³⁷ Whitney et al. (2004), pg. 4.

4.2.4.4 Organizational Architectures

"Modular and integral architectures are like oil and water. They don't mix." "638

In addition to the study of physical architectures, whether civil, product or system, the discussion then tends towards the architectures of those organizations which design, produce and operate the physical architectures.

A recent study of the literatures in 36 journals on modularity in product, process, organization and innovation over the past 35 years revealed relatively little work in the area of organizational modularity (Fixson, 2006). Table 13 below summarizes the literatures at the intersection of modularity and organizations.

Authors	Year	Modularity Type			Industry	
		Product	Process	Organ- ization	Innovation	
Baldwin & Clark	2000			1	✓	Computer
Browning	2001	✓	✓	✓		Auto. sub-system
Djelic & Ainamo	1999			✓		Luxury Fashion
Ethiraj & Levinthal	2004	✓		✓		(non-specific)
Fine, Golany & Naseraldin	2005	\checkmark	✓	✓		Automobile
Garud & Kumaraswamy	1995	\checkmark		✓		Computer & Auto.
Helfat & Eisenhardt	2004			✓		Electronics & IT
Henderson & Clark	1990			✓	✓	Photolithographty
Kusunoki, Nonaka & Nagata	1998			✓		Materials & Systems
Salvador, Rungtusanatham & Forza	2004	\checkmark	\checkmark	✓		(multi –industry)
Sanchez & Mahoney	1996	✓		✓		Aircraft, Auto, Elec.
Schilling	2000	\checkmark		✓		Stereo, Computer
Schilling & Steensma	2001		\checkmark	✓		(multi –industry)
Siggelkow & Levinthal	2003	~		✓		(non-specific)
Sinha & Van de Ven	2005			✓		(multi –industry)
Sosa, Eppinger & Rowles	2003	✓		✓		Aircraft Engine
Sosa, Eppinger & Rowles	2004	✓		✓		Aircraft Engine

Table 13: Research on Modularity in Organizations

⁶³⁸ Fine, C.H. (2005), pg. 4.

Comparing Physical- and Organizational Architectures

4.2.4.4.1.1 Common Points

From both physical architectural theory as well as sociology / organizational theory, we know the following:

4.2.4.4.1.1.1 Architecture *Enables* Function

Structure (or its more abstract form, architecture) is necessary to *enable* function. For example, in order to conduct the function of producing manufactured goods, one needs a structure/architectural form like a factory. In order to conduct the social function of business, one needs an organizational structure like a bureaucracy (Weber, 1952).

4.2.4.4.1.1.2 Architecture *Constrains* other Functions

In doing so, structure (architecture) *constrains* other functions. For example, the physical structure/architectural form of a factory, while enabling some production functions, constrains other functions like pursuit of leisure activities, like swimming. The social structure of bureaucracy, while enabling some business functions, constrains other functions like conducting an insurgent revolution.⁶³⁹

4.2.4.4.1.1.3 Architecture does not *Predetermine* Choice

But within an architecture, a range of *choice* (i.e. functional flexibility) is preserved. For example, within the physical architecture of a factory, one can manufacture goods or one can even meditate (even if not in a church, synagogue, mosque or temple). Within the organizational structure/architecture of a bureaucracy, one can conduct business or one can even raise a family (even if not in a more informal, trust-based environment).

⁶³⁹ It is interesting to note that when radical environmental change occurs, people in social organizations tend to preserve structures, instead of higher-order goals and objectives.

4.2.4.4.1.2 Differences

4.2.4.4.1.2.1 Visibility

Physical architectures are visible, while organizational architectures are invisible. This can present problems in theory development and testing in social science via "unobservables".

4.2.4.4.1.2.2 Evolution

Physical architectures can be approximated as static, or at least they "evolve" very slowly. Organizational architectures are dynamic, that is they have the potential to evolve very rapidly, particularly if their structural inertia is low (Hannan & Freeman, 1984).

4.2.4.4.1.2.3 Emergence

Physical architectures can be approximated as top-down deterministic, while organizational architectures are bottom-up emergent, that is they are continually enacted by their constituent agents.

4.2.4.4.2 Two Levels of Organizational Architecture

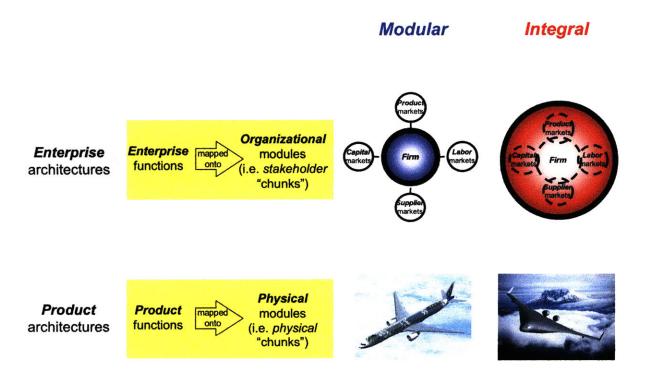
We will next explore both inter- and intra-firm architectures in the following sub-sections.

4.2.4.4.2.1 Inter-firm (Enterprise) Architectures

4.2.4.4.2.1.1 Concept Extended from Product Architecture

While we previously examined how the notion of architecture was used to map function to physical form, we now use the concept to relate how function relates to organizational form as shown in Figure 181 below.

Figure 181: Mapping Function to Organizational (not Physical) Form



4.2.4.4.2.1.2 Sub-case Example: Supply Chains

Baldwin and Clark (2000) show that firm boundary decisions in the computer industry are mediated by stakeholder groups representing both labor and capital markets. They argue that modularization or disintegration of the computer industry is driven by users demand for compatibility (modularity-in-use), which lead to modularity-in-design. The "environmental" or stakeholder factors that enabled such a transformation were the mobility of technical labor in the first instance, and the availability of venture capital to fund modular design firms.

Sako (2003) compares the catalysts driving product and organizational architectures in the computer and automobile industries, by searching for explanations in the stakeholder groups of labor and capital markets. She argues that the catalyst driving modularity in the automobile industry is modularity-in-*production* generated by the assembly of technologically and ergonomically complex components. The "environmental" or stakeholder factors that enabled such a transformation were the wage differentials of labor in the first instance, and the drive by investors to push for outsourcing and consolidation in a maturing industry with overcapacity and cost-competition.

Finally, Piepenbrock (2004) extends Baldwin and Clark (2000) and Sako's (2003) analyses to the commercial airplane industry, by noting that the catalyst driving modularity is modularity-in-*use* generated by the imperative of offset agreements in order to access international markets. This adds another stakeholder to the discussion, namely the customer via access to product markets. The "environmental" or stakeholder factors that enabled such a transformation were the wage differentials of labor to a small degree, but the access to risk-sharing partnerships with suppliers as a means of capital investment.

Figure 182 below, adapted from Sako (2003), applies the framework to illustrate the different catalysts driving product and organizational architectures in three industries: computers, automobiles, and airplanes.

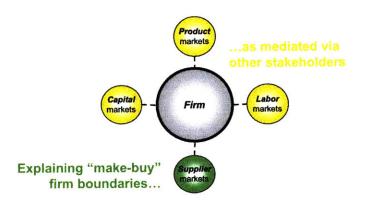
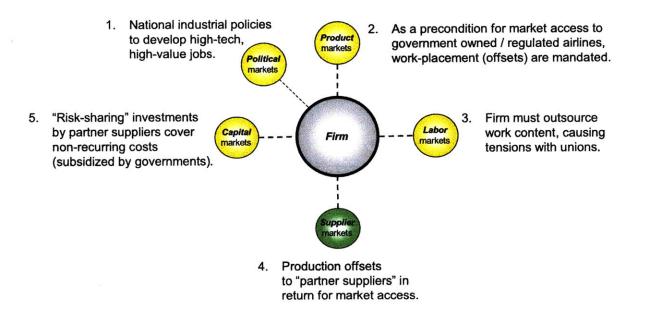


Figure 182: Stakeholder Catalysts driving Product and Organizational Architectures

Industry	Computers	Automobiles	Airplanes
Reference	Baldwin and Clark (2000)	Sako (2003)	Piepenbrock (2004)
Catalyst for Modularity	MiU → MiD (user demand for compatibility)	MiP → MiD (production complexity and ergonomics)	MiU, MiP → MiD (market access via production offsets)
Organizational Adaptation	Modular design teams & start- ups first, outsourcing later	Outsourcing, tiering and consolidation of suppliers	Outsourcing, tiering and consolidation of suppliers
Labor markets	Mobility of technical labor	Wage differentials between OEM and suppliers	International socio-political demand for work-placement
Capital markets	Venture capital for start-ups	Investment banking advice for M&A	Risk-sharing partner suppliers fund development costs
Product markets			Offsets give market access to international sales

Within the commercial airplane industry, the above-described stakeholder analysis, which ultimately drives product- as well as organizational architectures (and subsequent outsourcing) is shown in Figure 183 below.

Figure 183: Product & Organizational Architectures in Commercial Airplane Industry



4.2.4.4.2.2 Intra-firm Architectures

A mapping can be posited to exist between *inter*-firm (enterprise) architectural functions, and *intra*-firm functions or projects as shown in Figure 184 below.⁶⁴⁰ It will be demonstrated that a modular *inter*-firm enterprise architecture tends to be served by a modular *intra*-firm architecture, while an integral *inter*-firm enterprise architecture tends to be served by an integral *inter*-firm architecture.

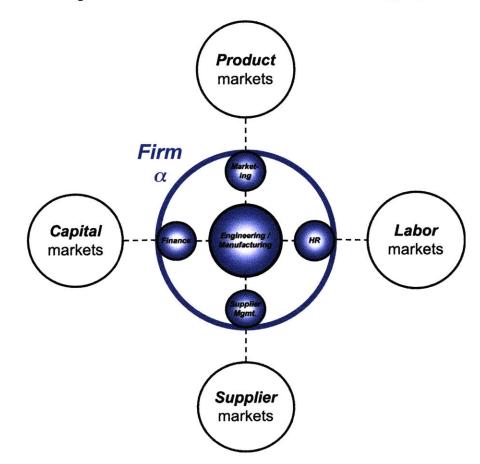


Figure 184: Inter-firm to Intra-firm Functional Mapping

Functional vs. Project (Forrester, 1961). Nadler & Tushman (1997).

⁶⁴⁰ Note that the customer-firm-supplier axis represents the three minimum internal business processes of marketing, engineering and supplier management as discussed in Hagel and Singer (2000).

4.2.4.5 Multi-Level Nesting: Product-Organizational Architecture Mapping

An overarching research question in this intellectual domain has been: "We know that organizations design products, but do products design organizations?" Recent research has observed that products do not design organizations, but knowledge does (Brusoni, 2006).⁶⁴¹

"Modular products can lead to modular organizations, as product design rules define both the technological and organizational architecture of the firm (e.g. Sanchez and Mahoney, 1996; Shilling, 2000; Sturgeon, 2002; Langlois, 2003). Empirical studies questioned such findings: non-modular organizations that produce modular products were observed in the aircraft engine (Prencipe, 1997), hard disk drive (Chesbrough and Kusunoki, 2001) and automotive industries (Takeishi, 2002). These studies illustrated that firms consist of different domains, e.g. organizational structures, technological architectures, etc. that may obey different design rules. The evolution of the firm's knowledge bases also plays a fundamental role in mediating the relationship between product and organization design (Brusoni et al. 2001)."⁶⁴²

While researchers like Fine (1998, 2005) have demonstrated that high firm performance results when product and organizational (i.e. supply chain) architectures are aligned, other researchers have demonstrated that *integral* organizations can indeed produce *modular* products (Prencipe, 1997; Chesbrough and Kusunoki, 2001; Takeishi, 2002 and Piepenbrock, 2004).

In fact, examples of *modular* organizations successfully producing *integral* products are not common. This research dissertation will attempt to show that in the commercial airplane industry, *Boeing* is evolving toward a more modular enterprise architecture, while its products are relatively more integral. Conversely, *Airbus* has a more integral enterprise architecture, while its products are more modular.

"Conventional aircraft comprising separate wings and fuselages accomplish the functions of providing lift and housing passengers using separate portions of the aircraft. Typically wings and fuselages are designed by different engineers and made within different factories. The **Airbus** consortium was **structured to take advantage of this architecture**. Wings are made in the UK, fuselage barrel sections in Germany, tail sections in Spain, and final assembly and integration take place in France."⁶⁶³

Many researchers have observed the coincident relationship between product architecture and higher level organizational and even supply chain architectures (Sanchez and Mahoney, 1996; Fine, 1998; Schilling, 2000; Sturgeon, 2002; Langlois, 2003; Helper and Khambete, 2006) as shown in Figure 185 below.

⁶⁴¹ I am indebted to Prof. Nightingale for helping me to clarify these concepts.

⁶⁴² Brusoni and Prencipe (2006).

⁶⁴³ Whitney et al. (2004), pg. 10.

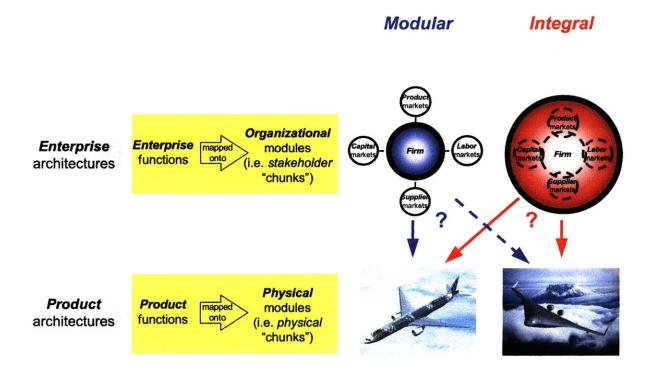


Figure 185: Deterministic Mapping of Product and Enterprise Architectures

The observation that successful product architecture drives (or is driven by) coincident supply chain architecture, does not necessarily imply that these in turn drive (or are driven by) coincident enterprise architectures (Prencipe, 1997; Chesbrough and Kusunoki, 2001, Takeishi, 2002; Sako, 2003; Brusoni and Prencipe, 2006). The potential reasons are hypothesized to be:

- The relatively narrow nature of the technologically-oriented interface information that drives the relationship between firm (product) and supply chain, compared to the more pluralistic information relating to investor and labor issues.
- Enterprise architecture does not necessarily drive product architecture, but product *system* (or platform) architecture. For example, it is much easier and more likely for an integral enterprise architecture (like that of *Airbus*) to produce a family or system of products which share more commonality, than it is for a modular enterprise architecture (like that of *Boeing*). In a sense, it is not *Airbus*' integral product's, but their integral product *strategy*, that is produced by the integral enterprise architecture.
- If/when product architectural changes are required, it will take successively longer times to evolve/adapt the architectures of the supply chain, and even longer to evolve/adapt the architectures of the enterprise. The greater the scope of the system in space and time, the greater the degree of architectural inertia.

Heuristic 1g:

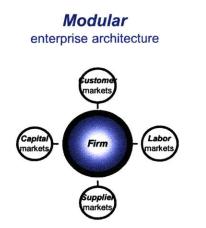
The nested architectures of product, supply chain and extended enterprise, will tend to be aligned along the integrality-modularity spectrum, as an indication of optimized performance. It is noted however that structural inertia increases with increasing extent of the architectures, making alignment changes slower.

"To a significant degree, product and supply chain architectures tend to be **aligned** along the integrality-modularity spectrum...in essence, product and supply chain architectures tend to be **mutually reinforcing**."⁶⁴⁴

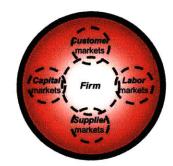
⁶⁴⁴ Fine, C.H. (1998), pg. 140.

4.2.5 Summary of Theoretical Underpinnings of Construct

Figure 186: Construct in Architectural Theory

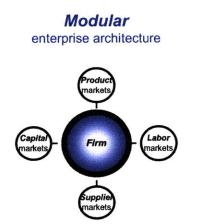


Integral enterprise architecture



Singular	Objective	Plural
(Maximization of <i>Shareholder Value</i>)	Function	(Maximization of <i>Stakeholder Surplus</i>)
Narrow	Enterprise	Broad
(narrow spatial, short temporal)	Boundaries	(broad spatial, long temporal)
Simple (High quantity of participants in a stakeholder class, Low quality of stakeholder relationships)	Stakeholder Interfaces	Complex (Low quantity of participants in a stakeholder class, High quality of stakeholder relationships)

Figure 187: Construct in Economic / Political Science Theory

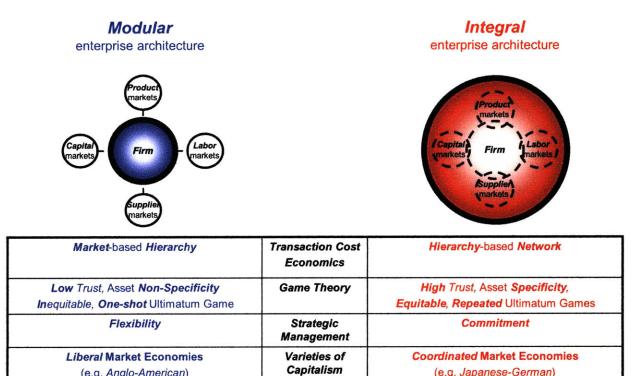


Integral enterprise architecture



<i>Mechanistic</i> (<i>Unstable</i> Environment)	Contingency	Organic (Stable Environment)
<i>Loose</i> -coupling	Theory	Tight-coupling
Resource Independence	Resource	Resource Dependence
(High Positional Power)	Dependence	(Low Positional Power)
<i>r-strategist</i>	Organizational	K-strategist
(<i>Opportunist</i> species)	Ecology	(Equilibrium species)
Exploitation	Organizational Learning	Exploration

Figure 188: Construct in Sociology / Organization Theory



(e.g. Anglo-American)

(e.g. Japanese-German)

Level	Typology (Disciplinary Basis)	Type 1	Type 2	Source	
Micro	Organizational Structure (Structural Contingency Theory)	Mechanistic	Organic	Burns & Stalker (1961)	
	Organizational Structure (Structural Contingency Theory)	Differentiation	Integration	Lawrence & Lorsch (1967)	
	"Strategic Types" (Organizational Theory)	Prospector	Defender	Miles & Snow (1978)	
	Organizational "Forms" (Organizational Ecology)	r-strategist	K-strategist	Brittain & Freeman (1980)	
	Organizational Learning (Organizational Theory)	Exploitation	Exploration	March (1991)	
	"Generic Strategies" (Economics)	Differentiation	Cost Leadership	Porter (1980)	
	"Mixed Duopoly" (Economics)	Profit Maximizer	Labor Managed	Lambertini & Rossini, (1998)	
Meso	Network Theory (Economic Sociology)	Under-embedded	Over-embedded	Granovetter (1985), Uzzi (1997)	
	Inter-organizational "Architecture" (Complex Systems Theory)	Modular	Integral	Piepenbrock (2009)	
Macro	Varieties of Capitalism (Political Economy)	Liberal Market Economy	Coordinated Market Economy	Hall & Soskice (2001)	

Figure 189: Summary of Architecture Typologies in the Literature

4.3 Enterprise Architecture: 3D-Functional Decomposition

"A company is its chain of continually evolving capabilities – that is, its own capabilities plus the capabilities of everyone it does business with." "645

"To extend a systemic approach to strategy, I suggest that a company be viewed not as a member of a single industry, but as part of a business ecosystem that crosses a variety of industries."⁶⁴⁶

Although based on the theory of architecture/modularity where the "chunks" can be functionally independent or interdependent, the enterprise architectue is not a physical / technological construct, but an organizational / relational contruct. The stakeholders are defined in functional "chunks" along three orthogonal axes: the axis defining the customer-supplier relationships of the value chain, the axis defining the factors of production, and the axis defining the nature of competition. Each will be briefly discussed in the following subsections.

4.3.1 Value Chain Axis

As shown in Figure 190 below, this pair of stakeholders comprise the customer and supplier "chunk" taken from Porter's 1985 classic.

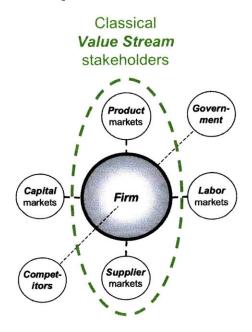


Figure 190: Enterprise Architecture: Value Chain Axis

⁶⁴⁵ Fine, C.H. (1998), pg. 71.

⁶⁴⁶ Moore, J.F. (1993).

4.3.1.1 Product / Service markets (customers)

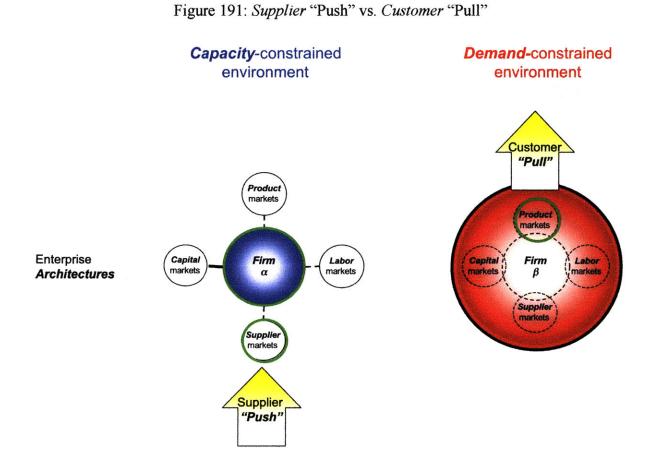
4.3.1.2 Supplier markets (suppliers)

Firm boundaries (Sako, 2006). Make-Buy. Vertical Integration. Outsourcing. Offshoring (Helper and Khambete, 2006).

4.3.1.3 Supplier "Push" vs. Customer "Pull"

"You can have any color you'd like ... as long as it's black."647

When markets are growing rapidly, the industry is generally capacity-constrained and the producer tends to be in control in a "push" mode. Conversely, when markets begin to mature, the industry is generally demand-constrained and the customer tends to be in control in a "pull" mode as shown in Figure 191 below.



⁶⁴⁷ Henry Ford's famous "push" tactics in the early automobile industry.

4.3.2 Factors of Production Axis

As shown in Figure 192 below, this pair of stakeholders comprise the capital and labor (K, l) "chunk" taken from classical economics. As will be discussed later, these stakeholders often provide the "teleological pull" or objective functions for the enterprise.

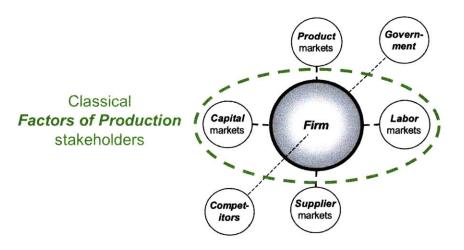


Figure 192: Enterprise Architecture: Factors of Production Axis

As we will discuss later in chapter 6, the relative dominance of capital vs. labor is contingent upon the state of the industrial evolution.

4.3.2.1 Capital markets (investors)

For the purposes of the framework, "capital" markets refers both to debt and equity markets, having fixed and variable (or residual) claims on the enterprise's cash flows. Each will be discussed in turn.

4.3.2.1.1 Capital Structure: Debt vs. Equity

Modigliani and Miller won the nobel prize for demonstrating (under certain circumstances) the irrelevance of capital structure.

"When a company earns more on borrowed money than it pays in interest, returns on equity will rise, and vice versa. Leverage thus improves financial performance when things are going well, but worsens performance when things are going poorly. It is a classic fair-weather friend."⁶⁴⁸

Higgins (2004) notes that leverage can both help and hurt ROE, depending on certainty of ROIC. In fact, based on empirical research (McConnell and Servaes, 19995), Higgins (2004) notes that debt levels should vary with firm growth.

"For 'high-growth' firms corporate value is negatively correlated with leverage, whereas for 'lowgrowth' firms corporate value is positively correlated with leverage." ⁶⁴⁹

"[In] rapidly growing businesses... high growth and high debt are a dangerous combination."650

"Slow-growth companies have a much easier time with financing decisions. Face the reality that the business has few attractive investment opportunities, and seek to create value for owners through aggressive use of debt financing. Use the company's health operating cash flow as the magnet for borrowing as much money as is feasible, and use the proceeds to repurchase shares."⁶⁵¹

4.3.2.1.1.1 Debt markets

4.3.2.1.1.2 Equity markets

Equity markets can be divided into *public* and *private* equity. Within this classification, equity investors can be characterized on the dimensions of *patience* as well as *activism*.

4.3.2.1.1.2.1 Quality of Equity Investors

4.3.2.1.1.2.1.1 Public vs. Private Equity

4.3.2.1.1.2.1.2 "Patient" vs. "Impatient" capital

⁶⁴⁸ Higgins, R.C. (2004), pg. 194.

⁶⁴⁹ Higgins, R.C. (2004), pg. 215.

⁶⁵⁰ Higgins, R.C. (2004), pg. 215.

⁶⁵¹ Higgins, R.C. (2004), pg. 217.

Within the Varieties of Capitalism framework, Goyer (2006) examines the varieties of institutional investors (ranging from the "patient" capital of pension funds, to the "impatient" capital of mutual/hedge funds) in France and Germany. He concludes that firm-level institutional arrangements of workplace organization account for the most significant variable in ascribing why French firms attract more short-term impatient capital (e.g. mutual/hedge funds) particularly from Anglo-Saxon investors, while German firms attract more long-term patient capital (e.g. pension funds).

"The concentration of power in the CEO of **French** companies is valued by **mutual and hedge funds**, since it makes it easier to reorganize the strategy of the firm quickly – a key aspect of the preferences of this type of investors given their **short-time horizon**. By contrast the relative absence of mutual and hedge funds, coupled with the growing strength of **pension funds** with their demands for financial transparency and **long-term horizon**, constitutes a **stabilizing** factor for the institutional arrangements of **workplace organization** of **German** companies."⁶⁵²

Conflicting accounts of pension funds exist however:

"Everyone who has worked with American managements can testify that the need to satisfy the **pension fund** manager's quest for **higher earnings next quarter**, together with the panicky fear of the raider, constantly pushes top management towards decisions they know to be costly, if not suicidal, mistakes. The damage is greatest where we can least afford it: in the fast growing, middle-sized, high-tech or **high-engineering firm** that needs to **put every available penny into tomorrow** – research, product development, market development, people development, services – lest it lose leadership for itself and for the U.S. economy."⁶⁵³

A recent example of patient capital comes from *Airbus*' parent company, *EADS*.

"Lagardere recently reported a 57% drop in 2006 profit, due largely to the poor performance of its 7.5% stake in EADS. Chief executive Arnauld Lagardère, who also co-chairs EADS, also ruled out the sale of the company's stake in EADS when announcing his annual results. 'I will play my role and I want to carry on being part o EADS's growth,' he told Le Monde. He added that he saw no need for a capital increase at EADS, presumably in lieu of politicians who wish to take a bigger role in Airbus. So concerned was Lagardère about EADS' future the he vowed to return any upcoming dividend back to the company. 'The Airbus situation has affected everyone, the employees above all, but also the shareholders and notably the small investors who have suffered from the drop in shares,' he said.'

4.3.2.1.1.2.1.3 Institutional vs. Individual Investors

Hansen and Hill (1991) determined empirically that contrary to popular belief, *institutional* owners are not necessarily myopic and that greater institutional ownership may be associated with greater R&D expenditures.⁶⁵⁵ They show that it is *individual* investors who exhibit more short-term orientation.

⁶⁵² Goyer, M. (2006), pg. 423.

⁶⁵³ Drucker, P. (1986), pg. 32, as quoted in Hansen and Hill (1991), pg. 1.

⁶⁵⁴ Olson, P. (2007), "Lagardere Won't Cut and Run from Airbus," Forbes magazine, March 14, 2007.

⁶⁵⁵ This research applied to time-series studies of four technology-driven industries: pharmaceuticals, chemicals, computers, and aerospace. It should be noted that while in R&D investment in most technology-driven industries was positively correlated with degree of institutional holdings, this relationship was reversed in the aerospace industry – it appears that institutional investors are myopic in aerospace stocks.

"American firms are myopic... in the sense that time horizons are short. [This] partly has to do with the high cost of capital in the United States."⁶⁵⁶

Gover (2006) compares the varieties of institutional investors in France and Germany.

"I distinguish primarily between **pension** and **mutual/hedge funds**. Pension funds constitute **long**term investors that acquire an equity stake in corporations primarily for diversification purposes; mutual/hedge funds seek to maximize assets under their management as they possess a shorter term horizon and operate under competitive pressures to beat market benchmarks. The importance of this distinction between different types of investors is primarily driven by its implications for the mode of coordination of firms. As Hall and Soskice (2001) have argued, access to patient capital constitutes a key feature of coordinated market economics, as opposed to liberal market economics that rely on short-term, risk capital. The investment strategies and time horizons of mutual/hedge and pension funds have different consequences for the sustainability of national models. Mutual and hedge funds posess short-term investment strategies and time horizons. They also exhibit firm-specific preferences since the performance of their portfolio is shaped by the behavior of a smaller number of companies than is the case for pension funds."⁶⁵⁷

⁶⁵⁶ Nelson, R. (1991), pg. 62.

⁶⁵⁷ Goyer, M. (2006), pp. 400-401.

4.3.2.1.1.2.2 Managerial capitalism

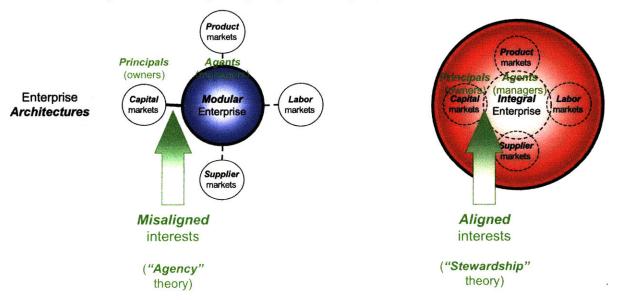
A variety of forms of "capitalism" have emerged, the most advanced of which is known as "managerial capitalism" which is the result of the separation of ownership from management.

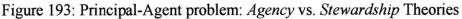
The capital markets or equity investors are traditionally seen as the "owners" of the firm. They claim any residual profits from the operations of the firm. Recently, researchers (e.g. Ghoshal, 2005) have begun to call into question this theory.

4.3.2.1.1.2.2.1 Principal-Agent problem: Agency vs. Stewardship

In an effort to increase efficiency through specialization (Smith, 1776), the functions of firm ownership and management were separated, resulting in a modular link in this portion of the factors of production axis. This however created a misalignment of incentives resulting in unintended inefficiencies, known as the 'principal-agent' problem (Jensen & Meckling, 1976; Fama, 1980).

Note however as shown in Figure 193 below, that an integral enterprise architecture (by definition) is one in which is designed to minimize or mitigate the misaligned incentives of the principal-agent problem which is known as "stewardship" (Donaldson and Davis, 1989 and 1991).





Davis, Schoorman and Donaldson (1997) summarize the key characteristics of each form as is shown in Table 14 below.

Enterprise Architecture	Modular	Integral	
Governance Theory	Agency theory	Stewardship theory	
Model of Man	Economic man	Self-actualizing man	
Behavior	Self-serving	Collective-serving	
Psychological Mechanisms			
Motivation	<i>Lower</i> order / economic needs (psychological, security, economic)	<i>Higher</i> order needs (growth, achievement, self-actualization)	
	Extrinsic	Intrinsic	
Social Comparison	Other managers	Principal	
Identification	Low value commitment	High value commitment	
Power	Institutional (legitimate, coercive, control)	Personal (expert, referent)	
SituationalMechanisms			
Management Philosophy	Control oriented	Involvement oriented	
Risk orientation	Control mechanisms Trust		
Time orientation	Short-term	Long-term	
Objective	ive Cost control Performance enhanceme		
Cultural Differences	Individualism	Collectivism	
	High power distance	Low power distance	

Table 14: 0	Comparing Agency ar	nd Stewardship	Theories
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As will be discussed in Chapter 5, ownership and managerial functioning are driven by different objectives of profit and growth.

4.3.2.1.1.2.2.2 Board of Directors: "Architectural" Gatekeeper

The shareholders, via the board of directors, have an important power: selecting, evaluating and rewarding the chief architect.

Many researchers have recently begun to question why the shareholders are the stakeholders that get to select the leadership, most recently Ghoshal (2005). Ghoshal argues that the primacy of shareholders interests was based on the (now) outdated notion that they were the risk-takers of the enterprise. Instead he argues, the employees are the true risk-takers of the enterprise:

"In every substantive sense, employees carry more risks than do the shareholders. Also, their contributions of knowledge, skills and entrepreneurship are typically more important than the contributions of capital by shareholders, a pure commodity that is perhaps in excess supply."⁶⁵⁸

This point of view is what was earlier described as "human capitalism", or "labor-managed firms".

⁶⁵⁸ Ghoshal, S. (2005), pg. 80.

4.3.2.2 Labor markets

The discussion of labor (or human capital) markets proceeds along the dimensions classically associated with other capital markets -i.e. in the make vs. buy analysis (Miles and Snow, 1984) of determining the boundaries of the firm, meaning is labor internalized or externalized?

Additionally the discussion of labor markets will include the quality of the interfaces between the firm and its human capital stakeholders, specifically along the short-term arm's length and long-term trust-based dimension.

4.3.2.2.1 Boundaries (make vs. buy)

Lepak and Snell (1999); Sako (2006).

4.3.2.2.2 Interfaces (arm's length vs. trust-based)

The integral EA form of the labor stakeholder sees long-term trust-based employment. Although this does not preclude the existence of labor unions (as *Southwest Airlines* demonstrated) it does tend to minimize their formal *raison d'etre*.

Although such integrality clearly exists in some enterprises (e.g. in the form of life-time employment), it is debatable as to the degree of complete foresight about its long-term effects. Evolutionary economists (Nelson, 1991) question the rationality of the origins of such practices:

"Thus, as I understand it, large Japanese firms adapted 'lifetime employment' for their skilled workers in the early post war era to try to deal with a problem of skill shortages and labor unrest. It is quite unclear how many Japanese managers foresaw advantages associated with worker loyalty."⁶⁵⁹

Like other stakeholder architectures, the effects of integrality in the labor stakeholder group involve temporal tradeoffs.

"Guaranteeing job security intensifies the tradeoff between short and long term effects. In the short run performance is worse." 660

⁶⁵⁹ Nelson (1991).

⁶⁶⁰ Sterman, Repenning and Kofman (1997), pp. 515-516.

In Table 15 below, Arthur (1992) defines two systems of workplace industrial relations. Table 15: Two Systems of Workplace Industrial Relations

Industrial Relations	Type of System		
Functions	Cost Reduction	Commitment Maximizing	
Organization of Work	Job tasks narrowly defined	Broadly defined jobs	
Employee Relations			
Staffing/Supervision	Low skill requirements; Intense supervision/control	High percent of skilled workers; Self-managing teams	
Training	Limited training efforts	More extensive, general skills training	
Compensation	Limited benefits; Relatively low wages; Incentive-based	More extensive benefits; Relatively high wages; All salaried/stock ownership	

In Table 16 below, Delery and Doty (1996) show the following rankings of human resource practices from a survey study using Likert rankings of the banking industry.

Ideal Strategic Profiles Variables	Market-type (Prospector)	Middle-of-the-Road (Analyzer)	Internal (Defender)
Results-oriented appraisals	4.44	3.41	2.38
Profit sharing	6.33	4.26	2.19
Job descriptions	3.38	4.49	5.60
Employment security	2.79	3.90	5.01
Internal career opportunities	3.86	4.67	5.48
Training	3.08	4.24	5,40
Participation/voice	4.60	5.36	6.12

Table 16:	HR Practices	in Configura	tions
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4.3.2.3 Dominant Factor of Production (capital vs. labor)

In certain situations, capital is relatively the more dominant factor of production, while in other situations, labor is relatively the more dominant factor of production. In the following subsections, we will explore important contingencies; and in essay #3, we will integrate these contingencies into a coherent environmental assessment in order to determine which combinations of contingencies (i.e. *traditional* capitalism or *human* capitalism) are expected to dominate during the life-cycle of an industry's (or more accurately, a business ecosystem's) evolution.

4.3.2.3.1 Traditional vs. Human capitalism

4.3.2.3.1.1 *Traditional* capitalism (*capital* dominance)

Traditional capitalism is characterized by the relatively rapid building of physical capacity (e.g. property, plant and equipment), often for economies of scale. For this to happen rapidly, capital markets are required which demand high rates of growth. The main attributes of *traditional* capitalism are:

- Capital (not labor) markets are the focus of the objective function: "profit maximization".
- Capital (not labor) is the risk-bearing factor of production (Ghohal, 2005)
- Capital (not labor) supply is the system constraint (Ghoshal, 2005)
- Capital (not labor) is the source of competitive advantage

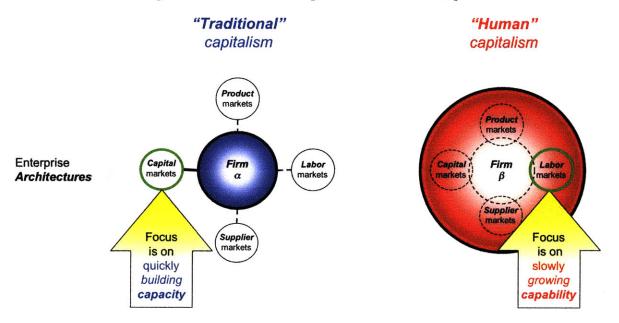
4.3.2.3.1.2 Human capitalism (labor dominance)

Human capitalism on the other hand is characterized by the relatively slow growing of knowledge-based capability, often for economies of scope. For this to happen, stability is often required for the labor markets. The main attributes of *human* capitalism are:

- o Labor (not capital) markets are the focus of the objective function: "labor-management".
- Labor (not capital) is the risk-bearing factor of production (Ghoshal, 2005)
- Labor (not capital) supply is the system constraint (Ghosahl, 2005)
- Labor (not capital) is the source of competitive advantage

4.3.2.3.2 Enterprise Architectural tendencies

While it is theoretically not impossible for both enterprise architectural forms to focus on traditional vs. human capitalism, this framework asserts that by definition, modular enterprise architectures tend to focus on physical capital as a means to ramp up physical *capacity* expansion, while integral enterprise architectures tend to focus on the *capability* of human assets as the source in innovation (whether product or process) and therefore competitive advantage. Figure 194 below summarizes the diametrically-opposed postures of each of the extremes of enterprise architectures.



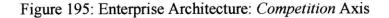


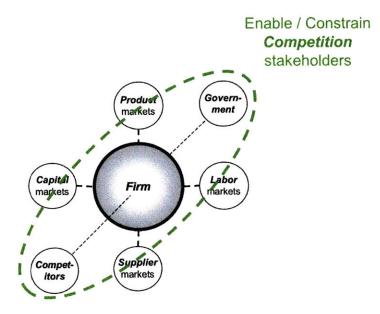
4.3.2.3.3 Cultural / National tendencies

While Anglo-Saxon capitalism has tended to focus on the providers of *capital*, the German-Japanese capitalism has tended to focus on the providers of *labor* (Thurow, 1992). Such stakeholders tended to integrate in order to achieve scale and therefore market power in the forms of unions. This would suggest that Anglo-Saxon traditions have a greater tendency towards modular enterprise architectural forms, while the German-Japanese capitalism has a tendency towards integral enterprise architectural forms.

4.3.3 Competitive Enablers and Constraints Axis

As shown in Figure 195 below, this pair of stakeholders comprise the competitor and government "chunk". "Government" is meant in the generic sense, covering local, state, federal and "meta-" levels like its participation in the World Trade Organization.





4.3.3.1 Regulatory markets (governments)

[In the U.S.] "business and government seldom work together and often are at odds."661

"Many of the organizations which play an important role in resource allocation, including governmental organizations, are not profit-maximizers."⁶⁶²

The role of governments both in regulating national industries and promoting international interests is important (Krugman, 1987; Brahm, 1995).

4.3.3.2 *Profit* markets (competitors)

Game theory, mixed duopoly.

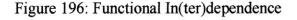
⁶⁶¹ Nelson, R. (1991), pg. 63.

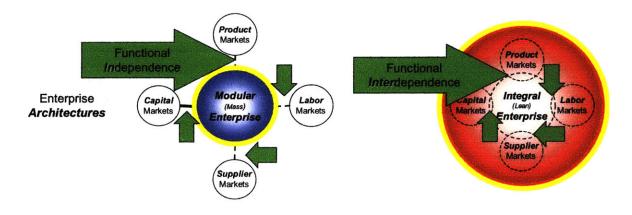
⁶⁶² Stiglitz, J.E. (1991), pg. 15, quoted in Braham, R. (1995), pg. 76.

4.3.4 Functional Decomposition

"Decomposition is a time-honored problem solving strategy (Simon, 1969). It often works effectively, provided the process under consideration is not strongly coupled to other systems. When couplings are strong, however, decomposition may lead to ineffective policies. Worse, piecemeal policies may intensify the problem (Forrester, 1971; Ackoff, 1978) or even lead to catastrophe (Perrow, 1984). Decomposition methods ignore feedback processes and discount time delays and side effects. Decomposition in complex, tightly coupled dynamic systems optimizes the parts at the expense of the whole and the present at the expense of the future."

As shown in Figure 196 below, the functional decomposition among stakeholders creates chunks (or stakeholder pairs) which are either functionally independent (in the case of modular enterprise architectures) or functionally interdependent (in the case of integral enterprise architectures).





4.3.4.1 Functional Independence

When an industry is in "push" mode, stakeholder power resides with the central firm. Therefore the interests of other stakeholders are relatively less important. Functions can be decomposed successfully to stakeholders in a modular fashion, and the zero-sum game of wealth distribution is played, particularly as this is the "dominant design" of enterprise architectures, and the winner is the one who plays it the most efficiently.

4.3.4.2 Functional Interdependence

When an industry is in "pull" mode, the stakeholder power is more distributed within the enterprise. Therefore the interests of other stakeholders are relatively more important. Functions cannot be decomposed successfully to stakeholders in a modular fashion, and a positive-sum game of wealth distribution is played. The winner is the one who plays it the most efficiently.

⁶⁶³ Sterman, Repenning and Kofman (1997), pg. 519.

4.3.4.3 Enterprise Performance

"In the presence of strong interdependencies (as is often the case in many complex products), the system can not be optimized by separately optimizing each element from which it is made. Indeed, in the case of strong interdependencies, it might well be the case that some, or even all, solutions obtained by tuning each component 'in the right direction' yield a worse performance than the current one. In the presence of strong interdependencies, the problem cannot therefore be decomposed into separate sub-problems which could be optimized separately from the others (Marengo, 2000)."⁶⁶⁴

The maximization of stakeholder surplus is by its very title a more global optimization around the relevant stakeholders who impact the long-term strategic advantage of the firm. It recognizes that the enterprise-level decomposition of functions across different stakeholders can and often does result in sub-optimal system performance, particularly if strong interdependencies exist across stakeholders, as shown in Figure 197 below.

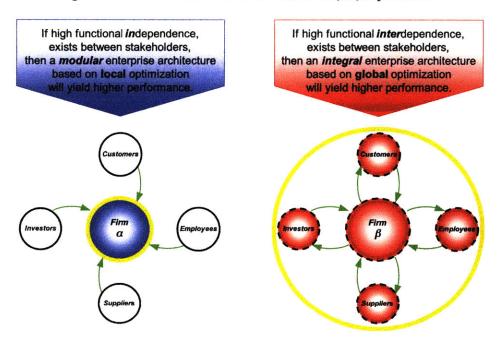


Figure 197: Performance and Functional In(ter)dependence

Note that the converse statements are also true and important. For example, if high functional *inter*dependence exists between stakeholders, then a *modular* enterprise architecture based on local optimization, would result in global sub-optimization and hence low performance. The formula one race car finding itself in a mud-bog, would be an example of increasing the functional performance of the parts (i.e. faster engine, or greater aerodynamics), would make the system performance no better, and in fact worse off if one considers the amount of resource spent on these activities as opposed to other "architectural" activities.

[.] 10

⁶⁶⁴ Dosi et al. (2003), pg. 106.

4.4 Enterprise Architecture: Objective Functions, Boundaries & Interfaces

Having defined the constituent chunks of the enterprise, we can now define the three properties that enable a typology of architectural forms: Objective Functions, Boundaries and Interfaces. Each will be briefly discussed in turn.

4.4.1 Enterprise *Objective Functions*

At its core, the enterprise architecture construct is about the functional independence or interdependence between stakeholder chunks. As different stakeholders have different and often conflicting goals, this construct is deeply rooted in the notion of power an politics, in which we build from past theoretical work:

"The business firm is a political coalition and the executive is a political broker. The composition of the firm is not given; it is negotiated. The goals of the firm are not given; they are bargained. We assume that there is a set of potential participants in the firm such as investors, suppliers, customers and various types of employees."⁶⁶⁵

"A political perspective defines power as the ability to get things done when goals conflict."666

This section outlines the goals or objective functions which drive the ultimate forms of the firms and their extended enterprises – the "forcing" functions. In this sense, the objective functions are an acknowledgement of a goal-directed or *teleological* change process (Van de Ven, 1992).

The objective function of the enterprise is broadly classified as a problem of corporate governance.

"Corporate governance deals with the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment."⁶⁶⁷

The following outlines two extremes in objective functions: maximization of *shareholder* value vs. the maximization of *stakeholder* surplus. While objective functions are complex and varied, this section will characterize them on a continuum from the traditional maximization of shareholder value to the more recent maximization of stakeholder surplus. Figure 198 below summarizes the spectrum of objective functions.

⁶⁶⁵ March J. (1962).

⁶⁶⁶ Dahl R. (1957).

⁶⁶⁷ Shleifer and Vishny (1997), pg. 737.

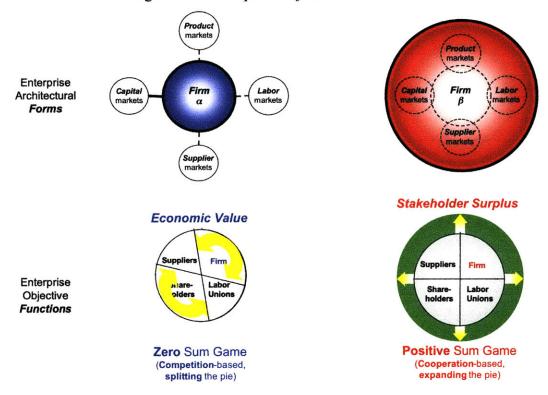


Figure 198: Enterprise Objective Functions

4.4.1.1 Maximizing Shareholder Value

"Milton Friedman [said]: 'Few trends could so thoroughly undermine the very foundation of our free society as the acceptance by corporate officials of a social responsibility other than to make as much money for their stockholders as possible' (Friedman, 2002, pg. 133).""⁶⁶⁸

The maximization of shareholder value is by its very title a very local optimization around a specific stakeholder group, the shareholders or equity investors.

"Whose income 'ought' to go down? Historically we have used economic growth to avoid having to make this judgment. Economic growth has been seen as the social lubricant that can keep different groups working together." 669

We will note in Chapter 5 that during times of high growth, the zero-sum game does create serious problems, as all stakeholders are growing. It is only when growth begins to slow down that the zero sum game starts to become dysfunctional.

⁶⁶⁸ Ghoshal, S., (2005), pg. 79.

⁶⁶⁹ Thurow, L. (1980), pg. 17.

4.4.1.2 Maximizing Stakeholder Surplus

Henry Ford, perceived as one of the greatest (modular) "capitalists", defended himself from a lawsuit by shareholders in 1919, for suspending *Ford's* dividend payments by arguing that *Ford* should serve a broader constituency of stakeholders than just the shareholders. He stated *Ford's* purpose as being:

".. to do as much good as we can, everywhere, for everybody concerned...and incidentally to make money."⁶⁷⁰

This positive sum objective function, coupled with *Ford's* vertically integrated Rouge complex, begins to sound like an integral EA, not the modular EA that we have come to observe over the past 50 years. One explanation is that, like *Boeing*, incumbents originally began their lives as integral EA, and have since disintegrated into modular EA.

Likewise, Owen D. Young, *General Electric* Chariman from 1922-1945 echoed the same pluralistic stakeholder-based sentiments:

"Managers are no longer attorneys for the stockholder; they are becoming trustees for an institution. It makes a great deal of difference in my attitude towards my job as an executive officer of General Electric whether I am a trustee of the institution or an attorney for the investor."⁶⁷¹

Leading academics have recently begun to challenge the most fundamental assumptions driving business today, the firm's objective function (Ghoshal, 2005).

"After all, we know that shareholders do not own the company – not in the sense that they own their homes or their cars. They merely own the right to the residual cash flows of the company, which is not at all the same thing as owning the company. They have no ownership rights on the actual assets or businesses of the company. We also know that the value a company creates is produced through a combination of resources contributed by different constituencies: Employees, including managers, contribute their human capital, for example, while shareholders contribute financial capital. If the value creation is achieved by combining the resources of both employees and shareholders, why should the value distribution favor only the latter? If these truths are acknowledged, there can be no basis for asserting the principle of shareholder value maximization. There just aren't any supporting arguments. Why do we not fundamentally rethink the corporate governance issue? Why don't we actually acknowledge in our theories that companies survive and prosper when they simultaneously pay attention to the interests of customers, employees, shareholders, and perhaps even the communities in which they operate? Such a perspective is available, in stewardship theory for example (Davis, Schoorman, and Donaldson, 1987),"⁶⁷²

Toyota, arguably the world's premier manufacturing company and the current dominant challenger in the automotive industry, states the following as its objective function:

"We maximize **shareholder value** over the **long term** by harmonizing the interests of **all our stakeholders**: customers, suppliers, employees, and members of the community at large, as well as shareholders."⁶⁷³

⁶⁷⁰ Quote taken from FTmagazine, June 11, 2005, issue no. 109, pg. 22.

⁶⁷¹ Quote taken from FTmagazine, June 11, 2005, issue no. 109, pg. 22.

⁶⁷² Ghoshal, S., (2005), pp. 79-81.

^{673 1998} Toyota annual report.

4.4.2 Enterprise Boundaries

The academic discussion around the "boundaries of the firm" has historically (Coase, 1937) embraced only its supplier markets in the traditional "make-buy" decision. More recently, it has embraced the firm's labor markets (Sako, 2006). This framework attempts to address a broader set of stakeholders which define the "boundaries of the firm", which include the complementary stakeholders to suppliers and employees, namely customers and investors as shown in Figure 199 below.

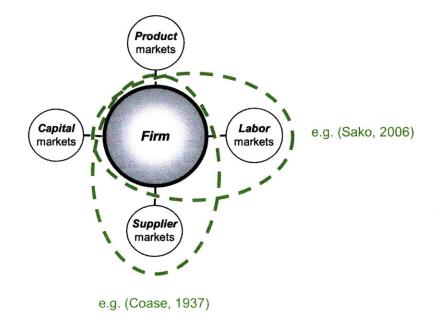
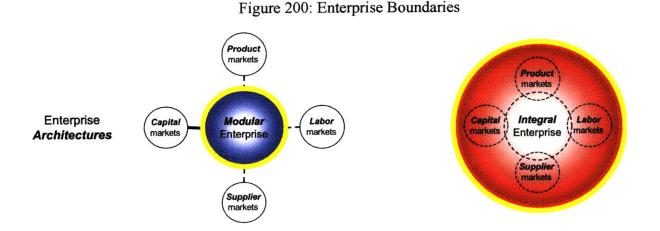


Figure 199: Classical discussions around the "Boundaries of the Firm"

As shown in Figure 200 below, the boundaries of the enterprise vary according to the objectives of the firm. These vary from local optimization of the firm, to more global optimization of the firm and its extended enterprise.



Organizations have long been recognized as exchanging things with their environments, called "open" systems. The boundaries of the organization (both spatial and temporal) define the extent of the organization, and the degree of "openness". As will be shown below, the firm exchanges things with entities outside of its control, and in that sense, all firms are open systems with respect to their stakeholders. However, as we shall explore later, different enterprise architectures (modular and integral) vary in their *control* over these exchanges with their extended enterprises. Specifically in chapter 5, when we address the structural dynamics of enterprises, we will draw a distinction between open and closed systems and open and closed *causal* systems.

Rice (1958, 1963) focused on boundary management issues.

[The primary task of leadership is] "to manage the relations between the enterprise and its environment so as to permit optimal performance of the primary task of the enterprise [which is] the task that it must perform to survive."⁶⁷⁴

⁶⁷⁴ Rice, A. (1963), pp. 13-15.

4.4.2.1 Spatial

"Firms and their attributes are parts of the environment and are linked to it by exchanges of resources."⁶⁷⁵

As noted by various researchers (Fine, 1998; Dyer and Singh, 1998), the spatial boundaries of the firm can be important in defining a firm's competitive advantage.

"Key firm resources may reside in a firm's external network".676

4.4.2.1.1 *Vertical* Integration (boundaries)

The theory of the firm (Coase, 1937) provides insights into why firms exist vis a vis markets, and where the efficient boundary of the firm should be. Either the price mechanism coordinates economic activity in market transactions, or managerial authority coordinates economic activity in vertically-integrated firms.

Later Williamson's transaction cost economics (Williamson, 1975) extended this theory by positing logical firm boundaries based on the transaction as the unit of analysis. While Coase focused on costs as the discriminating criterion between firms and hierarchies, Williamson posited a set of factors which generated these transaction costs: asset specificity, uncertainty, frequency, opportunism and bounded rationality, with asset specificity being the most important.

The classic case study of vertical integration or the make-buy problem is *General Motors-Fisher Body*.

4.4.2.1.2 Virtual Integration (interfaces)

"General Motors and Toyota are helpful for illustrating why the categories in 'make versus buy' or 'vertical integration versus outsourcing' are inadequate: they do not account precisely for the complexity of relationships we observe in practice. Rather than using the categorization of vertically integrated or disintegrated, supply chain relationships can be categorized on a scale running from the highly integral to the highly modular, depending on the degree of proximity of the members in the chain along four dimensions: geographic, organizational, cultural and electronic."⁶⁷⁷

More recently other researchers, while acknowledging power and clarity of transaction cost economics, have questioned the complexity that it captures. Instead of focusing on asset ownership, Fine (1998) posits four dimensions of "proximity": geographic, organizational (including ownership), cultural and electronic.

In this sense, Fine (1998) is less interested in who owns the assets (i.e. legal *boundaries*), but in how the assets are managed (i.e. *interfaces*). The *quality* of the relationships between stakeholders (often called "relational coordination" or "relational contracting" is very important in determining an enterprise's architecture and will be discussed in the following sections.

⁶⁷⁵ Farjoun, M. (2002), pp. 577.

⁶⁷⁶ Farjoun, M. (2002), pp. 577.

⁶⁷⁷ Fine, C.H. (1998), pg. 158.

4.4.2.2 Temporal

"Time horizon is a temporal yardstick for evaluating success or failure that reflects the dynamics of a firm and its context."⁵⁷⁸

"What are the implications of the difference in the time frames involved in firms sustaining superior performance as opposed to experiencing decline and bankruptcy?"⁶⁷⁹

4.4.2.3 Effect of Spatio-Temporal Boundaries on Strategy

Modular EA

(decisions are close in space & time)

Those enterprise architectures which are managed to a narrow spatial and temporal boundaries (i.e. modular), have great tactical advantages, while those which are managed to broader spatial and temporal boundaries (i.e. integral) have greater strategic advantages. As shown in Figure 201 below, the analogy is to a game of chess, where the integral enterprise architecture, by optimizing more globally has a greater vision both of the board as well as of many moves in advance. It is "built" to deal with greater dynamic complexity, where cause and effect are distant in (stakeholder) space and time, even though such extra vision has added costs.

Figure 201: Effect of Spatio-Temporal Boundaries on Strategy

Integral EA

(decisions are distant in space & time)

⁶⁷⁸ Lengnick-Hall and Wolff (1999), pg. 1119.

⁶⁷⁹ Farjoun, M. (2002), pg. 587.

4.4.3 Enterprise Interfaces

4.4.3.1 Quantity of Stakeholders

The first obvious descriptor of the architecture is the quantity of stakeholders within a specific chunk.

4.4.3.2 Quality of Stakeholder Relationships

The quantity-quality dimensions are not orthogonal. They are interrelated, with quality ultimately driving the quantity.

Fine (1998) defines the supply chain integrality along four dimensions: geographic, organizational, cultural and electronic.⁶⁸⁰

Within the context of off-shoring, Helper and Khambete (2006) define three types of organizational interfaces: information (e.g. degree of tacitness), incentive alignment (e.g. asset ownership, employment stability), and proximity (e.g. geographic and cultural).

Ghemawat (2001) defines proximity in terms of four distances: cultural, administrative, geographic and economic.

Trust is an important construct in defining the quality of stakeholder relationships, and recently, researchers have posited that trust is multi-dimensional, and differs between the firm and different stakeholders (Pirson and Malhorta, 2008).

4.4.3.2.1 Two Relationship Archetypes

Two different types of relationships are discussed. The qualitative properties of each can be extracted approximately via such classic games as the "ultimatum game".

4.4.3.2.1.1 Managing Contracts: Short-term, Arm's Length

Based on an ideology-based "gloomy-vision" (Ghoshal, 2005). Examples include: transactioncost economics having opportunism with guile (Williamson, 1975); agency-theory (Jensen and Meckling, 1976); exit (Helper, 1990).

4.4.3.2.1.2 Growing Relationships: Long-term, Trust-Based

"A company run on the basis that nobody can be trusted will be a **dysfunctional** place that has little chance of achieving anything much for its shareholders, let alone its customers or those who work there...for **trust lies at the heart of wealth creation**."⁶⁸¹

⁶⁸⁰ Fine, C.H. (1998), pp. 136-137.

⁶⁸¹ Gapper (2005), pg. 102.

Based on an ideology-based "positive organizational scholarship" (Ghoshal, 2005). Examples include: relational coordination (Hoffer-Gittell, 2003); relational contracting (Gibbons, 1999 and 2004); voice (Helper, 1990).

4.4.3.2.2 Costs of Quality (of Stakeholder Relationships)

In addition to the long-term cost reductions associated with the learning curve and economies of scale, the costs of quality of relationships can have a significant impact on transaction costs as shown in Figure 202 below.

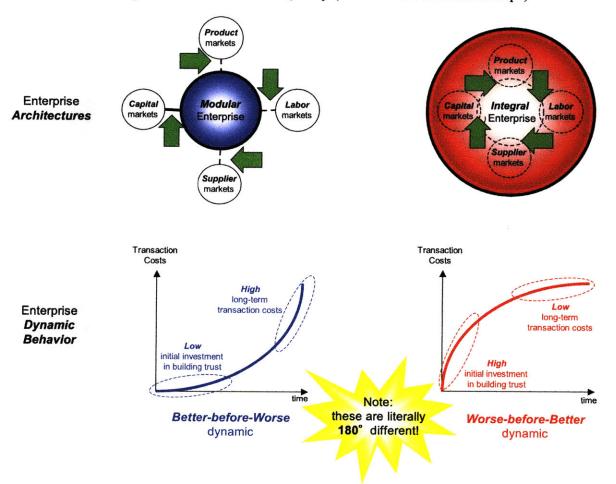


Figure 202: The Costs of Quality (of Stakeholder Relationships)

The properties of trust are highly nonlinear. It takes a long-time to build, and yet it can be destroyed instantaneously.

4.5 Enterprise Architectural Forms (Isomorphic Archetypes)

"The abstract concepts of modularity and integrality are shown to be useful for categorizing systems and illustrating how architectural form can influence important system characteristics." ⁶⁸²

This section will begin to differentiate between two extreme ends of the architectural continuum: modular and integral enterprise architectural isomorphic forms.

"Some architectures are easier to manage during **design**, others easier to manage during **operation**. Some are more robust to **deliberate attack**, while others are more robust to **random failures**."⁶⁸³

4.5.1 Modular Enterprise Architectures

The "modern" notion of *architecture* arose in the 1960's (Simon, 1962; Alexander, 1964) around the early concepts of nonlinear systems thinking & complexity science. Modular architectures are based on the reductionist-based *linear* view of systems, whereby the system can be functionally decomposed, optimized, and the resulting performance is equal to the sum of the parts.⁶⁸⁴ Integral architectures by contrast are based on the nonlinear view of systems, whereby design and global optimization occurs on the system level, and the performance can be equal to more than the sum of the parts.

Heuristic 1h:

A modular enterprise architecture will have relatively narrowly defined system boundaries⁶⁸⁵, and its *interfaces* are characterized by *short*-term, arms-length management of contracts with many undifferentiated stakeholders, i.e. a high quantity of a given stakeholder type, and relatively *low-quality* stakeholder relationships.

Heuristic 1i:

Exploitation is best served by organizational forms which exhibit *differentiation*. Therefore, a *modular* enterprise architectural form will have a greater degree of *exploitation* (or revenue growth) potential than an integral enterprise architectural *form*.

".. organizations innovate by switching between organic structures during early phases of an innovation to mechanistic structures for execution phase." 686

Heuristic 1j:

The modular enterprise is based on the offensive routines of the market-maker.

⁶⁸² Whitney et al. (2004), pg. 1.

⁶⁸³ Whitney et al. (2004), pg. 9.

⁶⁸⁴ Adam Smith's "division of labor" is a classic formalization of efficiency-driven disintegration.

⁶⁸⁵ The broad system boundaries implies an "open systems" approach to the firm.

⁶⁸⁶ Tushman et al. (2004), summarizing Duncan (1976).

4.5.2 Integral Enterprise Architectures

Heuristic 1k:

An *integral* enterprise architecture will have relatively *broadly* defined system *boundaries*⁶⁸⁷, and its *interfaces* are characterized by *long*-term, trust-based growing of relationships with few differentiated stakeholders, i.e. a *low quantity* of a given stakeholder type, and relatively *high-quality* stakeholder relationships.

Heuristic 11:

Exploration / innovation (whether in products or processes) is best served by organizational forms which exhibit *integration*. Therefore, an *integral* enterprise architectural form will have a greater degree of *exploration* (product or process innovation) potential than a modular enterprise architectural form.

"Cooptation is the process of absorbing new elements into the leadership or policy-determining structure of an organization as a means of averting threats to its stability or existence. This is a defensive mechanism..."

Heuristic 1m:

The integral enterprise is based on the defensive routines (e.g. co-optation) of the market-taker.

Heuristic 1n:

The integral enterprise has a more symbiotic, integral, long-term trust based relationships with its *competitors* than do modular enterprises.

Heuristic 10:

For an enterprise to have an *integrated* architecture, does not necessarily imply that it is "vertically integrated" in the classical sense of ownership of assets.⁶⁸⁹

⁶⁸⁷ The broad system boundaries implies an "open systems" approach to the firm.

⁶⁸⁸ Selznick, P. (1948), pg. 34.

⁶⁸⁹ Novak, S. and Eppinger, S. (1998) noted this in the automobile industry; Fine, C.H. (1998) developed a richer set of dimensions of "proximity"; Dyer, J. (2000) developed a the concept of "virtual integration".

4.5.2.1 Intra-species Heterogeneity within the Integral Enterprise Isomorph

Although the framework has thus far focused on the development of isomorphic enterprise architectural forms (i.e. exhibiting homogeneity within an isomorph while simultaneously allowing for evolutionary heterogeneity, due to the stage of disintegration), this section will begin to describe the complexity within the integral enterprise architecture species.

4.5.2.1.1 Institutional Exogenous Push vs. Individual Endogenous Pull

Enterprise architecture integrality can arise from two centripetal forces: either it can arise from the *institutional* exogenous push from the external stakeholders, or *individual* endogenous pull from the central architect(s), located within the firm that keeps the stakeholders engaged in a long-term, trust-based way as shown in Figure 203 below.

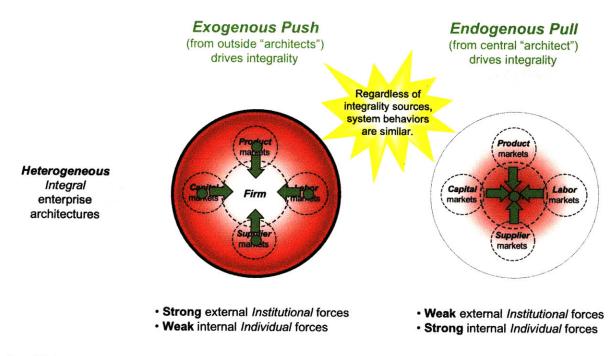


Figure 203: Institutional Exogenous Push vs. Individual Endogenous Pull

It will be argued in Essay #2, that regardless of which centripetal mechanism is operating, the dynamic behavior of the integral enterprise architecture is the same.

4.5.2.1.2 Examples and *Sustainability* of the Integral Enterprise Isomorph

We can use the three case studies used in the theoretical sample (*Airbus, Toyota* and *Southwest*) to infer different sources or combination of sources of enterprise integrality as shown in Figure 204 below.

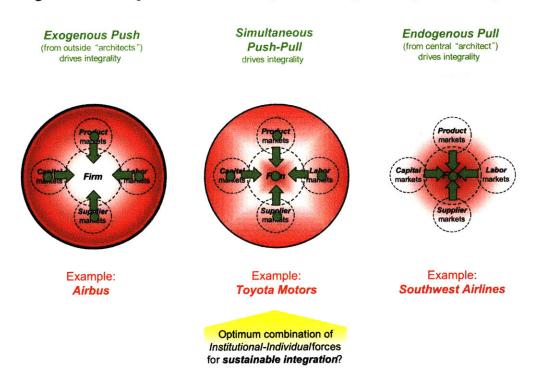


Figure 204: Examples and Sustainability of the Integral Enterprise Isomorph

Airbus might be an example of an integral enterprise architecture pushed together exogenously by strong environmental or institutional forces (e.g. European integration), while *Southwest* might be an example of an integral enterprise architecture pulled together endogenously by strong individual forces (e.g. CEO Herb Kelleher).

Toyota might however be an example of an integral enterprise architecture simultaneously pulled together endogenously by strong individual forces as well as exogenously by strong institutional forces. In fact, one might argue that the two forces feedback to create a more sustainable model, in which sustainable integrality is achieved by early internal architects which designed an exogenous environmental system which continues to nurture and select future internal architects, who continually redesign the relationship with the environment.

The sustainability of such a system arises from its mitigation of the continual concerns of leadership succession associated with the endogenous pull only (e.g. replacing a charismatic leader like Kelleher at *Southwest*), and from its mitigation of the continual concerns of broad and integrated social commitment associated with the institutional exogenous push only (e.g. maintaining a strong pan-European resolve via *Airbus* to challenge the US).

4.5.2.2 Integral Architecture and "New" Organizational Forms

"The business press heralds the twenty-first century corporation. Academic commentators identify new forms of organization, variously characterized as 'individualised', 'network', 'postmodern', 'federal', or 'cellular'."⁶⁹⁰

Recently in the management literature, researchers have begun to claim that there are new organizational forms which are displacing the old (Daft and Lewin, 1993; Whittington et al., 1999). The improved performance associated with these forms however have not systematically been tested (Nohira, 1996), in fact some researchers have been rather critical of such claims (Victor and Stephens, 1994).

"For Hedlund (1994 p. 83), too, the N-form comprises an 'integrated set' of practices, while Miles and Snow (1992) emphasize the 'systemic' character of the new organizational forms."⁶⁹¹

This research attempts to acknowledge the existence of such "new" organizational forms, but aims to define them as "new" not in absolute terms, but in relative terms – relative that is to the state of industrial evolution. Although organizational forms will undoubtedly continue to follow a unique path-dependent trajectory, making them "new" at each new future, this research seeks to find the underlying and abstracted commonality, such that there is a predictable determinism in the chaos.

⁶⁹⁰ Whittington et al. (1999), pg. 583.

⁶⁹¹ Whittington et al. (1999), pg. 584-585.

4.5.2.3 Integral Example: Japanese Keiretsu

"Groups allocate resources among their members according to a long-term vision of collective welfare. They provide a safety net for their weak members, police profiteering by imposing penalties when a member firm does too well, and insulate their membership from the harsh scrutiny of tax authorities and investment analysts by managing the reporting of profits and losses to show steady, incremental growth. The actions of groups in this regard are collectively 'rational' for the existing membership as a whole, though not necessarily rational for its strongest members"

Keiretsu are typically organized either horizontally or vertically. (Lincoln, Gerlach and Ahmadjian, 1996). It appears that long-term corporate performance is different depending upon which type of keiretsu and under which environmental conditions they are operating. For example, Lincoln et al. (1996) noted that between 1965-1988, members of Japan's "big-six" horizontal keiretsu have lower profitability than independents. The same cannot necessarily be said for Japan's vertical keiretsu during that time frame.

Others. (Dyer, 1999?; Hino, 2006.)

4.5.2.3.1 Horizontal keiretsu

The "big-six" horizontal keiretsu in Japan include the three reincarnated pre-war *zaibatsu*: *Mitsui, Mitsubishi* and *Sumitomo* as well as the post-war bank-centered groups: *Fuyo, Dai-Ichi Kangyo* and *Sanwa* (Lincoln, Gerlach and Ahmadjian, 1996, pg. 68).

4.5.2.3.2 Vertical keiretsu

Vertical keiretsu are groupings of firms, their suppliers and distributors. In Japan for example some of the most noteworthy are: *Hitachi* or *Toyota* (Ahmadjian, 1995; Aoki, 1988; Asanuma, 1989).

⁶⁹² Lincoln, Gerlach and Ahmadjian, 1996, pg. 85 and 86.

4.5.3 Orthogonality of Archetypes

Modular and integral enterprise architectures are not just marked by differences in boundaries and interfaces, by the quantity and quality of relationships with stakeholders, but by different emphases in dominant stakeholders. The confluence of these influences begins to point out the orthogonality of the enterprise archetypes.

As shown in Figure 205 below, the *modular* enterprise architecture is characterized by supplier "push" in a capacity-constrained world, and is focused on shareholder profit-maximizing goals. Conversely, the *integral* enterprise architecture is characterized by consumer "pull" in a demand-constrained world, and is focused on labor-managed goals. Note that in each case, these are diametrically opposed or orthogonal constructs.

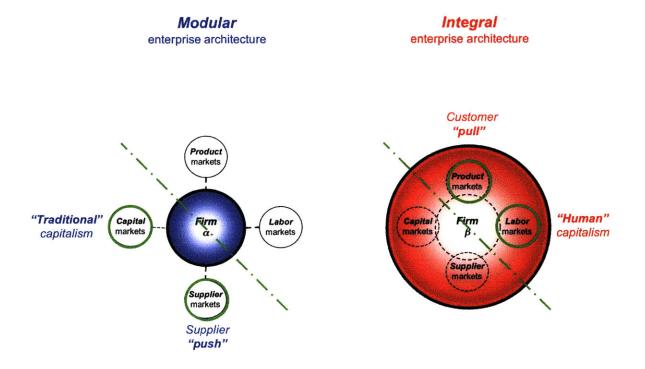


Figure 205: Orthogonality of Archetypes

4.6 The Process of Architecting Enterprises

The first step of architecting, is to understand the environmental conditions at a very deep level, and then to design the enterprise (or artifact) to fit within the requirements of the environment.

"There is an overriding management task in first interpreting correctly the market and technological situation, in terms of its instability or of the rate at which conditions are changing, and then designing the management system appropriate to the conditions, and making it work. 'Direction' is the distinctive task of managers-in-chief..."⁶⁹³

Heuristic 1p:

Enterprise architectural "design" may or may not be a conscious, rational, strategic choice (i.e. voluntaristic vs. deterministic).⁶⁹⁴ One determining factor is the maturity of the enterprise relative to the maturity of the industry.⁶⁹⁵

"We are called to be the architects of the future, not its victims." "696

"The architect must be a **prophet**... a prophet in the true sense of the term. If he can't see at least **ten** years ahead, don't call him an 'architect'."⁶⁹⁷

Heuristic 1q:

Enterprise architectural "design" is possible, however it requires long-term vision to seek environmental signals through the noise, boundary-spanning negotiation skills, and the ability to simplify complexity.

Organizational theorists Karl Weick (1993) and Peter Senge et al. (1999), have noted that design can be viewed from the perspectives of *formal* and informal or *emergent* design. In civil architectural terms, these are also referred to as: *self-conscious* and *unselfconscious* design. These will be discussed briefly in the following subsections.

4.6.1 Formal (self-conscious) design

"Formal design [is] the conscious, intentional architecture of organizations, such as guiding ideas and strategies, established structures, and policies and rules."⁶⁹⁸

4.6.2 Emergent (unself-conscious) design

"Emergent design [is] the ways that people naturally 'redesign' the organization as they live in it." "699

⁶⁹³ Burns and Stalker (1961), pg. viii (of the preface to the second edition by Tom Burns).

⁶⁹⁴ Herb Kelleher, CEO of *Southwest Airlines*, architected the enterprise's integral form.

⁶⁹⁵ For example, modular incumbents in a H.F.F. world were voluntaristic, while in a B.F.C. world, they become deterministic. See Astley and Ven de Ven (1983), and Whittington (2000)

⁶⁹⁶ Buckminster Fuller: engineer, architect, philosopher.

⁶⁹⁷ Frank Lloyd Wright.

⁶⁹⁸ Senge et al. (1999), pg. 360.

⁶⁹⁹ Senge et al. (1999), pg. 360.

4.7 Chapter Summary

This chapter was the first of three essays which forms an integrated framework which attempts to explain long-term firm performance. In this chapter, we defined the construct of an *enterprise architecture*, its sources and properties.

The context for this construct within the framework is shown below in Figure 206. In the following chapter, we will next discuss how these architectures provide the highest level explanations for the ensuing dynamic performance of the firm.

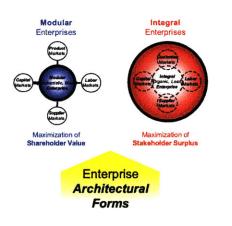


Figure 206: Enterprise Architecture within Framework

Chapter 5 Competitive Dynamics

Having defined the various enterprise architectural forms (or species) occupying the ecosystem, we can now discuss how these species function, that is, what market niches they occupy, how they serve those markets, and the dynamics of competition both within and between species.

"We [Ford] have been going out of business for 40 years."700

5.1 Introductory Constructs and Propositions

"We should have a system of economics that is structure. We do not have it. We are all hanging by our eyebrows from skyhooks economically, just as we are architecturally."⁷⁰¹

Having outlined a framework for the understanding of an enterprise architectural form, we now need to translate it operationally into a more concrete structural form, in order that we may understand and ultimately predict the dynamics of the enterprise.

5.2 Theoretical Foundations

The notion of *enterprise structural dynamics* can be constructed from a variety of eclectic theoretical management traditions ranging from general systems theory (von Bertalanffy, 1962) to system dynamics (Forrester, 1961). The following briefly summarizes a few of the threads in various fields within economics and sociology.

5.2.1 Economic Theories

5.2.1.1 Penrose and Firm Growth

"The question I wanted to answer was whether there was something inherent in the very nature of the firm that both **promoted its growth** and necessarily **limited its rate of growth**."⁷⁰²

Theories of firm growth have tended to focus on corporate growth through the inorganic mechanism of mergers and acquisitions in the development of the diversified M-form and beyond.

Theories of growth of the strategic business unit or the single product firm are relatively rare. One of the first researchers to tackle the topic was Penrose, in her 1959 classic, *The Theory of the Growth of the Firm.* It tended to focus internally on the constraints and enablers of the development of resources of the firm, which ultimately led to the school of thought in strategic management today known as the *resource-based view* of the firm.

⁷⁰⁰ Ford CEO, Alan Mulally, "The New Heat on Ford," by David Kiley, Business Week, June 4, 2007.

⁷⁰¹ Frank Lloyd Wright.

⁷⁰² Penrose, E. (1959).

5.2.1.2 Marris and Growth vs. Profitability

"In the managerial utility function: growth rate is a proxy for income, power, prestige, and accompanying managerial gains from growth; and stock-market value is a proxy for job security."⁷⁰³

Following in Penrose's search for the enablers and constraints to firm rates of growth, Marris (1963) noted that the separation of ownership from management created a principal-agent conflict regarding the tradeoff between growth and profitability as shown conceptually in Figure 207 below.

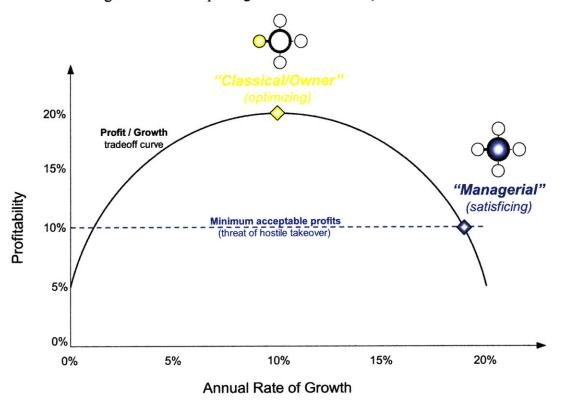


Figure 207: Principal-Agent conflicts in Profits and Growth

"Growth models, unlike managerial static models, required the development of a new of transformation function to specify the constraint against which utility was to be maximized. They required, that is to say, a body of theory to indicate the trade-off between growth rate and stock-market value – a 'valuation curve' with the (normalized) level of stock-market value on one axis and the expected growth rate of the size of the firm on the other."⁷⁰⁴

It is interesting to note that the trade-off between profits and high rates of growth is hypothesized to lie in the general "dynamic diseconomies of scale", or degradation of capabilities.

⁷⁰³ Marris, R. and Mueller, D.C. (1980), pg. 42.

⁷⁰⁴ Marris, R. and Mueller, D.C. (1980), pg. 42.

"The relationships were also embellished by taking account of the costs of administrative inefficiencies caused by rapid growth in size ('dynamic' diseconomies of scale, not to be confused with static phenomena) as suggested by E.T. Penrose (1959)..."⁷⁰⁵

Empirical evidence both in the U.S. (Holl, 1977) and Australia (Lawriwsky, 1984), supports the claims that managers – without contravening incentives – tend to maximize growth and satisfice profits.

As will be discussed in chapter 6, a life-cycle theory of the firm (Mueller, 1972), predicts that this severity of this owner-manager conflict varies throughout the age (and growth ability) of the firm.

5.2.1.3 Goodwin and the Business Cycle

"Goodwin showed that the antagonist relationship between workers and capital owners could lead to cycles."⁷⁰⁶

Goodwin was one of the first economists who tried to combine the behaviors of growth and cyclicality (Weber, 2005), which was based on the classical predator-prey models (Lotka, 1925; Volterra, 1926).

Within the framework of the enterprise architecture presented herein, it is the tension created by the separation of the interests of the factors of production (i.e. the capital owners and the labor) which generates the business cycle oscillation as shown in Figure 208 below.

⁷⁰⁵ Marris, R. and Mueller, D.C. (1980), pg. 42.

⁷⁰⁶ Weber (2005), pg. 5.

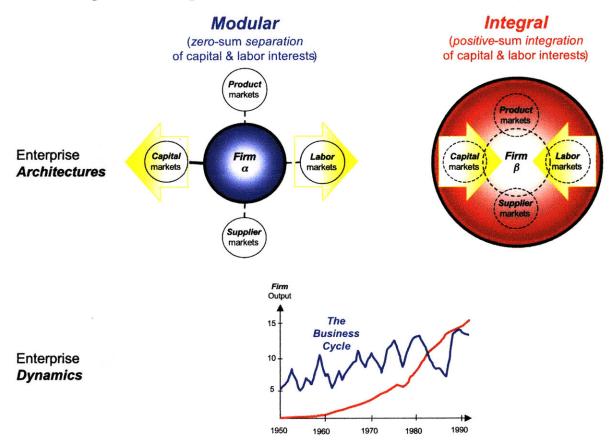


Figure 208: Enterprise Architecture as a Generator of the Business Cycle

Note that system dynamicists (e.g. Forrester, 1968b; Mass, 1976; Sterman, 2000) have long demonstrated via numerical simulation, the plausibility of workforce-inventory interactions in the form of a balancing loop with delay as the origin of the business cycle.

5.2.1.4 Kuznets and the Machine Investment Cycle

In addition to the lightly-damped, 3-5 year business cycle, the enterprise architecture can be used to idealize the heavily-damped 20-year machine-investment or Kuznets cycle. As shown in Figure 209 below, the enterprise architecture can be used to visualize the sources of both the business cycle (i.e. the balancing behavior with delays between firm's inventory and labor markets) and the Kuznets cycles (i.e. the balancing behavior with delays between the firm's inventory and capital markets).

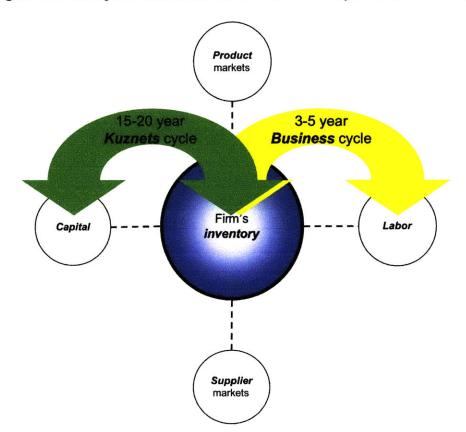


Figure 209: Enterprise Architecture and the Business Cycle and Kuznets Cycle

5.2.2 Sociology and Organizational Theories

A good discussion of the various threads can be found in Burrell and Morgan (1979).

5.2.2.1 Structural Functionalism

5.2.2.2 System Theory

The multidisciplinary field of general systems theory began in the 1950's with great ambition (von Bertalanffy, 1962). The intellectual traditions attempted to develop generic system characteristics across many fields from mechanistic to organismic to organizational.

5.2.2.2.1 System Goals: Growth and Stability

"Organization has three goals which are growth, stability and interaction."⁷⁰⁷

Early social systems theorists (Henderson, 1935; Boulding, 1956; Forrester, 1961; Scott, 1961) explored the range of system goals. Henderson (1935) hypothesized the goals of stability, growth and interaction, which later researchers classified as development (Ackoff, 1999). Boulding (1956) and Forrester (1961) focused on growth and stability.

"The goal is 'enterprise design' to create more successful management policies and organizational structures...which influence growth and stability."⁷⁰⁸

System Dynamics "is a quantitative and experimental approach for relating organizational structure and corporate policy to industrial growth and stability."⁷⁰⁹

"Top-management structures have different forms, different attitudes, and different histories. They differ in courage, conservatism, flexibility, rapidity of reaching decisions, and in the objectives being sought. Just as the operating functions interact with one another to produce important dynamic behavior characteristics, so will the interaction between top-management structure and the operating departments favor different growth and stability patterns."⁷¹⁰

5.2.2.2.2 Open vs. Closed Causal Systems

Much of the theory of enterprise architectures and their resulting structural dynamics hinges upon assumptions of the boundary of the firm (or of the unit of competitive analysis) which defines how the firm engages its environment. This issue will become important again later in essay #3 as we investigate the implications for industrial evolution.

There is a rich and slightly incoherent view of firms as either closed or open systems in the social sciences. Clarification of the definitions of these terms is crucial to understanding the discrepancies.

⁷⁰⁷ Scott, W.G. (1961), pg. 20.

⁷⁰⁸ Forrester, J.W. (1961).

⁷⁰⁹ Forrester, J.W. (1961), pg. 13.

⁷¹⁰ Forrester, J.W. (1961), pg. 329.

5.2.2.2.3 Open – Closed Systems and Functional In(ter)dependence

Modular enterprise architectures are characterized by functional independence. This can be modeled causally as an open causal system.

Integral enterprise architectures are characterized by functional interdependence. This can be modeled causally as a closed causal system.

5.2.2.2.4 Feedback Systems: *Positive & Negative*

While organizational theorists (Lawrence and Lorsch, 1967) have discussed the integrationdivision dichotomy, systems theorists (Stacey, 1995) note that the forces of *integration* lead to *stable* equilibrium via *negative* feedback, while the forces of *division* lead to *instability* via *positive* feedback.⁷¹¹ Both forms of feedback can lead to different forms of growth: stable and unstable.

It is interesting to note that the quest for *efficiency* is argued both for the forces of integration (Stacey, 1995, pg. 484) causing stability via negative feedback and for the forces of division (Smith, 1776), causing instability via positive feedback.

5.2.2.2.5 Feedback Systems: System Dynamics and Cybernetics

In a compelling historical review of feedback thinking, Richardson (1991) hypothesizes the existence of two subtle but important threads within the social sciences: the servomechanisms and cybernetics threads.

System Dynamics "is a quantitative and experimental approach for relating organizational structure and corporate policy to industrial growth and stability."^{7/2}

System dynamics is a method for understanding how structure drives behavior in a wide range of social and technical systems.

"To Professor Jay Forrester, for codifying the dynamics of social systems as long ago as the 1950's. I remain mystified as to why these essentially simple mechanisms that constitute the processes of change in all social systems have lain largely unnoticed for four decades."⁷¹³

⁷¹¹ Stacey, R.D. (1995), pp. 484-485.

⁷¹² Forrester, J. W. (1961), pg. 13.

⁷¹³ Warren, K. (2002).

5.2.3 Strategic Management Theories

5.2.3.1 Dynamic Capabilities

"We define dynamic capabilities as the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments."⁷¹⁴

Teece, Pisano and Shuen (1997) define dynamic capabilities as operating in rapidly changing environments. Yet they also ironically note that firm success, like *Toyota Motors* and *Southwest Airlines* fall outside conventional exploitation of market power models. We present some evidence to the contrary.

"We doubt that game theory can comprehensively illiminate how Chrysler should compete against Toyota or Honda, or how United Airlines can best respond to Southwest Arilines since Southwest's advantage is built on organizational attributes which United cannot readily replicate."⁷¹⁵

5.2.3.2 Functional Configurations

Miles and Snow (1978) defined a configurational typology which ultimately led to one of the top ten most influential publications in strategic management (Ramos-Rodriguez and Ruiz-Navarro, 2004). By studying four industries: publishing, electronics, food processing and health care, they defined a typology of four strategic types: *prospectors, analyzers, reactors* and *defenders*.

These strategic types were deemed to be equally effective independent of the environmental conditions. In Essay #3, it will be shown that other researchers demonstrated environmental contextual variables govern the performance of strategic types (Hambrick, 1983).

5.2.3.2.1 The Four Types

5.2.3.2.1.1 Prospectors

"Prospectors are characterized by their constant search for new products and markets. They continually experiment with new product lines and venture into new markets. These organizations are the creators of change in their markets and are the forces to which competitors must respond. As such, prospectors are more concerned with searching for new opportunities and will likely not be as efficient as defenders."⁷¹⁶

5.2.3.2.1.2 Analyzers

5.2.3.2.1.3 Reactors

5.2.3.2.1.4 Defenders

⁷¹⁴ Teece, Pisano and Shuen (1997), pg. 516.

⁷¹⁵ Teece, Pisano and Shuen (1997), pg. 512.

⁷¹⁶ Delery and Doty (1996), pg. 810.

"The defender has a **narrow and stable** product-market domain and **seldom makes major** adjustments in its technology or structure. The emphasis is on better and more efficient ways to produce a given product or service and on defending a market. A defender does little research and development. When defenders persue new products, they import the technology from outside the organization."⁷¹⁷

5.2.3.2.2 Empirical Examples

In Table 17 below, Arthur (1992) shows the results of an empirical study of IR practices and strategy of US Steel Mini-mills. Note that while it does show empirical match between strategy and IR practices, it does not specify levels of firm performance.

		Business Strategy	
		Low Cost	Differentiation
Industrial Relations System	Cost Reducing	8 (89%)	8 (40%)

Table 17: Strategy-HRM Fit

It is important to note that the three case studies presented in this dissertation demonstrate the opposite matching, namely that commitment maximizing IR systems tend map to Low Cost strategies, contingent upon the state of the industry's evolution.

In Table 18 below, Delery and Doty (1996) show the following rankings from a survey study using Likert rankings of the banking industry.

Table 1	8:	Configuration	Attributes
---------	----	---------------	------------

Ideal Strategic Profiles Variables	Prospector	Analyzer	Defender
Technological progress	5.64	4.82	4.86
Product / market breadth	5.68	5.18	1.59
Product innovation	6.95	4.68	1.68
Quality	5.47	5.30	5.86
Price level	6.61	4.40	1.32
Active marketing	6.52	5.54	3.14
Long-range financial strength	4.11	5.83	4.88
Resources level	4.86	5.18	4.30
Investment in production	2.91	4.59	6.18
Internal analysis level	3.68	5.62	6.82
External analysis level	6.95	5.24	2.05
Level of risk	6.00	2.62	2.68
Proactive management style	6.76	4.90	2.86

⁷¹⁷ Delery and Doty (1996), pg. 810.

5.3 Structural Mechanics

5.3.1 Structural Building Blocks

In order to build a theory translating architectural form into structural dynamics, we must next define the underlying structural building blocks which generate the dynamic reference modes.⁷¹⁸ These include the following, which will be described in more detail:

- Positive (reinforcing) feedback
- Negative (balancing) feedback
- Delays
- · Carrying capacity

"Learning to recognize and account for time delays goes hand in hand with learning to be **patient**, to **defer gratification**, and to trade **short-run sacrifice** for **long-term reward**. The abilities do not develop automatically. They are part of a **slow process of maturation**.

In a world of short time horizons, of annual, quarterly or even monthly performance reviews, the incentives people face often mean it is rational for them to be aggressive and ignore the delayed consequences of their actions.

The problem is one of aggregation. The individual firm tends to view itself as small relative to the market and treats the environment as exogenous, thereby ignoring all feedbacks from prices to supply and demand."⁷¹⁹

The two key feedback relationships (positive and negative) will first be described along with the two essential building blocks of time delays and system carrying capacity. These will subsequently be assembled into a set of reference modes that capture the fundamental structural dynamics of the enterprise architectures.

"The qualitative distinction between these two sorts of feedback mechanisms, one amplifying heterogeneity and the other sustaining the current level of heterogeneity, is likely to be robust. Heterogeneity in competitive position is sustained by existing market relations and tends to be amplified by overall market position."²⁰

⁷¹⁸ Forrester, J.W. (1968).

⁷¹⁹ Sterman, J.D. (200), pp. 696-697.

⁷²⁰ Levinthal, D. and Myatt, J. (1994), pg. 61.

5.3.2 Fundamental Reference Modes

Having defined the structural mechanics or principles of systems, we can next describe how these generate the fundamental reference modes which are summarized in Figure 210 below.

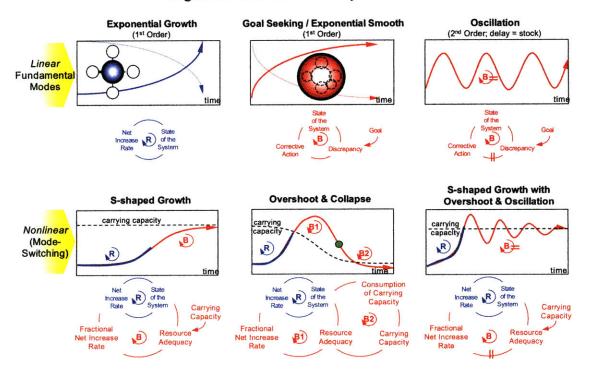


Figure 210: Fundamental Reference Modes

- Exponential Growth / Decay
- · Goal-seeking Growth / Decay
- Oscillation
 - Balancing Loop with delays
 - Conflicting Goals⁷²¹
- S-Shaped Growth
- Overshoot and Collapse
- Overshoot and Oscillate

"An appropriate caveat to these market positional advantages is that they are self-reinforcing in competitive environments in which the bases of competitive advantage are stable. Conversely, in changing environments, these same self-reinforcing mechanisms may lead to decline in the firm's competitive position (Levinthal, 1992)."⁷²²

⁷²¹ See Peter Senge interview, "Illuminating the Blind Spot: Leadership in the Context of Emerging Worlds." on McKinsey/SoL joint research project.

⁷²² Levinthal, D. and Myatt, J. (1994), pg. 47.

5.3.3 The "Physics" of Growth

The physics of growth depends upon the assumptions of model boundaries and therefore exogenous constants. Figure 211 below summarizes the structures and behaviors of a variety of single and multi-loop, linear and nonlinear first order systems, with exogenous constants shown in green.⁷²³ Note that one would not expect to see any oscillation in any of these behaviors, due to the fact that they are all first order systems.

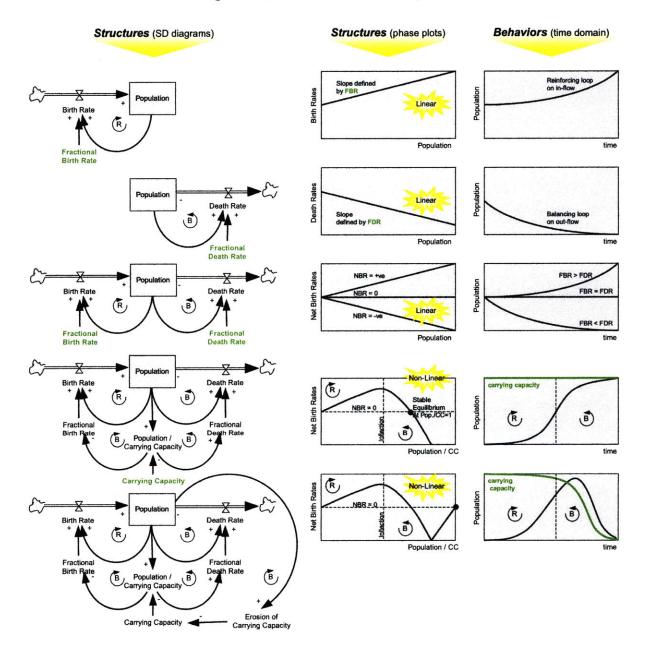


Figure 211: First Order Growth Systems

⁷²³ Sterman, J.D. (2000) pp. 118-127 and 282-290 provides a good discussion of growth modes.

"The question I wanted to answer was whether there was something inherent in the very nature of the firm that both **promoted its growth** and necessarily **limited its rate of growth**."⁷²⁴

"The analysis of the **limits to growth** – the factors determining the **maximum rate of growth** of firms – cannot, in its present formulation at any rate, be tested against the facts of the external world, partly because of the difficulties in expressing some of the concepts in **quantitative terms** and partly because of the impossibility of ever knowing for any given firm what is, or what would have been, its maximum rate of growth. Perhaps some of these difficulties will be overcome in **different formulations** constructed by others..."

"In order to find comprehensive and rigorous answers to the questions Penrose (1959) posed concerning firm growth processes, more conceptual and especially empirical research needs to be done on the dynamics of growth, that is analyzing the paths and the effects of the outcome of different sequences in the growth process."⁷²⁶

⁷²⁴ Penrose, E. (1959).

⁷²⁵ Penrose, E. (1959), pg. 4.

⁷²⁶ Kor and Mahoney (2000), pg. 128.

5.3.4 Enterprise Inertias

In contrast to the traditional beliefs of "classical" strategic management, where managers have high degrees of *rationality* and search capabilities, and where organizations have high degrees of *plasticity*,⁷²⁷ the notions of *inertia* posit that organizations are typically unable to react to environmental change in a timely manner.⁷²⁸

This framework, however broadens the perspective of strategy by identifying not one, but two separate forms of organizational inertia: *architectural* and *structural*, both of which ultimately arise from the enterprise's architectural form, as shown in Figure 212 below. Broadly speaking, architectural inertia limits the firm's response to *environmental* change, while structural inertia limits the firm's response to *operational* change.⁷²⁹

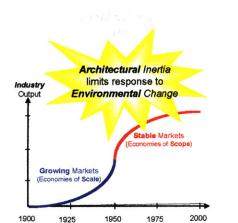
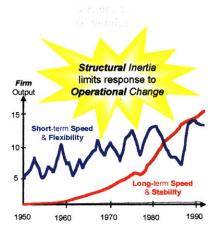


Figure 212: Architectural and Structural Inertia



⁷²⁷ Gavetti and Rivkin (2004).

⁷²⁸ Whittington, R. (2000).

⁷²⁹ While the terms "architectural" and "structural" inertia are coherent and consistent with the overall framework developed herein, they will undoubtedly cause confusion in the strategic management community. My use of the term "architectural" inertia to describe resistance to *environmental* change is termed "structural" inertia by population ecologists, which is the term that I use to describe resistance to *operational* change.

The following subsection briefly explores structural inertia and its effects on the dynamics of operational change. Chapter 6 will explore architectural inertia and its effects on the evolution of enterprise architectures in response to environmental changes.

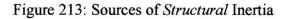
5.3.4.1 Structural Inertia

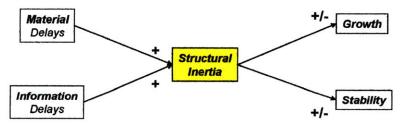
The notion of *structural* inertia limits the firm's response to *operational* change. Specifically, when looking at aggregate system variables like firm output (Q), it is clear that some enterprises undergo more severe instability or oscillations than others when subjected to similar environmental shocks (like variable customer demands). Structural inertia therefore is fundamental in defining an enterprise's approach to such system goals as *growth* and *stability*.⁷³⁰

Heuristic 2a:

Modular enterprise architectures tend to have less structural inertia than equivalent integral enterprise architectures. As a result, modular enterprise architectures have greater short-term speed and instability than equivalent integral enterprise architectures.

The determinants of structural inertia are also different than the determinants of architectural inertia. Although age and size have secondary impact on structural inertia, the fundamental drivers are those material, information and mental state delays in the system, as shown in Figure 213. Such delays tend to inject time into the system, making its fundamental period of oscillation longer. Instability therefore occurs when the fundamental period of oscillation is close (i.e. near resonance) with the fundamental period of oscillation of the forcing function (e.g. customer orders).⁷³¹





As an aside, please note that not only can structural inertia cause the amplification or attenuation of enterprise instability, but other structural quantities, like damping and stiffness can have similar effects. These will be discussed later.⁷³²

Heuristic 2b:

As the nature of customer demand changes tends to consist of a series of small, frequent, pulses, the "loading function" on the enterprise tends to be multi-frequency transients.

⁷³⁰ The field of System Dynamics explicitly addresses the mechanics of social system inertia. See Forrester (1961, 1968).

⁷³¹ Piepenbrock, T. (2004).

⁷³² Piepenbrock, T. (2004).

By way of a brief illustrative example, *Boeing*, the 90-year old large incumbent currently has a modular enterprise architecture. This would imply high architectural inertia (due to its age, size and routines) making it difficult to survive discontinuous environmental change⁷³³, while its structural inertia is relatively low due to its short-term speed and growth objectives.

Conversely, *Airbus*, the 40-year old smaller challenger currently has an integral enterprise architecture. This would imply lower architectural inertia (due to its age, size and routines) making it easier to survive discontinuous environmental change⁷³⁴, while its structural inertia is relatively high due to its long term speed and stability objectives.

"As we go back into a commodity supply system, the structural character begins to change. In the distribution system for manufactured products, goods are shipped in response to orders. A product is shipped to a customer only if he wants it. Stresses within the system manifest themselves more by a change in the flow rate of goods than by changes in price. We commonly observe that a factory will adjust production rate to market demand by production-rate changes that are larger and faster than are the price changes. By contrast, the commodity system tends to be one in which supply rates can be adjusted but slowly. The commodity is not produced to the specific order of the customer. Price fluctuates more rapidly than supply rate."

⁷³³ Like "disruptive innovations" at the low end of its market from *Embraer* and *Bombardier* for example. See Christensen et al. (2004).

⁷³⁴ Ibid.

⁷³⁵ Forrester, J.W. (1961), pp. 322.

5.3.5 Time and the Causal Levels of Competition

Wernerfelt (1984) argued for clarity in the strategic management literature by differentiating between competition based on *products* and competition based on a deeper generating mechanism, namely *resources*.

This research argues for a deeper generating mechanism, namely that of an *enterprise architecture*, which ultimately enables and constrains (but does not determine) what resources can be generated and how they might be built and maintained.

As shown in Figure 214 below, the research assembles a causal logic in which integral enterprise architectures are built based on the mutual consent of the stakeholder ecosystem to take the time required to develop the capabilities necessary to dominate a market over the long term. This is a "patient", long-term thinking ecosystem.

Conversely, modular enterprise architectures are built to extract as much rent from the ecosystem as possible to be given to the shareholders. This stakeholder group typically demand high rates of return (and therefore growth). This tends to be an "impatient" short-term thinking ecosystem.

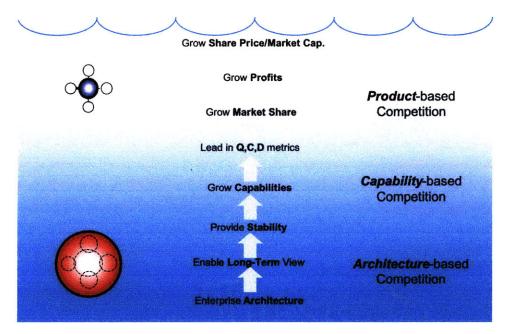


Figure 214: Time and the Causal Levels of Competition

It has been observed empirically⁷³⁶, that when a modular architecture is competing against an integral enterprise architecture, and is losing ground over the long run, it tends to adopt the "surface details" of the integral enterprise architecture, without changing the fundamental nature of its modular architecture, making its long-term competitive position even worse.

⁷³⁶ Empirical observations include: automobiles (Womack et al., 1990), airlines (Hoffer-Gittell, 2003) and large commercial airplanes (Piepenbrock, T. 2004).

5.4 Enterprise Architecture Form-Structure Mapping

Having dfined the characteristics of enterprise architectural forms, this section will now begin to map these forms to their associated "structures" or functional behaviors. These functional behaviors will be divided into *quantity*-based and *quality*-based growth variables.

5.4.1 Quantity Growth (Operations Strategy)

This sections deals with the growth in *quantity* of enterprise inputs (e.g. workforce, R&D spending) and outputs (e.g. annual number of cars produced, annual number of seat-kilometers flown).

"Top-management structures have different forms, different attitudes, and different histories. They differ in courage, conservatism, flexibility, rapidity of reaching decisions, and in the objectives being sought. Just as the operating functions interact with one another to produce important dynamic behavior characteristics, so will the interaction between top-management structure and the operating departments favor different growth and stability patterns."⁷³⁷

Having defined the spectrum of enterprise architectural forms, characterized by the modular and integral archetypes in chapter 4, we will now begin a stylized mapping of their structural dynamics. As can be seen in Figure 215 below, the growth of the modular enterprise is characterized by instability (i.e. positive feedback), while the growth of the integral enterprise is characterized by stability (i.e. negative feedback). It is important to note that the growth trajectories of each enterprise architecture are not subtly different, in fact they are 180 degrees different.

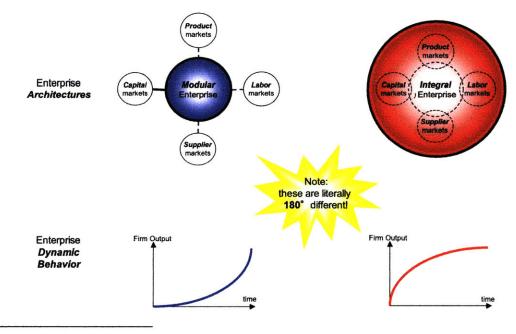


Figure 215: Enterprise Architecture Form-Structure Mapping

⁷³⁷ Forrester, J.W. (1961), pg. 329.

Heuristic 2c:

The structural *dynamics* of an enterprise (growth vs. stability), will be governed by the architectural *form* (modular vs. integral) of the enterprise. The modular enterprise is "built" for exponential growth, while the integral enterprise is "built" for goal-seeking stability.

"Firm growth is a result of a process of development... in which an interacting series of internal changes leads to increases in size accompanied by changes in the characteristics of the growing object."⁷³⁸

Heuristic 2d:

The dynamic response of any socio-technical system is governed by three structural properties: *structural inertia* (Hannan and Freeman, 1984), *structural damping*, (e.g. time constants used in exponential smoothing for decisions – i.e. level of "patience") and *structural stiffness*. Modular enterprise architectures tend to have shorter natural periods of oscillation (i.e. less inertia, less damping and/or more stiffness) than integral enterprise architectures.⁷³⁹

Heuristic 2e:

The dynamic response of the enterprise is a function of both the enterprise's endogenous structural properties, and those of the exogenous environment. The "dynamic amplification" of the enterprise is a function of the ratio of the natural periods of oscillation of the enterprise with respect to the environment.⁷⁴⁰

Heuristic 2f:

The structural mechanics of an enterprise defines the enterprise's *efficiency*. Enterprise *efficiency*, together with enterprise *effectiveness*, define an enterprise's performance capability. (Note: the more efficient enterprise structure may not exhibit the highest performance.)

Heuristic 2g:

A modular enterprise architecture having a greater degree of exploitation potential will be driven by shorter-term objectives, be able to have faster short-term growth rates, based on the positive or reinforcing feedback dynamics of economies of scale, associated with mass production. Rapid short-term growth is driven by competition for building capacity via the capital markets (known as "capitalism").

"Mass production is, in fact, a system ideally suited to the survival of large enterprises in a highly cyclical economy. Both workers and suppliers are considered variable costs. The problem with the American pattern is that it is extremely corrosive to the vital personal relationships at the core of any production process."⁷⁴¹

⁷³⁸ Penrose, E. (1959), pg. 1.

⁷³⁹ Piepenbrock, T. (2004).

⁷⁴⁰ Piepenbrock, T. (2004).

⁷⁴¹ Womack, Jones and Roos (1990), pp. 247-248.

Heuristic 2h:

A *modular* enterprise operates under the following reinforcing circular managerial mental model: "demand for my products is *not* durable...therefore I *can't* keep my supply stable...therefore my long-term costs are *not* lower...therefore demand for my products is *not* durable....

Heuristic 2i:

An *integral* enterprise architecture having a greater degree of *exploration* potential will be driven by *longer*-term objectives, be able to have faster *long*-term growth rates, based on the *negative* or *balancing* effects of economies of *scope*, associated with *lean* production. Rapid long-term growth is driven by competition for growing capability via the labor markets (known as "*human capitalism*").

"... the well-known 'lean production system' was developed within a highly integral supply chain."742

Heuristic 2j:

An *integral* enterprise operates under the following reinforcing circular managerial mental model: "demand for my products is *durable*...therefore I *can* keep my supply stable...therefore my long-term costs are *lower*...therefore demand for my products is *durable*....

5.4.1.1 Optimum Rates of Growth

A significant research area in strategic management explores whether there is an optimum rate of firm growth, and if so, what are its bounds

Raisch and Krogh (2007) posit that minimum rates of growth are determined primarily by competitive pressures for marktet share in order to achieve economies of scale and scope. They also posit maximum rates of growth are determined by external market limits, external or internal financial limits (i.e. the "sustainable growth rate"), or internal managerial limits (Penrose, 1959).

"Not all growth is good. An analysis of Fortune Global 500 companies shows that businesses that grew within the limits of their growth corridors performed far better than others – even those that grew faster." 743

Empirically, Raisch and Krogh (2007) demonstrate that "smart growth" firms which stay within their "growth corridor" deliver average returns to shareholders that are nearly double those firms that grow either faster or slower than their "growth corridors". They also note that such "smart growth" firms are relatively rare, comprising only 25% of their sample of *Fortune* Global 500 firms (between 1995 and 2004).

⁷⁴² Fine, C.H. (1998). pg. 138.

⁷⁴³ Raisch and Krogh (2007), pg. 65.

5.4.2 Quality Growth (Marketing Strategy)

"Many economists would be wont to propose that the strategy represents a firm's solution of its profit maximization problem, but this seems misconceived to me... firm strategies seldom determine the details of firm actions, but usually at most the broad contours.""⁷⁴⁴

"The architectural form is the solution-neutral restatement of the problem."745

5.4.2.1 Structural vs. Strategic variables

This section begins to explore the role of strategy within the context of an enterprise architecture. It will attempt to contribute to the debate of the importance of "structural" variables vs. the importance of "strategic" variables.⁷⁴⁶ As shown in Figure 216 below, the relationships between firm and industry structure are related to firm performance – either with or without strategy. As can be seen, the main strategic frameworks of SCP, SSP and RBV are shown.⁷⁴⁷

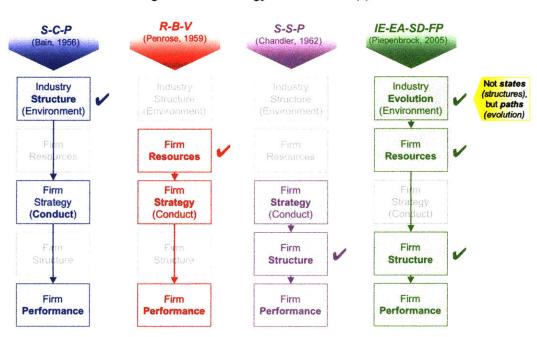


Figure 216: Strategy vs. Structure(s)

What this research aims to resolve therefore is the importance of strategy – namely under what conditions does it matter?⁷⁴⁸

⁷⁴⁴ Nelson, R. (1991), pg. 67.

⁷⁴⁵ Crawley E. and de Weck, O.

⁷⁴⁶ Farjoun, M. (2002), footnote 14, pp. 577.

⁷⁴⁷ Farjoun, M. (2002), pp. 573.

⁷⁴⁸ Whittington, R. (2000).

5.4.2.2 Strategic Positioning: Differentiation vs. Cost-Leadership

Classical strategy defines that firms achieve competitive advantage via strategic choices of differentiation vs. cost-leadership (Porter, 1980).

5.4.2.3 Strategic Investment: Flexibility vs. Commitment

Pacheco-de-Almeida et al. (2008) highlight the strategic investment choices between flexibility and commitment, which lie at the center of the choice between modular and integral enterprise architectures: with the former being designed for flexibility, and the latter for commitment.

"This high-profile example [between **Airbus** and **Boeing**] illustrates the fundamental strategic trade-off between commitment and flexibility that managers face when deploying firm resources to establish product-market positions. **Commitment** and **flexibility** lie on the **opposite ends** of a firm's investment spectrum, and scholars have been divides as to which of the two strategies is the main driver of investment value."⁷⁴⁹

5.4.2.4 Enterprise Efficiency vs. Effectiveness

Pfeffer and Salancik (1978) articulated clearly between internal *efficiency* and external *effectiveness*.

"The effectiveness of an organization is its ability to create acceptable outcomes and actions. It is important to avoid confusing organizational effectiveness with organizational efficiency. The difference between the two concepts is at the heart of the external versus internal perspective on organizations. **Organizational effectiveness is an external standard** of how well an organization is meeting the demands of the various groups and organizations that are concerned with its activities. **Organizational efficiency is an internal standard** of performance."⁷⁵⁰

The sources of long-term firm performance are known to emanate from the development of a sound strategy along with the execution of that strategy through its operations. The positioning school of strategy focuses on where in the cost-quality space to play, and the resource-based view school of strategy focuses on how to get to the firm's efficiency frontier (Porter, 1996; Markides, 2001; Saloner, Shepard and Podolny, 2001).

Porter (1996) famously argues that operational excellence is a necessary but insufficient condition for success as shown in Figure 217 below. Similarly, this research argues that strategy is a necessary but insufficient condition for success.

⁷⁴⁹ Pacheco-de-Almeida, Henderson and Cool, (2008), pg. 517.

⁷⁵⁰ Pfefer and Salancik, (1978), pg. 11.

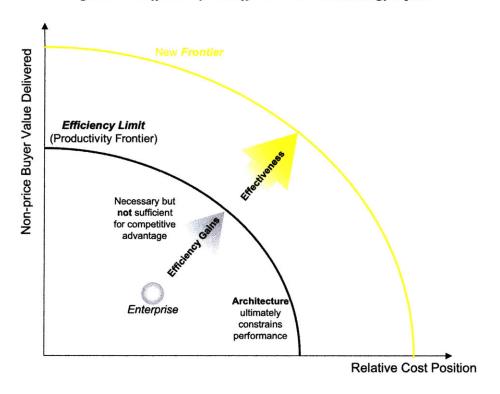
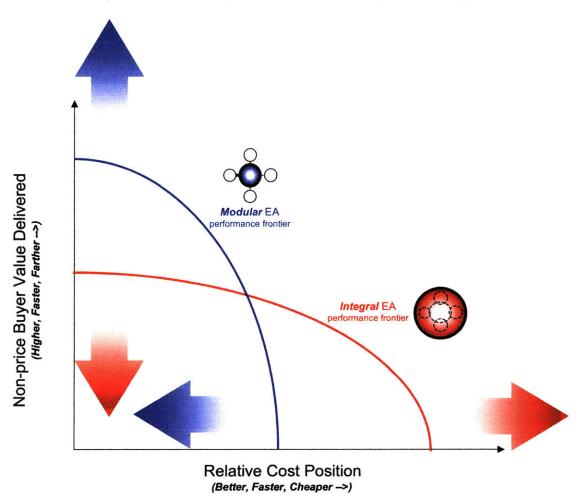


Figure 217: Efficiency vs. Effectiveness in Strategy Space

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5.4.2.5 Strategic Biases of Enterprise Architectures

Unlike the previous discussion, this research will attempt to demonstrate that different enterprise architectures have different strategic predispositions, which bias shape of the performance frontiers. As shown in Figure 218 below, the modular enterprise architecture has historical biases toward differentiated products, and as such exhibits a vertical stretch of its performance frontier. Conversely, the integral enterprise architecture has biases toward low cost (via its high stability), and as such exhibits a horizontal stretch of its performance frontier. It will be argued thin chapter 6 that environmental pressures act to bias these performance envelopes.



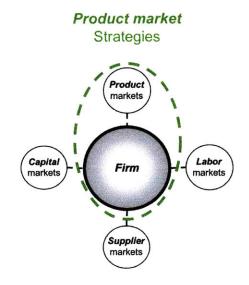


This research attempts to illustrate that the construct of enterprise architecture, which both enables and constrains performance, lies above operations and even strategy. It can determine what strategies are viable, and what operations - no matter how efficient - will be effective.

5.4.2.6 Case Studies: Product Strategy in Commercial Airplanes

In order to illustrate the above concepts, we will focus on one link in the enterprise architecture: the relationship between the firm and its customers through product markets, as shown in Figure 219 below.

Figure 219: Examining the Product Market Strategies in Commercial Airplanes



Two cases will be briefly explored to illustrate systemic architectural thinking. The first is the alleged competition between the *Boeing* 787 and the Airbus A380. The second is the real competition between the *Boeing* 787 and the *Airbus* A350, and more importantly how the evolution of product strategies can be explained by the respective enterprise architectures.

Note that in both cases, whether in direct or indirect competition, the trajectories of each firm are out of phase.

5.4.2.6.1 Boeing 787 vs. Airbus A380

"Two companies with fundamentally different products, based on diametrically opposite visions of the future, [are] engaged in a Hatfields versus McCoys battle with billions of dollars at stake. Boeing versus Airbus is one of the most hard-fought, closely watched marketing battles out there. It is also one of the most fascinating. Not long ago, it appeared as if Airbus had gained the upper hand. If Boeing succeeds in winning this battle – and it appears to be well on its way – it will amount to one of the great reversals of business fortunes. It will also serve as proof of the wisdom of understanding the marketplace well enough to lead, rather than follow."⁷⁵¹

"Another gamble by Boeing [is] that the future of the airline business will be in point-to-point nonstop flights with medium-size planes rather than the current hub-and-spoke model favored by Airbus, which is developing the 550-seat A380 superjumbo as its premier long-haul jetliner."⁷⁵²

Much has been said in the press about the "radically" different strategies of *Boeing* and *Airbus*, since *Boeing* abandoned its Sonic Cruiser for the 7E7, renamed the 787. It has been suggested that *Boeing* has adopted a strategy supporting "point-to-point" airline networks, with smaller airplanes traveling greater distances, as is evidenced by the 787. Conversely, *Airbus* has adopted a strategy supporting "hub-and-spokes" airline networks, with larger airplanes, as is evidence by the A380. This is another example of non-systemic "laundry list thinking". If one were to look *spatially* at the entire portfolio of products, as well as *temporally* the longitudinal timing and phasing of new product introduction initiatives, it is obvious that the "spin" in the press is just that (even though the sources of such spin come from the firm's PR functions themselves).

"A number of commentators have **spuriously** evaluated the prospects of the 787 and A380 as a question of the hub versus spoke concept of aviation growth. This is **wrong** because it is abundantly clear that the future will be characterized by **both**. These aircraft are not competitors; they are designed for **different markets**."⁷⁵³

Figure 220 below illustrates the current product performance portfolios of both the incumbent (*Boeing*) and the challenger (*Airbus*).

⁷⁵¹ Babej, M.E. and Pollak, T. (2006) "Boeing versus Airbus," Forbes, May 24, 2006.

⁷⁵² Wayne, L. (2006) "Boeing Bets the House on Its 787 Dreamliner," The New York Times, May 7, 2006.

⁷⁵³ Lawrence and Thornton (2005), pg. 149.

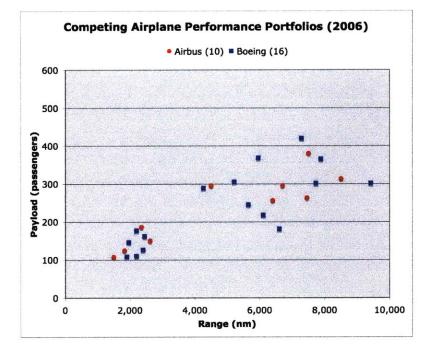


Figure 220: Product Performance Portfolios in Commercial Airplanes - 2006

By way of comparison, Figure 221 below illustrates the future product performance portfolios of both the incumbent (*Boeing*) and the challenger (*Airbus*).

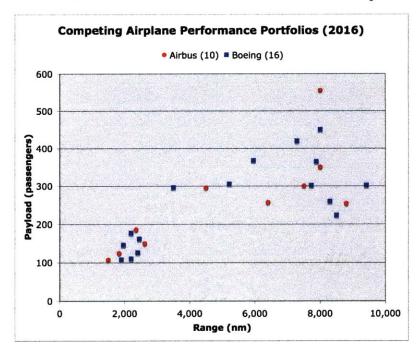


Figure 221: Product Performance Portfolios in Commercial Airplanes - 2016

While *Airbus* will have added the (hub-and-spokes) A380 to finally round out its product portfolio, as well as the middle-market (point-to-point) A350, *Boeing* will have added its (point-to-point) 787 and its (hub-and-spokes) 747-8. There is no significant difference in product performance portfolio strategies.

5.4.2.6.2 The Evolution of Boeing 787 vs. the Evolution of the Airbus A350

The real competition in the "middle of the market" is between *Boeing's* 787 and *Airbus'* A350. It is interesting to observe the inherent architectural tendencies of each firm's product development trajectories (including their respective "false-starts").

As shown in Figure 222 below, *Boeing*, being true to its high-performance products culture, initially offered the radically-improved "higher, faster, farther" Sonic Cruiser. Due to performance oversupply, it was pulled by the market back down to the "better, faster, cheaper" solution of the 787.

Airbus conversely and subsequently responded with its incrementally-improved modified A330 in order to protect its "better, faster, cheaper" low-cost system design. Due to performance undersupply, it was pushed by the market up to the "higher, faster, farther" solution o the A350.

Note that in the final competitive space, it is anticipated that *Boeing's* 787 will be a higher performing, but higher initial cost product than *Airbus'* A350.

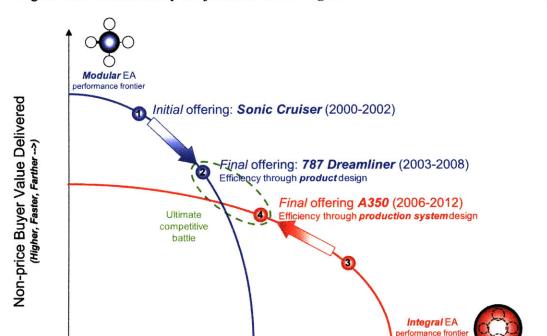


Figure 222: Evolutionary Trajectories of Boeing & Airbus' Recent Product Offerings

Relative Cost Position (Better, Faster, Cheaper -->)

5.5 **Opposing Dynamic Behaviors**

5.5.1 Opposing means to Profit: Top-line Growth vs. Bottom-line Productivity

5.5.2 Opposing Strategies Towards Meeting Demand

"In some industries we find one company whose policies attract the **fluctuating** part of the market demand, whereas another company has policies that attract a **stable** underlying continuity of demand... Differences in policy that tend to differentiate a company on the basis of its dynamic characteristics will be an important aspect of **competitive** models."⁷⁵⁴

As shown conceptually in Figure 223 below, different enterprises have fundamentally different approaches toward demand and strategies for how it is best served. These can be decomposed dynamically into the underlying stable demand and the superimposed fluctuating part.

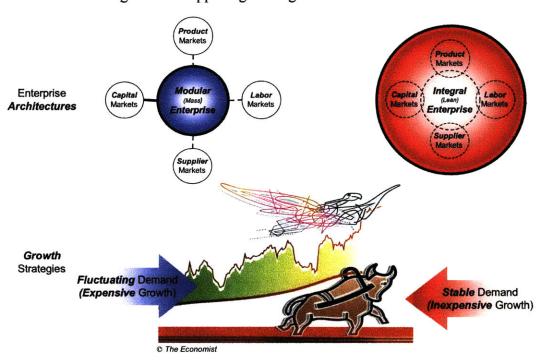


Figure 223: Opposing Strategies Towards Demand⁷⁵⁵

It will be argued later that the strategies chosen to chase the fluctuating part actually contribute to the very existence of the fluctuating part of demand. Additionally, chapter six will later begin to describe under what environmental conditions each growth strategy is more likely to be successful.

⁷⁵⁴ Forrester, J.W. (1961), pp. 336-337.

⁷⁵⁵ Graphic from The Economist.

5.5.3 Opposing Assumptions of Demand Durability

As shown in Figure 224 below, there is a different causal logic used by those firms chasing the fluctuating part of the market demand, than that used by those firms seeking the stable part of the market.⁷⁵⁶

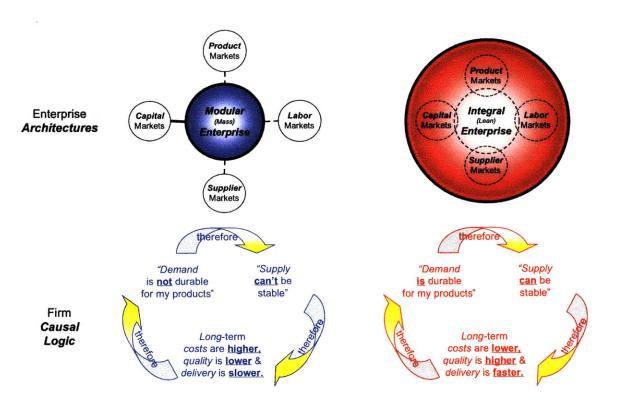


Figure 224: Opposing Assumptions of Demand Durability

"The company that follows the policy of pursuing every possible sale and having product available to **push** into the hands of the customer even in peak periods of demand may find it is unknowingly selecting peaks of demand as its share of the market. This will be especially true if the intrinsic value of the product in the eyes of the customer is less than that of competitors and if the company is taking advantage of sales that come to it because of the unavailability of preferred competitive products. On the other hand, a contrasting company policy could be to establish a preferred position in design, quality, and sales effectiveness so that all production is salable in the periods of lowered market demand. This company might forgo possible higher sales in periods of increased demand in the interest of greater continuity of operations and to prevent dilution of the quality and skill. In this situation the first company has a much higher percentage fluctuation in its operations than has the industry as a whole."⁷⁵⁷

⁷⁵⁶ These relations were obtained empirically from the case studies and will be discussed in more detail later.

⁷⁵⁷ Forrester, J.W. (1961), pp. 336-337.

5.5.4 Opposing Assumptions on Forecasting (managerial cognitive inertia)

"Expectations are usually modeled in system dynamics as adaptive learning processes such as exponential smoothing. Adaptive expectations (single exponential smoothing) outperform many other forecasting methods over the longer time horizons."⁷⁵⁸

As Sterman (2000, pg. 632) points out, various researchers have noted the long-term performance superiority of simple exponential smoothing (Makridakis et al. 1982; Makridakis et al. 1984; Carbone and Makridakis, 1986).

Figure 225 below summarizes the differences between managerial cognitive inertia and decision processes in modular and integral enterprises architectures.

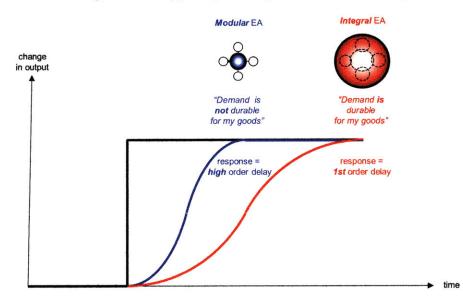


Figure 225: Opposing Assumptions on Forecasting

"In an embedded logic of exchange... on a microbehavioral level, actors follow **heuristic and** *qualitative decision rules*, rather than intensely calculative ones. These factors furnish an alternative mechanism for matching customer demand to production."⁷⁵⁹

⁷⁵⁸ Sterman, J.D. (2000), pg. 632.

⁷⁵⁹ Uzzi, 1997, pg. 61.

5.5.5 Opposing Assumptions of Span of Enterprise Control

Given that the modular enterprise architecture locally optimizes on the performance of the firm, it sees other stakeholders largely as inputs largely beyond their control. As a result, important environmental phenomena like the business cycle are exogenous. More plainly, the business cycle exists because the modular enterprise architecture needs it to - i.e. it creates the instability that it serves.

Conversely, the integral enterprise architecture globally optimizes on the performance of the ecosystem, as it sees other stakeholders largely as inputs largely within their control. As a result, important environmental phenomena like the business cycle are endogenous. More plainly, the business cycle does not exist because the integral enterprise architecture does not want it to.

These two opposing assumptions and therefore managerial cognitive decision sets are summarized stylistically in Figure 226 below.

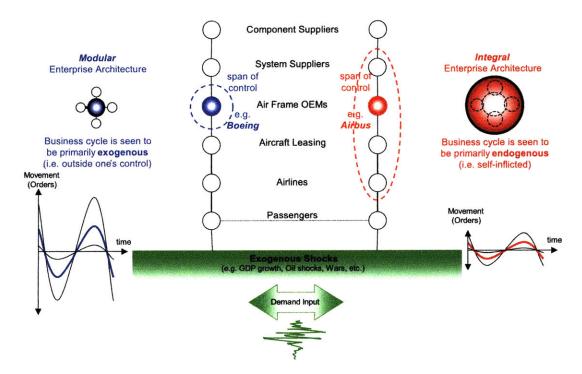


Figure 226: Opposing Assumptions of Span of Enterprise Control

This set of propositions clearly begins to offer problems for positivist science as it is stating that two "realities" exist with respect to what is the nature of the environment of the firm. This observation sits more comfortably with a relativist or interpretivist epistemology.

The question of which of the two "realities" offers competitive advantage will be addressed in chapter six.

5.5.6 Opposing Views of Speed: Short-term vs. Long-term

"The analysis of the limits to growth – the factors determining the **maximum rate of growth** of firms – cannot, in its present formulation at any rate, be tested against the facts of the external world, partly because of the difficulties in expressing some of the concepts in **quantitative terms** and partly because of the impossibility of ever knowing for any given firm what is, or what would have been, its maximum rate of growth. Perhaps some of these difficulties will be overcome in **different formulations** constructed by others..."

The causal mechanisms that underlie the dynamic reference modes can be used to predict and observe the structural dynamics of important macro enterprise response quantities like output. As shown in Figure 227 below which depicts data from the automobile industry, the output quantities can have significantly different dynamic characteristics, depending upon the underlying architectural forms.

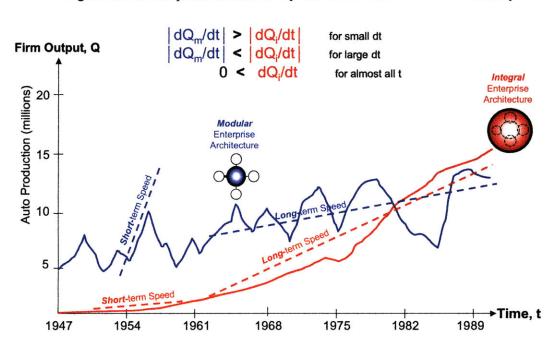


Figure 227: Enterprise Structural Dynamics in the *Automotive* Industry

From the above data, we can note the following observations:

For *short* time horizons, the absolute value of the rate of change of output of the modular enterprises tends to always exceed the rate of change of output of integral enterprises. Mathematically, this can be expressed as:

$$|dQ_m/dt| > |dQ_i/dt|$$
 (for small dt)

⁷⁶⁰ Penrose, E. (1959), pg. 4.

For *longer* time horizons, the absolute value of the rate of change of output of the integral enterprises tends to always exceed the rate of change of output of long enterprises. Mathematically, this can be expressed as:

$$|dQ_m/dt| < |dQ_i/dt|$$
 (for large dt)

Taken together, these two observations comprise the "tortoise vs. hare" dynamic. Note that the hare wins the race given a sufficiently long race, as well as certain environmental race conditions which we will discuss later.

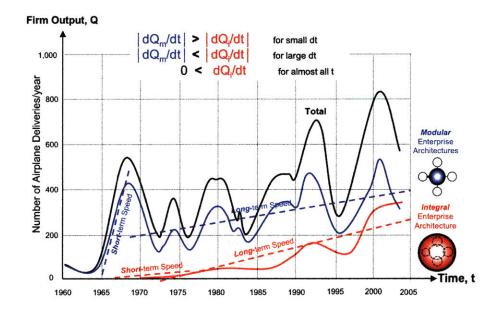
"Slow and steady wins the race."761

In addition, it appears that rate of change of output of integral enterprises tends to not go negative. In other words, integral enterprises are designed to grow at such a rate that they will not have to significantly shrink output. Mathematically, this can be expressed as:

$$dQ_i/dt < 0$$

Causally, this observation can be explained as integral enterprises are in the pursuit of minimizing long-term costs. If competitive advantage arises from lower long-term costs and higher long-term quality, then advantage arises from stability conditions for the workforce in order to avoid degradation of capabilities. This in turn results in continuous learning and improvement. As market share is gained, then learning curve effects, as well as economies of scale drive competitive advantage. The above observations can also be seen in Figure 228 below in the large commercial airplane industry, currently dominated by the incumbent, *Boeing* and the challenger, *Airbus*.

Figure 228: Enterprise Structural Dynamics in the Large Commercial Airplane Industry



⁷⁶¹ From the fables of Aesop.

5.5.7 Opposing Assumptions of Strategic Investment

When putting the enterprise architectural constructs in a head-to-head game theoretic setting, the equilibrium outcomes vary according to the homogeneity or heterogeneity of the duopoly as determined by the relative reaction functions of the firms (Law & Stewart, 1983; Mai & Hwang, 1989; Horowitz, 1991; Cremer & Crémer, 1992; Futagami & Okamura, 1994) as shown below in Figure 229.

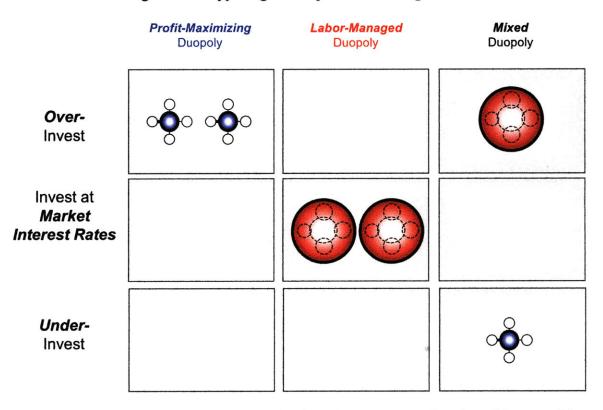


Figure 229: Opposing Assumptions of Strategic Investment

An interesting and counterintuitive result is that the outcomes of each architecture flip to near exact opposites when the composition of the duopoly changes from homogeneous to heterogeneous (or "mixed").

5.5.8 Opposing Financial Strategies

Integral enterprise architectures tend to employ more "conservative" financial strategies than their modular counterparts. Such strategies include maintaining lower debt levels as well as higher levels of cash on hand (Hoffer-Gittell, 2003, pp. 244-247).

"Most people think of us as this flamboyant airline, but we're really very conservative from a fiscal standpoint. We have the best balance sheet in the industry. We've always made sure that we never overreached ourselves. We never got dangerously in debt, and never let costs get out of hand. And that gave us a real edge during [the Gulf War crisis of 1990 to 1994]."⁷⁶²

"At Southwest, the maintenance of **financial reserves** is seen as **integral** to the organization's ability to maintain and even strengthen its relationships in the face of crises... Organizations with plentiful financial reserves in the form of **low debt levels** are better positioned to bolster their relationships by **maintaining commitments... to stakeholders** in times of crisis."⁷⁶³

"A simple analysis of these data shows that prior cash levels did not predict the extent of their layoffs, but their debt-equity ratios predicted the extent of their layoffs with 99 percent certainty."⁷⁶⁴

"Southwest protects its financial reserves by sticking to its policy of gradual steady growth, despite the fact that there is sufficient demand for Southwest's service to permit a far-faster rate of growth. According to John Denison, Southwest's former executive vice president of corporate services: 'We promise the marketplace 10 percent growth, but we are only going to grow as fast as we can manage... But we try to maintain the balance sheet. It is no accident that we are the only single-A rated company in the industry.'"⁷⁶⁵

"Indeed, Southwest's leaders have often had to maintain their conservative financial policies in the face of strong pressures from Wall Street to grow faster. According to Matt Hafner, one of Southwest's regional directors: 'It is nothing new with Southwest. The 'experts' always think we need to expand at a more rapid pace. What these so-called experts express is their desire for Southwest to jump at opportunities at a more rapid clip. Apparently growth excites investors. [But] nobody is pushing us. That could never happen.""⁷⁶⁶

"[Southwest's] conservative approach has been criticized by Wall Street analysts, who have argued that the airline should use its extra cash to make acquisitions or buy back stock. Goldman Sachs analyst Glenn Engel actually calls the balance sheet 'too strong' [though] Engel allows, 'this has meant that when times are tough, they have a lot more flexibility.""⁷⁶⁷

"Southwest's policy stands in contrast to accepted wisdom on Wall Street. Southwest's policy also stands in contrast to the policy of People Express, an airline that, like Southwest, also faced tremendous demand for its services and tremendous pressure from Wall Street to grow rapidly and take advantage of every opportunity. While southwest has experienced 31 years of disciplined, steady, profitable growth, always maintaining plenty of financial reserves to flourish in times of crisis, People Express under the leadership of Donald Burr grew at an exponential rate from 1981 to 1986 and then simply collapsed into its own wreckage."⁷⁶⁸

⁷⁶² Southwest Airlines CEO, Herb Kelleher, in Brooker, K. (2001).

⁷⁶³ Hoffer-Gittell (2003), pg. 245.

⁷⁶⁴ Hoffer-Gittell (2003), pg. 245.

⁷⁶⁵ Hoffer-Gittell (2003), pp. 245-246.

⁷⁶⁶ Hoffer-Gittell (2003), pg. 246.

⁷⁶⁷ Mount, I. (2002).

⁷⁶⁸ Hoffer-Gittell (2003), pg. 247.

5.6 Case Study: the Business Cycle (and other "Exogenous" Shocks⁷⁶⁹)

Summarizing and integrating some of the observations from the previous section, this framework posits that the business cycle is not an absolute reality in the positivist science sense, but rather is a socially-constructed phenomena in the interpretivist paradigm. It exists because certain social structures are designed to create them, while other social structures are designed to mitigate them.

"Contemporary management literature contains two significant gaps: it has neglected the strategic problems of the business cycle and it lacks an adequate account of strategic choice."770

One of the best tests to determine an enterprise's architecture is to observe its response to "exogenous" shocks from the environment, most notably the business cycle.⁷⁷¹ As noted by Whittington (1989), the business cycle is a unique litmus test as it teases out the underlying mental models and social constructs of enterprise leaders with respect to their notions of time.

"My contention shall be that the business cycle presents the strategic decision maker with a particularly intriguing, even paradoxical set of problems. The contradiction at the level of the firm is how to balance short-term survival during the recession with the need to preserve long-term competitiveness for the recovery."772

5.6.1 Cross-Industry Examples

We will next explore the behavior of competing firms within four different industries, in their reaction to the business cycle.

5.6.1.1 Appliance industry

In the opening page of his book, Corporate Strategies in Recession and Recovery, Whittington captured the different recession strategies of two rival domestic appliance manufacturers coping with the 1979-81 recession in the UK:

"The director from Exemplar:

When we come out of a recession in England, what happens? You begin to import like fury because everybody has abandoned their production capacity and run down. This cycle has destroyed British industry – this up and down – because no one can afford, due to the tax system et cetera, to develop during the recession. But that's what you've got to do, and that's why we hung on and that's what we did! (Bangs table). "773

"The director from Rose:

⁷⁶⁹ The word "exogenous" is kept in quotes to note later that various enterprise architectures have different degrees of environmental control, and therefore different frames of reference of what constitutes being "exogenous". ⁷⁷⁰ Whittington, R. (1989).

⁷⁷¹ Note however that not all strategy scholars are equally impressed with the importance of the business cycle. Porter (1980), pg. 6 regards the business cycle as being of merely 'tactical' importance, especially when market penetration is deep. ⁷⁷² Whittington, R. (1989), pp. 15 & 19.

⁷⁷³ Whittington, R. (1989), pg. 1.

It is important to preserve things for the future and one would like to do that, and to drive one's way through the recession by investment. But on the one hand the theory is good; but if you are faced with a factory loss this month one has to decide what to do... We cut back heavily."⁷⁷⁴

Whittington notes that these different strategies had very different consequences for firm performance both in the short- and long-term.

5.6.1.2 Automobile industry

"Westerners are resigned to the idea of the business cycle. Like gravity, it's simply there, although nobody quite knows why."⁷⁷⁵

"The issue never arose in Japan. Neither the domestic auto market nor domestic production is cyclical. The Japanese domestic industry has always been able to plow through slumps in export markets by **cutting margins**. Indeed, the largest contraction in production in Japan over the past forty years is smaller than the smallest contraction in North America."⁷⁷⁶

This difference in viewpoint has played out in the global automobile industry over the past 50 years, as was brought to the attention to the academic research and professional communities by Womack, Jones and Roos (1990). As a *General Motors* executive noted:

"When the Japanese producers encounter these gigantic market waves, they will quickly become as **mediocre as we are**. They will have to start **hiring and firing** workers along with suppliers and will **end up as mass-producers** in short order."⁷⁷⁷

This statement reveals the mental models of a leader embedded within an enterprise architecture which enables and constrains what he/she can do. It does not necessarily have to be the case however for other enterprise architectures.

"Some observers have even wondered if the lack of a cyclical market in durable goods in Japan is a direct result of lean production: an inventoryless, highly flexible system that may significantly damp cyclicality."⁷⁷⁸

In fact, some 15 years after the above *GM* quote, *Toyota* went on to systematically dismantle the US mass-producers with its integral enterprise architecture and a view of stability which is impossible for modular enterprise, mass producers.

"We will maintain long-term, stable growth by building a business structure that can respond to market fluctuations." (Fujio Cho, President, Toyota).⁷⁷⁹

⁷⁷⁴ Whittington, R. (1989), pg. 1.

⁷⁷⁵ Womack, Jones and Roos (1990), pp. 247.

⁷⁷⁶ Womack, Jones and Roos (1990), pp. 249.

⁷⁷⁷ Womack, Jones and Roos (1990), pp. 249.

⁷⁷⁸ Womack, Jones and Roos (1990), pp. 249.

⁷⁷⁹ Toyota 2004 Annual Report, "President's Message", pg. 11.

5.6.1.3 Airplane industry

A similar story is recorded 20 years later in the airframe and airline industries in the recession of 1999-2001 and the exacerbating exogenous shock of the September 11th terrorist attacks in the US, as the leaders of leading firms in these industries attest:

"I am always a bit surprised by the **speed** with which Americans take decisions: that in three days after the attacks they announce 25,000 lay-offs at Boeing seems to me **totally stupefying**. Airbus has a bigger order book than Boeing and until now **growing market share**, which will allow the bumps to be smoothed out."⁷⁸⁰

"We had to take necessary steps to manage the cycle profitably."781

5.6.1.4 Airline industry

"At Southwest, we manage in good times as though we were in bad times."⁷⁸²

"Nothing kills your company's culture like layoffs. Nobody has ever been furloughed [at Southwest], and that is unprecedented in the airline industry. It's been a huge strength of ours."⁷⁸³

"We are willing to suffer some damage, even to our stock price, to protect the jobs of our people."784

5.6.2 Exogenous vs. Endogenous Views

Modular EA's create the instabilities that they are designed to serve, while integral EA's create the stability that they are designed to serve. In other words, to the firm at the center of the modular EA (with its narrowly-defined span of control) the business cycle is exogenous, outside of its conrol, and the best it can do is to predict it, and "ride" it as tightly and efficiently as possible. Conversely, to the firm at the center of the integral EA (with its broadly-defined span of control) the business cycle is endogenous.

5.6.3 Dominant Firm Behavior

"When the Japanese producers encounter these gigantic market waves, they will quickly become as mediocre as we are. They will have to start hiring and firing workers along with suppliers and will end up as mass-producers in short order."⁷⁸⁵

The mental model of leaders in modular EAs is that while integral EAs may be able to "get away with" being stable as challengers, once they begin to dominate an industry in terms of market share, they must begin to oscillate, just as the modular EAs have done. This research framework posits that such behavior is not necessarily true, which the evidence begins to support.

⁷⁸⁰ Airbus CEO, Noel Forgeard, 20 Sept. 2001.

⁷⁸¹ Boeing executive, post- 9-11.

⁷⁸² Quote from Southwest Airlines employees, as cited in Hoffer-Gittell (2003), pg. 244.

⁷⁸³ Southwest Airlines' Chairman, Herb Kelleher, from Hoffer-Gittell (2003), pg. 243.

⁷⁸⁴ Southwest Airlines' CEO, Jim Parker, from Hoffer-Gittell (2003), pg. 242.

⁷⁸⁵ Womack, Jones and Roos (1990), pp. 249.

An interview with a senior executive in a modular EA prior to being overtaken by their competitor predicted:

"Once [our competitor] *takes more than 50% of the market*, they will have to become unstable, just as we are." ⁷⁸⁶

Deeper probing revealed that the mental model is that the business cycle is a given, and that whoever dominates the supply of that market must swing with it. In a subsequent interview with the same executive three and a half years later (after the data showed that their prediction did not come true), the executive offered the following explanation:

"Once [our competitor] starts behaving rationally, they will have to become unstable, just as we are."⁷⁸⁷

Again the mental model is that the competitor is of the same architecture, therefore if they do not pursue the same policies, they must be behaving irrationally. This research offers that both competitors are highly rational, given their enterprise architectures.

5.6.4 Signal-to-Noise Ratios

The data suggests that as over time, as modular EAs are under pressure from integral EAs, they oscillate more severely, with their signal-to-noise ratios (on output) decreasing.

Conversely, as integral EAs begin to dominate, their signal-to-noise ratios remain high, and in fact they tend to "discipline" the market, giving it a higher signal-to-noise ratio, commensurate with their own behavior.

⁷⁸⁶ Interview took place in January 2002.

⁷⁸⁷ Interview took place in August 2005.

5.7 Symbiotic Inter-species Competition and Mixed Duopoly

Interspecies competition is a relatively new concept which is therefore underrepresented in the economics and sociology literatures. In economics, it takes the form of "Mixed Duopoly" competition, while in sociology (and biology), it takes the form of "Interspecies Competition" between heterogeneous organizational set architectures under the heading of Community Ecology (Astley, 1985).

5.7.1 Inter-species Competition in Community Ecology

"This paper distinguishes between two ecological perspectives on organizational evolution: population ecology and community ecology. The perspectives adopt different levels of analysis and produce contrasting views of the characteristic mode and tempo of organizational evolution. **Population ecology** limits investigation to evolutionary change unfolding within established populations, emphasizing factors that homogenize organizational forms and maintain population stability. Population ecology thus fails to explain how populations originate in the first place or how evolutionary change occurs through the proliferation of heterogeneous organizational types. **Community ecology** overcomes these limitations: it focuses on the **rise and fall** of populations as basic units of evolutionary change, simultaneously explaining forces that produce **homogeneity and stability** within populations and heterogeneity between them."⁷⁸⁸

Even the original classic work on population ecology (Hannan and Freeman, 1977) highlights this important form of competition.

"The greater the unexhausted capacity in the environment, the faster should be the rate of growth of populations of organizations. But the rate at which populations of organizations can expand into unused capacity varies among forms of organization. So there are two distinctive ecological considerations: the capacity of the environment to support forms of organizations and the rate at which populations grow (or decline) when the environmental support changes."⁷⁸⁹

"Up to this point, we have presumed that the limits to growth reflect the finite nature of the environment. It is now time to reintroduce competition. According to Hawley, competition enters indirectly when the competitors lower the fixed supply. We can model this by following the lead of bioecologists and extending the logistic growth model. The two populations are said to compete if the addition of units [of market share] of either decreases the rate of growth of the other. This will be the case when both populations are sustained by the same types of resources."⁷⁷⁰

"If two populations of organizations sustained by identical environmental resources differ in some organizational characteristic, that population with the characteristic less fit to environmental contingencies will tend to be eliminated. The stable equilibrium will then contain only one population which can be said to be isomorphic to the environment."⁷⁹¹

The state of the environment has a significant effect on interspecies competition. Lenox, Rockart and Lewin (2006) develop simulation models to theorize about the nature of environmental interdependencies, and their effects on firm and industry profitability.

⁷⁸⁸ Astley (1985), pg. 224.

⁷⁸⁹ Hannan and Freeman (1977), pg. 941.

⁷⁹⁰ Hannan and Freeman (1977), pg. 942.

⁷⁹¹ Hannan and Freeman (1977), pg. 943.

"For high PIA-industries [Potential for Interdependencies among Activities], we expect a few high performers and a relatively large number of laggards. High levels of PIA produce industries where most firms cluster around low profit levels and a few firms occasionally achieve vastly superior profits."⁷⁹²

"In low PIA-industries, individual firm profits are driven by the ability of all firms to find low cost positions absolutely; while in **high** PIA-industries, individual firm profits are driven by the ability of the best firms to find better cost positions relative to those of rivals."⁷⁹³

"In high PIA-industries the potential exists for an individual firm to discover a highly efficient configuration of business practices relative to rivals and to realize profits well-above the industry average. Thus, the average profits in high-PIA industries are bolstered by the occasional highly successful firm. While the existence of this kind of skewed profit distribution is striking when observed, it remains a relatively infrequent outcome even in high-PIA industries. Paradoxically, it is within these otherwise unattractive industries that we are most likely to observe an outstanding firm that is both high performing and highly profitable."⁷⁹⁴

"Medium PIA-industries, present firms with a real potential for competing for a very long period without becoming competitive."⁷⁹⁵

"The overall result that average industry profits are highest for intermediate levels of PIA proves robust from one extreme of pure innovation to the opposite extreme of pure imitation."⁷⁹⁶

"Our results provide guidance for identifying **likely industries** where competitive advantage accrues to a chosen few firms that have valuable, rare, nonsubstitutable, and hard-to-imitate resources and capabilities that allow for favorable market positions relative to rivals. In this way, **interdependencies** provide an explanation not only for what sustains profit heterogeneity within and across industries, but why it emerges in the first place in some industries more than in others. By recognizing that industries can vary in terms of potential interdependency due to technology and other structural factors, we also see **the beginning of a reconnection of firm-level and industry-level analyses**. To the extent that the potential for interdependency is driven by structural elements of an industry, industry structure [SCP] can be used to explain differences in firms' resources, capabilities, [RBV] and profits."⁷⁹⁷

"There has been a great deal of interest among economists in how firm heterogeneity may affect the structural evolution of industries."⁷⁹⁸

"Perhaps the most promising, those studying industry dynamics may find that a more explicit treatment of interdependency provides new insights into the structural evolution of industries."⁷⁹⁹

⁷⁹² Lenox, Rockart and Lewin (2006), pg. 766.

⁷⁹³ Lenox, Rockart and Lewin (2006), pg. 766.

⁷⁹⁴ Lenox, Rockart and Lewin (2006), pg. 769.

⁷⁹⁵ Lenox, Rockart and Lewin (2006), pg. 770.

⁷⁹⁶ Lenox, Rockart and Lewin (2006), pg. 771.

⁷⁹⁷ Lenox, Rockart and Lewin (2006), pg. 771.

⁷⁹⁸ Lenox, Rockart and Lewin (2006), pg. 771.

⁷⁹⁹ Lenox, Rockart and Lewin (2006), pg. 772.

5.7.2 Example: Biological Ecosystem

Before investigating *business* ecosystems, the following discussion of the evolution of *biological* ecosystems is used to illustrate the framework. We look at the well-known forest (or Canadian boreal) ecosystem consisting of pine, aspen and spruce species of trees.⁸⁰⁰

As shown in Figure 230 below, the lifecycle of the ecosystem consists of the symbiotic competition between two sets of species, designed to grow in different environments: the jack pine and aspen in post-fire soil which is rich in nutrients, and the black spruce in later pine and aspen environments.

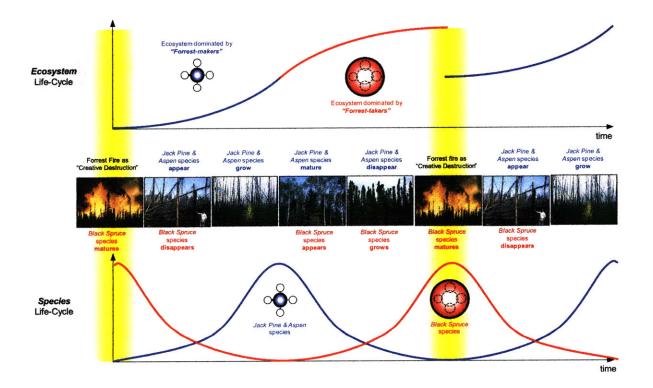


Figure 230: Symbiotic Competition in a Biological (boreal) Ecosystem

⁸⁰⁰ I am indebted to MIT PhD student, Jason Jay for bringing this example to my attention during one of my lectures at the MIT PhD class, *Enterprise Architecting*, in Spring 2006.

The two species do not merely exist, they co-exist symbiotically, i.e. create the conditions for the growth and ultimate destruction of the other species. In other words, they create and destroy their own carrying capacities. The spruce create the conditions for "market-clearing" creative destruction (Schumpeter, 1939) via forest fire; the forest fire creates the clear sunlight and rich soil necessary to grow the "pioneer species", the pines and aspen; the pines and aspen create the environment for the spruce, which ultimately choke off their sunlight. While the two species are in a competitive struggle to the death, they need each other to create the conditions for life.

Note that like the framework presented herein for business ecosystems, this example shows how the biological ecosystem evolves over time from one species of dominance to another, yet it does not describe how the very long-term random processes of variation, selection and retention evolve the species of trees that exist in the forest.

Recall this symbiosis was proved mathematically by the mixed duopoly economics of *profit-maximizing* firms (i.e. pines & aspen) vs. the *labor-managed* firms (i.e. spruce), in which the LM firms grew to slowly to survive in the rich growth environment.

The causal physics of the nonlinear dynamic interplay between the two species will be discussed in subsequent sections under the classical "predator-prey" formulation.

5.8 Modeling Inter-species Competition

The following section discusses various formal simulation models used to understand the competitive interaction between firms embedded within heterogeneous enterprise architectures and the co-evolution with their industry. The formal modeling will be covered in Chapter 7.

5.8.1 Biological Competition within the Mathematical Modeling Tradition

5.8.1.1 Population Growth of Verhulst (1838)

"The **positive loop** corresponds to the tendency of the population to grow at a rate proportional to itself. The **negative loop** corresponds to the growth-limiting effects Verhulst envisioned in conflict and stress. Thus over time **the system changes its own growth tendencies**. In feedback terms, the system shows a **gradual shift in loop dominance**."⁸⁰¹

Verhulst (1838) was the first to model nonlinear mode-switching (between reinforcing and balancing feedback) of a population in an environment having fixed carrying capacity (Richardson, 1990).

5.8.1.2 Predator-Prey Ecosystem of Lotka-Voltera (1925-1926)

"But unquestionably his [Lotka's] most quoted contribution is the model of a closed ecosystem attributed jointly to him and to Volterra (1931)."⁸⁰²

Predator-Prey "competition" within a biological ecosystem was first put forth by Lotka (1925) and Volterra (1926).

5.8.2 Firm Competition within the System Dynamics Tradition

Within the 50-year history of system dynamics, an intellectual thread has developed which has embraced competitive dynamics between firms. After Forrester's original work in the 1960's (Forrester, 1961 and 1968), the thread is picked up again by Sterman (Sterman, 1989; Sterman, 1991; Paich and Sterman, 1993; Sterman, Henderson, Beinhocker, Newman, 1995; Langley, Paich, Sterman, 1999; and Sterman, 2000) and again more recently by researchers in the UK (Sice, Mosekilde, Moscardini, Lawler, and French, 2000; Warren, 2002; Kunc, 2004; Kunc and Morecroft, 2004).

5.8.2.1 Embracing *Macro*-Structures: Forrester (1960-1970)

"If substantially different policies would be desirable for the industry, there then arises the question of what will happen should one company unilaterally adopt these policies. Differences in policy that tend to differentiate a company on the basis of its dynamic characteristics will be an important aspect of competitive models."⁸⁰³

⁸⁰¹ Richardson, G.P. (1990), pg. 33.

⁸⁰² Richardson, G.P. (1990), pg. 36.

⁸⁰³ Forrester, J.W. (1961), pp. 336 and 337.

While Forrester (1961) originally noted the potential for explicit modeling of the competitive dynamics of firms having differing policies, his first research effort focused on understanding the dynamics of an industry composed of homogeneous firms.

"It seems wise to start a study of dynamic characteristics with the **industry as a whole**. Once the nature of the industry is adequately understood, the study of different policies between companies becomes important."⁸⁰⁴

Forrester's subsequent research effort the "Market Growth Model" (1966) also represented the competitive environment passively by specifying the exogenous benchmarks for competitive success. The purpose of this benchmark was not necessarily to simulate the true behavior of competitors, but to represent abstractly the standards that customers judge product attractiveness (Kunc and Morecroft, 2004).

5.8.2.2 Embracing *Micro*-Behaviors: Sterman (1985-2005)

"The playing field is level – the structure and parameters for the firm and its competitor are identical." 805

The focus on firm performance picks up again with the development of management flight simulators looking at specific firms like *People Express Airlines* (Sterman, 1988), and more generally, the *Boom and Bust Enterprises* (Sterman, 1991). The emphasis now was less on industry dynamics but on managerial perceptions and misperceptions using behavioral decision theory. This time, competition is modeled slightly more explicitly and directly, as a matrix of discrete competitor pricing strategies and market environment scenarios.

Paich and Sterman (1993) identify a variety of competitive strategies ranging from "Adaptive" to "Ballistic" in their models of competition to build a market. This dissertation argues that "Adaptive" and "Ballistic" strategies are more advantageous at different phases during the industry lifecycle.

5.8.2.3 Embracing the *Meso*-Interactions: Morecroft (2000-2005)

Recently the system dynamics group at the London Business School (Kunc, 2004; Kunc and Morecroft, 2004), have modeled the dynamic interaction of competition between forms.

"However, not all business dynamics problems can be modeled as individual firms or as aggregate industries. **Industry evolution** is one important exception. During the evolution of industries, the process of mutual adjustment between **heterogeneous firms** is particularly relevant because the actions of individual firms sooner or later influence the responses of other firms in the same industry."⁸⁰⁶

⁸⁰⁴ Forrester, J.W. (1961), pg. 336.

⁸⁰⁵ Paich and Sterman (1993), pg. 1442.

⁸⁰⁶ Kunc and Morecroft (2004), pg. 4.

Also other researchers have explicitly begun to look at duopolistic interations (Sice, Mosekilde, Moscardini, Lawler, and French, 2000).

"The model reflects the essential relationships of **two equivalent competitors** and reveals the possible dynamics of the battle for customers."

5.8.3 Formal Models of Business Ecosystems

5.8.3.1 Bertrand Competition & "The Principle of Competitive Exclusion"

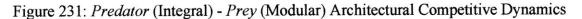
In ecosystem biology and population ecology (Hannan & Freeman, 1977), interspecies competition, is traditionally modeled with rather simple and severe assumptions. "The Principle of Competitive Exclusion" states no two species can occupy the same niche in equilibrium. The underlying assumption to this principle is based on Bertrand (1883) or price-based competition, in which, the winner-takes-all.

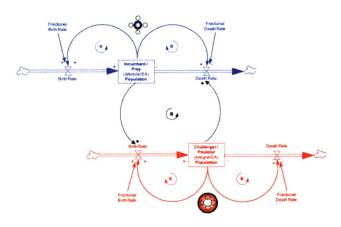
5.8.3.2 Predator - Prey Ecosystem Revisited

It is plausible that the *modular* enterprise architecture, which seeks growth and disregard for its environment can be modeled as a "prey" species, whereas the *integral* enterprise architecture, which seeks stability and harmony with its environment can be modeled as a "predator" species, in the classic population ecological sense.

1

The governing growth dynamics of each population of species are driven separately by S-shaped growth dynamics (Lotka, 1925; and Volterra, 1926).⁸⁰⁷ However, when "competing" together in an ecosystem for resources (e.g. sales revenues), their dynamics are coupled as one provides the carrying capacity for the other. This coupled nonlinear dynamic system generates stable but unpredictable chaotic oscillations as shown in Figure 231 below, the likes of which were discussed in the preceding sections.





⁸⁰⁷ These S-shaped growth dynamics are generated by a reinforcing loop on the inflow and a balancing loop on the outflow of the population; as well as the existence of a carrying capacity which modifies that fractional birth and death rates.

5.8.3.3 Classic System Dynamics Models of Enterprise Architectures

The following section defines the development of a formal model using the system dynamics methodology (Forrester, 1961; Lyneis, 1980; Sterman, 2000) to quantify and simulate the nonlinear dynamic interactions between the firm and its key input providers – its extended enterprise. As shown in Figure 232 below, the key stakeholder interactions that have been modeled in the system dynamics tradition, have tended to focus primarily on the value chain axis of *firm-supplier* interaction (Forrester, 1961) and *firm-market* interaction (Forrester, 1968), although a secondary focus on *firm-employee* interaction and *firm-investor* interactions were also made.

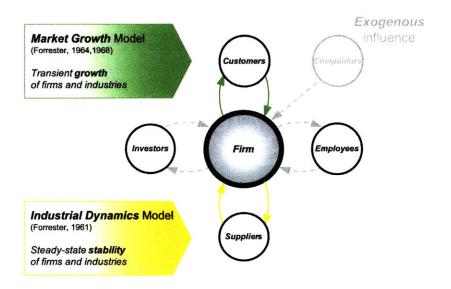


Figure 232: System Dynamics Enterprise Subsystem Diagram

Note that Forrester's two seminal studies have focused on the system goals of steady-state *stability* appropriate to mature industries (Forrester, 1961) and transient *growth* appropriate to new industries (Forrester, 1968) respectively.

"The first phase dealt primarily with the 'steady-state' dynamics of mature industries. The new phase will deal more with transient situations... of industry and company growth."⁸⁰⁸

By way of example of stakeholder interactions, the classic *firm-market* interaction (Forrester, 1964) can be seen in Figure 233 below.⁸⁰⁹ Aside from the information (i.e. orders), material (i.e.

⁸⁰⁸ Forrester, J.W. (1961), pg. viii.

⁸⁰⁹ Other examples of system dynamics firm-environment interactions can be seen from Forrester's "Market Growth" model (1968) and Sterman, Repenning and Kofman's (1997) quality improvement program.

products) and value (i.e. money) flows, the two stakeholders are coupled through competitive signals which importantly define the level of integration between stakeholders.

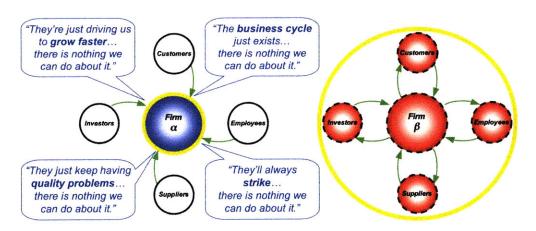


Figure 233: System Dynamics Firm-Market Subsystem Diagram

5.8.3.4 Modeling the Enterprise Archetypes: Modular & Integral

As shown in Figure 234 below, each firm in the mixed duopoly has a fundamentally different view of its relationships with the key stakeholders in its extended enterprise. While the firm at the center of the modular enterprise is an open system, exchanging information, material and value with its environment, it also sees itself as causally open, with little ability to control the strategic interests of the stakeholders in its extended enterprise. While the firm at the center of the integral enterprise is also an open system, exchanging information, material and value with its environment, it sees it self as causally closed (i.e. having many important strategic feedbacks), with significant ability to control the strategic interests of the stakeholders in its extended enterprise. The presence of a feedback rich environment, is both a cause and effect of the fact that an integral enterprise architecture is managed to longer time constants.

Figure 234: Enterprise Archetypes: Modular and Integral

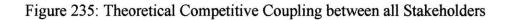


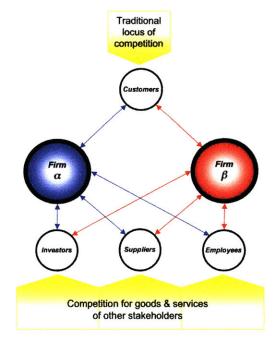
5.8.3.5 Modeling the *Competitor* subsystem

In Forrester's early seminal studies, competition was treated as passively via an exogenous benchmark representing relative attractiveness of the firm's products in the market (Kunc and Morecroft, 2004). The assumption being that the industry structure supports multiple similar competitors engaged in perfect competition. As a result, the feedbacks between competitor decisions are deemed weak and are not assumed to significantly alter the competitive environment over the time horizons of interest in the study (Kunc and Morecroft, 2004). A more detailed survey of the treatment of competition within the system dynamics tradition is shown in Appendix H.

5.8.3.5.1 Competition for Customers

In order to model the competitor subsystem in system dynamics, it is important to first acknowledge which stakeholders will be characterized as territory for competition. While the competitor stakeholder is typically modeled as competing through the customer stakeholder, in principle the "competitive coupling" could take place across all stakeholders as shown in Figure 235 below. In fact, in pursuit of competition for customers (or market share), one could argue that the successful firm will be the one that manages the highest quality providers of investors, employees and suppliers (as an integral part of possessing the best strategy). Note this is where the SCP paradigm begins to meet the RBV paradigm in strategic management. For each stakeholder, there is a spectrum of quality ranging from undifferentiated commodity to differentiated, dedicated asset.





5.8.3.5.2 Competition for *Investors*

While firms are in principle competing for investors or providers of capital, such input can (but not always as we shall discuss later) be seen as an undifferentiated commodity. Although the *quantity* of capital available may be large, the *quality* of capital may not be. Therefore, although an institutional investor may like the structure of a particular industry (e.g. the duopoly structure of the large commercial airplanes industry), they may choose between firms based on a more integrated, dedicated logic.⁸¹⁰

5.8.3.5.3 Competition for *Employees*

In addition, firms are in principle competing for employees or managerial talent, as is occasionally evidenced by the switching of high-profile executives in the automotive industry.

5.8.3.5.4 Competition for *Suppliers*

Finally, firms are in principle competing for suppliers, and not necessarily to create captive supply. Although suppliers in some industries can make parts, subassemblies or subsystems for competing OEMs, recent research (Dyer, 2003) has indicated that it not a given that such supply is commodity. In other words creating a high quality relationship with a supplier who has a low quality relationship with your competitor can be a competitive advantage, in terms of productivity, continuous improvement, etc. Such relationships have "sticky" value.

The primary case study of this research focuses on the *Boeing-Airbus* duopoly which is primarily characterized by a partial coupling between the stakeholders along the value chain – namely the customers and suppliers as shown in Figure 236 below.

Each firm has its own "dedicated", "captive" or non-shared providers of capital and labor. Competition takes place along the value chain for customers (either shared or dedicated) and suppliers (also either shared or dedicated).

⁸¹⁰ Consider for example *EADS* composed of *Daimler*, and *BAE Systems* as institutional investors in *Airbus*.

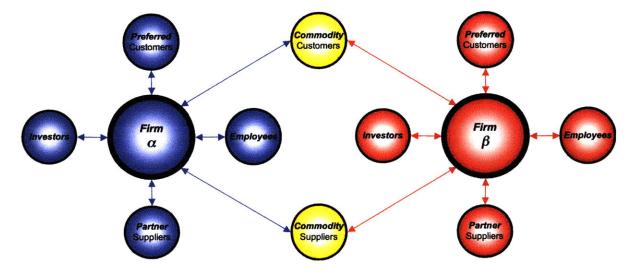


Figure 236: Competitive Coupling between Value Chain Stakeholders

5.9 Tying Structural Dynamics to Valuation and Firm Performance

From above, it appears that modular enterprise architectures are driven by "profitable growth", while integral enterprise architectures are driven by "sustainable growth". *Profitable* growth can be achieved by chasing demand in a market upturn, and releasing capacity (and thus short-term costs) in a market downturn. *Sustainable* growth can be achieved by the opposite strategy, namely, not chasing demand in a market upturn, and maintaining capacity in a market downturn. The following quotations from leaders of various enterprise architectures illustrate the mental models.

"Aiming to achieve sustainable growth, Toyota will implement a financial strategy emphasizing the balance of growth, efficiency and stability." (Ryuji Araki, Executive Vice President, Finance and Accounting, Toyota).⁸¹¹

"I believe, no matter what the era, a company that has lost its appetite for growth cannot develop. In my view, sustained growth drives corporate value." (Fujio Cho, President, Toyota).⁸¹²

⁸¹¹ Toyota Motors 2004 Annual Report, pg. 14.

⁸¹² Toyota Motors 2004 Annual Report, "President's Message", pg. 13.

5.10 Chapter Summary

This chapter was the second of three essays which forms an integrated framework which attempts to explain long-term firm performance. In this chapter, we defined the construct of enterprise structural dynamics, its sources and properties. In addition, we discussed how these dynamics drive the associated performance,

The context for this construct within the framework is shown below in Figure 237. In the following chapter, we will next discuss how firm performance drives and is driven by the evolution of the industry.

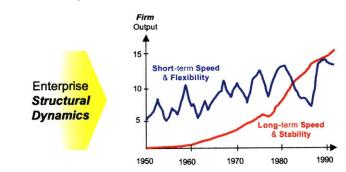


Figure 237: Enterprise Structural Dynamics with Framework

Chapter 6 Industrial Co-Evolution

6.1 Introductory Constructs and Propositions

"Industry evolution takes on critical importance for formulation of strategy."813

Having discussed how the enterprise architectural form drives the enterprise structural dynamic behavior, this section will explore the link between the enterprise's structural dynamic behavior and the financial performance of the "keystone" firm and ultimately with the dynamic evolution of the environment and co-evolution with the firms.

First, we will explore the enterprise's *architectural* evolution from integral to modular, as exploration gives way to exploitation. Second, we will explore the environment's simultaneous *structural* evolution from growth to stability. Third, we will explore industry's simultaneous *architectural* evolution from modular to back to integral as exploitation gives way to a new type of exploration (noting that change now takes place at a population level instead of at a firm level, signaling the birth of a new integral firm in a new environment). This feedback mechanism will attempt to explain the co-evolution of firm's ecosystem with the competitive environment.

"One of the enduring problems facing the field of strategic management is the lack of theoretical tools available to describe and predict the behavior of firms and industries. The fundamental problem is that industries evolve in a dynamic way over time as a result of complex interactions among firms, government, labor, consumers, financial institutions, and other elements of the environment. Not only does industry structure influence firm behavior, but firm behavior in turn can alter the structure of an industry and the contours of competition."⁸¹⁴

6.1.1 Change from a System Perspective

Organizational and environmental change has been profitably expressed and subsequently decomposed from a systems perspective (Bossel, 2007), which are the result of different processes associated with different time constants. The following subsections address three processes each having longer time constants and therefore deeper causality: adaptation, self-organization and evolution as summarized in Figure 238 below.

⁸¹³ Porter, M.E. (1980), pg. 156.

⁸¹⁴ Levy, D. (1994), pg. 167.

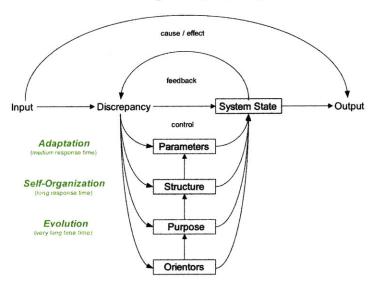


Figure 238: The Structure of Adaptation, Self-Organization and Evolution

6.1.1.1 Adaptation

"Processes of adaptation ... in this case the system maintains its basic influence structure, but parameters are adjusted to adapt to the situation. Adaptation means adjustment to a change in the system environment by changing the system parameters and/or limited structural change."⁸¹⁵

Within the context of this framework, *adaptation* of an enterprise architecture lies in its relatively minor adjustments towards efficiency, while keeping the existing architecture constant.

6.1.1.2 Self-Organization

"On the next higher level we find processes of self-organization in response to environmental challenges. This means structural change in the system. Self-organization denotes the ability of a system to change its system structure and its functions to cope with new challenges."⁸¹⁶

Within the context of this framework, *self-organization* speaks to the change of the underlying structure (and associated functions), for the example, the natural dis-integration (or modularization) of the enterprise architecture.

6.1.1.3 Evolution

"A system may also change its identity in the course of an evolutionary process. This means that its functional characteristics, and hence its system purpose, change with time. Evolution is adaptation and self-organization under fitness competition in a population of similar systems."⁸¹⁷

Within the context of this framework, *evolution* speaks to the change of the deep underlying function and purpose of an enterprise, i.e. the re-integration of the enterprise architecture.

⁸¹⁵ Bossel, H. (2007), pp. 13 and 48.

⁸¹⁶ Bossel, H. (2007), pp. 13 and 49.

⁸¹⁷ Bossel, H. (2007), pp. 13 and 49.

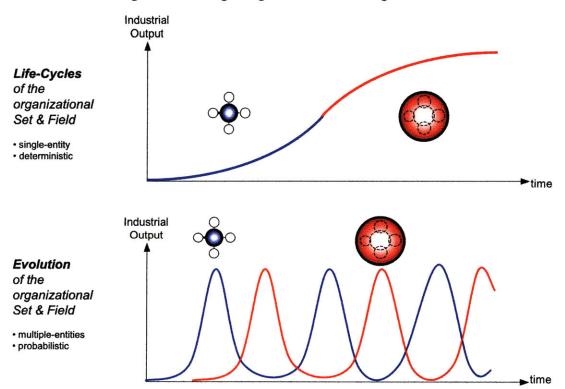
6.1.2 Employing Multiple Views on Change Processes

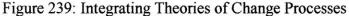
"It is the **interplay between different perspectives** that helps one gain a more comprehensive understanding of organizational life, because any one theoretical perspective invariably offers only a partial account of a **complex phenomenon**."⁸¹⁸

Van de Ven and Poole (1991 and 1995) conducted an extensive review of the management literature and discovered four distinct theories of change processes: life cycle, teleology, dialectics and evolution (Van de Ven, 1992) – the former two being deterministic and predictive and the latter two being probabilistic and non-predictive.

"Life-cycle, teleology, dialectics and evolution are viewed as abstract ideal types of theories of change processes. These ideal types are based on fundamentally different logics, which represent the underlying generative mechanisms or laws that explain why observed events occur in particular sequence progressions when specific circumstances or conditions exist."⁸¹⁹

The following subsections will briefly describe each, and as is shown in Figure 239 below, essay #3 will explore the change processes which occur in enterprise architectures from the primary viewpoints.





⁸¹⁸ Van de Ven and Poole, (1995), pp. 510-511.

⁸¹⁹ Van de Ven, (1992), pg. 169.

6.1.2.1 *Life-Cycle* theory

"The grandfather of concepts for predicting the probable course of industry evolution is the familiar product lifecycle."⁸²⁰

The mode of change of life-cycle theory is deterministically prescribed and focuses on continuity. The unit of change of life-cycle theory is the single entity, whether in the case of this research, the entity is the enterprise (i.e. organizational *set*) or the ecosystem (i.e. organizational *field*).

"According to life cycle theory, change is imminent; that is, the developing entity has within it an underlying form, logic, program or code that regulates the process of change and moves the entity from a given point of departure toward a subsequent end that is prefigured in the present state."⁸²¹

As Van de Ven (1992) notes, Greiner's (1972) model of organizational growth is rooted in a life-cycle perspective in distinct opposition to a teleological perspective.

"...historical forces [organizational age, size, growth rate, and stages of evolution and revolution] shape the future growth of organizations... the future of an organization may be less determined by outside forces than it is by the organization's history... behavior is determined primarily by previous events and history, not by what lies ahead."⁸²²

6.1.2.2 *Teleological* theory

"A teleology process theory is based on the assumption that the developing entity is **purposeful** and **adaptive**."⁸²³

The mode of change of teleological theory is emergent and focuses on discontinuity. The unit of change of teleological theory is the single entity, whether in the case of this research, the entity is the enterprise (i.e. organizational *set*) or the ecosystem (i.e. organizational *field*). Although teleological theory is rooted in the purposefulness of human actors, this brings up an interesting question: if an organizational set or organizational field are purposeful, who administers this purpose and how?

The primary fields which have supported this theory include *functionalism*, general system theory and strategic planning.

"Unlike life-cycle theory, teleology does not prescribe a necessary sequence of events or specify which trajectory development of the organizational entity will follow."⁸²⁴

The underlying purpose or goal of an enterprise architecture is captured by its objective function, whether maximization of shareholder value or maximization of stakeholder surplus. To the extent that the enterprise architect(s) (e.g. CEO) are purposeful actors, teleological theory applies to our theory of the evolution of business ecosystems. The question becomes, to what

⁸²⁰ Porter, M.E. (1980), pg. 156.

⁸²¹ Van de Ven and Poole, (1995), pg. 515.

⁸²² Greiner, L. (1972), pg. 166.

⁸²³ Van de Ven, (1992), pg. 178.

⁸²⁴ Van de Ven and Poole, (1995), pg. 516.

extent does the enterprise architecture enable and constrain purposeful action and strategic choice?⁸²⁵ And at what stages in the development of an ecosystem do teleological factors dominate?

6.1.2.3 *Dialectical* theory

"Different patterns for resolving dialectical oppositions can push an organization to flow toward equilibrium, to oscillate in cycles between opposites, or to bifurcate far from equilibrium and spontaneously create revolutionary changes."⁸²⁶

The mode of change of dialectical theory is emergent and focuses on discontinuity. The unit of change of dialectical theory are multiple entities, whether in the case of this research, the entity is the enterprise (i.e. organizational *set*) or the ecosystem (i.e. organizational *field*). As will be discussed below, dialectical theory is necessary (along with evolutionary theory) to explan the emergence and disappearance of organizational forms in a community ecology approach.

"Dialectical theory begins with the assumption that the organizational entity exists in a pluralistic world of colliding events, forces or contradictory values that **compete** with each other for domination and control. These oppositions may be **internal** to an organizational entity because it may have several **conflicting goals or interest groups** competing for priority. Also, oppositions may be **external** to the organizational entity as it pursues directions that **collide with the direction of other organizations**."⁸²⁷

Within the enterprise architecture or organizational set, a zero-sum competition between stakeholders for residual cash-flows is a form of dialectic. Also, external competition between organizational sets represents a form of dialectic. The creation of a "win-win" is an example of *thesis* and *anti-thesis* generating *synthesis*, while a "win-lose" is an example of maintenance of *thesis* or replacement with *anti-thesis* (Van de Ven and Poole, 1995, pg. 517). Unpredictable change therefore can result within an organizational set from a power-struggle that results in either the creation or destruction of a "win-win" in the enterprise's objective function. As interenterprise competition is likely to preclude collusion, such unpredictable dialectic change would be less common.

6.1.2.4 *Evolutionary* theory

"The evolutionary model suggests a blurring of the hard lines defining the adaptation-selection debate $."^{828}$

The mode of change of evolutionary theory is probabilistically prescribed (in the sense that variations can be "blind") and focuses on continuity. The unit of change of evolutionary theory are multiple entities, whether in the case of this research, the entity is the enterprise (i.e. organizational *set*) or the ecosystem (i.e. organizational *field*).

⁸²⁵ Recall from the *Airbus* case, the CEO's inablility to implement proposed changes to the enterprise architecture led to his exit in 1996 after only 100 days on the job.

⁸²⁶ Van de Ven, (1992), pp. 179.

⁸²⁷ Van de Ven and Poole, (1995), pp. 517.

⁸²⁸ Scott, (2003), pg. 222.

"Variations, the creations of novel forms of organizations are often viewed to emerge by blind or random chance (Aldrich, 1979; Campbell, 1969). Selection of organization occurs principally through the competition for scarce resources and the environment selects entities that best fit the resource base of an environmental niche. (Hannan and Freeman, 1977). Retention involves forces (including inertia and persistence) that perpetuate and maintain certain organizational forms."⁸²⁹

Evolutionary studies of organizations are comprised by the economics and the sociology traditions (Barron, 2003). These tend to characterize the debate of whether *managerial adaptation* or *environmental selection* dominates organizational change. Both processes can be expressed in evolutionary terms, i.e. based on the processes of variation, selection and retention as shown in Figure 240 below.

"Organizational scholars who adopt **Darwinian** evolution argue that traits are inherited through intergenerational processes; whereas those who follow Lamarck argue that traits are acquired within a generation through learning and imitation. A Lamarckian view on the acquisition of traits appears more appropriate than strict Darwinism for organization and management applications."⁸³⁰

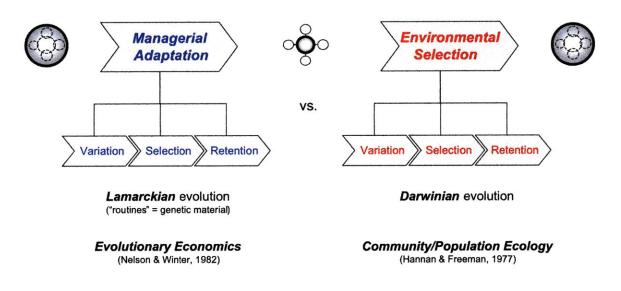


Figure 240: Evolution in Managerial Adaptation & Environmental Selection

6.1.2.4.1 Evolutionary Economics

Nelson and Winter (1982) define "routines" as the underlying genetic material of organizations. Their approach to evolution is Lamarckian as the governing mechanism is the transfer of genetic material across generations via learning.

6.1.2.4.2 Population Ecology

Hannan and Freeman (1977) note that the unit of selection are the organizations themselves within their environment.

⁸²⁹ Van de Ven and Poole, (1995), pg. 518.

⁸³⁰ Van de Ven and Poole, (1995), pg. 519.

6.1.2.5 Combinations of theories

Van de Ven and Poole (1995) assemble the fore aforementioned change theories into combinations of theories to describe how well-known meta-theories are constituted. For example, while population ecology is certainly an evolutionary theory, its more general parent discipline, community ecology is rooted in both evolutionary theory and dialectical theory, thereby allowing for the explanation for the emergence and disappearance of new forms, which population ecology does not focus on.

Figure 241 below summarizes the combination of change theories on the framework. At the enterprise level, change occurs both via life-cycle theory, where organizations (like organisms) go through the sequential stages of birth and death; and via teleological theory, where managerial adaptation can work to disintegrate enterprises.

At the ecosystem level, change occurs both via evolutionary theory, where new organizational forms (like *Toyota*) appear in "blind" *variation*, they are competitively *selected* and their forms are *retained* (like the adoption of "lean"); and via teleological theory, where managerial adaptation via entrepreneurship is evident.

At the interface between enterprise and ecosystem, change occurs via dialectical theory, where thesis and antithesis compete and vie for synthesis.

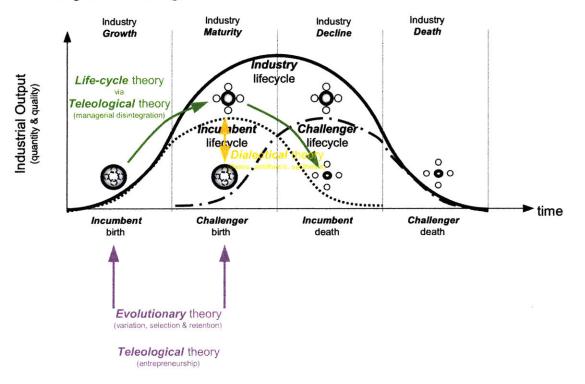


Figure 241: Change Theories and the Evolution of Business Ecosystems

6.2 Theoretical Foundations

"Models that integrate sociological and economic aspects of the environment, or that move beyond traditional life-cycle conceptions of its evolution, are lacking."⁸³¹

As this chapter aims to understand the nature of the evolution of the environment, and it cause and effect on the evolution of the enterprise, I will draw from a diverse set of theoretical traditions spanning economics and sociology.

6.2.1 Economic and Strategic Management Theories

"In classical economic theory... change was within the structure but the structure was always stable. Institutional economists examine institutions that provide economic order, and they study the endogenous forces that cause these institutions to evolve."⁸³²

While *classical* economics is rooted in natural law, *institutional* economics rooted in human organization. The framework derived from this research embraces both epistemologies. Change is described both from the natural law of Newton's tradition, as well as from the human organization of Darwin's tradition.

The most notable and influential economic theories of evolution come from Nelson and Winter (1982). Unlike the sociological view of Darwinian evolution, they are avowedly Lamarckian in their focus on learning routines.

6.2.1.1 Life Cycle of Industry Structure, Technologies & Markets

Oliver Williamson (1975) gave an early economics description of the different stages in an industry's evolution, which predates some of the more established work on this topic in the field of technology and innovation (Abernathy and Utterback, 1978):

"Three stages in an industry's development are commonly recognized: an early exploratory stage, an intermediate development stage, and a mature stage. The first or early formative stage involves the supply of new product of relatively primitive design, manufactured on comparatively unspecialized machinery, and marketed through a variety of exploratory techniques. 'Volume is typically low. A high degree of uncertainty characterizes business experiences at this stage. The second stage is the intermediate development stage in which manufacturing techniques are more refined and market definition is sharpened; output grows rapidly in response to newly recognized applications and unsatisfied market demands. A high but somewhat lesser degree of uncertainty characterizes market outcomes at this stage. The third stage is that of a mature industry. Management, manufacturing, and marketing techniques all reach a relatively advanced degree of refinement. Markets may continue to grow, but do so at a more regular and predictable rate...established connections with customers and suppliers (including capital market access) all operate to buffer changes and thereby to limit large shifts in market shares. Significant innovations tend to be fewer and are mainly of an improvement variety."

⁸³¹ Farjoun, M. (2002), pg. 585.

⁸³² Atkinson G. (2004), pg. 275.

⁸³³ Williamson, O. (1975), pp. 215-216, as cited in Klepper (1997), pp. 146-147.

Subsequently, Gort and Klepper (1982) conducted one of the most extensive studies of industrial evolution in which they examined the life cycles of nearly 50 industries which originated between 1887 and 1960 and which represented a diverse mix of products. As shown in the quote below, they found a number of general (although not universal) patterns in the evolution of the structure of industries along the dimensions of: number of firms, industry output growth, prices, and rate of innovations.

"[Gort and Klepper, 1982]... observed that industries for new products pass through a brief period with few firms, followed by a rapid increase in the **number of firms**, which then falls rapidly to a relatively stable level (p. 639). During the evolution of the industry, [they] also observed that **output** growth is initially high but declines steadily (p. 645); prices fall rapidly but at a decreasing rate (p. 647); and the rate of both major innovations and minor innovations rise, peak, and then remain stable over time, with major innovations peaking earlier (p. 648)."⁸³⁴

While many researchers have focused on the causal mechanisms of scale advantages, recent researchers like Lenox, Rockart and Lewin (2007) have generated numerical simulation models to which use the mechanism of interdependency to demonstrate similar patterns in the evolution of the structure of industries:

"This model is able to recreate the patterns observed in improvements in efficiency (continued but with less-substantial improvement as time passes), industry output (increasing at a decreasing rate), prices (steady decline at a decreasing rate), and industry participation (rapid entry is followed by mass exit, leading to a shakeout and a stable number of competitors)."⁸³⁵

⁸³⁴ Lenox, M.J., Rockart, S.F., Lewin, A.Y. (2007), pp. 600-601.

⁸³⁵ Lenox, M.J., Rockart, S.F., Lewin, A.Y. (2007), pp. 610-611.

6.2.1.2 Life Cycle of Finance and Governance

In advancing a life cycle theory of the firm, Mueller (1972) posited that the distribution of dividends back to investors would follow the traditional life cycle curve as shown in Figure 242 below.

"We therefore expect the growth-maximizing management to undertake-more investment than a stockholder-welfare maximizer, pay equivalently smaller dividends, grow at a faster rate, and have a lower market value for its firm."⁸³⁶

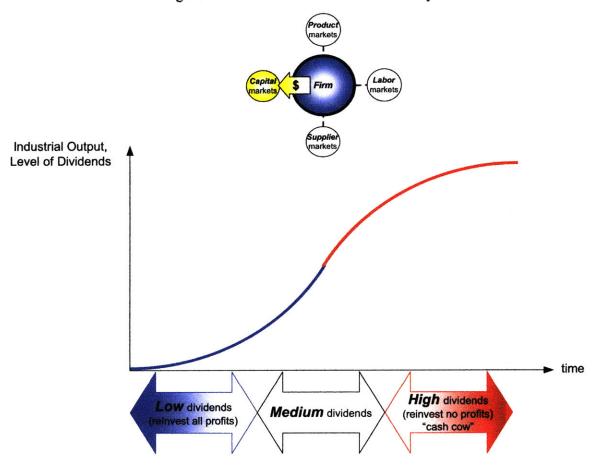


Figure 242: Dividend Distribution Life Cycle

"This paper attempts to fill this void by developing a life cycle theory in which the tendency of managers to pursue growth, rather than stockholder welfare, increases as the firm grows and matures."⁸³⁷

⁸³⁶ Mueller, D.C. (1972), pg. 206.

⁸³⁷ Mueller, D.C. (1972), pg. 199.

Building off of Marris' work (1963), Mueller (1972) also noted that as a market was emerging, with increasing rates of growth, there was no negative trade-off between growth and profitability, therefore principal-agent problems were minimized. However, as the market was maturing, with decreasing rates of growth, there was a negative trade-off between growth and profitability, exacerbating principal-agent problems, as shown in Figure 243 below.

"He postulated the existence of 'young' firms... that had 'taken off' into a process of fast, accelerating growth associated with good profitability. The valuation curve presented no negative trade-off between growth and stock-market value because at this stage the return on retained profits was better than could be obtained elsewhere. Later, as the exceptional circumstances fade, the optimum growth rate for stockholders gradually declines and may finally become negative. During this phase, which may be very long if not indefinite, conflict between managerial and stockholder interests emerges."

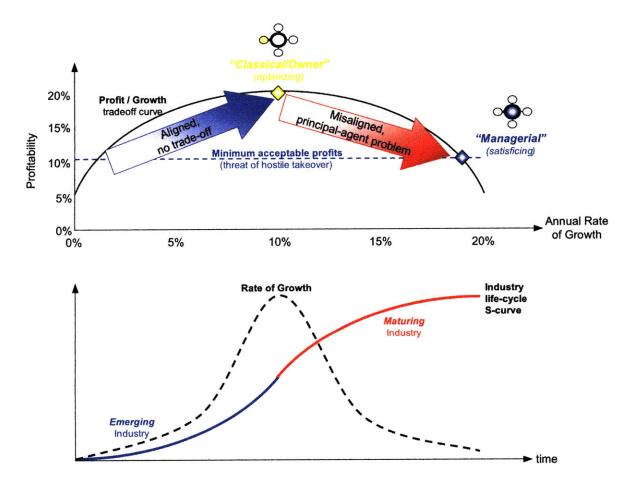


Figure 243: Emergence of the Principal-Agent Problem with Industry Maturity

"Mergers are an obvious way to avoid the slowdown in growth that product maturity brings."839

⁸³⁸ Marris, R. and Mueller, D.C. (1980), pg. 44.

⁸³⁹ Marris, R. and Mueller, D.C. (1980), pg. 45.

"Agency theory predicts that there will be greater divergence between the interests of managers and shareholders in declining industries than in general."⁸⁴⁰

Jensen (1986, 1988) noted that agency theory can be used to explain how and why the interests of principals (investors) and agents (managers) diverge more in maturing or declining industries. He argues that the *value*-driven goals of investors can be incompatible as shown in **Error! Reference source not found.** below.

"Jensen (1988) suggests that the growth-oriented goals of managers during phases of industry growth are compatible with shareholder goals because the opportunities in the industry simultaneously address shareholder wealth maximization and revenue maximization (the latter is one of the more important managerial motives). However, in the decline phase of the industry, these goals are incompatible. Managers would still like to enlarge the firm or reduce risk through diversification, whereas shareholders would rather let the firm shrink so that they can reinvest the capital in better opportunities. Hence, managers may be biased in favor of diversification-oriented acquisitions in the decline and mature stages of a business because such acquisitions represent a feasible path toward growth in such environments."⁸⁴¹

Chandler (1977) argues for the evolution of investor-management relationships as firms grow and evolve. He notes the transition from *personal* enterprise to *family* capitalism to *financial* capitalism to *managerial* capitalism.⁸⁴²

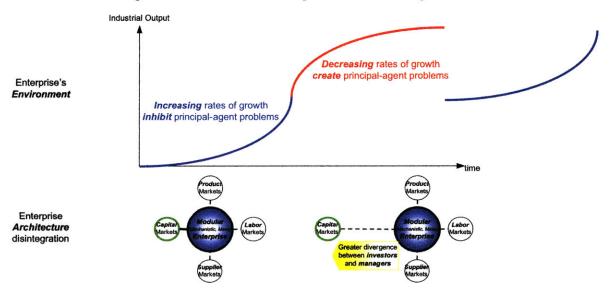


Figure 244: Investor Disintegration in Maturing Industries

"By conservative estimates, **10 percent** of the invested capital in industrialized countries is in industries that are suffering a decline in demand."⁸⁴³

- ⁸⁴¹ Anand, J. and Singh, H. (1997), pg. 101. They cite agency theorists in Jensen (1988).
- ⁸⁴² As cited in Putterman and Kroszner (1996), pg. 83.

⁸⁴⁰ Anand, J. and Singh, H. (1997), pg. 100. They cite agency theorists in Amihud and Lev (1981) and Jensen (1986).

⁸⁴³ Anand, J. and Singh, H. (1997), pg. 99. They cite Ghemawat and Nalebuff (1990).

6.2.1.3 Life Cycle of Strategic Management Theories

This framework posits that the dominant theories in strategic management literature would reflect the state of evolution of most major industries of the time.

6.2.1.3.1 Externally-focused SCP

This framework posits that as the majority of industries in the dominant region where strategic management research was being undertaken – i.e. the US – was experiencing a boom of mass production from the 1920's to the 1960's the strategic management literature reflected this industrial phenomenon. As such exogenous industry structural variables would seem particularly relevant. The Industrial Organization school (Mason, 1939; Bain, 1959) reflected this external view of structural variables.

6.2.1.3.2 Internally-focused RBV

Additionally, this framework posits that as the majority of industries in the dominant region where strategic management research was being undertaken - i.e. the US - was experiencing a saturation of the mass production markets from 1960's onwards, the strategic management literature reflected this industrial phenomenon.

As the focus was then on growth in firms and/or industries experiencing limited rates of growth, productivity would then be more important. Economies of scope would replace economies of scale in such industries. Learning and the internal capabilities of the firm would begin to dominate the external strategy schools. The Resource-Based View which initially began with Penrose in 1959 was largely ignored until the mid-1980's (Wernerfelt, 1984).

"The question I wanted to answer was whether there was something inherent in the very nature of the firm that both **promoted its growth** and necessarily **limited its rate of growth**."^{x844}

From Penrose's most fundamental question, one can infer that she was studying a firm that while growing, its rate of growth was slowing down. In graphical terms, this is a firm in the later stages of its "S-curve".

If a firm's rate of growth is in some way limited by the carrying capacity of the firm's environment, then one might posit that Penrose was studying a firm in the later, maturing stages of its development. It turns out that Penrose's classic 1959 book was based on the study of one firm, The Hercules Powder Company, a commodity materials company, which in 1959 could be demonstrated to be in the maturing stages of its industry.

This posited evolution of strategic management theoretical focus may have mapped approximately to the evolution of major US industries as shown in Figure 245 below.

⁸⁴⁴ Penrose, E. (1959).

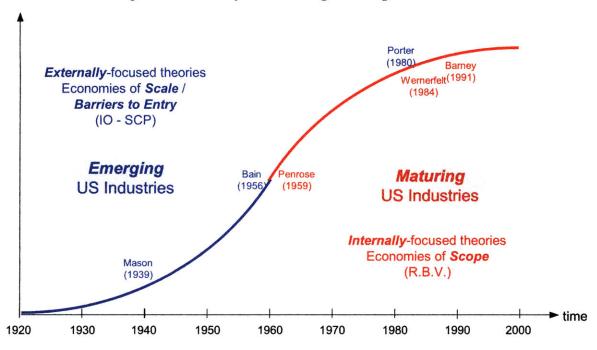


Figure 245: Life Cycle of Strategic Management Theories

6.2.2 Sociology and Organizational Theories

6.2.2.1 Environmental Descriptions

Sociologists and organizational theorists have long characterized the environment within which firms operate, as they have established the environment as a source of critical contingencies with respect to firm performance. The following summarizes some of the most influential in order to situate their theories within the proposed framework.

6.2.2.1.1 Six *Dimensions* (Aldrich)

"Use of a single dimension of an industry's environment to build theory and to test proposed relationships empirically may result in a failure to investigate alternative plausible explanations of observed relationships."⁸⁴⁵

Population ecologists have long identified multiple "dimensions" for characterization of the environment (e.g. Aldrich, 1979, pp. 63-74), the most common of which include:

- Environmental *Capacity*
- Environmental *Homogeneity-Heterogeneity*
- Environmental *Stability-Instability*
- Environmental Concentration-Dispersion
- Domain Consensus- Dissensus
- Turbulence

Other organizational theorists have combined these dimensions into various descriptors of the environment as will be seen below.

6.2.2.1.2 Four Causal Textures (Emery & Trist)

Emery and Trist (1965) identified four 'ideal types' of causal texture, which are briefly summarized below and interpreted within the context of the industry life-cycle S-curve in Figure 246 below.

"Together, the four types may be said to form a series in which the degree of causal texturing is increased." 846

6.2.2.1.2.1 Step #1: Placid, Randomized

The economist's "classical market" corresponds to this type. The firm can be though of as entrepreneurial.

6.2.2.1.2.2 Step #2: Placid, Clustered

⁸⁴⁵ Dess, G.G., Ireland, R.D., and Hitt, M.A. (1990), pg. 16.

⁸⁴⁶ Emery and Trist (1965), pg. 23.

"Organizations tend to grow in size and also to become more hierarchical, with a tendency towards centralized control and co-ordination."⁸⁴⁷

The economist's "imperfect competition" corresponds to this type.

6.2.2.1.2.3 Step #3: Disturbed-Reactive

The economist's "oligopolic market" corresponds to this type. Strategic interaction is now important.

6.2.2.1.2.4 Step #4: Turbulent Fields

"The dynamic properties arise not simply from the interaction of the component organizations, but also from the field itself. The 'ground' is in motion."⁸⁴⁸

Note that other researchers speak of discontinuity. Abernathy et al. (1983) speaks of industrial "de-maturity".

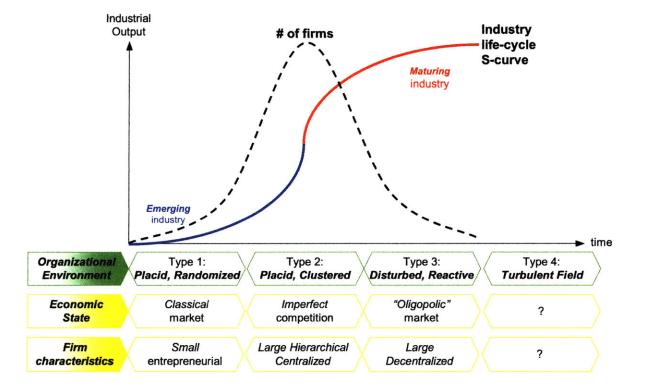


Figure 246: Four Causal Textures and the Industry Life Cycle

⁸⁴⁷ Emery and Trist (1965), pg. 23.

⁸⁴⁸ Emery and Trist (1965), pg. 24.

6.2.2.1.3 Three Dimensions (Dess & Beard)

Aldrich (1979) defined the environment using six dimensions: geographic concentration and heterogeneity, stability and turbulence, and domain consensus and capacity. In a subsequent influential paper, Dess and Beard (1984) condensed these dimensions to three: munificence, dynamism and complexity.⁸⁴⁹

6.2.2.1.3.1 Munificence

Environmental munificence is the scarcity or abundance of resources (e.g. demand) in a given environment. It represents the extent to which the environment can support sustained growth (Starbuck, 1976). In the language of system dynamics, environmental munificence can be considered as environmental "carrying capacity", which may or may not be constant over time.

High environmental munificence creates favorable supply-demand tradeoffs and therefore makes it easier for firms to survive, perform successfully or create profit (Hart and Banbury, 1994). Poorly managed firms can still survive and create profits, discouraging their efficiency levels or improvement capabilities.

Conversely, low environmental munificence makes it harder for firms to perform successfully and therefore forces firms to make more frequent adjustments to access resources from the environment (Koberg, 1987).

"In a high-growth period, productivity can be raised by anyone. But how many can attain it during the more difficult circumstances induced by low-growth rate? This is the deciding factor in the success or failure of an enterprise."⁸⁵⁰

Lean competitors based on integral enterprise architectures tend to make frequent or continuous incremental "kaizen" improvements in response to a mature, saturated anti-munificent environment. The are well-suited to their harsh environment like a cactus in the desert.

6.2.2.1.3.2 Dynamism

Environmental dynamism is the level of change or rate of volatility in the environment. More precisely, it is the extent to which such change is *unpredictable* (Dess and Beard, 1984). An environment having a high level of dynamism has also been described as "unstable" (Mintzberg, 1990).

Note: from a system dynamics perspective, this instablilty mathematically corresponds to dominant positive feedback generating exponential growth or decline.

⁸⁴⁹ Environmental "dynamism" and "complexity" are often combined under the concept of environmental "uncertainty".

⁸⁵⁰ Ohno, T. (1978), pg. 114.

6.2.2.1.3.3 Complexity

Environmental complexity is the number and diversity of "forces" (e.g. stakeholders) with which interaction is required, and the extent to which an organization must have sophisticated knowledge about customers, competitors etc. (Aldrich, 1979).

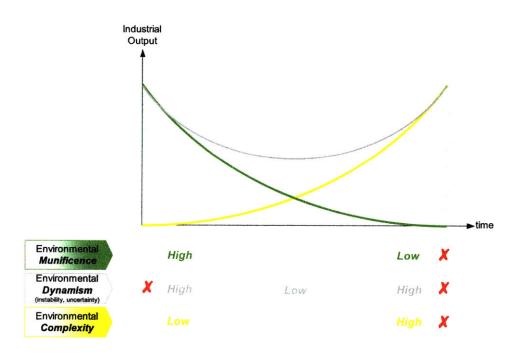
"The environmental contexts in which organizations exist are themselves changing, at an increasing rate, and towards increasing complexity. This point, in itself, scarcely needs labouring."⁸⁵¹

This research posits that environments with high environmental complexity tend to exhibit more boundedly rational behavior (March and Simon, 1958), and therefore present opportunities for integral enterprise architectures to develop.

6.2.2.1.3.4 Discussion

When considering the trajectories of the three dimensions of an organizational environment, it is clear that they have opposite levels (Castrogiovanni, 1996), as shown in Figure 247 below.

Figure 247: Trajectories of the Three Dimensions of Organizational Environments



⁸⁵¹ Emery and Trist, (1965), pg. 21.

One can then begin to map these three dimensions of organizational environment onto the industry life-cycle S-curve. As shown in Figure 248 below, emerging industries tend to exhibit high levels of environmental munificence and dynamism and low levels of complexity, while conversely, maturing industries tend to exhibit low levels of environmental munificence and dynamism and high levels of complexity.

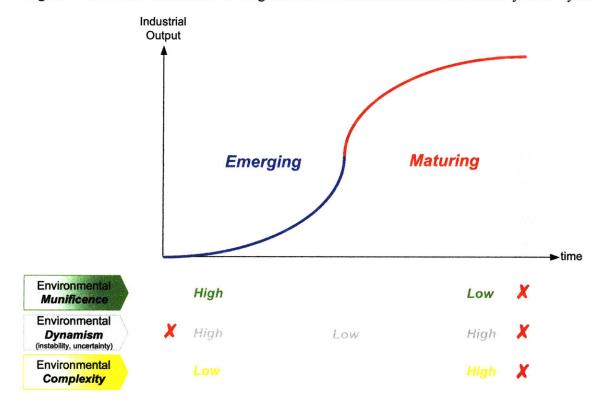


Figure 248: Three Dimensions of Organizational Environment & the Industry Life-Cycle

6.2.2.1.4 Two Dimensions (Burns & Stalker)

In their classic exposition on Contingency Theory, Burns & Stalker (1961) describe the environment as different rates of change in *technical* or *market* variables.

"These extrinsic factors are all, in our view, identifiable as different rates of technical or market change. By change we mean the appearance of novelties: i.e. new scientific discoveries or technical inventions, and requirements for products of a kind not previously available or demanded."⁸⁵²

Burns and Stalker (1961) conceived of their two characterizations of the environment via observing empirically the technical and market conditions for electronics during World War II, which they called "stable", and those conditions after the war, which they called "unstable".

"When novelty and unfamiliarity in both market situation and technical information become the accepted order of things, a fundamentally different kind of management system be comes appropriate from that which applies to a relatively stable commercial and technical environment."⁸⁵³

6.2.2.1.5 Three Dimensions (Chandler)

Chandler (1962) also conceded that different environmental conditions demanded different (strategies and therefore) structures. These conditions were characterized as the rate of environmental change in technology, markets and supply.

"As long as an enterprise belonged in an industry whose markets, sources of raw materials and production processes remained relatively unchanged, few entrepreneurial decisions had to be reached. In that situation, such a weakness was not critical, but where technology, markets and sources of supply were changing rapidly, the defects of such a structure became more obvious."⁸⁵⁴

6.2.2.1.6 Two Dimensions (Lawrence & Lorsch)

In their classic exposition on Contingency Theory, Lawrence and Lorsch (1967a, pg. 157) describe two external variables: *certainty* and *diversity* of the environment.

6.2.2.1.6.1 Certainty (Dynamic-Stable)

Lawrence and Lorsch (1967a, pg. 151-152) describe environmental *certainty* as either *dynamic* (*i.e. uncertain* or *unstable*) or *stable* (*i.e. certain*). Their empirical sample covered three different industrial environments: plastics, packaged foods and standardized containers, ranging from most dynamic to most stable. The following excerpt illustrates their definition of a stable environment.

"One important consideration was to select industries with slower rates of environmental change. We therefore sought one industry whose rates of growth and change were very slow... the most stable

⁸⁵² Burns, T. and Stalker, G.M. (1961), pg. 96.

⁸⁵³ Burns, T. and Stalker, G.M. (1961), pg. vii.

⁸⁵⁴ Chandler, A. (1962), pg. 41.

environment. Here the rate of sales increase was only slightly higher than the growth in national population."855

6.2.2.1.6.2 Diversity (Diverse-Homogeneous)

Lawrence and Lorsch (1967a, pg. 151-152) describe environmental *diversity* as either *diverse* (*heterogeneous*) or *homogenous*. The following excerpt illustrates their definition of a homogeneous environment.

"Even more important, no significant new products had been introduced in the past 20 years."856

6.2.2.1.6.3 Critique

It appears that Lawrence and Lorsch's two characterizations of the environment - i.e. *certainty* (or *stability*) and *diversity* (or *heterogeneity*) correspond roughly to the two dimensions in this research (i.e. *quantity* and *quality*).

It also appears that these two external variables are meant to be used together, and therefore define the "diagonal" states where dynamic (unstable) and diverse (heterogeneous), or stable and homogeneous go hand in hand. It is not clear if they intended to cover the "off-diagonal" cases of dynamic (unstable) and homogeneous or stable and diverse (heterogeneous). In a similar way, the two external variables used in this research are meant to be used together although not necessarily coincident temporally. Therefore the rate of change in quantity of output has similar mapping to the rate of change in quality of output.

It is very important to note however that (unlike this research), Lawrence and Lorsch do not appear to posit a continuous evolution between the two different environmental states, e.g. that dynamic/diverse environments precede stable/homogeneous environments in the typical S-curve of environmental development.

6.2.2.1.7 Environmental Uncertainty

While Aldrich (1979) and Dess (1984) have focused on six and three dimensions respectively characterizing the environment, other researchers have combined these and other variables into a notion of environmental uncertainty. Some researchers have combined Dess' environmental "dynamism" and "complexity" into the concept of environmental "uncertainty".

"Uncertainty appears as the fundamental problem for complex organizations, and coping with uncertainty, as the essence of the administrative process."⁸⁵⁷

Anderson and Tushman (2001) observed empirically the mortality rates of firms in longitudinal studies of two industries.⁸⁵⁸ Instead of using Dess' three dimensions of munificence, dynamism and complexity, they used the three dimensions of munificence, *uncertainty* and complexity and

⁸⁵⁵ Lawrence, P.R. and Lorsch, J.W. (1967a), pg. 85.

⁸⁵⁶ Lawrence, P.R. and Lorsch, J.W. (1967a), pg. 85.

⁸⁵⁷ Thompson, J.D. (1967), pg. 159.

⁸⁵⁸ The industries were the US cement industry (1888-1980) and the minicomputer industry (1958-1982).

found that *uncertainty* is the key dimension which determines organizational mortality. While firms can slowly adapt to changes in environmental munificence and complexity, it is rather more difficult to respond quickly to unpredictable changes in the quantity and quality of demand.

Moberg and Koch (1975, pg. 115) observe that such a contingency variable as environmental uncertainty has been operationalized in many different ways: Dill (1958) uses "homogeneous-heterogeneous", Thompson (1967) uses "stable-shifting" and Lawrence and Lorsch (1969) use "clarity of environment related information", "degree of certainty of cause-effect relationships" and "time span of definitive feedback."

6.2.2.1.8 Rates of Environmental Change

"Perhaps the most ubiquitous force leading to structural change is a change in the long-run industry growth rate. Industry growth is a key variable in determining the intensity of rivalry in the industry."⁸⁵⁹

Various researchers in fields ranging from economics to sociology – specifically, strategy (Porter, 1980; Levinthal and Myatt, 1995) and organizational theory (Burns and Stalker, 1961; Chandler, 1962; Lawrence and Lorsch, 1967a) – have argued that the rates of change of the environment impact the development of organizations. These have typically been applied to technological and market changes.

"Perhaps the most basic attribute of the markets and customers served that will impact the development of the firm's capabilities is their growth rate. Is the firm serving customers and market segments that are growing rapidly and thereby can provide a rich experience base for the firm? Similarly, consider the co-evolution of a firm's capabilities when the industry is in decline. As markets shrink, so does reinvestment in equipment. This yields a vintage effect on the firm's production capabilities."⁸⁶⁰

Researchers (e.g. Levinthal and Myatt, 1994) have posited the beneficial effects of positive feedback in the generation of capabilities, and thus identify the underlying growth rate of markets as a driver of success. It is interesting to note that this point of view is valid for modular enterprise architectures as "market makers" in growing markets, while it is also valid for integral enterprise architectures as "market takers" who grow by taking market share off incumbents and therefore build capabilities, even when underlying growth rates of markets are low.

Lawrence and Lorsch (1967a, pg. 19) focus on the rates of *technological* change in both products and processes.

Chandler (1962), as reported in Lawrence and Lorsch (1967a, pg. 197-198), focuses on rates of change in "technology, markets, and sources of supply".

Burns and Stalker (1961), as reported in Lawrence and Lorsch (1967a, pg. 187), focus on "rates of change in the *scientific techniques* and *markets*".

⁸⁵⁹ Porter, M.E. (1980), pg. 164.

⁸⁶⁰ Levinthal, D. and Myatt, J. (1994), pg. 48.

6.2.2.2 Theories of Firm Evolution

Organizational researchers have long posited theories of firm evolution: Scott (1971), Greiner (1972) in Van de Ven, (1992).

6.2.2.3 Open Systems Theory

"The environment sets conditions that help shape the organization even as the organization shapes and influences its environment."⁸⁶¹

One of the most fundamental theoretical assumptions used is that of firms as *open systems*. A considerable amount of open systems theories have proliferated, some of the most noteworthy include: structural contingency theory (Burns and Stalker, 1961; Woodward, 1965; Thompson, 1967; Lawrence and Lorsch, 1967), institutional theory (Selznick, 1957), population ecology (Hannan and Freeman, 1984), economic theories of organizations (e.g. transaction cost economics), resource dependence theory, and network theory.⁸⁶²

"There is no one best way to organize ... any way of organizing is not equally effective."863

Heuristic 3a:

The enterprise performance is contingent upon: the environment's evolutionary state, the architectural form (i.e. its effectiveness), and the structural dynamics (i.e. its efficiency).

Contingency theorists Lawrence and Lorsch (1967), highlight the opposing forces of *differentiation* and *integration*. Other organization theorists (Scott, 2002) introduce the notions *rational* and *natural* systems. The rational (differentiation) perspective sees conflict as something unhealthy to be resolved, while the natural (integration) sees conflict as part of the healthy negotiation process of attaining consensus. These support the following propositions:

Heuristic 3b:

The modular enterprise architecture is based primarily on differentiation and rational optimization. The integral enterprise architecture is based primarily on integration and natural compromise⁸⁶⁴.

6.2.2.4 Structural Contingency Theory

Structural contingency theory has been an important mode of explanation of firm performance in the organizational theory literature using *context-structure-performance* relationships.

One of the important contributions of structural contingency theory is the notion of "fitness" of an organization with its environment. Not only does Van de Ven (1979) enumerate four

⁸⁶¹ Lawrence and Dyer (1983), pg. 295.

⁸⁶² As noted in Smelsner and Swedborg (1994), pg. 537.

⁸⁶³ Galbraith, J. (1973).

⁸⁶⁴ Simon referred to cognitive global suboptimization as "satisficing".

different conceptual definitions of "fit, he also (Drazin and Van de Ven, 1985), considers three different notions of "fitness".

"Recently a systems approach to contingency theory has emerged. Advocates of this approach assert that the understanding of context-structure performance relationships can only advance by addressing simultaneously the many contingencies, structural alternatives and performance criteria that must be considered holistically to understand organization design."⁸⁶⁵

6.2.2.5 Population (Organizational) Ecology

Within the field of sociology, population ecology explores the evolution (i.e. the birth, growth and death rates) of populations of firms.

"Organizational ecology, unlike strategic management or industrial organization economics, models competition as an explicitly dynamic phenomenon. Ecologists see competition and environmental characteristics as having an interactive effect on the success of a given strategic approach."⁸⁶⁶

Boeker (1991) notes that strategic management researchers have classified *strategy* typologies/taxonomies in much the same was as organizational ecology researchers have classified *organizational forms* typologies/taxonomies.

6.2.2.5.1 Natural Selection

Selection works best in a static population, and is disguised by rapid growth of the population.⁸⁶⁷

6.2.2.5.2 Structural Inertia

Hannan and Freeman (1977 & 1984) notably espoused the contruct of structural inertia, which inhibits organizational change. They do not claim that adaptation does not occur, but that it merely occurs at rates that are slower than the demands from the environment.

6.2.2.5.3 Co-Evolutionary Dynamics

Recently, a proliferation of research on the co-evolution of firm and environment has come out of the "Rotterdam school" Volberda and Lewin (2003).

6.2.2.6 Structuration

An enterprise architecture is a socially-enacted structure which simultaneously and recursively enables and constrains, but does not determine human action. This duality of structure is called "structuration" by its proponents (Giddens, 1979; Whittington, 1992; Yates, 1997).

"Giddens resists post-modernist pessimism as to the possibility of humanly engineered progress. Nevertheless, he concedes that control within an organization is unlikely to be complete."⁸⁶⁸

⁸⁶⁵ Drazin and Van de Ven (1985), pg. 519.

⁸⁶⁶ Boeker, W. (1991), pg. 614.

⁸⁶⁷ *The Economist*, December 24th 2005, pg. 12 of "A Survey of Human Evolution".

⁸⁶⁸ Whittington, R. (1992), pp. 695.

6.2.3 Technology and Innovation Theories

6.2.3.1 *Product* Life Cycle

"Organisms are depicted as proceeding through distinct cycles in their life as they age (Bonner, 1993, pp. 15-35). Can the same be said for **industries**? Is it meaningful to talk, as has been done, about a **product** life cycle that captures the way many industries evolve? If so, what are the characteristics of this life cycle?"⁸⁶⁹

Product life cycles were postulated more than fifty years ago by a variety of authors including Dean (1950), Levitt (1965), Vernon (1966), Cox (1967) as a means for firms to exploit deterministic continuity of industrial evolution to their advantage.

6.2.3.2 *Industry* Life Cycle

The industry life-cycle gained acceptance in strategic management as a dominant model for analyzing the external environment as a dynamic extension of Porter's (1980) five forces model.⁸⁷⁰ Both were derived from the Structure-Conduct-Performance (SCP) paradigm of the Industrial Organization (IO) economics tradition.

6.2.3.3 Technological Discontinuities

[Technological discontinuities] "...command a decisive cost or quality advantage that strike not at the margins of the profits and the outputs of existing firms, but at their foundations and their very lives."⁸⁷¹

Like Schumpeter before them, researchers Tushman and Anderson focused on the technological aspects of the organization's environment as a key determinant of environmental change. They authored two influential papers (briefly discussed below) which define *technological discontinuities* and their relationship to the other key punctuating event in the evolution of a technology, the *dominant design*.

"Discontinuities predictably affect environmental uncertainty, munificence, and organizational growth rates."⁸⁷²

Tushman and Anderson (1986) noted that major technological breakthroughs or "discontinuities" increase both environmental uncertainty and munificence. They noted that such discontinuities can both enhance and destroy firm competence, with new firms (challengers) typically initiating competence-destroying discontinuities which have increased environmental turbulence (or uncertainty) and existing firms (incumbents) typically initiating competence-enhancing "discontinuities" which have decreased environmental turbulence (or uncertainty).

⁸⁶⁹ Klepper, S. (1997), pg. 145.

⁸⁷⁰ Farjoun, M. (2002), pp. 565.

⁸⁷¹ Schumpeter, J. (1942), pg. 84.

⁸⁷² Anderson, P. and Tushman, M.L. (1990), pg. 606.

More recently, Anderson and Tushman (1990) further clarify, refine, develop and extend their concepts of technological discontinuities, particularly with vis à vis dominant designs, in their cyclical model of technological change.

"Technological discontinuities (innovations that dramatically advance an industry's price vs. performance frontier) trigger a period of ferment that is closed by the emergence of a dominant design. A period of incremental technical change then follows, which is, in turn, broken by the next technological discontinuity."⁸⁷³

Furthermore, they began to quantify further relationships, namely:

"Sales always peak after a dominant design emerges. Discontinuities never become dominant designs, and dominant designs lag behind the industry's technical frontier."⁸⁷⁴

From these two complementary pieces of research, one can begin to infer an internally consistent set of propositions represented in Figure 249 below.

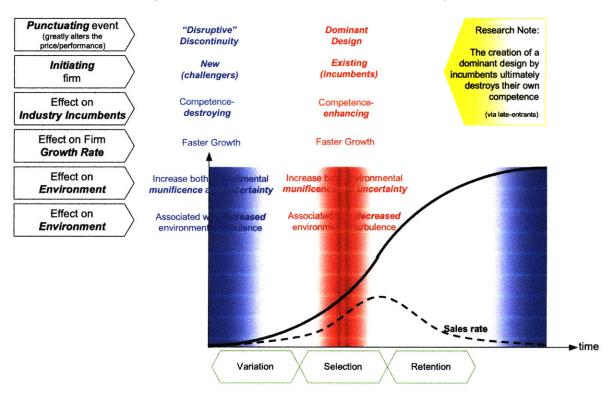


Figure 249: Discontinuities and Dominant Designs

6.2.3.4 Disruptive Technologies

An important endogenous mechanism whereby firm performance feeds back to shape the industrial evolution is the over-serving existing markets and the subsequent creation of disruptive innovations (Christensen and Bower, 1996; Christensen, 1997).

⁸⁷³ Anderson, P. and Tushman, M.L. (1990), pg. 604.

⁸⁷⁴ Anderson, P. and Tushman, M.L. (1990), pg. 604.

6.2.3.5 Dominant Designs (Products)

"Linking technology cycles and dominant designs to organizational architectures and competencies is a way to get more deeply to the roots of dynamic organizational capabilities. Much exciting theoretical and empirical work remains in coupling dominant designs and technology cycles to environmental conditions and organizational evolution."875

Research on dominant designs have productive developed this construct for thirty ranging from Abernathy and Utterback (1978) to Tushman and Murmann (1998).

"We argue that the search for a dynamic theory of strategy and for a link between the productmarket and resource-based views may be incomplete without an explanation of the evolution of the technology that underlies products and heterogeneous firm capability. The evolution determines what kinds of products (low cost, niche or differentiated) can be offered at each stage of evolution."870

Researchers have demonstrated a life-cycle theory of product and process innovation, with the establishment of a "dominant design" as the catalyst marking the tipping from one regime to the other. This literature has evolved through the following theoretical phases:

- Product-Process evolution (Utterback & Aernathy, 1975)⁸⁷⁷
- Dominant Designs (Abernathy & Utterback, 1978) ٠
- Technological discontinuities & political processes (Tushman & Anderson, 1986)
- Dominant designs on firm entry & exit (Utterback & Suarez, 1993) ٠

The concept of a "dominant design" is itself fluid and evolving. The following for example summarizes the claims in the automotive industry:

- Ford Model T in 1908 (Abernathy & Utterback, 1978)
- GM's Automatic transmission in 1940 (Abernathy, Clark & Kantrow, 1983, pg. 115) ٠
- Dodge all-steel closed body in 1923 (Utterback & Suarez, 1993)
- Ford Model T in 1908 (Klepper & Simons, 1997)⁸⁷⁸ ٠

Attempts have been made recently to numerically model the interactions between products and processes (Milling and Strumpfe, 2000), albeit over relatively short time horizons, and not over the evolution of industries.

Table 19 below summarizes some of the research in this space.

⁸⁷⁵ Tushman, M. and Murmann (1998).
⁸⁷⁶ Afuah and Utterback (1997), pg. 184.

⁸⁷⁷ Note that product & process innovation was typically measured by *number* of innovations ("transilience") and note level of product or process performance.

⁸⁷⁸ Klepper and Simons (1997) pg. 448 noted a potential error in Utterback & Suarez's dataset.

Year	Citation	Empirical Basis	Notes
1966	Fabris (PhD dissertation)	US Auto.	Empirical basis of product innovationa and demography for much of Abernathy-Utterback research.
1974	Utterback (paper)		Presents a model of <i>product</i> evolution: performance- maximization, sales-maximization & cost minimization
1975	Abernathy & Townsend (paper)		Presents a model of <i>process</i> evolution; uncoordinated, segmental, and systemic.
1975	Utterback & Abernathy (paper)	5 industries in 120 firms (Myers & Marquis)	Model of <i>product</i> and <i>process</i> evolution. ("Rate of innovation" means number of innovations, not product performance). No mention of "Dominant Design".
1978	Abernathy (Productivity Dilemma)	US Auto.	
1978	Abernathy & Utterback (paper)	Electric light bulb, auto., airplane	"Dominant Design" mentioned for the first time. Examples given: Model T in 1908 and DC-3 in 1935. Three phases identified: Fluid, Transitional & Specific.
1983	Abernathy, Clark & Kantrow (Industrial Rennaissance) (pp. 109-118)	US Auto. (see Appendix D)	"Dominant Design" term used, but not explained. "Transilience" used to define competitive effects of technology. "Revolutionary change with the closed steel body in the mid-1920's in the 1940s, the dominant design was completed."
1985	Abernathy & Clark (paper)	US Auto.	Summary of 1983 book. 1908 Model T \rightarrow 1913 moving line \rightarrow 1923 closed steel body \rightarrow 1965 sports car.
1986	Tushman & Anderson (paper)	Minicomputers, Cement, Airlines	Dominant design (e.g. Model T in 1908) creation as a technological discontinuity emerging from a political process.
1988	Butler (paper)	747 airplane	
1990	Anderson & Tushman (paper)	Minicomputers, Cement, Glass	
1993	Utterback & Suarez (paper)	Typrwriter, Auto., TV, TV tubes, Transistor, IC, Calculator, Supercomputer	For auto. industry, Fabris data, dominant design in 1923 with peak number of firms.
1994	Utterback (Dynamics of Innovation) (pp. 34-37)	Assembled & Non-Assembled	"The (1923) <i>Dodge</i> all-steel closed body became the dominant design <i>for the auto body</i> "
1995	Suarez & Utterback (paper)	Typrwriter, Auto., TV, TV tubes, Transistor, IC, Calculator, Supercomputer	Explicit reference to population ecology.
1995	Nelson (paper)		Explores "dominant designs" as an outcome of "dynamic increasing returns".
1996	Klepper (paper)		Math model that supports the Abernathy-Utterback hypothesis.
1997	Afuah & Utterback (paper)		Applies strategy (IO and RBV) theories to dominant designs.
1997	Klepper (ICC paper)	US Automotive	Transilience revisited for product and process innovation. Data show a peak in firm no. in 1908.
1997	Klepper & Simons (82 page ICC paper)	Autos., Tires, TVs, Penecillin	Generalizes Klepper's 1997 paper to 4 industries.
1998	Christensen, Suarez & Utterback (paper)	Rigid Disc Drive	

Table 19: Chronological Research in Dominant Designs
--

1998	Mazzucato (paper)	US Auto.	Their data show a peak in firm no. in 1908.
1998	Windrum &		Dominant designs emerge in niche markets.
	Birchenhall (paper)		
1999	Mazzucato & Semmler	US Auto.	Effect on share price volatility
	(paper)		
2003	Simmons (paper)	US Auto.	Their data seems to match Mazzucato (1908 peak)
2006	Murmann & Frenken		Summarize theory on Dominant Designs and integrate
	(paper)		Architectural/Modularity theory.

6.3 Industrial Evolution

"The desired dynamic characteristics of the management structure depend on the kind of markets, **rate** of technological change, and the other characteristics of the industry. Different organizational forms are seen to favor different classes of products. The management attitudes that work well in one situation falter in another because the life cycle of the product is longer or shorter, the ratios of the times needed to develop a product in comparison with the time for putting it into production are different, or the market is more sensitive to certain of its characteristics and less sensitive to others."⁸⁷⁹

The final construct shown in Figure 250, the industry life-cycle (or S-curve)⁸⁸⁰ has its theoretical underpinnings in the following literatures: the management of technology (Utterback, 1994), evolutionary economics (Nelson, 1991), organizational ecology (Hannan and Freeman, 1989) and strategic management theory (Porter, 1980).⁸⁸¹ It is used to help describe and understand the longitudinal, evolutionary nature of the forces driving the dynamics of industrial evolution.

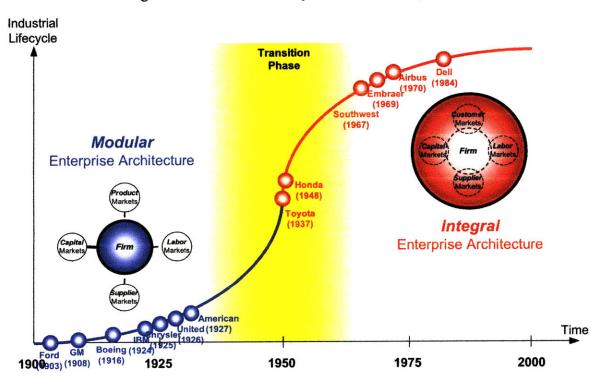


Figure 250: Industrial/Ecosystem Evolutionary Dynamics

Lawrence and Lorsch (1967) argued that the amount of uncertainty, and the *rate of change*⁸⁸² of an environment impacts the development of the internal structure of the organization. From the

⁸⁷⁹ Forrester, J. (1961), pg. 329.

⁸⁸⁰ Also known mathematically as the "logistic" function based on the Lotka-Volterra model.

⁸⁸¹ As described in Agarwal, Sarkar, and Echambadi, R., 2002.

⁸⁸² Note that 'rates of change" can refer to the industry *quantitatively* (i.e. amount of industrial output and *qualitatively* (type of industrial output).

stylized S-curve of industrial output, it can be seen that rates of change in *quantitative* output increase up to the dominant design, and diminish thereafter. Uncertainty, however in the *qualitative* output (i.e. when will the dominant design emerge, and what will it be?) or when will the discontinuity emerge, and what will it be?) decrease up to the dominant design and increase thereafter.

"To cope with these various environments, organizations... have differing structural features...including planning time horizon."⁸⁸³

While the dynamics of industrial consolidation or shakeout can arise from a number of exogenous sources including technological, regulatory and geographic discontinuities, this research focuses on the traditional Schumpeterian technological discontinuity as the primary driving force behind industrial shakeout.

While the population ecologists have theorized and demonstrated that the success rate of new entrants diminishes as the industry matures along its life-cycle, and the total number of firms diminishes during a "shake-out", this theory suggests a nuanced observation:

Heuristic 3c:

While the success rate of new entrants into a post-dominant design industry may be diminished, it is likely that these new entrants possess the modular enterprise architectures of the incumbents. Those few who survive are likely to have an integral enterprise architecture, which will significantly challenge the incumbent modular architectures. Therefore incumbent inertia, once thought to be a strength in selection, is now a potential weakness.⁸⁸⁴

"Rumours of the death of the old-style big businesses are greatly exaggerated...big old businesses have great staying power."⁸⁸⁵

"Very often the individual companies in an industry are similar. The conspicuous manifestations are those of the industry as a whole rather than those uniquely marking one company. Other industries are characterized by the evident differences between the companies, but this is more apt to be in the earlier parts of the life cycle of an industry. In the older more mature industries we often find similarity of companies, a rather highly competitive environment, and often a marked degree of industry instability."⁸⁸⁶

⁸⁸³ Scott, R. (2002), pg. 89.

⁸⁸⁴ It is important to note that due to "survivor bias", the number of integral enterprises born pre-dominant product design is unknown, due to their hypothesized early mortality.

⁸⁸⁵ Whittington and Mayer (2000), pg. 49.

⁸⁸⁶ Forrester, J. (1961), pp. 340.

6.3.1 Industry Maturity Assessment Metrics

Recall that population ecologists have long identified multiple "dimensions" for characterization of the environment (e.g. Aldrich, 1979, pp. 63-74), the most common of which include:

- Environmental Capacity
- Environmental Homogeneity-Heterogeneity
- Environmental Stability-Instability
- Environmental Concentration-Dispersion
- Domain Consensus- Dissensus
- Turbulence

6.3.1.1 Environmental Capacity

"...those firms that possess more skill and/or luck in anticipating changes in demand and technology will be able to earn above average profits (Kirzner, 1973)."⁸⁸⁷

When characterizing the evolutionary state of the industry, this research will adopt multiple dimensions, in an effort to ensure greater internal validity. Two exogenous variables will be discussed herein: the ecosystem carrying capacities in terms of *quantity* (e.g. demand or population size of consumers) and *quality* (e.g. ability of consumers to absorb technological innovation. The existences of these exogenous variables, define logistic growth functions or S-curves which define the growth trajectories of the industry life-cycle summarized in Figure 251 below.

More importantly, the rates of change of these two S-curves will be demonstrated to define key dynamics in the evolution of business ecosystems.

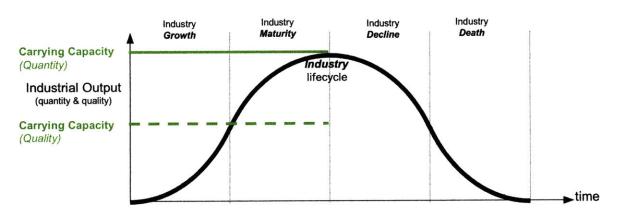
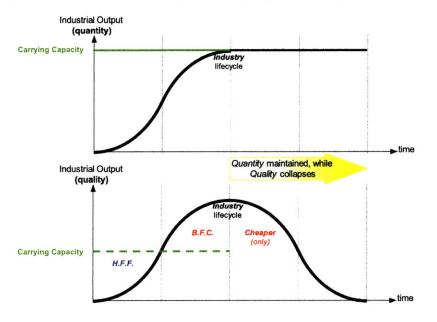
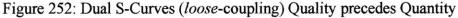


Figure 251: Dual S-Curves (tight-coupling assumption)

⁸⁸⁷ McWilliams, A. (1993).

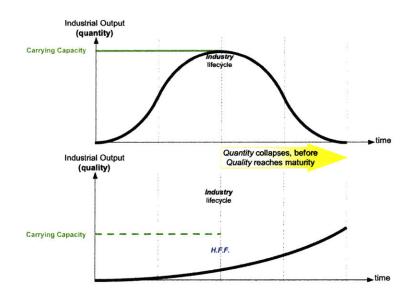
The depiction of the above figure may imply that as industries evolve, their quantity and quality grow and mature at identical rates, i.e. that there is tight-coupling between these two environmental variables relating to carrying capacity. However, in order to present a more generalizable framework, one must allow the two sub-dimensions to uncouple as is summarized in Figure 252 below, which is characteristic of mature commodities.





Another example of such loose-coupling of the quantity-quality space is illustrated in Figure 253 below, where the quantity diverges before full-exploitation of the quality space, due to say, the invasion of a disruptive new innovation.

Figure 253: Dual S-Curves (loose-coupling) Quantity precedes Quality



6.3.1.1.1 Quantity of Output

By way of example from the airline industry, empirical data shown in Figure 254 below shows the state of maturity in quantity space by plotting global available seat kilometers (ASK's) over time.

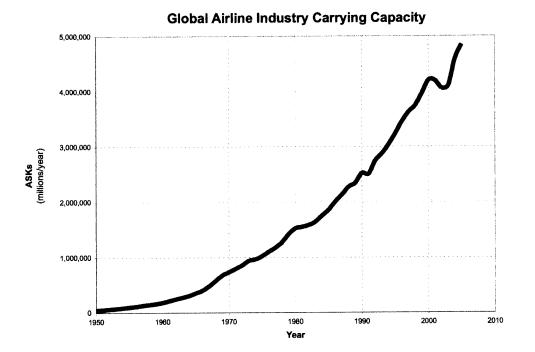
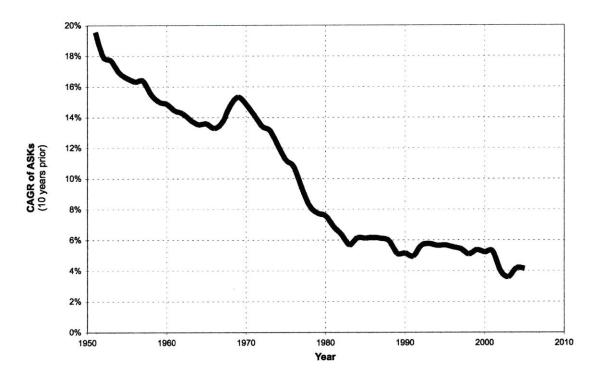


Figure 254: Carrying Capacity of the Global Airline Industry

As can be seen, the carrying capacity is clearly growing, but what is not evident is the rate of change of growth. For this, we need either the first derivative of the underlying growth, or the compound annual growth rate (CAGR) to determine if growth is speeding up or slowing down. Again from Figure 255 below, we can see that the industry is growing but at a decreasing rate, apparently converging toward a long-term growth rate in global GDP.⁸⁸⁸

⁸⁸⁸ Note, the significant increase in global ASK CAGR that occurred in the late 1960's is due to the extremely high production of new jet aircraft, relative to the small stock of jets in existence at the time. In other words, the temporary technological emergence of the "jet age."

Figure 255: Rate of Change of Carrying Capacity of the Global Airline Industry



Global Airline Industry Carrying Capacity

6.3.1.1.2 Quality of Output

Although the quality of output tends to grow as industries evolve, the rate of change of output quality tends to go from fast to slow, which can be modeled as logistic growth.

"Sahal (1981, pg. 32) noted that... once a branch of industry is established, the core technology on which it was founded remains largely unchanged. Modifications that are made tend to be, from a design standpoint, only incremental, even if thay are highly significant improvements from a cost standpoint. Sahal cites as examples the farm tractor, airplane, and electric motor industries, all of which rely on core technologies introduced over a half century ago. These technologies have undergone a great deal of cost improvements since then, but such progress has occurred only through a gradual refinement of essentially invariant patterns of design. Moreover, as Kuznets (1930) and others have noted, gradual modifications and improvements in a given basic form of technology can only go so far. The marginal returns of further innovative advances inevitably decrease as their marginal costs increase. The development of a technology eventually reaches certain dead ends, with little prospect for further advances in its capability."⁸⁸⁹

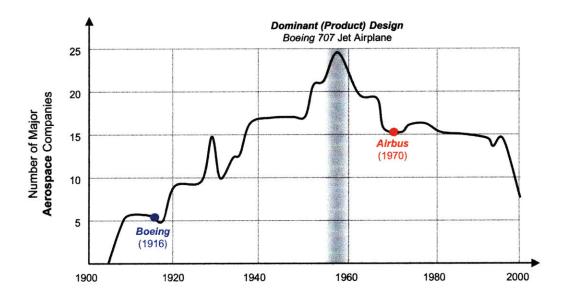
⁸⁸⁹ Astley, W. G. (1985), pg. 224.

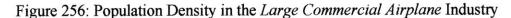
6.4 Evolution of Population Density: Firm Entry and Exit

From the previous section, growth rates (in both quantity and quality) are deemed to be important in defining the state of the environment. There is also considerable empirical evidcence to suggest that such variables are important in defining firm entry and exit, as well as their inherent birth and death rates.

"Industry profitability does not seem to have any significant effect on entry and exit, which are instead positively correlated with industry growth."⁸⁹⁰

Figure 256 below illustrates the population density in the large commercial airplane industry. Note that *Airbus*, entered the market long after the consolidation process began.





⁸⁹⁰ Dosi, G., Malerba, F., Marsili, O., Orsenigo, L. (1997), pp. 7-8.

Figure 257 below illustrates the population density in the automotive industry. Note that *Toyota*, entered the market long after the consolidation process began.

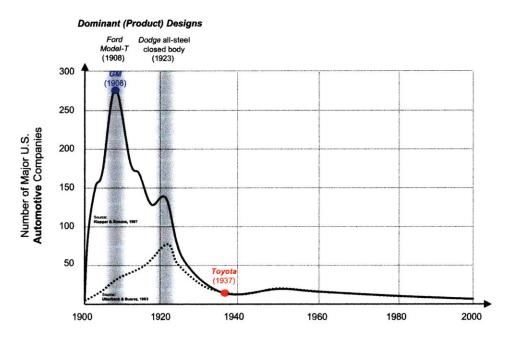


Figure 257: Population Density in the Automotive Industry

Figure 258 below illustrates the population density in the automotive industry. Note that *Southwest*, entered the market long after the consolidation process began.

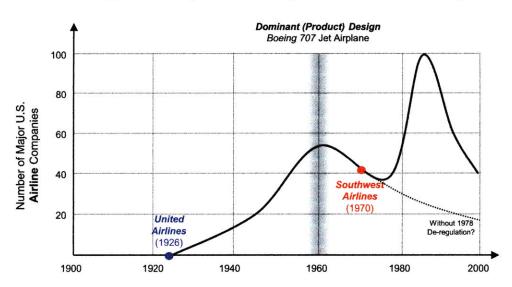


Figure 258: Population Density in the US Airline Industry

Much empirical data from population ecologists demonstrate that late entrants have high mortality rates. The research in this dissertation empirically demonstrates that late entrants of a different species not only have low mortality rates, but they go on to dominate the market. These K-strategists enter late into maturing environments, having lower rates of growth in market and technology space. In this sense this research is not about *population* ecology, but about *community* ecology, as shown in Figure 259 below.

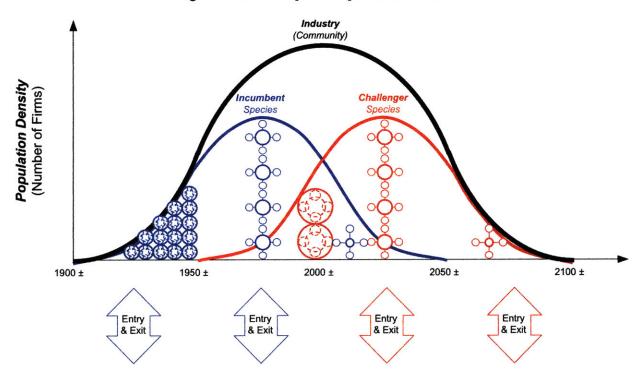
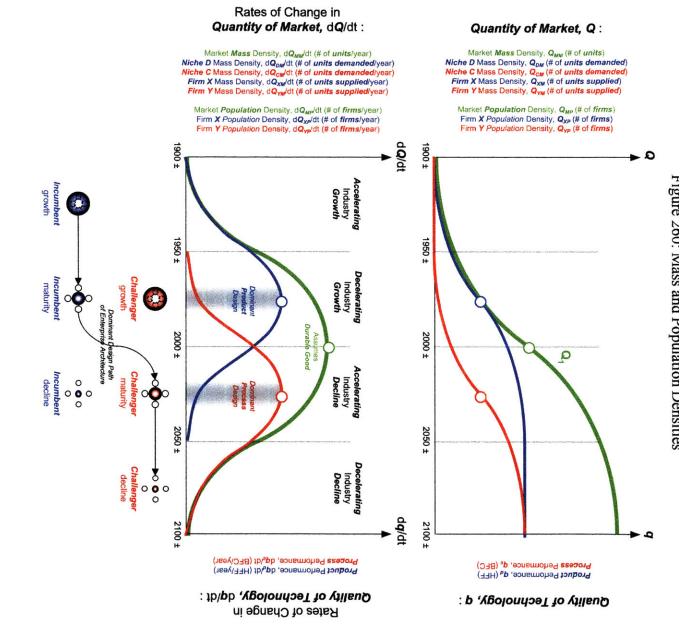


Figure 259: Conceptual Population Densities

Finally, by applying the theoretical framework, we can compare the environmental maturity in quanity and quality space with population densities, mass densities as shown in Figure 260 below.



6.5 Evolution of "Landscapes"

Fitness landscapes evolve over time from rugged, multi-peak to smooth, single-peak, and back to rugged, multi-peak. Due to the complex interdependencies associated with integral architectures, these correspond to integral, modular and integral enterprise architectures.

Figure 261 below shows the two-phase equivalent, whereby landscape smoothness is increasing with each time-step in the first phase, and subsequently landscape smoothness is decreasing with each time-step in the second phase.

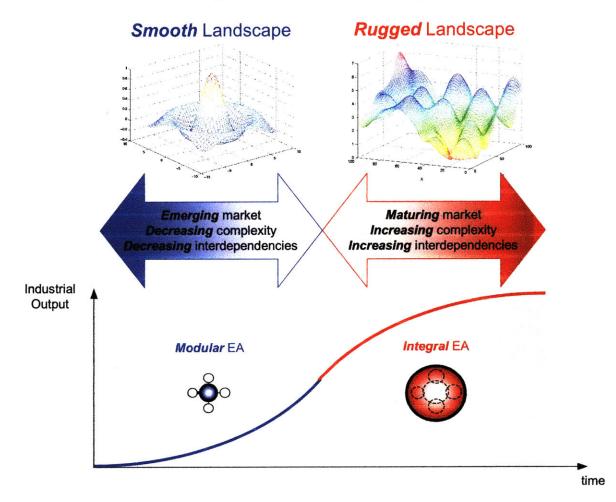


Figure 261: Evolution of Landscapes

6.6 Evolution of Dominant Factor of Production

As can be seen in Figure 262 below, the environment defines the dominant factor of production in the extended enterprise. In the growth phase of the industrial evolution, the capital markets are the dominant factor of production where the focus is on quickly building capacity. Conversely, in the maturity phase, the labor markets are the dominant factor of production, where the focus is on slowly growing capability.

It is important to note that this implies that the firm objective function or "teleological pull" changes, with dramatic implications on enterprise form, structure and behavior.

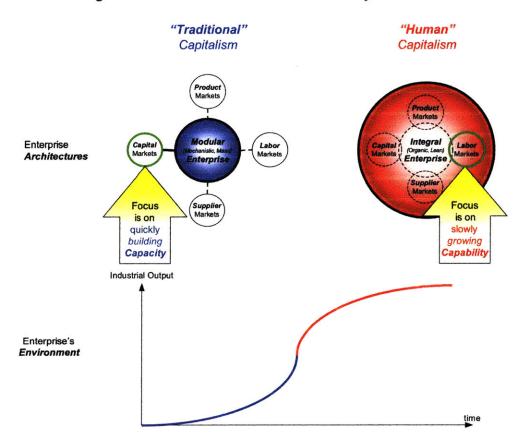


Figure 262: Evolution of Dominant Factor of Production

6.6.1 Traditional capitalism

"This period [the 1980s] also corresponded to the growing numbers and power of institutional investors and the declining numbers and power of trade unions. Capital became more important than labor, whether in the public mind or the productivity equation."⁸⁹¹

"Practically speaking, the change in climate for American corporate executives started in the mid-1980s, due to an extraordinary wave of hostile take-over bids, in which profitable companies, such as Gillette and Disney, were targeted by raiders who thought that these companies could be **even more profitable** in their hands (Ward, 1997). The message to corporate executives was stunningly clear: 'Your days of **satisficing** are over; from now on, you must **maximize**. If you don't we will.' At the same time, institutional investors held larger shares of major companies (Useem, 1996), and these powerful owners exerted more pressure for financial performance."⁸⁹²

6.6.2 Human capitalism

"A growing body of scholarly research shows the relationship between **profitability** and the good treatment of **employees and customers** or between financial success over time and an emphasis on **all stakeholders**."⁸⁹³

⁸⁹¹ Kanter, R.M. (2005), pg. 94.

⁸⁹² Hambrick, D.C. (2005), pg. 106.

⁸⁹³ Kanter, R.M. (2005), pg. 95.

6.7 Evolution of Dominant Production Strategy

Researchers (Poire and Sabel, 1984; Womack, Jones and Roos, 1990) have posited the evolution of dominant production strategies: ranging from *craft* to *mass* to *lean* production. This can be mapped onto the industrial S-curve as shown in Figure 263 below in order to posit that rates of growth enable and constrain certain production technologies.

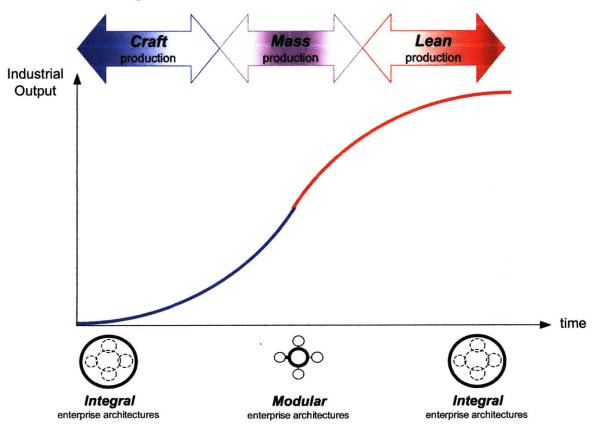


Figure 263: Evolution of Dominant Production Strategy

6.7.1 Craft production

Here *product* innovation is important which requires experimentation and close collaboration with manufacturing. As innovation is best served by integral organizational structures, one would expect to see integral internal design-produce functions as well as integral enterprise architectures.

6.7.2 Mass production

"Mass production is, in fact, a system ideally suited to the survival of large enterprises in a highly cyclical economy. Both workers and suppliers are considered variable costs. The problem with the

*American pattern is that it is extremely corrosive to the vital personal relationships at the core of any production process.*⁸⁹⁴

Here rapidly ramping up production capacity in order to access mass markets is important. This requires economies of scale in production, and a clear division of labor internally between the design-produce functions as well as modular enterprise architectures.

6.7.3 Lean production

Here process innovation is important which requires experimentation and close collaboration with manufacturing (Womack, Jones and Roos, 1990). Like craft production, as innovation is best served by integral organizational structures, one would expect to see integral internal design-produce functions as well as integral enterprise architectures.

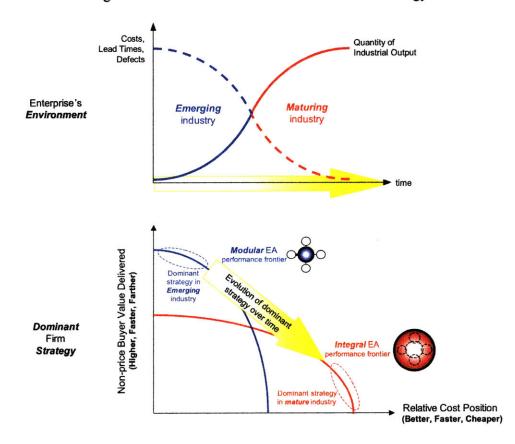
⁸⁹⁴ Womack, Jones and Roos (1990), pp. 247-248.

6.8 Evolution of Dominant Product Strategy (Position)

Miles and Snow's (1978) classic typology identified four different configurations which could theoretically be equally successful in different environments: *defenders, prospectors, analyzers* and *reactors.* Subsequent researchers, however have identified that different environmental conditions produce different successful configuration types. Hambrick (1983a) for example found that *defenders* consistently outperformed *prospectors* on profitability and cash flow metrics in all markets, while *prospectors* performed better than *defenders* in market share change in markets with high product innovation.

Researchers Kim and Lim (1988) found that high-performing differentiators and highperforming cost-leaders were more likely to compete in different environments. More explicitly, Miller (1988) found that successful firms pursuing a strategy of differentiation were more likely to compete in unstable environments, while successful firms pursuing a strategy of costleadership were more likely to compete in stable environments.

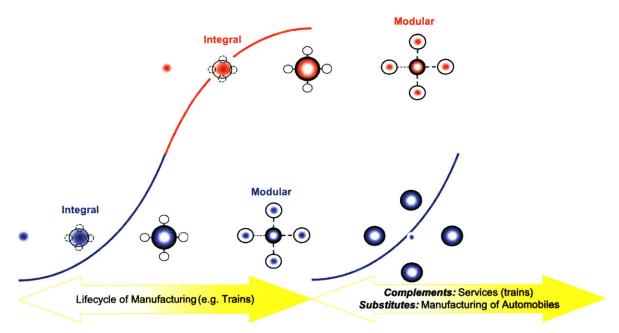
As shown in Figure 264 below, this research finding, coupled with the proposition that enterprise architectures are built to excel at different tasks, helps to explain how firms having different enterprise architectures will fare in different environmental settings.





6.9 Evolution of Dominant Economic Offering

Once a competitive landscape matures, often another is born. Typically, these can take the form of either complements or substitutes to the original competitive landscape as is shown in Figure 265 below.





6.9.1 Co-Existence of Complements

Once an S-curve has begun to end, and an existing industry is beginning to decline, a new growth opportunity exists in the form of complementary products or services. For example, going from agriculture to manufacturing; or going from manufacturing to services, etc.

6.9.2 Co-Existence of Substitutes

Once an S-curve has begun to end, and an existing industry is beginning to decline, a new form of competition – substitutes - emerges that does not directly challenge the old (Porter, 1980). Substitutes exist as competition on a higher level of abstraction. For example, when rail travel reached market saturation, it was overtaken by another form of indirect competition, automobiles.

6.10 Evolution of Dominant Levels of Cognitive Inertia

As was discussed in essay #2, each form of enterprise architecture is driven by a different level of managerial cognitive inertia. As shown in

Figure 266 below, it is posited that the state of environmental evolution - i.e. the rate of environmental change - drives the dominant level of cognitive inertia. Specifically, when the environment is speeding up, managers must think and act quickly, that is they must have low cognitive inertia. Conversely, when the environment is slowing down, managers must think and act more slowly, that is they must have higher levels of cognitive inertia.

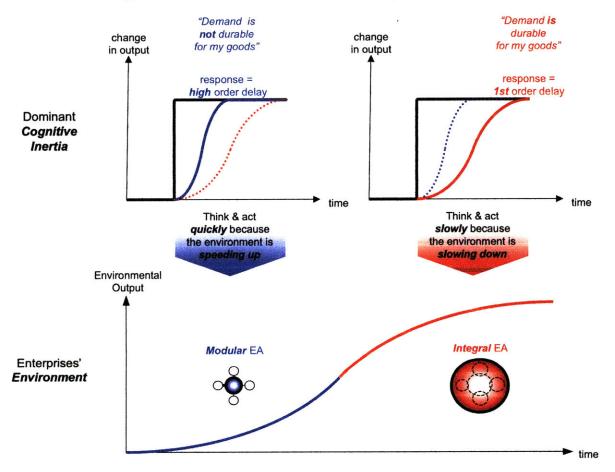


Figure 266: Evolution of Dominant Levels of Cognitive Inertia

6.11 Evolution of Dominant Growth Strategy

"Jensen (1988) suggests that the growth-oriented goals of managers during phases of industry growth are compatible with shareholder goals because the opportunities in the industry simultaneously addres shareholder wealth maximization and revenue maximization (the latter is one of the more important managerial motives). However, in the decline phase of the industry, these goals are not compatible. Managers would still like to enlarge the firm or reduce risk through diversification, whereas shareholders would rather let the firm shrink so that they can reinvest the capital in better opportunities. Hence, managers may be biased in favor of diversification-oriented acquisitions in the decline and mature stages of a business because such acquisitions represent a feasible path toward growth in such environments."

Here, we examine which species grows *organically*, when and why. We also examine which species grows *inorganically*, when and why.

6.11.1 Organic Growth

Late-entrant integral enterprise enterprise architectures (e.g. *Toyota, Southwest* and *Airbus*) appear to grow organically in their own niche. When they approach the carrying capacity of their own markets, they largely appear to diversify organically (i.e. without significant M&A activity). For example, *Toyota's* current market dominance in the automotive industry comes after a successful (organic) diversification from another manufacturing sector, textiles (Sako, 2006, pg. 94).

6.11.2 Inorganic Growth (M&A)

We note that moduar enterprise architectures tend to grow inorganically, either to diversify or to consolidate. The success of these two strategies is dependent upond the maturity of the environment (Anand and Singh, 1997).

"Our results indicate that **consolidation**-oriented acquisitions **outperform diversification**-oriented acquisitions in the **decline** phase of their industries in terms of both ex ante (stock market based) and ex post (operating) performance measures."⁸⁹⁶

When facing a maturing or declining market, a firm and its enterprise is faced with a dilemma: should it stay (and *fight*), or should it exit (and *take flight*) towards an existing market with higher rates of growth and more favorable competitive dynamics, or even create a new market. This decision is particularly problematic if a clear integral competitor has begun to grow.

Different enterprise architectures will face this maturing market in different ways. The modular enterprise (which is built for rapid short-term growth), is faced with the dilemma: is it easier to change oneself (i.e. re-architect the enterprise architecture towards more integrality) or to change the environment (i.e. create the next discontinuity)?

⁸⁹⁵ Anand, J. and Singh, H. (1997), pg. 101.

⁸⁹⁶ Anand, J. and Singh, H. (1997), pg. 99.

If the modular enterprise architecture remains in tact with its demands for high short-term growth rates from the investor stakeholder group, it often grows inorganically via mergers and acquisitions.⁸⁹⁷ As was discussed earlier, agency theory predicts the further "disintegration" of the relationship between shareholders and managers (principals and agents). The question then becomes, if growth is to come via acquisition, should one have a strategy of consolidation or diversification? Consolidation can be thought of as being a proxy for "fighting" (i.e. staying, maintaining focus on existing markets, attempting re-architecture with stakeholders to enable long-term focus on cost and productivity, etc.). Diversification can be thought of as being a proxy for "taking flight" (i.e. maintaining the modular architecture and exiting a low-growth environment).

As a mature or declining market will tend to have overcapacity, it is necessary for the industry to extract some competitors. The natural inclination of the ecosystem is to consolidate (as verified by data from population ecologists who have noted the number of firms fall after the emergence of a dominant design). One would therefore postulate that modular architectures that "go with the forces of the ecosystem" and acquire for consolidation in a maturing industry would perform better than those who do not or even who try to diversify out. In fact, one would expect that firms attempting to grow via consolidation acquisitions while the industry is pre-dominant design, while the number of firms entering the industry is still growing would perform worse than those that do not or that diversify in the hopes of securing what will ultimately be the dominant design.

"Although firms in declining industries may not have good prospects within their own industry, they cannot enhance their value by diversifying to escape the unattractiveness of their own industry."⁸⁹⁸

These propositions can be summarized as follows and as shown in Figure 267 below.

Heuristic 3d:

In growing industries, modular firms that grow via *diversification* acquisitions will perform better than firms who do not, or firms who grow via consolidation acquisitions.

In *maturing/declining* industries, modular firms that grow via *consolidation* acquisitions (i.e. who stay and fight) will perform better than firms who do not, or firms who grow via diversification acquisitions (i.e. who take flight).

⁸⁹⁷ The strategic management literature on the value/performance of acquisitions is rich, led by Rumelt (1974).

⁸⁹⁸ Anand, J. and Singh, H. (1997), pg. 113.

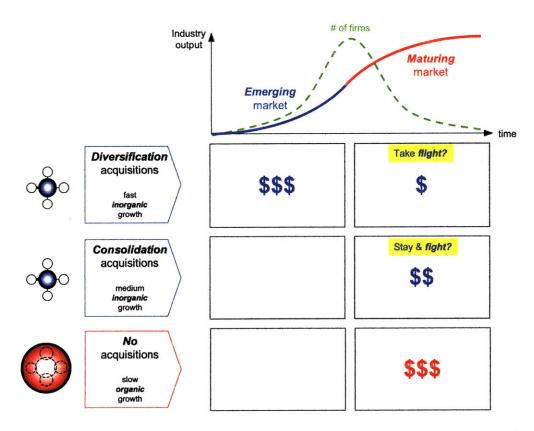


Figure 267: Diversification and Consolidation Strategies and the Industrial Evolution

Recent and rare empirical research on strategies in declining industries by Anand and Singh (1997) indicate that for industries in the US defense sector between 1981-1992, the above propositions appear to be valid.⁸⁹⁹

In a twenty year study of acquisition policies in a representative declining industry - the US defense sector between 1978-1996 – Anand and Singh (1997) noted that consolidation oriented acquisitions outperformed diversification oriented acquisitions, both in terms of *ex ante* stock market valuations and *ex post* operating performance metrics.

This lends some credence to the "fight" stance in the question of "fight or flight" strategies of incumbent modular architectures that find themselves in harsh environments for which they are not suited.⁹⁰⁰

⁸⁹⁹ It is interesting to note their "inverted" findings: namely *given* that a firm wants to consolidate, it will be more successful doing so in a mature/declining industry; while *given* that a firm wants to diversify, it will also be more successful in a mature/declining industry, but consolidating will be even more successful in a mature/declining industry.

⁹⁰⁰ Hambrick and Schecter (1983) highlight similar findings for "mature industrial-product business units".

6.12 Evolution of Dominant Intra-firm Structure

6.12.1 Mechanistic vs. Organic structure

Much work in contingency theory deals with intra-firm structures which only have indirect references to a theory of evolution which focuses on *continuity*, as opposed to *discontinuity*. Burns and Stalker (1961) predicated their version of contingency theory not based on a natural continuous logistic growth model of the technical and commercial environments, but rather on a model of discontinuous change, which for their empirical dataset arose when the "stable" environment of World War II supported *mechanistic* organizational structures, was displaced by the "unstable" discontinuity of the war ending, producing an *organic* organizational structure. As a precursor to the much later organization ecologists (e.g. Hannan & Freeman, 1977), Burns & Stalker observed that transition of organizational structures between ideal types is difficult:

"The first question is why some concerns – indeed most of those which took part in the studies – did not change their management system from mechanistic to organic as the general context, technical and commercial, of their operations changed from relative stability to fairly rapid change."⁹⁰¹

In fact, like the entropy proposition generated in this research, in which all enterprise architectures tend toward dis-integration, Burns & Stalker observed a similar trend:

"A mechanistic system is more economical of the individual's effort. Commitments to the working organization are more prescribed the closer the approximation to mechanistic form. The tendency is for most individuals to oppose extending such commitments and to try to reduce them, and thus to exert pressure towards a mechanistic system. If conditions are stable, this means that overall economy in human resources may be effected. If conditions are unstable, a mechanistic system becomes extravagant in numbers of persons employed each with his limited commitment to the working organization."⁹⁰²

6.12.2 Functional vs. Project structure

At approximately the same time, another systems scientist, Jay Forrester made similar claims regarding the difficulty in organizational change from one form to another.

"[In the **functional** subdivision], the stress is on *efficiency* within each of the separate functional specialties. It is an organizational form having advantages in a very slowly changing product situation. The functional organization runs into difficulty as the product life cycle becomes short. In the project organization, top management takes a view that is longer than the individual project. The dynamics of the long-term evolution of management structure are interesting in that most small new companies begin with the project form. As they grow, they break into the functional subdivision driven by a desire to achieve an apparent gain in effectiveness. This gain may be short-term, lasting but a few years. The functional organization provides a poor training ground for the type of man necessary for project or top-management leadership, so that the transition back [to project organization] becomes less and less possible as the organization ceases to regenerate the kind of wide-ranging leaders necessary for preceiving the interactions of all facets of an enterprise.""

⁹⁰¹ Burns, T. and Stalker, M. (1961), pgs. xi and 6.

⁹⁰² Burns, T. and Stalker, M. (1961), pg. 210.

⁹⁰³ Forrester, J.W. (1961), pp. 329-331.

6.13 Evolution of *Dominant Designs* in Enterprise Architectures

The notion of a "dominant design" is well-established in the field of product and technological innovation (Abernathy, 1978; Abernathy and Utterback, 1978), and their effects on both technological and organizational evolution have been noted.

Dominant designs have been demonstrated to end periods of radical change (ferment) and initiate periods of incremental change. Tushman and Murman (1998) observe that dominant designs have been linked by various researchers to: shifts in innovation types, product and firm performance, firm entry and exit rates, organizational fate, shifting industry structures, and industrial and organizational evolution.

What this research aims to discover is that there are dominant designs at the inter-firm organizational level or enterprise level.⁹⁰⁴ The definition of the dominant design of enterprise architectures will be discussed within the context of industry and technology cycles. Recent researchers (Sigouris, 2007, pg. 334) have called this "the Piepenbrock Hypothesis."

This research posits that there are "dominant designs" in enterprise architectures which arise at different times and for different reasons. Specifically, it is hypothesized that the modular enterprise architecture is the dominant design when the industry is going through its rapid growth phase, while the integral enterprise architecture is the dominant design when the industry is going through its maturing phase (i.e. when the rates of growth are diminishing over time). As shown in Figure 268 Utterback and Suarez (1993), postulate the existence of a new dominant design in organizations which centers on value chain integration.

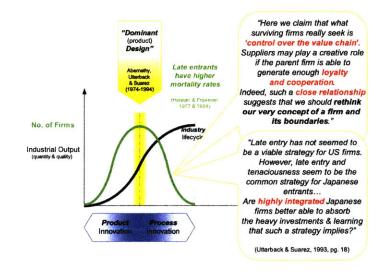


Figure 268: Dominant Designs in Enterprise Architectures

⁹⁰⁴ The field of Organizational Design has historically tended to focus on "intra-firm" design. This research however focuses on enterprise or "inter-firm" design. Prof. Michael Tushman, specialist in organization design, exclaimed at a June 2005 lecture at the London Business School, "Design died 20 years ago...the last great work on design was Thompson (1967)."

"New patterns of behavior that emerge fall within **recognizable categories** – they are similar to but never the same as previous patterns of behavior. In this sense, **history repeats itself** but **things are never the same**."⁹⁰⁵

A number of researchers have recently hypothesized the oscillatory dynamic evolution of product and supply chain architectures from integral to modular and back to integral (Schilling, 2000). Fine (1998) refers to this as the "double helix", Chesbrough (2003) alludes to "a cyclical model" of the dynamics of modularity, and finally Christensen et al. (2004) develop the theory of "Value Chain Evolution".

"Product architectures are dynamic and unstable as they continually migrate toward or away from increased modularity. Given the evolutionary nature of the relationships between technologies, firms and industries, changes in product architectures are both driven by and have significant repercussions on organizational and industry structures." 906

From system dynamics theory, this primary mode of architectural oscillation implies that there is a dominant mode consisting of negative or balancing goal-seeking behavior with delays.

Heuristic 3e:

The enterprise architectural forms (modular vs. integral) will evolve over time from integral to modular (i.e. the process of *disintegration*). The dominant architectural form from an industry population perspective will evolve over time from integral, to modular and back to integral – i.e. re-integration occurs at a population level, not at firm level.

"Speciation is a property of populations (organisms do not speciate), while extinction [a sorting process] is often a simple concatenation of deaths among organisms."⁹⁰⁷

The capability of a firm to evolve (through strategic choice or environmental determinism) the architecture of its extended enterprise under competitive pressures from rival enterprises is governed by the amount of structural inertia it possesses.

"It should not be taken as given that the strategic shifts required to compete successfully in a maturing industry should be attempted at all, in view of the substantial and perhaps new types of skill that may be required."⁹⁰⁸

The debate on whether or not it is possible for an enterprise's architecture to evolve is joined by the normative question of whether or not firm leaders *should* attempt the evolution.

"Industry leaders may or may not be in the best position to make the adjustments required by transition if they have substantial **inertia** built into their strategies and strong ties to the strategic requirements of the **growth phase** of the industry's development...a **new firm entering the industry during the transition phase**, possessing financial and other resources but no ties to the past, is often able to establish a **strong position**."⁹⁰⁹

⁹⁰⁵ Stacey, R.D. (1995), pg. 483.

⁹⁰⁶ Eytan Lasry (University of Toronto, working paper).

⁹⁰⁷ Gould, S.J. (1989), pg. 122.

⁹⁰⁸ Porter. M.E. (1980), pg. 246.

⁹⁰⁹ Porter. M.E. (1980), pp. 246-247.

Figure 269 below illustrates the co-evolutionary feedback dynamics defined by the theory.⁹¹⁰ Note how the enterprise architecture drives the enterprise structure, which drives the firm performance, which shapes the evolution of the industrial environment. Also note how the feedback switches from integral to modular and back to integral again. This will be discussed further in subsequent sections.

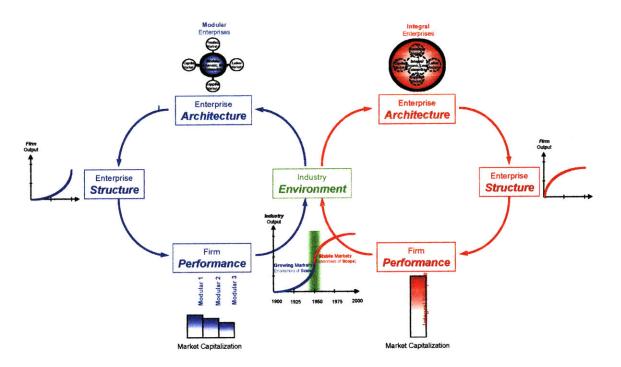


Figure 269: Co-Evolutionary Feedback Dynamics of the "Double Helix"

⁹¹⁰ Kunc, M. and Morecroft, J. (2004).

6.14 Evolution of Ecosystem Entropy ("The Architect's Dilemma")

"A social system left to itself gravitates toward equilibrium – maximum entropy so to speak. All efforts to avoid this death must aim at lowering the barriers that impede communication between the discipline-oriented and the [customer]-oriented wings of the [organization]."⁹¹¹

As shown in Figure 270 below, there appears to be a natural drift toward disintegration of enterprise forms, that is a trajectory from integral to modular forms as it is hard to maintain *centripetal* forces in the face of *centrifugal* forces. This drift towards disintegration marks the process of *creative destruction* (Foster and Kaplan, 2001). This inevitable and steady deterioration of a system is not unlike the concept of entropy.

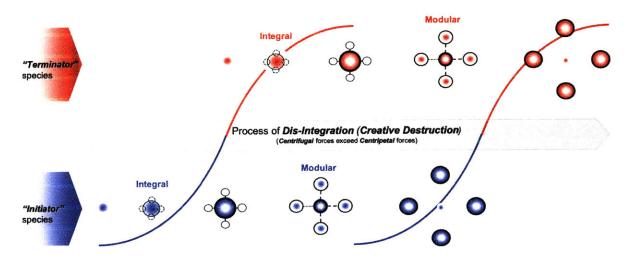


Figure 270: The Evolutionary Trajectories of Architectures

Enterprise architectures are not static, but rather dynamic or more precisely evolutionary constructs. In this sense, the enterprise architecture can be seen as a DNA coding specific to a species. The "species' that grows in *emerging* markets can be thought of as the *initiator* species. It begins with an integral architecture and over time begins to disintegrate, or become more modular.

Through the processes of variation, selection and retention, the environment selects an enterprise form that has the DNA of the species that initiated the industry, but which is now too "efficient" to begin to bring innovation in processes. The environment again selects an integral enterprise form that grows in *maturing* markets and can be thought of as the *terminator* species.

"Scope, permeability and modularity are the crucial factors for success. By judiciously adjusting them over time, a business can remain competitive even as its industry matures."⁹¹²

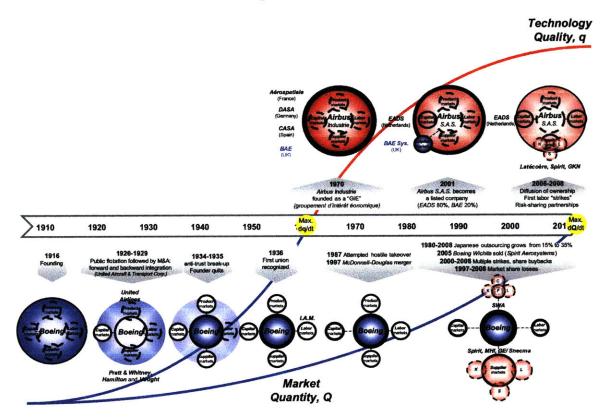
⁹¹¹ H. Simon (1967).

⁹¹² From "The Make-or-Buy Question in Mature Industries," Sloan Management Review, Spring 2008, pg. 6. This references Santos, Abrunhosa and Costa (2006).

6.14.1 Example: Commercial Airplane Industry

The following example shown in Figure 271 below, chronicles the phased trajectories of disintegration of *Boeing* and *Airbus* in the large commercial airplane industry. Key events or phases are summarized chronologically for each enterprise in the subsections below, with particular attention paid on the effects on the enterprise architectures.

Figure 271: Evolution of Dominant Designs in Enterprise Architectures in the Commercial Airplane Industry



6.14.1.1 Boeing (1916): Founding

On July 15, 1916, founder Bill Boeing incorporated the *Pacific Aero Products Company*, which would subsequently be changed to the *Boeing Airplane Company* with the US Navy as *Boeing's* first customer as a result of World War I. As will be discussed in the following subsection, the US government would also be the first customer for *Boeing's* imminent commercial business.

The Navy contract for 50 Model C airplanes, was worth \$575,000. Prior to winning its first contract, *Boeing* had invested its own money building and testing a total of seven airplanes.

6.14.1.2 Boeing (1925-27): Airplanes/Airlines (forward integration)

Less than a decade after *Boeing* was founded, the U.S. Post Office required a new mail plane, for which *Boeing* built its first commercial airplane, the Models 40 and 40A. Congress subsequently passed the Contract Air Mail Act (a.k.a. the Kelly Act) in 1925, which privatized airmail. That *Boeing's* first commercial customer was the US government would begin a long and symbiotic relationship.

The *Boeing Airplane Company* (BAC) forward-integrated into airlines by establishing a subsidiary, *Boeing Air Transport* (BAT) on February 17, 1927 that purchased *Boeing* 40A airplanes from its BAC parent.

Soon thereafter, *Boeing* purchased a competitor to BAT, named *Pacific Air Transport* (PAT). By the end of 1928, BAT was carrying 30 percent of the US's mail and passenger traffic (Sterling, 1992, pg. 16).

6.14.1.3 *Boeing* (1928): Public Flotation (owner-manager dis-integration)

On November 1, 1928, *Boeing* became listed on the New York Stock Exchange. The capital raised allowed expansion via acquisitions and the formation of a holding company a few months later.

6.14.1.4 *Boeing* (1928-31): *Vertical* Acquisitions (value chain integration)

A holding company, United Aircraft and Transport Corporation (UATC) was founded on February 1, 1929 with the merger of engine manufacturer, Pratt and Whitney (who themselves had bought out two propeller companies: Hamilton and Standard Steel), and Chance Vought, a manufacturer of naval aircraft.

UATC then went on to acquire *Stearman Aircraft*, which made light biplanes, *Northrop Aircraft*, which made military trainer aircraft, and *Sikorsky*, which made amphibian aircraft.

Between 1929 and 1931, UTAC increased its purchases of airlines, including: Varney, Stout Airlines, and National Air Transport, combining them into a subsidiary called United Air Lines, Inc.

In addition, UATC established the *Boeing School of Aeronautics* to train pilots and mechanics, *Boeing of Canada* to build aircraft, and an aircraft export subsidiary.

6.14.1.5 *Boeing* (1934-35): Government Break-up (value chain dis-integration)

Amidst charges that the high profits of the largest US carriers were an abuse of public funds, the US Congress passed the Air Mail Act (a.k.a. the Black-McKellar Act) On September 28, 1934 which dis-integrated the aviation industry into airplane manufacturers and airlines (Lawrence and Thornton, 2005, pp. 15-16).

6.14.1.6 *Boeing* (1936-48): Labor Unions Established (labor dis-integration)

Boeing recognized its firs union in 1936, the Local Lodge 751 of the International Association of Machinists (IAM).

In 1948, the IAM initiated a strike over seniority rights which lasted 140 days and which also resulted in the creation of a union for engineers, called the Seattle Professional Engineering Employees Association (SPEEA).

Since its first strike in 1948, the IAM has staged six strikes approximately every ten years over the past 60 years. The strikes occurred at or slightly after the bottom of the ten-year airplane delivery cycle, precisely at the time when labor was in a strong political position, facing large impending production schedules.

6.14.1.7 Boeing (1970): Patient Finance (customer integration)

6.14.1.8 Boeing (1987): Hostile Takeover Bid (investment horizon shortened)

"Throughout the 1980s, the giants of American industry had been cut to shreds by **aggressive** young investment bankers and junk bond merchants of Wall Street who had taken it upon themselves to revitalize what they considered the **tired**, **struggling dinosaurs** of the country's commercial establishment... 'Some Wall Street executives say Boeing's characteristics make it a particularly good candidate for **recapitalization** that could yield a bonanza for shareholders,' reported the Wall Street Journal. To the stockbrokers the argument was simple: Boeing was **sitting on a pile of cash** – about \$3 billion – which it had set aside for developing new planes."⁹¹³

In 1987, *Boeing* (like much of corporate America in the mid-1980s) was beginning to feel the pressures of another quality of stakeholder in the capital markets, one optimized in the name of efficiency to very narrow boundaries of stakeholder space and time, an outlier on the spectrum of impatient capital, known generally as the "corporate raider" and in this particular case, as T. Boone Pickens. Having identified a cash reserve on *Boeing's* balance sheet, which - given his assumptions of stakeholder space and time - was logically and rationally computed to be inefficient, Pickens allegedly launched a hostile takeover bid. Instead of responding to this new stakeholder in *Boeing's* enterprise with a narrow and constrained solution space (i.e. focusing exclusively on financial strategies), *Boeing* responded by more degrees of freedom in stakeholder space and time.

"[Washington] State lawmakers, meeting in emergency session, overwhelmingly approved antitakeover legislation today to help the Boeing Company fend off unwanted suitors such as T. Boone Pickens.... The legislation [was] sought by the aerospace giant, the state's leading employer. The majority brushed aside critics who called the measure unconstitutional and against free enterprise. Sponsors called it a wise step to protect the 85,000 Boeing jobs in the state. 'The company is very, very appreciative,' said Boeing's chief lobbyist, Forrest Coffrey."⁹¹⁴

In response to the unfriendly takeover bid, senior managers at *Boeing* co-opted a broad stakeholder group including state and federal government (i.e. political markets) as well as labor markets. Although a modular enterprise architecture exchanges with its environment, it tends to do so in an emergency, short-term, ad-hoc way. An integral enterprise architecture conversely

⁹¹³ Lynn, M. (1997), pp. 184-187.

^{914 &}quot;State Passes Bill for Boeing," The New York Times, August 11, 1987.

interacts with its relevant environment in a sustained, longer-term and systematic way. Through *Boeing's* "architectural" actions with it's stakeholders, it chose the *quality* of capital that it wanted in its enterprise, and in the process it defined the goals and objectives of the enterprise. In system dynamics parlance, the system chose *stability* over *growth*, or more precisely *stable* growth over *unstable* growth.

"But even without a Pickens bid, the Texan had done them [Airbus] a valuable service. The Boeing management was looking nervously over its shoulders before it made a decision, and could only become **more cautious** and more financially conservative... The takeover scare died, but the challenge from Airbus did not, and Boeing was **now in a weaker position** from which to fight."⁹¹⁵

This non-sustained integration episode would have longer term implications for the future disintegration of *Boeing's* enterprise architecture, as it seeks alternate ways to finance investments for growth (i.e. without having cash sitting idle to attract impatient investors), like "risk-sharing" partnerships with suppliers.⁹¹⁶

6.14.1.9 Boeing (1997): Horizontal Acquisition (inorganic growth)

In 1997, *Boeing* merged/acquired one of its long time competitors, *McDonnell Douglas*, and in doing so, brought the large commercial airplane industry down to a global duopoly with *Airbus*.

Unlike the major *vertical* acquisitions of customer (i.e. airline) and supplier (i.e. engine manufacturer) that took place 70 years earlier to create a vertically integrated company with diversified market power in a rapidly growing an uncertain environment, this major *horizontal* acquisition of its competitor was done in a maturing industry, primarily (on the commercial side) for *consolidation* reasons.

The merger could be argued both on the grounds of *consolidation* in a maturing (commercial aircraft) industry, or *diversification* in a growing/changing (defense) industry, as *McDonnell Douglas* had both commercial and defense businesses, for which empirical research demonstrates different success outcomes (Anand and Singh, 1997).

6.14.1.10 *Boeing* (2005): Risk-sharing Partners (value chain dis-integration)

"Hearing in June 2005 that Boeing has just announced another 10 million US\$2.7bn share buy back scheme does not square with the requirement for major product investment. As the aerospace analyst Scott Hamilton notes, the money Boeing has spent buying back its own stock – more than US\$9 billion since December 2000 – could easily have funded an entirely new airplane."⁹¹⁷

As shown in Figure 272 below, *Boeing* has begun to outsource more to the supply base in recent years for a number of reasons, not the least of which is the access to investment capital from

⁹¹⁵ Lynn, M. (1997), pg. 187.

⁹¹⁶ Note, *Southwest Airlines*' more integral enterprise architecture has by definition a more sustained dialogue with key stakeholders, allowing it to have carry more debt to manage in difficult times (e.g. cyclical downturns). See Hoffer-Gittell (2003), pp. 244-247.

⁹¹⁷ Lawrence and Thornton (2005), pg. 151.

their suppliers. This has been pursued under the strategy rubric of "large-scale systems integration".

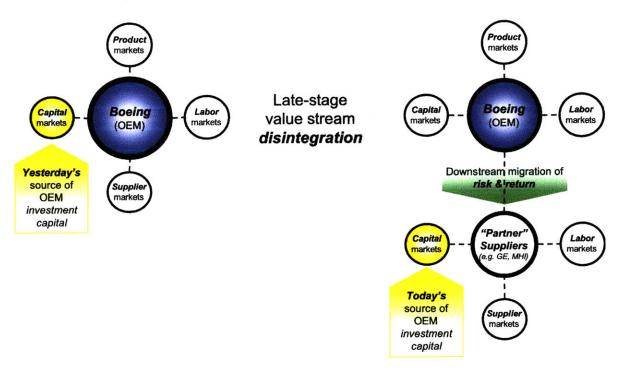


Figure 272: Value Chain Disintegration (for "Risk-Sharing")

"Remember, we're all on the same system. So we understand the design parameters and design specifics on a real-time basis as well with our partners as we do in our own engineering shops. So we are very agile and very quick in terms of being able to go back and put resources on some of that. Other things we're doing, there has been some production process help we've given a couple of suppliers as they're setting up new facilities and needed some boundary-less kind of collaboration between our production people and theirs to move it along a little faster. It's all the kinds of thing we anticipated. It's all the kinds of things that you do when you share a supply chain with people who have a lot of skin in the game with you. But the good news about a lot of skin in the game is we are both incented to get it done. It is not us pointing at them and them pointing at us. It's us getting together..."⁹¹⁸

Three years later as *Boeing's* vision for its new supply-chain model was beginning to take shape, comments from suppliers began to reveal how modular this intendedly integral architecture really was:

"As a supplier to the 787 program, I see a problem that hasn't gotten a lot of press. The partner model is seriously flawed. In the perfect world, each parner performs their tasks in lockstep with the others analogous to a rowing team. The reality is that each partner is lashed to its own suppliers in a sort of three legged race against the other partners. The problem is that no one wants to win - everyone wants to come in second to last. Losing, or being the one holding up the schedule, draws international embarrassment, so no one wants to lose. But, completing the assigned task more than a week or so before the slowest partner means holding very expensive (Smillions) inventory. This has created a stage for all sorts of theatrics. The partners can see, often more easily than Boeing managers, who is going to be holding up the program (keeping in mind that this race is like the Tour de France, where there are dozens of race segments.) But no partner is going to tell Boeing, 'We aren't going to hit our promise

⁹¹⁸ Jim McNerney, CEO, The Boeing Company. Q3 2006 Earnings Call.

dates because we know that the spoilers will be late.' Instead, they brick wall over a 'spec change.' Or, they tacitly conspire to tangle fastener procurement to the point of non-functionality (FUBAR might be better used here.) Or, they find a Boeing selected single source supplier in their ranks and hobble that supplier so that a delay in the partner schedule is traceable back to Boeing. (The way they do it is like a kid tripping his little brother every time mom looks away and then claiming the little brother can't walk.) Boeing managers have dismissed the theory because they do not believe that the partners are sufficiently clever to perpetrate such schemes. But the partners had schedules requiring them to build hundreds of millions of dollars worth of assemblies yet they knew they wouldn't be paid for months, even years. The partners had to figure a way out of that trap. The partners resorted to all sorts of shinanigans at the level of the minute details with the ultimate effect of deliberately misleading Boeing at all levels. The latest side body join problem may be entirely encompassed by Boeing's internal communication loop. But, the entire program has been rife with deceptions vigorously advanced from low levels at the partners to low levels at Boeing over small details. This creates context for senior partner managers to rationalize delays to senior Boeing managers. The delays appear fixable to Boeing management because they are presented as quantifiable technical or commercial problems. Boeing still hasn't realized that those problems were created and have been nurtured as the partners means of controlling the schedule and thus, their cash flow. The problems won't get solved until the partners decide to let them be solved (or Boeing decides to take and pay for each deliverable on each partner's schedule.) The thing about airplanes is that they don't fly until the last bolt is torqued down and the last i is dotted. The devil really is in the details. Boeing's internal communications are based almost exclusively, because of the partner model, on communications from the partners. Who knows? Boeing may not be able to avoid making garbage out of good information. I do know that Boeing is not clever enough to make good information of the garbage that is coming in. "919

6.14.1.11 Boeing (2005-2009) 787: "The Game-Changer"

Boeing (2008) Departure of "The Red Queen" 6.14.1.12

"It takes all the running you can do, to keep in the same place."920

The vice-president and general manager of airplane programs at Boeing Commerical Airplanes, until her retirement in December 2008, was was Carolyn Corvi. She was acknowledged as fundamental in leading Boeing's "lean" efforts, resulting in significant productivity gains over the years. Her passion for executive learning in general, and her sponsorship of this research project (commonly referred to at Boeing as "Red-Blue", short for Integral-Modular) in particular, lead to her reputation within Boeing Commercial Airplanes as "The Red Queen."

Her rather abrupt departure (giving two weeks notice) was announced on Dec. 11, 2008, on the day that Boeing announced its fourth delay to its 787. Although a "retirement" she was only 58. As the leader of Boeing's Integral Enterprise Architect, her departure can be interpreted as a further disintegration of Boeing's Enterprise Architecture.

⁹¹⁹ Blog posted by "Mel", on Flightblogger, 10 July 2009 in "Commentary: Its Time for Boeing to Talk. To Itself" (Jon Ostrower). ⁹²⁰ Quote from "The Red Queen" in Carroll, L. (1871).

6.14.1.13 *Airbus* (1970): Founding (enterprise co-option and integration)

"American industry spills out across the world primarily because of the energy released by the American corporation. [This is a] highly organized economic system based on large units, financed and guided by national governments. Most striking of all is the strategic character of American industrial penetration. One by one, U.S. corporations capture those sectors of the economy with the highest growth rates."⁹²¹

European sentiment in the late 1960's was driven to emulate what it assessed as the driving success behind American industrial dominance: integrated corporate and national interests (Servan-Schreiber, 1967), or portions of an integrated enterprise architecture. It was in this spirit that *Airbus Industrie* was formally founded in December, 1970.

"Airbus was a 'groupement d'intérêt économique', a form of commercial partnership established in French law in the mid-1960's, which was mainly intended to help wine growers. A GIE, as it is known, is a flexible and user-friendly form of corporate structure, although it tends to baffle Anglo-Saxons – and Americans in particular – used to the rigid structure of the limited company. A GIE is not a company, and escapes many of the obligations of a company. For example, it does not have to pay taxes, unless it chooses to do so. It simply pools the capital contributed by its members, and its results are taken out of the books of its member companies in proportion to their share of the enterprise."⁹²²

Airbus Industrie was initially founded as a "groupement d'intérêt éonomique" (GIE), a flexible "corporate" structure that co-opts the stakeholder environment (Selznick, 1948). One of the key architectural features of this enterprise was the function-sharing of the stakeholders: e.g. the governments (i.e. political markets) served as investors (i.e. capital providers). The suppliers also served as the capital markets as well as securing access to customer markets.

"Beteille [CEO] was serious in his desire to widen the Airbus consortium...it was crucial to get as many of the European powers involved with Airbus as possible. Only as a strong, united European force could the consortium be a success. A sure way of increasing sales was to rope more countries into the consortium. Negotiations with the Spanish in 1971 showed how fruitful this could be."⁹²³

6.14.1.14 *Airbus* (1974-77): Strategy (low cost & financing, stable production)

"The A300 was not a very innovative plane in terms of aeronautical engineering, and was never intended to be; in terms of financial engineering, however (like all subsequent Airbus planes), it was one of the most innovative machines ever built. It was competing mainly against the DC-10 and the Lockheed L-1011 Tristar, but it was much smaller than both, and cheaper. Boeing was too wrapped up in the 747 to consider that section of the market, and Douglas too involved in the DC-10, and both thought it too small a market to be of much interest."⁹²⁴

Airbus started out offering only a single product, the A300, aimed at a very narrow and relatively unattractive niche in the market. Competing against the other modular enterprise architectures of *Boeing*, *McDonnell Douglas* and *Lockheed*, which offered "higher-faster-farther" products,

⁹²¹ From Servan-Schreiber (1967), quoted in Lynn, M. (1997), pg. 103.

⁹²² Lynn, M. (1997), pg. 113.

⁹²³ Lynn, M. (1997), pp. 111 and 115-116.

⁹²⁴ Lynn, M. (1997), pp. 110, 115 and 121.

Airbus offered a "better-faster-cheaper" product to over-served customers like *Eastern Airlines*. In addition, *Airbus* offered innovative low risk, low cost financing. And finally, *Airbus* kept long-term stable production in the absence of short-term demand.

"The months wore on without any new orders. And planes were still being produced. It was during that year that the term "whitetails" became part of the industry jargon."⁹²⁵

6.14.1.15 *Airbus* (2000-01): Public Flotation (owner-manager dis-integration)

"The German [industrial] side accepted the large French [state] shareholding very reluctantly. In announcing the agreement at the time [2000], the other EADS co-chairman, Manfred Bischoff, who was also chief executive at DASA, described the concession to the French [state] as 'the toad that we had to swallow' to create EADS."⁹²⁶

The creation of *Airbus's* parent organization, the *European Aeronautic Defense and Space Company (EADS)* as a publicly listed company in 2000 was the product of industrial and political compromise between French, German and Spanish business and governments. The decomposition of ownership of *EADS* was as follows:

- Dutch Law "Contractual Partnership" (65.5% stake in EADS)
 - 30% by the French holding company, SOGEADE
 - 15% by the Lagardère Group
 - original owner of Matra, now the merged Aérospatiale Matra
 - 15% by the French state
 - former owner of Aérospatiale
 - 30% by German "interests"
 - 30% by the German company, *DaimlerChrysler*
 - owner of DASA Aerospace division
 - o 5.5% by the Spanish state holding company, SEPI
 - owner of Construcciones Aeronáuticas, CASA
- European Stock Markets free float (34.5% stake in *EADS*)

"'Some people consider today [2006] that this pact doesn't give enough power to the [French] state because I remind you that in this pact, concluded in 2000, it was the industrial shareholders, Lagardère and DaimlerChrysler, who assumed operational control, 'Mr. Breton [the French finance minister] said. 'The state was there to only validate strategic options.'"⁹²⁷

"'Today, the French state only has an advisory role,' he [a spokesman for Lagardère, Jean-Pierre Joulin] said."⁹²⁸

⁹²⁵ Lynn, M. (1997), pg. 118.

⁹²⁶ Clark, N. "France Seeks More Control of Airbus Parent," International Herald Tribune, June 20, 2006.

⁹²⁷ Clark, N. "France Seeks More Control of Airbus Parent," International Herald Tribune, June 20, 2006.

⁹²⁸ Clark, N. "France Seeks More Control of Airbus Parent," International Herald Tribune, June 20, 2006.

Soon after the formation of *EADS* in 2000, *Airbus* became a single fully integrated company in 2001, incorporated under French law as a simplified joint stock company or Société par Actions Simplifiée (S.A.S.). Its relatively concentrated ownership had the following composition, which is summarized in Figure 273 below:

- EADS (80% stake in Airbus)
- BAE Systems (20% stake in Airbus)

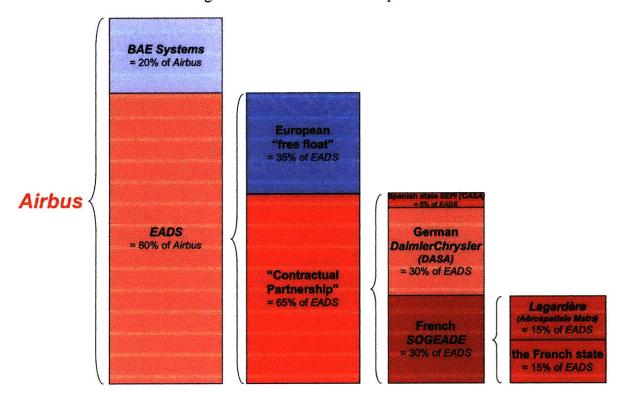


Figure 273: Airbus' "ownership" in 2001

6.14.1.16 Airbus (2001): Shareholders and the Response to 9-11

Just as *Airbus* had dis-integrated its capital stakeholder, a severe exogenous shock placed demands on the new enterprise. One might conjecture that having myopic shareholders would drive *Airbus* to make significant downsizings to reflect the downturn in the airline industry as a result of 9-11. However, unlike *Boeing* which did downsize immediately after 9-11, *Airbus* did not. This *may* serve as an indication of the relative patience of the capital-providers of *Airbus* vis a vis *Boeing*.

6.14.1.17 Airbus (2006): Evolutionary Diffusion of "Ownership"

Six years after the creation of *EADS* in 2000 and the public flotation of *Airbus* in 2001, the ownership of *Airbus* began to become slightly more diffuse, with sell-offs both from *EADS* and from *BAE Systems*.

6.14.1.17.1 Russian State Banks buy *EADS* shares

In September 2006, the Russian state-controlled bank, *Vneshtorgbank (VTB)* purchased a 5% stake in EADS from the available free float. Although it did not get a seat on the board of directors, it did seek to formalize industrial partnerships, for example the conversion of A320 passenger aircraft into cargo planes.⁹²⁹

Over one year later, after VTB was privatized, its investors began to complain that the EADS shares were losing value.⁹³⁰ In response, VTB sold its shares to another state-owned bank, Russia's Bank of Development.

6.14.1.17.2 BAE Systems sells shares to EADS

On October 13, 2006, *BAE Systems* sold off its 20% stake in *Airbus* to *EADS*, giving *EADS* 100% ownership of *Airbus*. The reason that *BAE Systems* gave for its sale of *Airbus*, was that it wanted to focus on it core business of defense, particularly on future potnential acquisitions in the US defense market. It is noteworthy that *BAE Systems* only received an estimated 50% of the value of their stake due to short-medium term valuation reductions due to problems with the A380.

"'The fact that BAE is selling its stake should not come as a surprise' Gustav Humbert, the chief executive of Airbus, said last week. 'This is a business decision, not an industrial one.' Its departure could be transformational for Airbus, which is seeing its ownership – and decision making – structure evolve."⁹³¹

The architectural differences in *Airbus*' two shareholders (*EADS* and *BAE Systems*) is evident, and these differences transcend national boundaries, where the UK's *BAE Systems* took a relatively short-term, arm's length approach to *Airbus*, while the French/German/Spanish *EADS* took a relatively long-term, collaborative approach to investment in *Airbus UK*. It was *EADS* of continental Europe which invested over the long term in developing UK capabilities, not the UK's *BAE Systems*:

"[Roger Berry]: 'Do you think that BAE Systems sold out on the future of UK civil aerospace?' [lain Gray, Managing Director, Airbus UK]: 'BAE Systems had a strategy which was progressively to move out of civil aerospace... They were an arm's length shareholder. Over the last five years we have

⁹²⁹ Approximately one year later, *VTB* explored selling its stake ("Russian Bank Exploring Sell of EADS Stake", *International Hearald Tribune*, July 11, 2007).

⁹³⁰ Robertson, D. "VTB Sells EADS Stake to Another Russian Bank," The Times, December 28, 2007.

⁹³¹ Clark, N. "BAE Turns Toward U.S. as it Ends Airbus Ties," International Herald Tribune, May 24, 2006.

seen significant investments coming into Filton and Broughton [UK] through EADS's commitment to Airbus.'"932

"[Lindsay Hoyle]: 'Do you think the [EADS] board would allow a [future] partnership with BAE in composite technology?' [Iain Gray, Managing Director, Airbus UK]: 'I would not envisage that being the outcome. I do acknowledge that BAE Systems are a supplier to Airbus.'"⁹³³

6.14.1.17.3 Dubai International buys EADS shares

Dubai Internaional Capital LLC bought 3.12% of *EADS*' free float shares on July 5, 2007. The move could be interpreted as a form of backward integration, as *Dubai International* owns *Emirates Airlines*, the largest customer for *Airbus*' A380. They, however have no plans to take a board seat or an active role at *EADS*.

"'They clearly have their interpretation of where the business is going,' said Harry Breach, an analyst with JP Morgan in London. 'They see material upside in the long term.'"⁹³⁴

6.14.1.17.4 Future Posssible Diversification

6.14.1.17.4.1 German Bank, KfW to buy half of Daimler/Chrysler's stake

When *Daimler/Chrysler* sells half of its stake, the German government (initially through its development bank *KfW*, or even through the Hamburg city government) is rumored to purchase it.

6.14.1.17.4.2 French Government to buy half of Lagardère stake

When *Lagardère* sells half of its stake, the French government is rumored to purchase it, leaving the following owernship structure in place.

"'EADS is starting to go from being a **minority** floated company to a **majority** floated company,' Aboulafia said. 'That ultimately changes your **comportment**.'"⁹³⁵

⁹³² "Recent Developments with Airbus," Uncorrected transcript of oral evidence to be published as HC427-i, UK Parliament, House of Commons, Trade and Industry Committee, March 27, 2007.

⁹³³ Gray, I. (Managing Director, Airbus UK), "Recent Developments with Airbus," Uncorrected transcript of oral evidence to be published as HC427-i, UK Parliament, House of Commons, Trade and Industry Committee, March 27, 2007.
⁹³⁴ McSheehy, W. and Oliver, E. "Dubai International Buys 3.1% of Airbus Parent EADS," Bloomberg.com, July 5,

⁹³⁴ McSheehy, W. and Oliver, E. "Dubai International Buys 3.1% of Airbus Parent EADS," Bloomberg.com, July 5, 2007.

⁹³⁵ Clark, N. "BAE Turns Toward U.S. as it Ends Airbus Ties," International Herald Tribune, May 24, 2006.

- Dutch Law "Contractual Partnership" (reduced to 50.5% stake in EADS)
 - o 22.5% (reduced by 7.5%) by the French holding company, SOGEADE
 - 7.5% by the Lagardère Group (sells 7.5%)
 - original owner of Matra, now the merged Aérospatiale Matra
 - 15% by the French state
 - former owner of Aérospatiale
 - o 22.5% (reduced by 7.5%) by German "interests"
 - 15% by the German company, DaimlerChrysler (sells 7.5%)
 - owner of DASA Aerospace division
 - 7.5% by the German bank, *KfW* (buys 7.5% from *DaimlerChrysler*?)
 - o 5.5% (unchanged) by the Spanish state holding company, SEPI
 - owner of Construcciones Aeronáuticas, CASA
- European Stock Markets free float (49.5% stake in EADS)
 - o 5% by Russian State Bank, VTB (then to the Russian Development Bank)
 - o 3.1% by Dubai International Capital LLC

This new ownership structure is summarized in Figure 274 below.

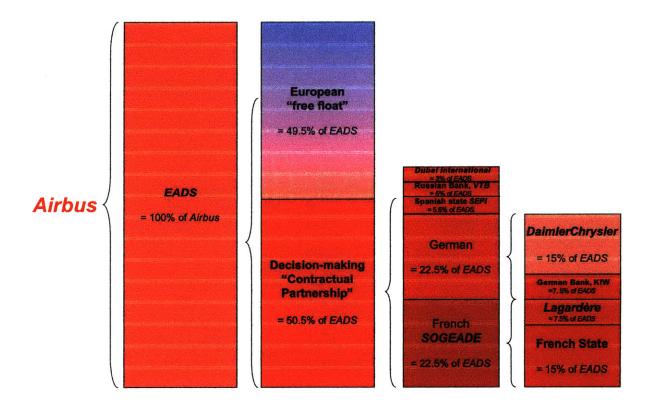


Figure 274: Airbus' "ownership" in 2007

6.14.1.18 Airbus (2006): CEO transitions

In the wake of announced production delays on the A380 in the summer of 2006, *Airbus* CEO Noel Forgeard resigned. Christian Humbert, the first German *Airbus* CEO took over, and resigned one year later in July 2006.

Christian Streiff took over and proposed significant structural changes to *Airbus* within his first few months in control, which included a rebalancing of work and power within the delicately-balanced political consortium. The *EADS* board did not support his recommendations and after only 100 days on the job, he resigned.

"I progressively came to the conviction that the governance of Airbus did not allow my plan to succeed."⁹³⁶

Streiff was succeeded as *Airbus* CEO by *EADS* co-chair, Louis Gallois who occupied both jobs. Gallois is a Frenchman with significant experience in French aerospace industry (formerly with both *Aerospatiale* and *SNECMA*).

Streiff apparently tried to use conventional firm-bounded logic to transition *Airbus* away from its core strength as a world-class political-economic enterprise into a "rational" profit-maximizing firm. His stakeholder ecosystem apparently rejected his efforts to "rationalize" or narrow down the boundaries of the enterprise too much too soon. In our parlance, *Airbus's* integral enterprise architecture (with its strong enterprise stability) resisted attempts to dis-integrate too rapidly, and rejected its "modularizing" architect.

The theory predicts that enterprises disintegrate over time (which *Airbus* and *Boeing* both appear to be doing). The point of question seems to be the rate at which this will happen for *Airbus*. The data seems to continue to support the view that *Airbus'* disintegration will continue at a slower rate than would be expected by a modular incumbent. Does *Airbus* have (short-term) *efficiency* problems? Certainly. Are they abandoning their (long-term) *effectiveness* platform to solve these problems? Apparently not. Gallois appears to be a more natural integral architect, and his dual-appointment as CEO of both *Airbus* and *EADS* appears to be a return to the integrality that made *Airbus* successful.

Certain elements of the popular business press were beginning to observe the differences between Streiff and Gallois as "architects", and the resulting success.

"Considering that Airbus, before its latest difficulties, managed to become number one in the industry suggests that there is nothing wrong with the model. If anything, it has become a **template for success**. In short, for such a model to work, you need a **skilful architect** who has all the plans in his head, knows what needs to be done, and can keep politics and meddling shareholders out of the factory."⁹³⁷

In July 2007, *EADS* ended the bi-national management structure that it began with at its inception: dual French and German CEOs as well as chairmen, in an effort to streamline

⁹³⁶ Reuters, Monday, October 9, 2006.

⁹³⁷ Financial Times, October 12, 2006.

decision making. Frenchman, Lois Gallois went from being *EADS* co-CEO (with German, Thomas Enders) and *Airbus* CEO, to *EADS*' sole CEO, while Enders gave up his *EADS* co-CEO job to become the sole *Airbus* CEO. Finally, German Ruediger Grube became the sole *EADS* chairman.

6.14.1.19 *Airbus* (2007): Supply Chain Restructuring

The new CEO, Louis Gallois moved to restructure *Airbus*' production facilities in order to improve cost-competitiveness in the "Power 8" program. This included the proposed sale of a number of internal factories, "layoffs" (or hiring freezes) and the increase in risk-sharing partnerships. The proposal resulted in "tensions" between France and Germany as well as between management and labor. Former *Airbus* chief Jean Pierson expressed his concerns as well as his confidence in this new architect:

"This system cannot continue. EADS is a company which is up against the wall. I cannot see who will agree to make concessions. This Franco-German rivalry cannot continue, this environment is noxious and the system ungovernable... "I am not familiar with the current cost cutting plan, but I know [Airbus chief executive] Louis Gallois. I do not doubt that this plan will be both serious and reasonable in industrial and social terms and that it will also be balanced."⁹³⁸

In response to Gallois' balanced proposal, German Chancellor Angela Merkel and French President Jacques Chirac came to an agreement:

"The competitiveness of Airbus is the most important factor in the company's restructuring, German Chancellor Angela Merkel said on Friday. 'The competitiveness of the company is the top priority for us.""⁹³⁹

While such measures appear to be a drastic dis-integration or modularization of the firm-supplier link, closer inspection reveals a much more slow and modest dis-integration. The announced "layoffs" were in reality more akin to "announced attrition" – something unheard of in Liberal Market Economies. The "strikes", while new to *Airbus*, were different in both quantity and quality to those experienced in modular enterprise architectures like *Boeing*. Instead of lasting continuously for weeks or months, they were organized as a series of one-hour walkouts staged every few weeks. The integral nature of labor and capital was exercised with "voice" used over "exit" (Hirshman, 1970).

Similarly, capital remained "patient", with major partner investors sharing negative "rents" with the ecosystem:

"Lagardere recently reported a 57% drop in 2006 profit, due largely to the poor performance of its 7.5% stake in EADS. Chief executive Arnauld Lagardère, who also co-chairs EADS, also ruled out the sale of the company's stake in EADS when announcing his annual results. 'I will play my role and I want to carry on being part of EADS's growth,' he told Le Monde. So concerned was Lagardère that he vowed to return any upcoming dividend back to the company. 'The Airbus situation has affected everyone, the

⁹³⁸ Former Airbus chief, Jean Pierson, in Les Echos, Thursday 22 February 2007.

⁹³⁹ Reuters, February 23, 2007.

employees above all, but also the shareholders and the small investors who have suffered from the drop in shares, 'he said." 940

Finally, with regards to outsourcing major work to "risk-sharing" partners as *Boeing* had "pioneered" on its new 787 program, *Airbus* began to pursue a similar strategy, albeit at a much more measured pace:

"It is not exactly Boeing but it is radically different. It's about halfway to Boeing and that is pretty radical for Airbus."."^{994]}

Although *EADS* looked to sell some of its assets to the US's *Spirit Aerosystems*, it decided at the last minute to sell UK plants to *GKN*, a UK firm; German plants to *OHB Technology Aerospace*, a German firm; and French plants to *Latecoere*, a French firm.

"In the end, we just couldn't close a business case that met both our customer requirements and our shareholder requirements."⁹⁴²

"The three partners had better offers commercially and technically, were more aggressive than Spirit in the last round of negotiations. Politics had no influence." "943

⁹⁴⁰ Forbes, March 14, 2007.

⁹⁴¹ Flightglobal.com, March 30, 2007.

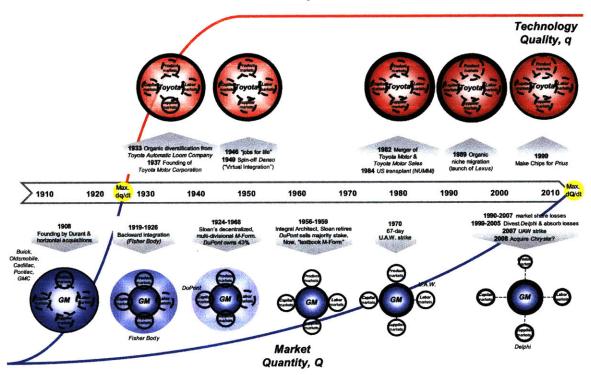
⁹⁴² Wichita Eagle, December, 20, 2007

⁹⁴³ Wichita Eagle, December, 20, 2007.

6.14.2 Example: Automotive Industry

Figure 275 below, illustrates the evolution of dominant designs in enterprise architectues in the automobile industry.

Figure 275: Evolution of Dominant Designs in Enterprise Architectures in the Automobile Industry



6.14.2.1 General Motors (1916): Incorporation

The General Motors Corporation was incorporated in 1916, succeeding the General Motors Company.

6.14.2.2 General Motors (1926): Vertical Integration of Fisher Body

The classic textbook case study for vertical integration to reduce opportunistic "hold-up" is *General Motor's* 1926 acquisition of one of its auto body suppliers, *Fisher Body* (Klein, Crawford and Alchian, 1978).

The case has created alternate viewpoints, however in that vertical integration can in fact create, not reduce, hold-up (Freeland, 2000); and that vertical integration was simply done to improve coordination, not reduce opportunism (Casadesus-Masanell and Spulber, 2000).

6.14.2.3 General Motors (1999): Vertical Dis-integration of Delphi

In 1999, *General Motors* spun off its internal parts manufacturer, *Delphi*, which is *GM's* chief supplier, and the largest U.S. auto parts supplier. *Delphi* struggled since it was spun off and ultimately filed for bankruptcy less than six years later in 2005.

In a related move, *Ford* spun off its internal parts manufacturer, *Visteon* in 2000. It, too struggled on its own, with *Ford* still accounting for 70% of its business, it filed for bankruptcy in 2005.

6.14.2.4 General Motors (2005): Vertical "Re-integration" of Delphi

As both *GM* and *Ford* struggled to revive their critical parts suppliers which included important contract renegotiations from the United Auto Workers labor unions, *Ford's* CFO clearly stated the resolve of the modular enterprise architecture:

"Our goal is to approach a true arms-length relationship with Visteon."944

Recent data suggests that investors are interested in taking over these former internal suppliers from public to private equity settings.

6.14.2.5 Daimler & BMW (1994-2007): Acquitision & Divestiture of Rivals

In addition to the above examples of the divestiture of internal divisions from modular enterprise architectures, there is also evidence of acquisition and immediate divestiture of rival OEMs in the cases of *Daimler-Chrysler* and *BMW-Rover*.

"Bayerische Motoren Werke AG, experienced a serious cash shortage in 1999 following the disastrous acquisition of the British carmaker Rover Group Ltd. five years earlier... CEO Joachim Milberg responded to the crisis by selling off the loss-making Rover and Land Rover units and refocusing the company's core business of producing and marketing premium cars."⁹⁴⁵

"DaimlerChrysler moved to undo the **most expensive** and one of the **least successful mergers** in auto industry history Monday as it agreed to essentially **pay to dump** the money-losing Chrysler unit which it paid \$37 billion for nine years ago. A private investment firm like Cerberus will provide management with the opportunity to focus on their long-term plans rather than the pressures of shortterm earnings expectations."⁹⁴⁶

6.14.2.6 General Motors (2008-9): Becomes No. 2 & Bankruptcy Protection

After approximately 90 years dominating the global automobile market, *General Motors* finally ceded its number one position to the late entrant *Toyota*.

⁹⁴⁴ "Ford to Take Back 24 Ailing Visteon Plants", Dee-Ann Durbin, Associated Press, May 26, 2005.

⁹⁴⁵ Raisch and Krogh (2007), pg. 69.

⁹⁴⁶ CNN.com May14, 2007, "Daimler pays to dump Chrysler".

Soon thereafter, *General Motors* found it very difficult to weather the global financial crisis of 2008-2009 and sought bankruptcy protection. In an effort to save the company from bankruptcy, the highly modular and disintegrating enterprise architecture attempted a radical attempt at "re-integration" when two unlikely shareholders, the US Government and the United Auto Workers union became some of the largest investors.⁹⁴⁷ While the *structure* of this move may appear to be a move toward integrality, the *function* of this new stakeholder set re-configuration may not necessarily be integral or long-term, trust-based.

6.14.2.7 Toyota (1937): Founding through Organic Diversification

In August, 1937 Toyota Motor Co. Ltd. was established as an internal or organic diversification away from Toyoda Automatic Loom Works, Ltd.

6.14.2.8 Toyota (1949): Spin-off of Nippondenso (value chain dis-integration)

While GM and Ford spun-off their largest internal parts divisions (a.k.a. Delphi and Visteon) in 1999, Toyota made a similar move literally 50 years earlier, by spinning-off Nippondenso (now Denso) in 1949.

"Denso began life as a spin-off division of Toyota in 1949, and over time grew into one of the largest auto-parts manufacturers in the world."948

Toyota however, maintained a significant equity stake in Denso, which in 1999 it was 25%.

6.14.2.9 Toyota (1950): Recession, Lay-offs, Strikes, Bankruptcy & Bailout

"The resulting **recession**, however, led many large firms to **reduce their work force** and produced bitter labor confrontations. The three dominant truck producers Toyota, Nissan, and Isuzu – all underwent **strikes**. Toyota faced **bankruptcy** due to **inventory mismanagement**, until it was **bailed out** by Bank of Japan."⁹⁴⁹

In 1950, after the post-war recession, *Toyota Motor Corporation Ltd.* fired approximately one quarter of its workforce. The resulting strikes, led to near-bankruptcy and a bank bail-out. A precondition of this bail-out was the separation of sales from its production operations, by creating the *Toyota Motor Sales Co. Ltd.*

6.14.2.10 Toyota (1982): Reintegration of Sales and Operations Companies

In 1982, after 32 years of forced separation between sales and production functions, *Toyota* reintegrated these companies into the new *Toyota Motor Corporation*.

6.14.2.11 *Toyota* (1988): Vertical Integration in Auto Electronics

⁹⁴⁷ I am indebted to Charlie Fine, for pointing out this fact.

⁹⁴⁸ Smitka, M.J. (1990), pg. 165..

⁹⁴⁹ Smitka, M.J. (1990), pg. 165..

Having apparently vertically disintegrated in automotive electronics in 1949, by spinning off *Nippondenso*, *Toyota* reintegrated in auto electronics in 1988, not by inorganically repurchasing the world-leading *Denso*, but by organically opening its Hirose plant, which is the location of four electrical engineering divisions.

At a time when *GM* and *Ford* were disintegrating or considering selling off it internal parts divisions, *Toyota* appeared to be on the opposite trajectory. Researchers have posited theoretical explanations for this architectural move, by synthesizing governance-based transaction cost economics explanations with learning based explanations (Ahmadjian and Lincoln, 2001).

6.14.2.12 Toyota (1995-99): Vertical Integration with Daihatsu

In 1995, *Toyota* increased its equity stake in *Daihatsu* from 17% to 33%, and again in 1999 to 50%, making it a legal subsidiary (Ahmadjian and Lincoln, 2001).

6.14.2.13 Toyota (2008): First Annual Loss

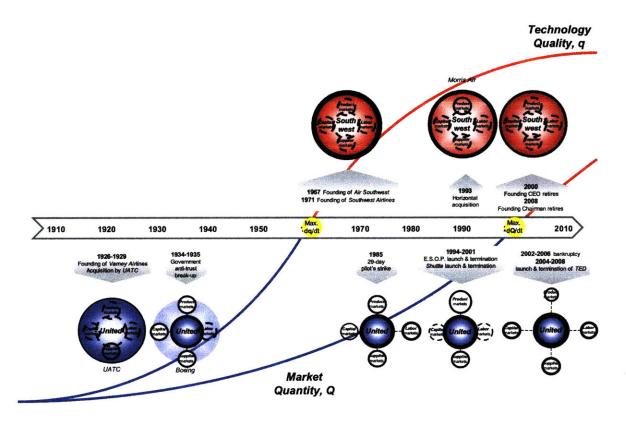
In 2009, *Toyota* recorded it first annual loss for 2008 in 71 years amid the global financial crisis. Note that this exogenous event, which affected all auto manufacturers seemed to negatively impact *Toyota's* modular competitors (e.g. *General Motors* and *Chrysler*) more severely as they not only reported massive losses, they were forced to seek bankruptcy protection and/or merger possibilities.⁹⁵⁰

⁹⁵⁰ Fiat proposed a takeover of Chrysler as well as the purchase of General Motor's European brands.

6.14.3 Example: Airline Industry

The following chronicles the evolutionary trajectories of two enterprise architectures: an incumbent, *United Airlines*⁹⁵¹, and a challenger, *Southwest Airlines*⁹⁵², as shown in Figure 276 below.

Figure 276: Evolution of Dominant Designs in Enterprise Architectures in the US Airline Industry



6.14.3.1 United Airlines (1928-30): Pre-founding (value chain integration)

In 1928, Boeing Airplane - Transport Corporation (BATC) is incorporated in Delaware and acquires Boeing Air Transport (BAT), Pacific Air Transport (PAT), and the Boeing Airplane Company (BAC) as subsidiaries.

In 1929, BATC subsequently changes its name to United Aircraft and Transport Corporation (UATC), and it acquires other subsidiaries, including Pratt & Whitney Aircraft, Hamilton Standard Propeller Company. and Chance Vought Corporation.

⁹⁵¹ Much historical information on United Airlines was obtained from its website: www.united.com.

⁹⁵² Much historical information on Southwest Airlines was obtained from its website: www.southwest.com.

In 1930, UATC acquires National Air Transport (NAT) and Varney Airlines.

6.14.3.2 United Airlines (1931): Founding (value chain dis-integration)

United Air Lines Incorporated (UAL) is incorporated as a management corporation to coordinate operations of UATCs airline subsidiaries.

6.14.3.3 United Airlines (1931): Formation of Labor Unions

A few days after the official incorporation of UAL, pilots organize the *Air Line Pilots Association* (ALPA), which affiliates with the *American Federation of Labor* (AFL). The airline industry's first labor agreement with pilots is signed Oct. 8, 1940.

6.14.3.4 United Airlines (1975-85): Labor Strikes (labor dis-integration)

In 1975, IAM-affiliated mechanics and related crafts employees stage 16-day strike at *United*. Four years later, in 1979, the same organizations stage a 58-day strike at *United*.

In 1985, members of the Air Line Pilots Association (ALPA) stage a 29-day (six-week) strike at United. Members of the Association of Flight Attendants (AFA) stage a sympathy walkout.

6.14.3.5 United Airlines (1994): ESOP (attempted re-integration)

(Lowenstein, 2002).

6.14.3.6 United Airlines (2001): Bankruptcy (dis-integration)

6.14.3.7 United Airlines (2003): Launch of Ted (inorganic diversification)

In an attempt to compete with *Southwest Airline's* low cost model, *United Airlines* created a low cost airline, *Ted* within it corporate boundaries. While it attempted to mimic many of *Southwest's* features, it did not replicate *Southwest's* underlying integral enterprise architecture, and was unsustainable.

6.14.3.8 Southwest Airlines (1971): Founding

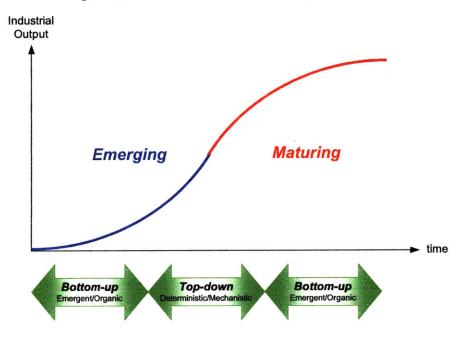
6.14.3.9 Southwest Airlines (2001): Response to 9-11

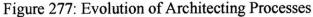
6.14.3.10 Southwest Airlines (2008): Quarterly Losses

6.15 Evolution of Architecting Processes

"A pure top-down process cannot succeed in the early phases of a technology or industry. Thus as technologies mature, the active choices are pushed lower and lower, ultimately to the component level."⁹⁵³

The process of system architecting evolves over time to suit the demands of the environment. As shown in Figure 277 below, the process switches from a bottom-up process in the early phases of an industry to a top-down process in the middle phases of an industry, and finally back to a bottom-up process, or more explicitly whereby the top-down architecting enables bottom-up process.





⁹⁵³ Whitney et al. (2004), pg. 4.

6.15.1 Enterprise Architectural States (Fit) and Paths (Change)

6.15.1.1 Enterprise Architectural Fit⁹⁵⁴

"The ultimate object of design is form. The form is the solution to the problem; the context defines the problem. Fitness of the system is the degree to which the system and its context are 'mutually acceptable'."⁹⁵⁵

From this construct, the co-evolution of firm and industry architectural dynamics can be developed. It is here that the framework closes the feedback loop whereby the dynamics of the enterprise architecture can be seen to have "fit" with the environmental dynamics. This architectural notion of enterprise-environmental fit is well understood in classical architectural theory (Alexander, 1964).

In addition, this notion of fit is seen to be a source of competitive advantage (Powell, 1992), as was made influential by the organizational contingency theorists (Burns and Stalker, 1961; Lawrence and Lorsch, 1967). The *consonance hypothesis* is stated as follows:

"Those organizations that have structures that more closely match the requirements of the environment are more effective than those that do not."⁹⁵⁶

In fact, as Stinchcombe (1965) famously observed, there are long-term, path-dependent, lock-in effects associated with the firm's "birth". The environmental imprint on the firm at the time of its founding encodes a form of DNA that has a lasting influence on the structure of the firm. This begins to explain the structural inertia associated with firms in the evolution of industries.

It is in this way that architectural fit can be seen as a meta-strategic framework which mediates between the external competitive positioning view of strategy and its counterpart, the internal resource-based view of strategy.

Heuristic 3f:

The enterprise architectural forms will grow and prosper in different industrial competitive regimes, where they have better growth-fit characteristics. Modular enterprise architectures will grow and prosper in pre-dominant design regimes, where competition is based on *discontinuous radical product* innovation (a.k.a. "higher, faster, farther" regime). Integral enterprise architectures will grow and prosper in post-dominant design regimes, (populated by shake-out survivor modular architectures) where competition is now based on *continuous incremental process* innovation (a.k.a. "better, faster, cheaper" regime).

"In the later developing states there was, often, a much readier sponsorship accorded to approved associations who were thereafter co-optated, in the case of labour unions, brought into the corporate structure of the sector or firm (Loveridge, 1983). Thus what is seen as the more tightly socially

⁹⁵⁴ In Organizational Behavior, the notion of "fit" has surfaced primarily in *structural contingency* theory and *complexity* theory (e.g. "fitness" landscapes).

⁹⁵⁵ Alexander, C. (1964), pp. 15 and 19.

⁹⁵⁶ Pfeffer (1982). pg. 148.

integrated systems of later developing national business systems has much to do with the management of the process of institutionalization."⁹⁵⁷

Heuristic 3g (advanced refinement):

The enterprise architectural forms will grow and prosper in different industrial competitive regimes, where they have better growth-fit characteristics. Integral enterprise architectures will grow and prosper where industry rates of growth are relatively slow and stable, where competitive capabilities center on *exploration* and competition is based on *innovation* in product (and ultimately process). On the contrary, modular enterprise architectures will grow and prosper where industry rates of growth are relatively fast and unstable, where competitive capabilities center on *exploration*.

Heuristic 3h:

The two types of technological change which facilitate the conditions for integral enterprise architectures are: the emergence of a discontinuous technological change in which integrality is needed for *product* innovation, and the emergence of a dominant product design in which integrality is needed for *process* innovation.

Heuristic 3i:

The successful birth rate of integral architectures post-dominant design is dependent on the clockspeed of the industrial development. As integral architectures tend to take existing markets in a low-cost, high quality world, via a strategy based upon human capitalism, based on stability in order to deliver continuous improvement, some industries may evolve too quickly to allow for stability to be a viable mechanism. In other words, Schumpeter's "winds of creative destruction" may be too rapid and frequent for human capitalism to take hold.

Heuristic 3j:

There is an optimum rate of firm growth that is contingent upon where in the industrial evolution cycle the firm operates. The optimum growth rate is governed either by the competitive dynamics associated with building of capacity or the growing of capability. For the predominant design regime, the optimum rate of growth is near the fastest possible, while for the post-dominant design regime, the optimum rate of growth is significantly slower than the maximum possible.

"As to what is the maximum efficient rate... a too rapid expansion will introduce so many disharmonious elements that efficiency will be destroyed."⁹⁵⁸

*"Virtually all natural systems including organizations have intrinsically optimal rates of growth, which is far less than the fastest possible."*⁹⁵⁹

"The Toyota Production System can be realized only when all the workers become tortoises. Speed is meaningless without continuity. Just remember the tortoise and the hare".⁹⁶⁰

⁹⁵⁷ Loveridge, R. (2003).

⁹⁵⁸ Robinson (1932).

⁹⁵⁹ Senge, P. (1990), pg. 62.

⁹⁶⁰ Ohno, T. (1978), pg. 63

Heuristic 3k:

The enterprise's structural dynamics (growth vs. stability), judged within the context of the environment or industry's structural dynamics will contribute to the mechanism defining long-term financial performance of the firm.

"Perhaps the most **ubiquitous force** leading to structural change is a **change in the long-run industry** growth rate. Industry growth is a key variable in determining the **intensity of rivalry** in the industry and it sets the pace of expansion required to maintain share, thereby influencing the supply and demand balance and the inducement the industry offers new entrants."⁹⁶¹

"In a high-growth period, productivity can be raised by anyone. But how many can attain it during the more difficult circumstances induced by low-growth rate? This is the deciding factor in the success or failure of an enterprise." ⁹⁶²

Finally, it is worth noting that some research exists to challenge the notion of contingent fit as a source of organizational efficiency. Nickerson and Zenger (2002), for example observe that "being efficiently fickle" via modulation between centralization and decentralization, can in some instances lead to higher efficiencies – independent of what the environment dictates. The logic of such apparent oscillatory "fickleness" appears to lie in the physics of control theory, namely the presence of a balancing loop with delays.

⁹⁶¹ Porter, M.E. (1980), pg. 164.

⁹⁶² Ohno, T. (1978), pg. 114.

6.15.1.2 Enterprise Architectural Change

There are two distinct mechanisms for architectural change in the face of environmental change: managerial *adaptation* or environmental *selection*. The degree to which each mechanism governs the change process is defined by the amount of *architectural inertia* within the organization or enterprise. Each change process will be discussed in turn.

"Theories typically placed in the adaptational camp include contingency theory (Woodward 1965, Lawrence & Lorsch 1967), resource dependence theory (Pfeffer & Salancik 1978, Burt 1983, 1992), institutional theory (Meyer & Rowan 1977, DiMaggio & Powell 1983), and transaction cost economics (Williamson 1975, 1985). Theories residing in [the selection camp] include organizational ecology (Hannan & Freeman 1977, 1989) and, on occasion, evolutionary economics (Nelson & Winter 1982)." 963

6.15.1.2.1 (Managerial) Adaptation

As the enterprise architecture both enables and constrains but does not determine action, there is room for both the mechanisms of managerial adaptation as well as environmental selection. This research intends to present a balanced explanation for which mechanisms govern and when.

Managerial adaptation is underpinned by the notions of free-will (Burrell and Morgan, 1979), strategic choice and strategic renewal (Volberda and Lewin, 2003). The change process theories that underpin it are those that are *predictive*, e.g. life-cycle and teleological (van de Ven, 1992).

"I agree with the main content of your research. My difficulty has more to do with the **slightly fatalist** tone of the work. I understand what you are trying to do, but it is hard for me to accept the **determinism** of the blue-red duality. Then again, my perspective is tainted with the **engineering mindset of being able to fix anything if you try hard enough**. Yes, you have to make tough decisions, and you have to approach the problem from a systems perspective on many fronts at the same time, you have to dismantle old value systems, and attack cultural problems, and realign incentives, and have an integrated strategy that considers all major stakeholders and you need a good plan to implement it, but I still think you can do it. It is very difficult, but I don't think it is impossible. **Maybe I'm being overly optimistic...**" ⁹⁶⁴

Throughout the process of creating the grounded theory in this proposed framework, constructive criticism frequently came back from the knowledge co-creators that (some presentations of) the framework came across as too fatalistic and deterministic, that it understated the power of management. These viewpoints were very valuable in the creation of the theory, and the proponents tended to have similar backgrounds: relative inexperience with leading in large, complex enterprises, and relatively little exposure to the theories of structural inertia of the environmental schools.

This framework does not intend to understate the power of human agency, but in fact to do the opposite; that is to state that such adaptation, while rare is very possible, but it requires a very special and rare type of leadership – *architectural* leadership.

⁹⁶³ Barnett and Carroll, 1995, g. 218.

⁹⁶⁴ Critique of framework from MIT PhD student. Received via email on 18 May 2006.

6.15.1.2.1.1 Re-integration to Fight or for Flight?

When faced with a maturing industry, is it easier/better for an incumbent to stay and fight by reintegrating itself around *process* innovation in order to fit more with the new evolving demands of the environment or is it easier/better to take flight by re-integrating itself around new *product* innovation? An example of the former might be *Chrysler* in the early 1990's under the direction of Thomas Stallkamp in which re-integrated supplier networks around quality, cost and delivery metrics brought new success (Dyer, 2000), while an example of the latter might be *IBM* in the 1990's under the direction of Lou Gerstner in which a re-integration around services took place (Gerstner, 2002).⁹⁶⁵

In either case, re-integration of a modular (and dis-integrating) enterprise is not straightforward, as it often appears to require the re-building of trust with existing stakeholders, which is often harder than new integral enterprise starting from scratch.

6.15.1.2.1.2 Dis-integration to Fight or for Flight?

Finally, is it easier/better for a modular incumbent in a maturing industry to continue to disintegrate and either: stay and fight by "integrating" competitors via consolidation or is it easier/better to take flight by continuing to exploit and "diversify" and re-deploy capital (i.e. to exit)? As was discussed earlier, post-dominant design dis-integrating enterprises are successful when they consolidate as opposed to diversify.

6.15.1.2.2 (Environmental) Selection

Environmental selection is underpinned by the notions of determinism (Burrell and Morgan, 1979). The change process theories that underpin it are those that are *explanatory*, e.g. dialectic and evolutionary (van de Ven, 1992).

⁹⁶⁵ I am indebted to Prof. Charlie Fine for suggesting these to me, and for his own development of these hypotheses in his own research.

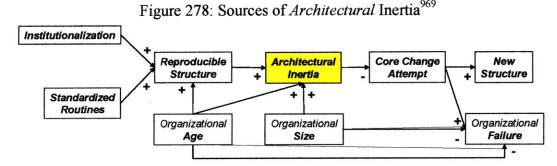
6.15.1.3 Enterprise Inertia Part II: Architectural Inertia

"Grant me the serenity to accept the things I cannot change, the courage to change the things I can, and the wisdom to know the difference."⁹⁶⁶

"Wisdom is the ability to see the long-run consequences of current actions, the willingness to sacrifice short-run gains for long-run benefits, and the ability to control what is controllable and not to fret over what is not. Therefore the essence of wisdom is the concern for the future. It is not the type of concern with the future that the fortune teller has; he only tries to predict it. The wise man tries to control it." ⁹⁶⁷

The notion of organizational inertia is well-established in the fields of sociology and organizational behavior (Hannan and Freeman, 1984). It accounts for the reason that there is a time delay in an organization's ability to adapt to *environmental* change. For this reason, the framework adopted herein refers to *architectural* inertia.

As shown in Figure 278 below, architectural inertia, as asserted by the population ecologists is a function of a number of organization attributes, including: age, size and reproducible structure (which is derived from institutionalization and standardized routines).⁹⁶⁸



Although the notion of inertia was derived over 300 years ago in the physical sciences, in that setting, mass or inertia was typically seen as a constant in most problems of physics. In an organizational setting, inertia is a function of organization age (as shown above), and is therefore not a constant but variable with respect to time. This makes the dynamic equations of motion coupled and therefore nonlinear.

Architectural inertia constrains timely evolution of enterprises in response to environmental shifts. As shown in Figure 279 below, architectural inertia presents difficulty for modular enterprises which are post-dominant design and competing with integral enterprises; as well as for integral enterprises which face the discontinuity of creative destruction.

⁹⁶⁶ Attributed to Boethius, 5th century Roman philosopher.

⁹⁶⁷ Ackoff, R. (1999). pg. 99.

⁹⁶⁸ Kelly and Amburgy (1991).

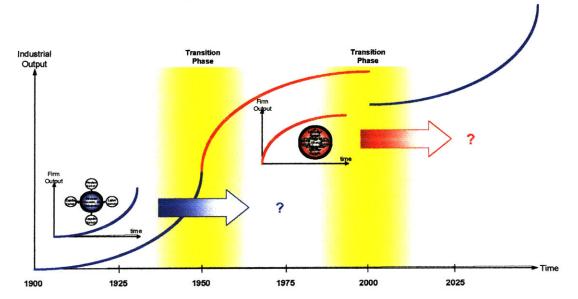
⁹⁶⁹ Kelly and Amburgy (1991).

Architectural inertia impacts the nature and importance of strategy as the firm evolves over time. In other words, is architectural inertia low enough that strategic choice is possible, or is it high enough that environmental pressures dominate?

Heuristic 31:

Dominant designs in enterprise architectures grow unchallenged for most of the industry lifecycle, acquiring architectural inertia, before a new architectural form emerges, making it very difficult to change its form.

As each enterprise architectural form typifies the initiation of a particular competitive regime (e.g. modular architectures initiate discontinuities and dominate until the establishment of a dominant product design, while integral architectures dominate once the dominant design is established until the next discontinuity is created⁹⁷⁰), it will have a significant amount of time to age (i.e. approximately half the duration of the industry S-curve) to grow architectural inertia, making it very difficult to change when a new enterprise architecture is created.





Heuristic 3m:

Enterprise architectures that become out-of-fit with their environments, do not rapidly adjust and can continue to exist (albeit in a less competitive state) long after the emergence of a dominant design or a technological discontinuity due to architectural inertia.

⁹⁷⁰ At this stage, the discussion assumes a two-stage modular-integral evolution, as opposed to the three-stage form discussed later.

Architectural inertia, while seemingly a function of organization age and size, have different subdeterminants depending upon whether they are modular or integral.

Modular enterprise architectures are highly flexible and adaptable to environmental change due to their modular "plug-and-play" interfaces with stakeholders. However architectural inertia grows over time due to their age, size and routine development.

Heuristic 3n:

Modular enterprise architectures develop architectural inertia over time due to age, size and routine development, in spite of their inherent flexible, adaptable design.

Integral enterprise architectures are highly inflexible to environmental change due to their high commitment to stakeholders around a specific environmental regime (e.g. a stable, saturated market). From architectural design theory, integral architecture forms are highly optimized to minimize risk and uncertainty in the external environment.

Heuristic 30:

Integral enterprise architectures also develop architectural inertia over time due to age, size and routine development, which supplements their inherent inflexible environment-specific form.

"Integrated structures reduce a system's flexibility and ability to adapt to environmental changes thus increasing architectural inertia." 971

Heuristic 3p:

As the nature of technological discontinuities tends to consist of large, rare, discrete stepchanges, the "loading function" on the enterprise tends to be a pulse, in the spirit of Shumpeter's "creative destruction."⁹⁷²

Finally, using the theory developed thus far, one can begin to explain why change often does not occur, even long after the environment has begun to change. Do managers not see the environmental change? Do they see it, but the inertia is too high making change very slow?

If modular enterprise architectures are built to thrive in growing environments, and integral enterprise architectures are built to thrive in a less munificent environments, why do modular architectures continue to pursue their strategies long after the inflection of the environment? The answer may lie (at least for dynamically complex industries, which exhibit significant "boom and bust" cycles) in the fact that although the underlying "signal" of the S-curve has long saturated, there is a second mode "boom and bust" oscillation that is superimposed on the saturated market (i.e. "noise").

In other words, even though the commercial airplane market (with its current 10-year "boom and bust" cycle) may have started to saturate fifty years ago, *Boeing* is still modular because every five years there is a tremendous growth opportunity. Modular architectures built for rapid

⁹⁷¹ Eytan Lasry (University of Toronto, working paper).

⁹⁷² The enterprise response spectra therefore tend to be *shock spectra*, Piepenbrock, T. (2004).

growth stay modular, because rapid growth opportunities still exist as shown schematically in Figure 280 below.

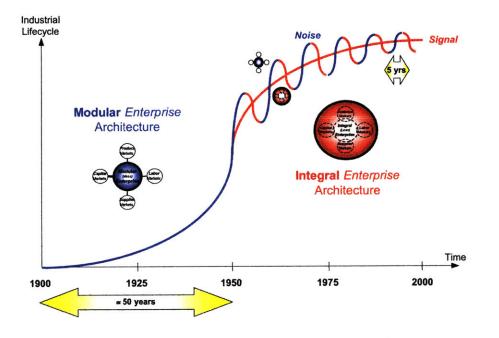


Figure 280: Cyclical Growth Spurts in a Maturing Industry Inhibit Architectural Change

6.15.1.4 Punctuated Architectural Change: Exploration and Exploitation

Tushman and Romanelli (1985) argued that punctuated organizational change will occur if the following three conditions are present:

- The pressure to change is high (i.e. poor performance).
- The ability to change is high (i.e. low structural inertia).
- Environmental misfit is perceived (i.e. visionary leadership).

Sastry (1997) developed a formal system dynamics model of these punctuated change processes which has been modified as shown in Figure 281 below to adapt to the framework.

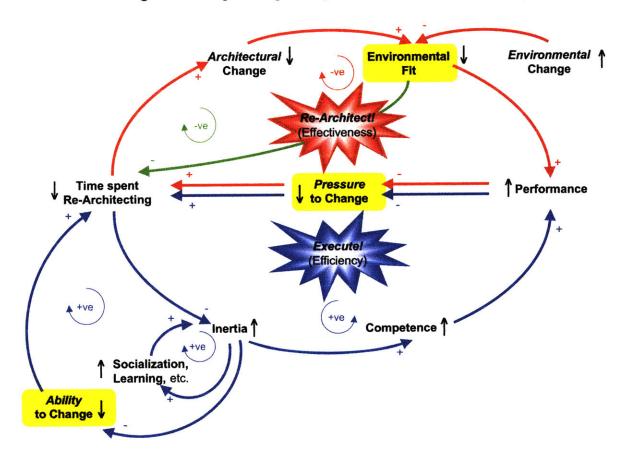


Figure 281: Exploit-Explore Dynamics of Architectural Change

From this figure, one can see the competing dynamics of change in the face of poor performance as being either:

- Execute faster and harder (bottom reinforcing loop).
- Realign to achieve environmental fit (top balancing loop).

When not facing poor performance, these mechanisms can translate into the well-known mechanisms of *exploitation* and *exploration*.

As can be seen, time spent executing builds inertia, which prevents future change if/when the environment changes. Therefore, the best way to "dissolve" the inertia or at least keep the effects of inertia at bay is to continuously take frequent but incremental forays up into the top balancing loop (mapping out a figure eight around the causal loops) to ensure fit and/or to explore. This appears to be what *Toyota* has done well. This may also explain how modular enterprise architectures which tend toward short-term exploitation, grow significant structural inertia, making the infrequent attempts at architectural change less successful.

In addition, if there are time delays in determining and implementing architectural change in response to environmental change, this will result in a worse-before-better tradeoff and oscillation due to the existence of delays on a balancing loop, which again is a problem associated with modular enterprise architectures.

6.15.2 Profiles in Courage: Why Re-Integration is Difficult

"This book is about that most admirable of human virtues – courage. 'Grace under pressure,' Ernest Hemmingway defined it. And these are the stories of the pressures experienced by eight United States Senators and the grace with which they endured them – the risks to their careers, the unpopularity of their courses, the defamation of their characters, and sometimes, but sadly only sometimes, the vindication of their reputations and their principles.

These problems do not even concern politics alone – for the same basic choice of courage or compliance continually faces us all, whether we fear the anger of constituents, friends, a board of directors or our union, whenever we stand against the flow of opinion on strongly contested issues. A man does what he must – in spite of personal consequences, in spite of obstacles and dangers and pressures – and that is the basis of all human morality.

To be courageous, these stories make clear, requires **no exceptional qualifications, no magic** formula, no special combination of time, place and circumstance. The stories of past courage can define that ingredient – they can teach, they can offer hope, thay can provide inspiration. But they can not supply courage itself. For this each man must look into his own soul."⁹⁷³

"Few men are willing to brave the **disapproval** of their fellows, the **censure** of their colleagues, the **wrath** of their society. **Moral courage is a rarer commodity than** bravery in battle or **great intelligence**. Yet it is the one essential, vital quality for those who seek to change a world which yields most painfully to change."⁹⁷⁴

Based on thousand of hours of interviews and ethnographic observation with the top management teams in the primary case study, one of the striking constructs which emerged from coding and analysis of the data, is that of "courage."

"If I understand what you are speaking about, you are likely to find [in your research] that the key to our transformation is **courage** – which is a rare commodity [in our company] these days – and I wish you the best of luck."⁹⁷⁵

"How dare you insult me - of course we know this [research] is correct! The reason we don't implement it is that we **don't have the courage to**!"⁹⁷⁶

"Between the *idea* and the *reality*, between the *conception* and the *creation*, falls the *shadow*. This is the way the world ends; Not with a *bang* but a *whimper*."⁹⁷⁷

There are many examples in the theoretical sample of unsustained re-integration attempts. In the automotive industry: the establishment of Saturn with General Motors; Thomas Stallkamp's re-integration of supplier relationships at Chrysler (Dyer, 2000). In the airline industry, the Employee Stock Ownership Program at United Airlines (Lowensiten, 2002). In the commercial airplanes industry, Carolyn Corvi's re-integration of *Boeing Commercial Airplanes*.

⁹⁷³ Kennedy, J.F. (1955), pp. 1, 224-225.

⁹⁷⁴ Kennedy, R.F. (1966), speech.

⁹⁷⁵ Anonymous executive, Jan, 2002.

⁹⁷⁶ Anonymous executive, Summer, 2006.

⁹⁷⁷ Elliot, T.S. (1925).

6.16 Chapter Summary

This chapter was the third of three essays which forms an integrated framework which attempts to explain long-term firm performance. In this chapter, we defined the construct of industrial evolution, and how it co-evolves with the performance of firms.

The context for this construct within the framework is shown below in Figure 282. Going back to Essay #1, we can now begin to see how different enterprise architectures are born or created in different states of the environment or industrial evolution.

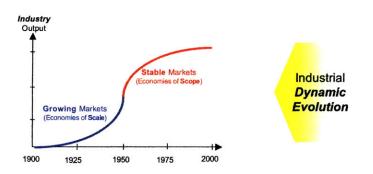


Figure 282: Enterprise - Environment Evolution and Co-Evolution within Framework

Part III: INTEGRATING THE THEORY

Chapter 7 Mathematical Model and Numerical Simulation

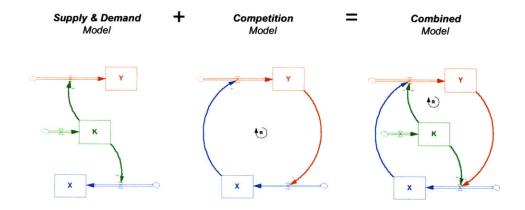
Equations of Motion. The evolution of business ecosystems will be expressed formally by a system of *coupled simultaneous nonlinear* differential equations,⁹⁷⁸ where the state variables, X_n are stocks which accumulate net flows (dX_n/dt) over time.

$$\begin{split} dX_1/dt &= f_1(X_1, X_2, ..., X_n) \\ dX_2/dt &= f_2(X_1, X_2, ..., X_n) \\ & \cdot \\ dX_n/dt &= f_n(X_1, X_2, ..., X_n) \end{split}$$

Note that such equations form a feedback system that generates system dynamics endogenously, via information from the various state variables, which feed back to influence their own rates of change.⁹⁷⁹ When formulating these equations of motion, we aim for parsimony, i.e. the least amount of causal structure to explain the most salient features of the dynamic behavior of the evolution of business ecosystems.⁹⁸⁰ Clearly more detailed models can (and eventually hopefully will) add more precise insights into this dynamic phenomena.

Conceptual Formulation. The combined model represents a predator-prey interaction, with two firm "predators" in interspecies competition for a market "prey" evolving into two niches. The organization-environment ecosystem model will consist of four primary state variables. The market environment K will be represented in the two dimensions of quantity (i.e. the state of *diffusion*) and quality (i.e. the state of *commoditization*). The competitive environment will be represented in two dimensions represented in the two dimensions of early entrant "market-maker" X and later entrant "market-taker" Y. The basic ecological interactions between organization and environment are shown in Figure 283 below.

Figure 283: Constituent Elements of Conceptual Model



⁹⁷⁸ In the traditions of the general system theory (e.g. Von Bertalanffy, 1950), cybernetics (e.g. Ashby, 1952), system dynamics (e.g. Forrester, 1961); as well as organizational ecology (e.g. Hannan and Freeman, 1977).

⁹⁷⁹ System dynamics has been used for many years to model firm competition - See Appendix G for a brief summary. Most formulations are made with operational managerial decisions, while this research uses a higher-level ecological system formulation.

First, we present a model of supply and demand interaction. Most theories of the firm are unsurprisingly firm-centric and take the product/service offering as representing "supply" to a market of customers representing "demand". This ecosystem model focuses its lens on the carrying capacity of the market as representing "supply" of revenues to a market of competing firms representing "demand" for that revenue. Crucially, by allowing the market K to vary over time in terms of amount and type of product/service demanded/supplied, we lay the theoretical foundations for the emergence of heterogeneous competing organizational species X and Y. Note that the market K size (a stock) positively affects the growth rates (flows) of the competitors.

Second, we present a model of inter-species competition. Here we note simply that in a market of finite carrying capacity, one firm's amount of market, say X (a stock), negatively impacts or reduces the growth rate of its competitor's (a flow), in what is known in the ecological sciences as "exploitation" (as opposed to) "interference" competition. This simple formulation endogenously links the competitor organizations with their environment in closed-loop feedback. Unlike the classic Lotka-Volterra predator-prey equations in which the closed loop is negative or balancing generating oscillations, here the feedback is positive or reinforcing, resulting in the unstable "principle of competitive exclusion." We seek however, a nonlinear parametization of the model which will enable the inter-species dominance-switching observed empirically.

Model Build-Up. In the following sections, the model will be constructed progressively, each time adding a higher level of sophistication in order to more clearly understand the underlying assumptions, parameters, structure and behavior of the model at each stage of complexity.⁹⁸¹ The following partial models will be analyzed and discussed sequentially:

Section 7.1	 <i>Constant</i> (Unchanging) Market <i>Intra</i>-species Competition in a Constant Market <i>Inter</i>-species Competition in a Constant Market
Section 7.2	 <i>Diffusing</i> Market (Quantity) <i>Intra</i>-species Competition in a Diffusing Market <i>Inter</i>-species Competition in a Diffusing Market
Section 7.3	 <i>Commoditizing</i> Market (Quality) <i>Intra</i>-species Competition in a Commoditizing Market <i>Inter</i>-species "Competition" in a Commoditizing Market
Section 7.4	 <i>Diffusing, Commoditizing</i> Market (Quantity and Quality) <i>Intra</i>-species Competition in a Diffusing, Commoditizing Market <i>Inter</i>-species Competition in a Diffusing, Commoditizing Market
Section 7.5	 Advanced Topics <i>Firm</i>-sector Topics <i>Market</i>-sector Topics

⁹⁸⁰ Although the mathematical notation used in this chapter is slightly modified from that used in the Executive Summary at the beginning of this document, the underlying structure and dynamics remain unchanged.

⁹⁸¹ I would like to thank Ventana Systems Inc., for the generous use of their dyamic simulation software, Vensim,

7.1 Competition in a Constant (Unchanging) Market Environment

7.1.1 Single Firm Growth in an Infinite Market

First, we assume a monopolist operating under increasing returns to scale. This assumption captures a variety of business phenomena including economies of scale, learning curve effects, etc. Under this reinforcing feedback, the more market the firm accumulates, the faster it continues to be accumulated.

Second, we assume initially that the firm exists in a market of unlimited growth potential – unlimited carrying capacity. The firm then is able to grow at its maximum fractional rate, r which is assumed to be constant and is determined by a number of goals and constraints which might include the rate of return on residual cash flows promised to risk bearers.⁹⁸²

Most models in organizational ecology focus on population size or density - expressed as number of organizations - as the primary state variable, which accumulates net flows of organizational entries and exits (e.g. Hannan and Freeman, 1977). Population size is of lower importance in these formulations. This paper however focuses instead on organizational size as approximated by the amount of environmental resources an organization accumulates, or more specifically in the case of business ecosystems, the amount of a market a firm possesses. In this way, a population could consist of a spectrum of organizations ranging from a large number of equally sized firms, each possessing the same percentage of the total market; to a single firm operating as a monopolist possessing the entire market. We will derive equations of motion for a firm accumulating market, X over time.⁹⁸³

The following differential equation captures this simple reinforcing feedback:

$$dX/dt = AR_X = r_X X \tag{1}$$

Where:

- X = firm X's acquired market
- dX/dt = the rate of change of firm X's market acquisition
- $AR_X = \text{firm X's acquisition rate of market (the inflow into X)}$
- $r_X = firm X$'s maximum fractional acquisition rate of market

Constants. The model has one active "constant", r_X which is undoubtedly a time-dependent variable. This will be enforced in the next formulation.

⁹⁸² This is actually the fractional net growth rate, and has the units of percent of market growth per unit of time.

⁹⁸³ For the present discussion, we assume that the firm converts demand into supply instantaneously or without any delays associated with order backlogs, inventory backlogs etc. Such delays in a balancing loop can account for cyclical oscillatory behavior. As the time horizon of interest in this evolutionary research is measured in centuries, the oscillations which manifest themselves over timeframes of decades are of secondary importance.

Figure 284 below illustrates the causal structure⁹⁸⁴ of this *linear* first-order formulation, which results in unrestrained exponential growth of the firm's market acquisition.

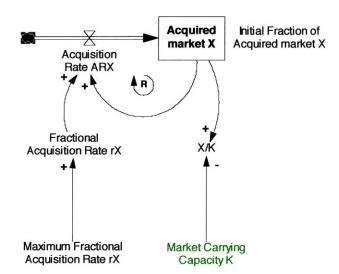
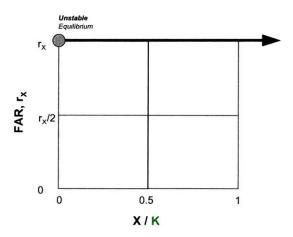


Figure 284: Model Structure of Single Firm Growth in an Infinite Market

Figure 285 below shows the relationship between the firm's Fractional Acquisition Rate, r_X and the amount of the available market that it has taken. In this simple model of the firm, r_X is assumed to be constant and independent of the market availability.

Figure 285: Fractional Acquisition Rate of Firm in an Infinite Market



Organisms and organizations which maintain a constant r_X are known as "opportunist" species or r-strategists (Brittain and Freeman, 1980) that build – or take – ecosystems at high rates of growth and then exit them once the underlying growth opportunities diminish to find new opportunities in other ecosystems.

⁹⁸⁴ In the diagrammatic representations of the differential equations, the "box" variables represent stocks or accumulations, while the variables below the "valves" represent rates or flows in and out of the stocks.

A firm starting out in a new ecosystem or market with constant r_x exists in an unstable equilibrium and exhibits unsustainable exponential growth that ultimately exceeds the carrying capacity of the ecosystem. The dynamic behaviour of such a firm is illustrated in Figure 286 below.

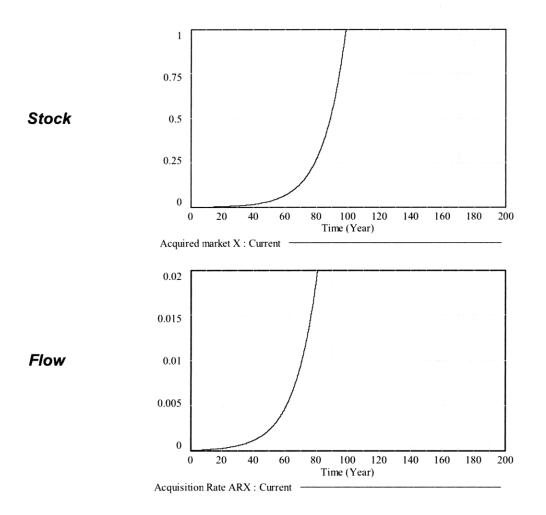


Figure 286: Dynamic Behavior of a Single Firm in an Infinite Market

One can either view this formulation as firm growth in an unlimited market, or as the early growth of a firm in a finite market, when its accumulated quantity of market, X is far from the carrying capacity of the market. What happens to this firm as it approaches the carrying capacity of the ecosystem will be covered in the subsequent section.

7.1.2 Single Firm Growth in a Constant, Finfite Market

As no firm exists in an infinitely rich resource environment, we next constrain the model by imposing finite but constant market carrying capacity, K, which might represent the size of population of potential customers or sales. The model now needs another feedback, this time a balancing loop which enables the firm growth to begin to slow down as it approaches the ecosystem's carrying capacity.

We therefore extend the previous differential equations to capture the mode-switching from reinforcing to balancing feedback as the firm approaches the carrying capacity of the market. This new logistic equation is shown below:⁹⁸⁵

$$dX/dt = AR_X = r_X X (1 - X/K)$$

$$= r_X X - r_X X^2/K$$
(2)

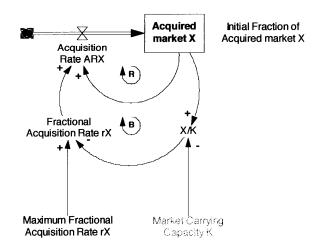
Where:

• K = the market carrying capacity of the ecosystem⁹⁸⁶

Constants. The model has two "constants", K and r_X which are undoubtedly time-dependent variables. For example, exogenous factors influencing the market carrying capacity K are consumer population size and wealth per capita, both time-dependent variables. A firm's maximum fractional acquisition rate r_X is also influenced by exogenous factors like stakeholder goals, resource access, etc. each of which may also be time-dependent variables.

Figure 287 below illustrates the causal structure of this *linear* first-order formulation, which results in logistic growth of the firm's market acquisision. Note that since there is only in inflow to the stock of Acquired market X (which is controlled by both reinforcing and balancing loops) the value of the stock can only ever increase.

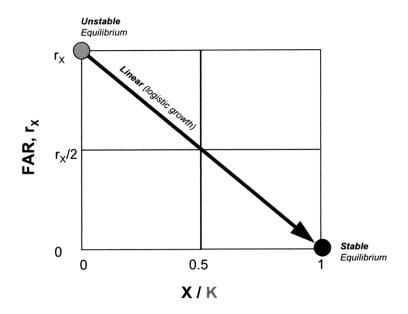
Figure 287: Model Structure of Single Firm Growth in a Constant Market



⁹⁸⁵ This was first formulated in social systems by Verhulst (1838) in his logistic population growth model.

Figure 288 below shows the relationship between the firm's Fractional Acquisition Rate, r_X and the amount of the available market that it has taken. In this simple model of the firm, r_X is assumed to vary linearly with the the market availability. The assumption here is that, as the firm acquires more of the finite market, K, the rate of firm growth, r_X begins to reduce linearly⁹⁸⁷, making the organization's rate of growth dependent upon the proportion of the carrying capacity that remains unexploited⁹⁸⁸.





Organisms and organizations which vary their underlying growth rate r_X in response to the market carrying capacity, K are known as "equilibrium" species or K-strategists (Brittain and Freeman, 1980) that build – or take – ecosystems at slower rates of growth and then await for other ecosystems to be built by r-strategists before they move into that new market.

A firm starting out in a new ecosystem or market with linearly declining r_x exists in an unstable equilibrium and exhibits logistic growth towards the carrying capacity of the ecosystem.

Figure 289 below illustrates the dynamic behavior of this *nonlinear* first-order formulation, which results in sigmoid or S-shaped growth of the firm's market capture.

⁹⁸⁶ Note: K need not be constant nor homogeneous. We will explore each in subsequent sections.

⁹⁸⁷ This linear relationship, which produces logistic growth, will be relaxed in subsequent sections which explore interspecies competition.

⁹⁸⁸ This is called "mass dependence" in the organizational ecology literature.

⁹⁸⁹ Note that the two axes of this figure represent the two exogenous factors in the model structure: the Maximum Fractional Acquisition Rate (vertical axis) and the amount of available market remaining (horizontal axis).

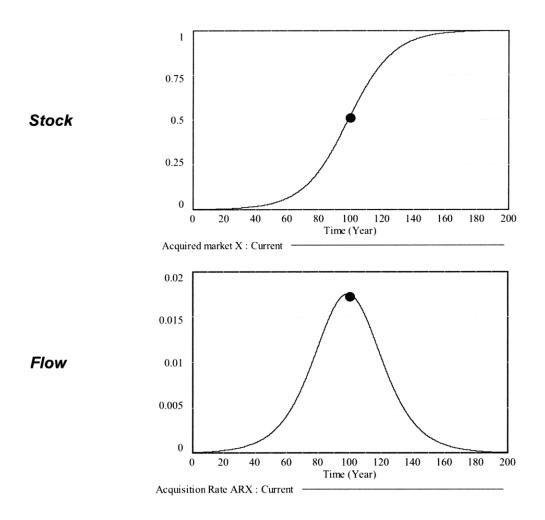


Figure 289: Dynamic Behavior of a Single Firm in a Constant Market

Note that *differentiation* of the stock (i.e. the slope of the line tangent to the curve), yields the flow or rate values, with the maximum rate (i.e. steepest slope) occurring at year 100. Conversely, note that *integration* of the flow (i.e. the area under the curve), yields the stock values, with the maximum stock occurring at year 200.

7.1.3 Intra-species Competition in a Constant Market⁹⁹⁰

In most markets, no firm exists without competition; we therefore need to next introduce competition between firms for customers in a common market. At this point, we assume two identical isomorphic competitors, X1 and X2 having homogeneous enterprise architectures occupying the same mathematical point niche. We therefore extend the previous differential equation (2) to account for the simple fact that the addition of sales to either competitor decreases the rate of growth of the other competitor.⁹⁹¹ Both competitors are now connected via a reinforcing loop that amplifies differences in market share resulting in an unstable equilibrium.⁹⁹² The new, coupled system of differential equations is shown below:⁹⁹³

$$dX_{1}/dt = AR_{X1} = r_{X1}X_{1} (1 - X_{1}/K - X_{2}\alpha_{12}/K)$$

$$= r_{X1}X_{1} - r_{X1}X_{1}^{2}/K - r_{X1}X_{1}X_{2}\alpha_{12}/K$$
(3a)

$$dX_{2}/dt = AR_{X2} = r_{X2}X_{2} (1 - X_{2}/K - X_{1}\alpha_{21}/K)$$

$$= r_{X2}X_{2} - r_{X2}X_{2}^{2}/K - r_{X2}X_{2}X_{1}\alpha_{21}/K$$
(3b)

Where:

- $\alpha_{12} = \text{firm } X_1$'s competition coefficient
- $\alpha_{21} = \text{firm } X_2$'s competition coefficient

The competition coefficient defines the intensity of competition. If firm X_1 competes directly in the same market or niche as firm X₂, then its competition coefficient $\alpha_{12} = 1$. This is the implicit assumption of the model formulation at this point. Later, we will explore the opposite case, where the competition coefficient $\alpha = 0$, that is competition in heterogeneous (commodifizing) market environments, in which niches develop that are suited to different species of organiztions.

Figure 290 below illustrates the causal structure of this nonlinear second-order formulation, which results in sigmoid or S-shaped growth of each competitor's market capture. Provided that both firms have identical forms and occupy the same market niche, no two-firm (or more generally, two-population) equilibrium can be stable - any exogenous shock to the system will result in the elimination of one of the firms (or populations).994

⁹⁹⁰ By definition, in *intra*-species competition each stock represents a firm (or collection of firms having similar growth rate characteristics) but not an entire species. ⁹⁹¹ In ecology, this is called "exploitation" (vs. "interference") competition (Brian, 1956). Other dynamic models

formulate competition using more operational variables (Sterman, Henderson, Beinhocker and Newman, 2007).

⁹⁹² This severe "winner-takes-all" competitive assumption is akin to Bertrand (price) competition, rather than the weaker form of Cournot (quantity) competition where the market is shared in proportion to relative firm growth rates. Under this assumption, the "competition coefficients", α_{12} and α_{21} equal 1.

⁹⁹³ This system of equations formed the basis for modeling competition within the seminal organizational ecology framework (Hannan and Freeman, 1977: 942). It is based on the classic Lotka-Volterra equations for competing populations, after Lotka (1925) and Volterra (1931). Note that this is different from the classic Lotka-Volterra equations for *predator-prey* populations which generate chaotic oscillation due to a central *balancing* loop. ⁹⁹⁴ This is known in ecosystem theory as the "principle of competitive exclusion" (Gause, 1934).

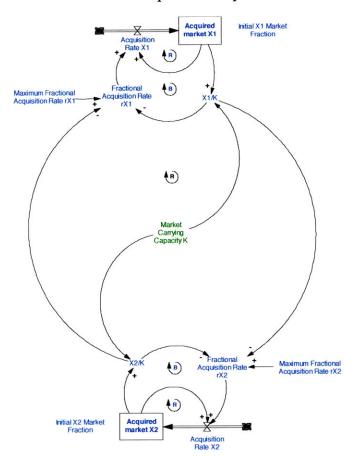
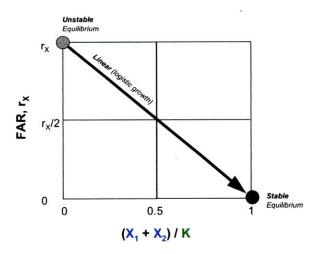


Figure 290: Model Structure of Intra-species Competition in a Constant Market⁹⁹⁵

Figure 291 below shows the relationship between the competing firms' Fractional Acquisition Rates, r_{X1} and r_{X2} and the amount of the available market that they have collectively taken.

Figure 291: Fractional Acquisition Rates of Competing Firms in a Constant Market



⁹⁹⁵ Note that the only exogenous variables are the maximum growth rates, These are a function of a variety of factors, as will be discussed in subsequent sections.

Figure 292 below illustrates the dynamic behavior of intra-species competition between homogeneous firms in a constant market. In this case, both firms unsurprisingly split the market 50%-50%. Their peak acquisition rates are also unsurprisingly half the acquisition rate of a monopolist. What might be surprising is that the peak aquisition rates of the competitors occurs before that of a single monopolist, due to the fact that each acquisition impacts both the firm and its competitor, i.e. the reinforcing loop that now links competitors.

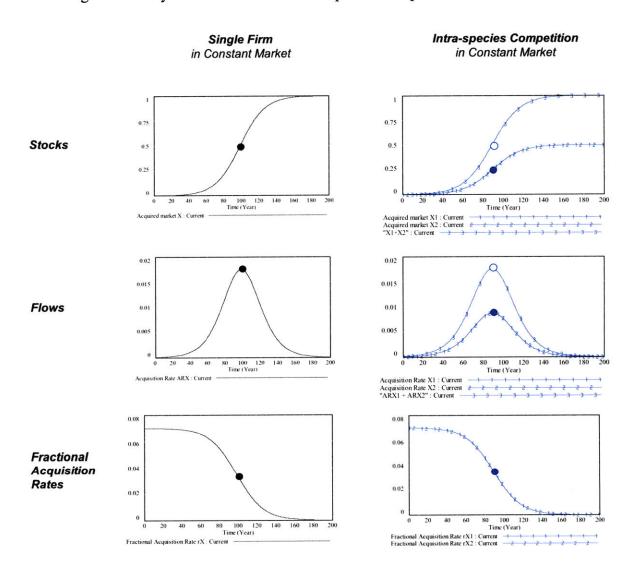


Figure 292: Dynamic Behavior of Intra-species Competition in a Constant Market

7.1.3.1 Parametric Study: Initial Conditions

Figure 293 below illustrates the dynamic behavior of intra-species competition between two firms having differing initial acquired markets – one firm having twice the initial acquired market than the other. This formulation assumes that both firms are equally efficient, however one firm has greater luck or initial endowments.

Here, a simple linear relationship exists between the initial endowment of a firm (as expressed by its initial acquired market) and its success. Specifically, a doubling of the initial fraction of acquired market, results in a doubling of the acquired market – here a 67% to 33% split of the acquired market.

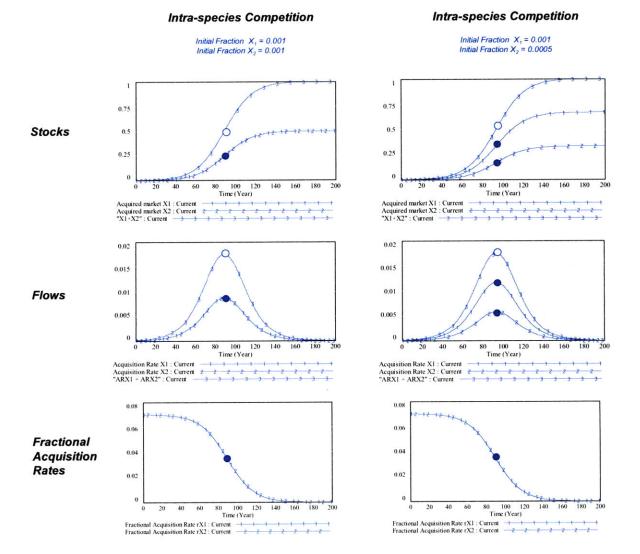
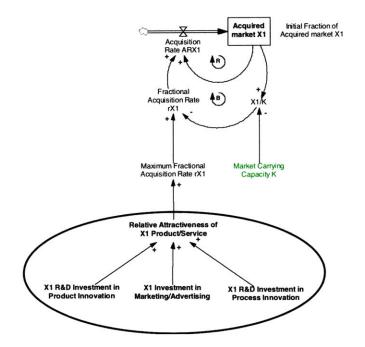


Figure 293: Dynamic Behavior of of Competing Initial Acquired Markets

7.1.3.2 Parametric Study: Fractional Acquisition Rates

Next, we explore intra-species competition between two firms having different efficiencies, which is reflected in their maximum fractional acquisition rate, capturing the relative attractiveness of a firm's products and services (see for example, Paich & Sterman, 1993). Although not explicitly part of the model presented herein, a number of operational factors can impact a firm's efficiency or maximum fractional acquisition rate, including its investment in R&D in product innovation, process innovation, or its investment in marketing/advertising as illustrated in Figure 294 below.

Figure 294: Model Structure of Relative Attractiveness of a Firm's Products/Services



The relationship between competing firm's fractional acquisition rates and their acquired market relative to the market carrying capacity is illustrated in Figure 295 below.

Figure 295: Fractional Acquistion Rates of Firms in Intra-species Competition

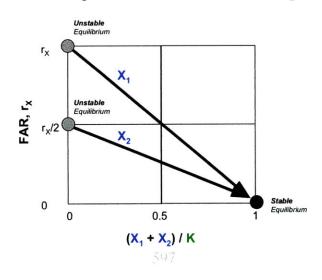


Figure 296 below illustrates the dynamic behavior of intra-species competition between two firms having differing fractional acquisition rates - one firm having twice the factional acquisition rate than the other. This formulation simply assumes that one firm is more efficient than the other.

Here, the *principle of competitive exclusion* operates, namely that a nonlinear relationship exists between the efficiency of a firm (as expressed by its maximum fractional acquisition rate) and its success. Specifically, a doubling of the maximum fractional acquisition rate, results in a greater than doubling of the acquired market – here a 95% to 5% split of the acquired market. What is slightly counter-intuitive, is that the slower, less-competitive firm peaks sooner than the faster, more-competitive firm.

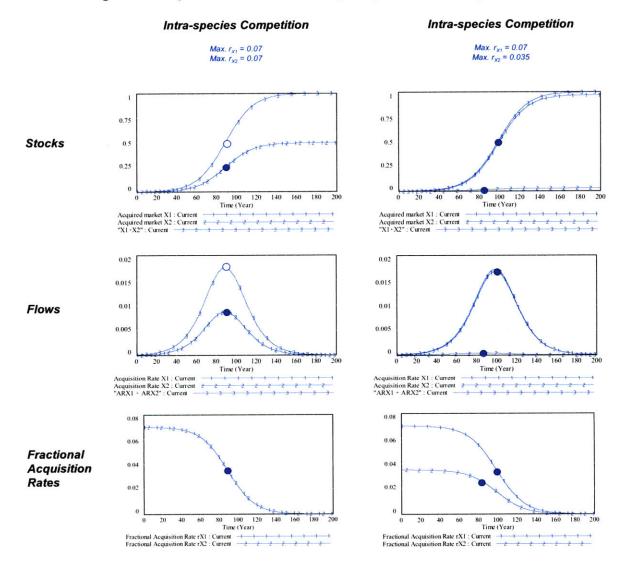


Figure 296: Dynamic Behavior of Competing Fractional Acquisition Rates

7.1.4 Inter-species Competition in a Constant Market

We will next cover the case of *inter*-species competition in a constant, unchanging environment. This case is weak theoretically because significant sustained environmental variation is required in order to produce and sustain significant variation in organizational species. Inter-species competition in a constant market could be a special parametric study when exploring interspecies competition in a logistic growth market, in which the market diffusion rate is much greater than the competitor growth rates.

The new, coupled system of differential equations is shown below:

$$dX/dt = AR_{X} = r_{X}X (1 - X/K - Y\alpha_{XY}/K)$$
(4a)
$$= r_{X}X - r_{X}X^{2}/K - r_{X}XY\alpha_{XY}/K$$
(4b)
$$= r_{Y}Y - r_{Y}Y^{2}/K - r_{Y}YX\alpha_{YX}/K$$
(4b)

The incumbent species, X which builds the market is known in bio-ecology as an *r-strategist*, and the late-entrant challenger species, Y which takes the market is known as a *K-strategist* (MacArthur and Wilson, 1967). The primary difference between this formulation and the previous, is that each competitor's fractional net growth rates are no longer linearly density-dependent, with the (*Modular*) *r-strategist* growing faster when the environment is experiencing rapid growth, and the (*Integral*) *K-strategist* growing faster when the environment's rate of growth is slowing down, as shown in Figure 297 below.

$$r_{X} > r_{Y} \text{ when } (X+Y) < K/2$$

$$r_{Y} < r_{Y} \text{ when } (X+Y) > K/2$$

$$(4c)$$

$$(4d)$$

Figure 297: Fractional Acquisition Rates of Firms in Inter-species Competition

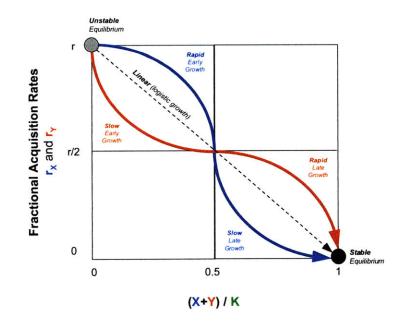


Figure 298 below illustrates the causal structure of this nonlinear second-order formulation, which results in *non-sigmoid* S-shaped growth of each competitor's market capture.

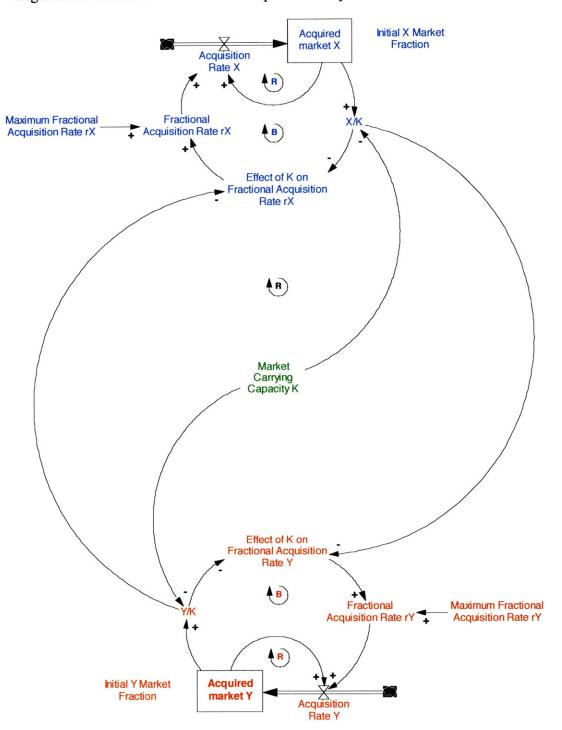


Figure 298: Model Structure of Inter-species Competition in a Constant Market

Figure 299 below illustrates the dynamic behavior of inter-species competition between heterogeneous firms in a constant market. First, note that the non-linear fractional acquisition rates result in non-logistic growth in the stocks and asymmetric flow diagrams. Second, note that their peak acquisition rates occur at different times, with X occurring before and Y occurring after the case of intra-species competition. Third, note that in spite of the fact that the maximum flow rates are different and occur at different times, the areas under the respective rate curves are similar, meaning that both firms ultimately split the market 50%-50%. Finally, note that X's factional acquisition rate time history is a *single* reverse S-curve which is steeper than the intra-species case, and that Y's factional acquisition rate time history is a *double* reverse S-curve.

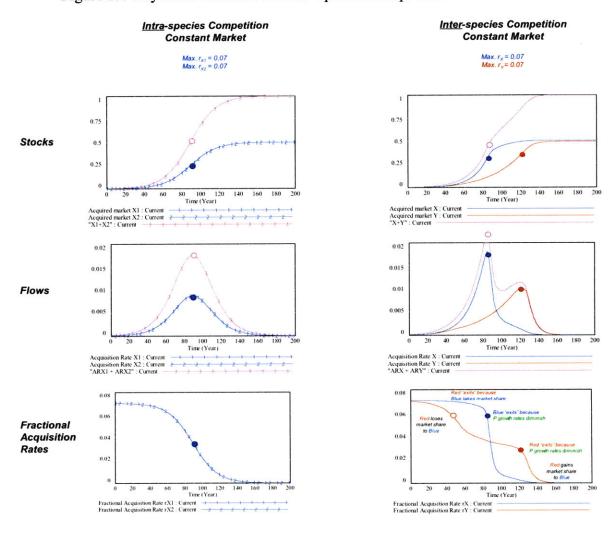


Figure 299: Dynamic Behavior of Inter-species Competition in a Constant Market

7.2 Competition in a Diffusing Market (Quantity)

7.2.1 Diffusing Market (Quantity)

Next, we relax the assumption of a constant carrying capacity of the market or resource environment, K (Brittain, 1994). Instead, we permit sigmoid growth as it approaches its own inherent carrying capacity.⁹⁹⁶ This assumption captures the scenario of a new product/service that either:

1) diffuses logistically throughout a constant population of potential consumers (Bass, 1969), or

2) diffuses instantaneously through a logistically-growing population of potential consumers (Verhulst, 1838), or

3) some combination of the two.

7.2.1.1 First-Order Two-Stock Logistic Growth

Previously, we modeled a firm's logistic growth with one stock and two loops, reinforcing and balancing. We now demonstrate that this structure can be represented more intuitively for a market as a two-stock, two-loop structure by introducing a complementary variable, the potential market, P.

The new, coupled system of differential equations is shown in its most simple form below:

	$dP/dt = -DR = -r_dA (1 - A/K)$	(5a)
noting $P = K - A$	$= -r_{d}PA/K$	
	$dA/dt = DR = r_dA (1 - A/K)$	(5b)
noting $P = K - A$	$= r_d PA/K$	

Where:

- P = potential market
- A = adopted market
- dP/dt = the rate of change of the potential market
- dA/dt = the rate of change of the adopted market
- DR = diffusion rate of market (the inflow into A, outflow from P)
- $r_d = maximum$ fractional diffusion rate of the market

The equivalence of these two market growth model structures is shown in Figure 300 below.⁹⁹⁷

⁹⁹⁶ For simplicity, we model a linear relationship between the diffusion rate and available carrying capacity, which results in logistic growth.

⁹⁹⁷ Note this model structure is the same as modeling *chronic* infectious diseases, where the susceptible population all eventually becomes infected – also known as the SI model. See Sterman (2000), pp. 300-301.

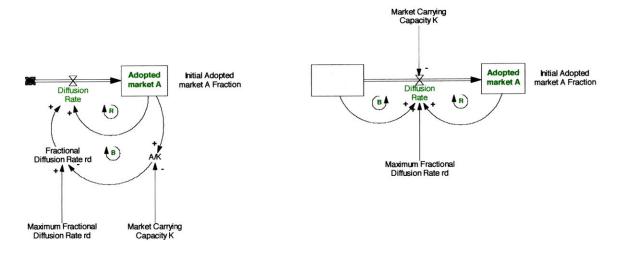


Figure 300: Equivalence of Logistic Market Growth Model Structures

7.2.1.2 Bass Industry Diffusion Model

Although the above model captures the basic diffusion of a technology, product or service into a market, it suffers from a subtle modeling problem, namely how does the dis-equilirium momentum get started? A simple way around the problem is to give the Adopted market A stock an initial positive value, which is shown above as the "Initial Adopted market A Fraction" and is formalized as a small fraction of the Carrying Capacity, K. While this mathematically solves the "start-up" problem, it implies that at time zero, there was already an existing diffused market, no matter how small.

A more appealing formal model of the start-up problem was used by Bass (1969), in which an additional balancing loop is used on the outflow from the Potential market P to initiate the model momentum. Bass conceived this operationally as an advertising function which generated market or product awareness. We add this additional structure to the model, with the new, coupled system of differential equations is shown in its most simple form below:

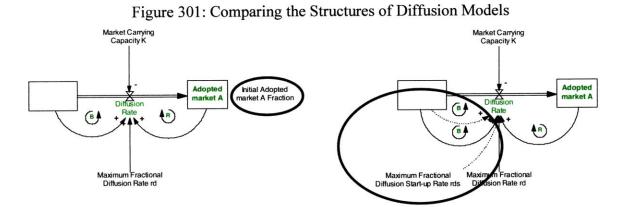
	$dP/dt = -DR = -r_dA (1 - A/K) + r_{ds}P$	(5c)
noting $P = K - A$	$= -(\mathbf{r}_{d}\mathbf{P}\mathbf{A}/\mathbf{K}+\mathbf{r}_{ds}\mathbf{P})$	

$$dA/dt = DR = r_d A (1 - A/K) + r_{ds} P$$
(5d)
noting P = K - A = r_d PA/K + r_{ds} P

Where:

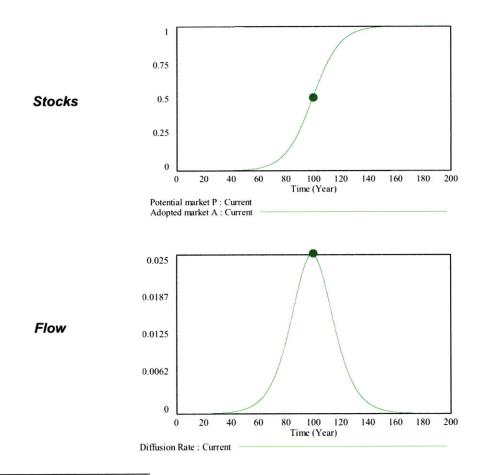
• r_{ds} = maximum fractional *start-up* rate of the diffusing market

The Bass diffusion model formulation is shown in Figure 301 below and compared with the previous diffusion model.



The Bass diffusion model is now applied not to individual products, but instead to aggregations of products or services at the industry level. The dynamic behavior of the Bass model is shown in Figure 302 below.⁹⁹⁸

Figure 302: The Dynamic Behavior of a Bass Industry Diffusion Model



⁹⁹⁸ Note: the diffusion rate is comprised of both components due to advertising and word of mouth. As the Fractional Diffusion Start-up Rate is so small, its effects (i.e. a declining logistic curve) are not visible on the figure above.

7.2.1.3 Bass Industry Diffusion Model with Replacements

The above industry diffusion model assumes that once a unit of market is captured, it remains captured (or adopted) forever. This implies that the market consists of durable goods, with an infinite product life.

In order to make the model more generalizable or more applicable to a wider range of products and services covering a continuum of average product lives, we introduce the notion of replacements to the Bass industry diffusion model.

The new structure of the model requires a new outflow from the Adopted market A back towards the Potential market P, in which a new balancing loop on the outflow which controls the replacement rate.⁹⁹⁹ The resulting behavior of this local structure is exponential decay.

The new, coupled system of differential equations is shown in its most simple form below:

$$dP/dt = RR - DR = A/L - (r_dA (1 - A/K) + r_{ds}P)$$
(5e)

$$= A/L - (r_dPA/K + r_{ds}P)$$
(5e)

$$dA/dt = DR - RR = (r_dA (1 - A/K) + r_{ds}P) - A/L$$
(5f)

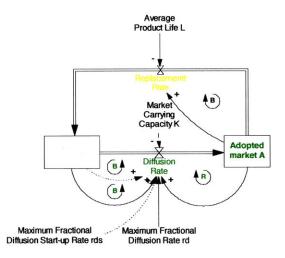
$$= (r_dPA/K + r_{ds}P) - A/L$$
(5f)

Where:

- RR = replacement rate of market (the inflow into P, outflow from A)
- L = Average product life

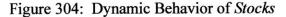
The industry diffusion model with replacements is shown in Figure 303 below.

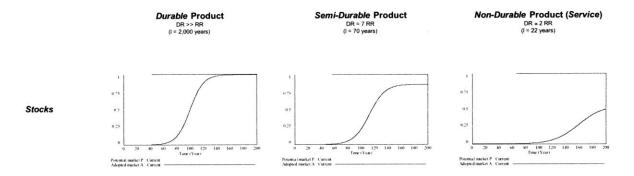
Figure 303: Bass Industry Diffusion Model with Replacements



⁹⁹⁹ Note, the primary model structure (two flows, three loops: balancing, reinforcing & balancing) is similar to the modeling of *acute* infectious diseases, where the susceptible population (Potential market P) can move to an infected state (Adopted market A) before they move towards a recovered state (Potential market P) – also known as the SIR model. See Sterman (2000), pg. 303.

Figure 304 below illustrates the dynamic behavior of the stocks in this nonlinear *first*-order formulation. The results of a parametric study of durability of offering (decreasing from left to right) indicate sigmoid or S-shaped growth for the resource environment, albeit with inflection and peaking occurring later with decreasing durability. This occurs because the lower the durability, the more time spent producing replacement market (and the higher percentage of the Potential market P, that remains potential).





The results of a parametric analysis of the rates in a diffusing market are presented in Figure 305 below. As the derivative (slope) of the stocks, equals the value of the rates, it is clear that the peak rates of change in the stocks decline as the durability decreases.

Dissecting the rate of change of Available market A (i.e. dA/dt) into its constituent flows of diffusion and replacement rates, reveals that: 1) the replacement rates grow logistically and increasingly as durability decreases, 2) the diffusion rates maintain their peaks, but these peaks are delayed with decreasing durability, and the shape moves from bell-shaped to S-shaped; 3) the diffusion and replacement rates approach each other as durability decreases – the definition of a service.

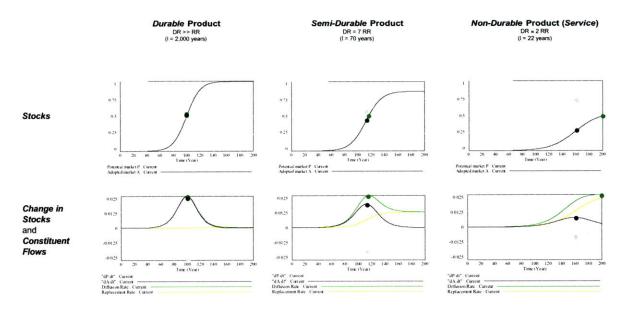
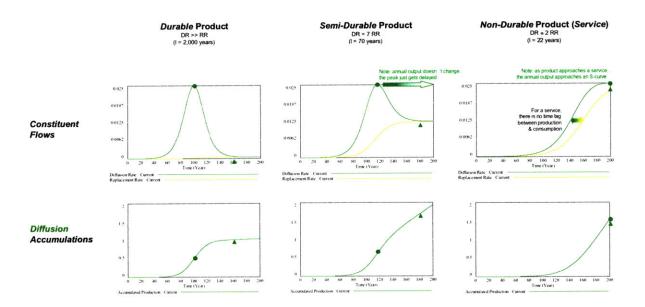


Figure 305: Dynamic Behavior of Changes in Stocks and Constituent Flows

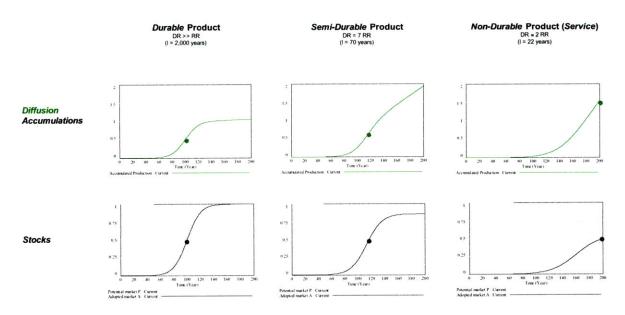
The results of a parametric analysis of the accumulated diffusion in market with replacements are presented in Figure 306 below. When the diffusion rates and replacement rates eventually meet in equilibrium, the accumulated diffusion continues to grow at that constant equilibrium rate. Finaly, while durable product industries may diffuse relatively fast, their total market size is smaller than service industries, which diffuse relatively slowly, but which have larger total markets.





Finally, coming full circle, the results of a parametric analysis of the accumulated diffusion in market with replacements are presented in Figure 307 below. For a durable product, the accumulated diffusion is the same as the Adopted market A, as there are no retirements. For decreasing durability, the meaning of the Adopted market A loses some relevance.

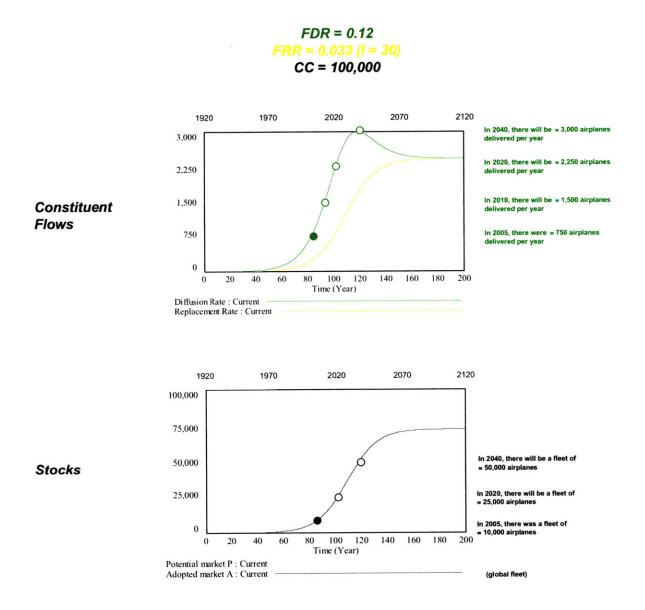
Figure 307: Dynamic Behavior of Accumulated Diffusion & Stocks



7.2.1.4 Industry Studies of Diffusing Markets

This section demonstrates how the diffusing market model can be applied conceptually to a series of industries.¹⁰⁰⁰ Figure 308 below demonstrates how the diffusing market model is applied to the commercial airplane industry.

Figure 308: Diffusing Market in the Commercial Airplane Industry



¹⁰⁰⁰ The purpose of this section is not to offer detailed calibrated models, but merely a series of conceptual models.

Figure 309 below demonstrates how the diffusing market model is applied to the global airline industry.

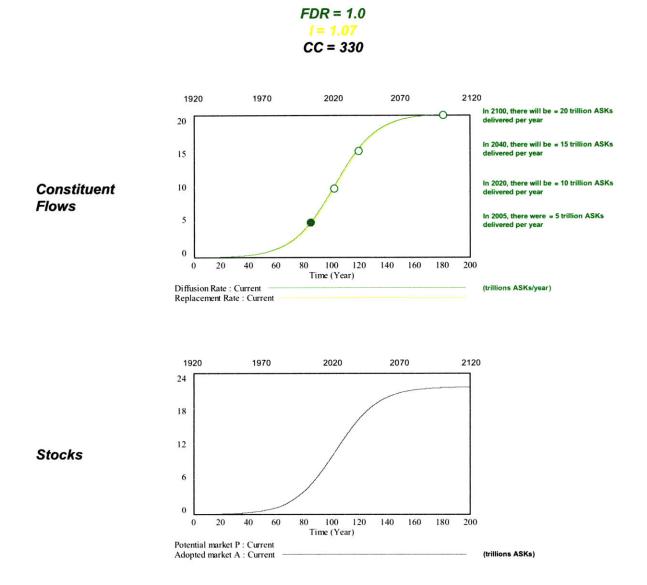
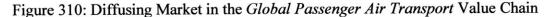
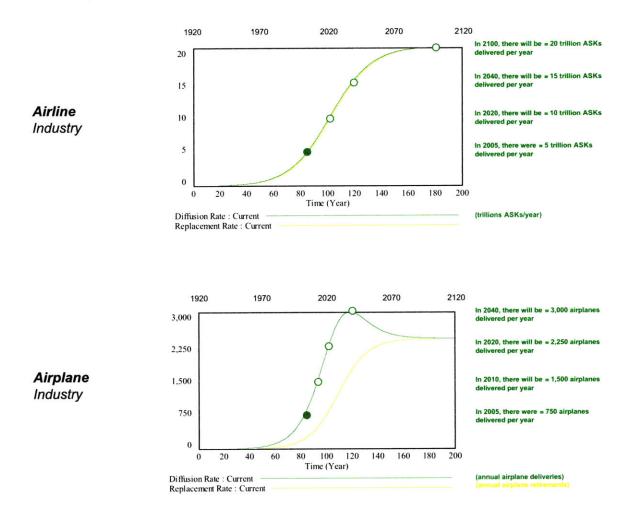


Figure 309: Diffusing Market in the Global Airline Industry

Finally, when comparing the dynamics of a value chain, Figure 310 below demonstrates how the diffusing market model is applied to the global airline and commercial airplane industry.





Intuitively, one may think of airplanes (having 30 year product lives) as being relatively durable goods. But from the previous figures, their annual production rates do not exhibit the classic "bell-shaped curve" associated with the first derivative of an S-shaped stock. What this demonstrates, however, is that the notion of product "durability" is relative to the diffusion rate of the industry. For example, if we kept the product life of an airplane as 30 years, but had the the diffusion of air transport increase say four-fold, we would begin to see the classic "bell-shaped curve" as shown in Figure 311 below.

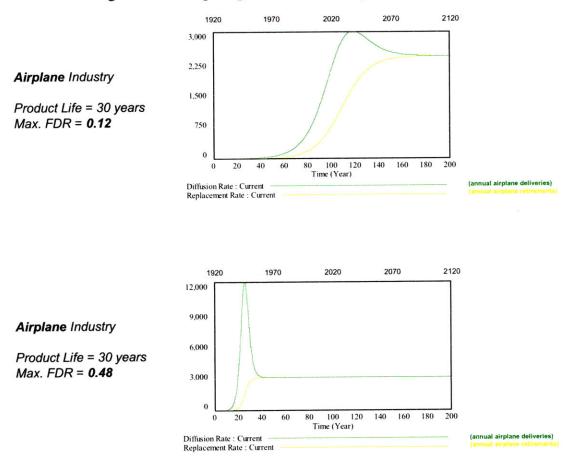


Figure 311: Comparing Product Durability vs. Market Diffusion Rate

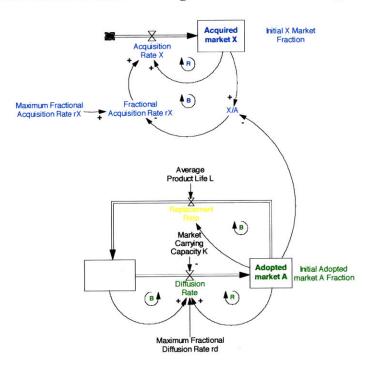
7.2.1.5 Market Diffusion & Obsolescence

Having produced a model of how a market "grows" or diffuses, we will explore how a market "dies" or becomes overtaken by a substitute market. Instead of discussing this here, it will be treated as a special case covered in section 7.5 under "Advanced Topics."

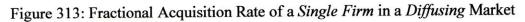
7.2.2 Single Firm Growth in a Diffusing Market

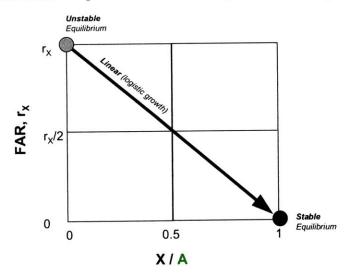
Next, we study how a single firm grows in a diffusing market, before we proceed to investigate competition in a diffusing market. The model structure is shown in Figure 312 below.

Figure 312: Model Structure of Single Firm Growth in a Diffusing Market



The Fractional Acquisition Rate of a Single Firm X is assumed to be a linear function of the carrying capacity of the market A, as shown in figure Figure 313 below. We will relax this assumption later, when we investigate inter-species competition.





The dynamic behavior of a single firm in a diffusing market is summarized in Figure 314 below. From left to right, we explore the effects of increasing maximum Fractional Acquisition Rates.

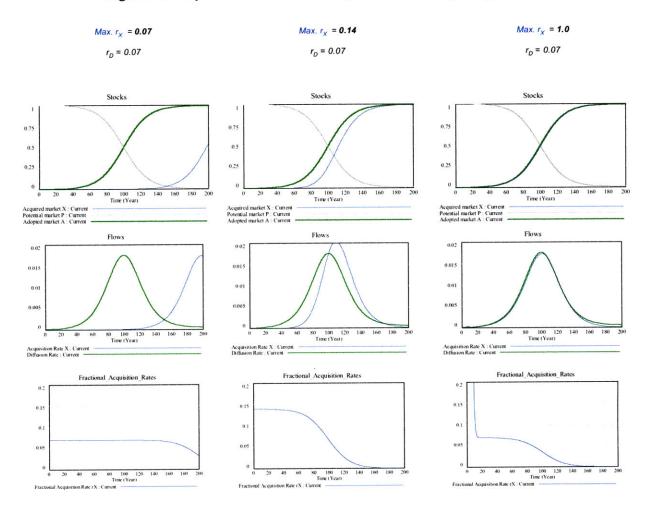


Figure 314: Dynamic Behavior of Single Firm in a Diffusing Market

As can be seen, when the firm grows at the market diffusion rate (left column), there is a considerable time lag before it penetrates the market fully. However, when the firm grows at twice the market diffusion rate (center column), the time lag is greatly reduced and the firm begins to follow the market diffusion. Finally, when the firm grows very fast relative to the market diffusion rate (right column), it essential tracks the market diffusion.

7.2.3 Intra-species Competition in a Diffusing Market

Next, we reintroduce two members of the same species, competing for the logistically growing market. The new, coupled system of differential equations is shown in its most simple form below:

$$dX_{1}/dt = AR_{X1} = r_{X1}X_{1} - r_{X1}X_{1}^{2}/K - r_{X1}X_{1}X_{2}\alpha_{12}/K$$
(6a)

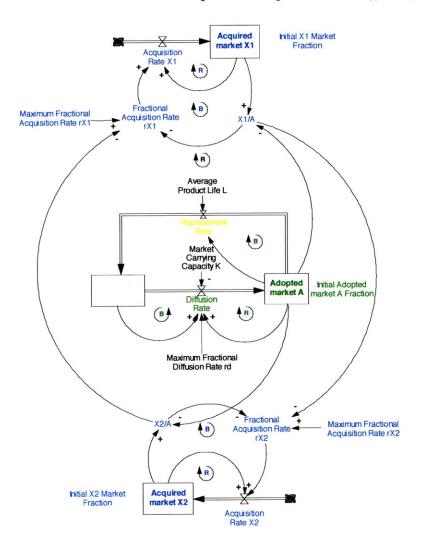
$$dX_2/dt = AR_{X2} = r_{X2}X_2 - r_{X2}X_2^2/K - r_{X2}X_2X_1\alpha_{21}/K$$
(6b)

$$dP/dt = \frac{RR}{DR} - DR = A/L - (r_d P A/K + r_{ds} P)$$
(6c)

$$dA/dt = DR - RR = (r_d PA/K + r_{ds}P) - A/L$$
(6d)

Figure 315 below illustrates the causal structure of this nonlinear *third*-order formulation, which again results in sigmoid or S-shaped growth for both the resource environment and the dominant firm (or population of firms) that created it.

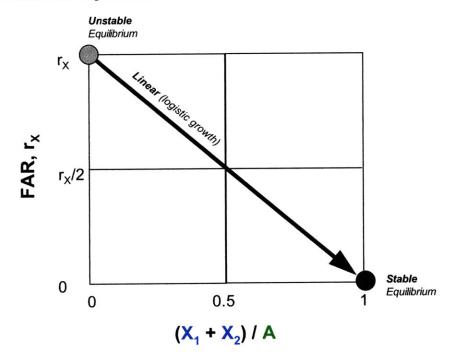
Figure 315: Model Structure of Intra-species Competition in a Diffusing Market



Although this refinement of Hannan and Freeman's (1977) classic does not itself add new insights into the behavior of competing organizations or populations, it is a necessary building block for the next step of the formulation of the evolution of business ecosystems, namely, it establishes the condition necessary for the establishment of interspecies competition, resulting in an extension of the theory of competitive exclusion (Gause, 1934).

Figure 316 below illustrates the fractional acquisition rates r_X as a function of the available carrying capacity of two homogeneous competitors (i.e. both are equally efficient) engaged in intra-species competition.

Figure 316: Fractional Acquisition Rates of Homogeneous Firms in Intra-species Competition



The previous dynamic behavior of a single firm in a diffusing market is compared (on the left) with intra-species competition in a diffusing market (on the right) in Figure 317 below. As can be seen, a single firm having a maximum Fractional Acquisition Rate of 0.14 exhibits the same behavior at two identical competitors (splitting the market) and each having a maximum Fractional Acquisition Rate of 0.14.

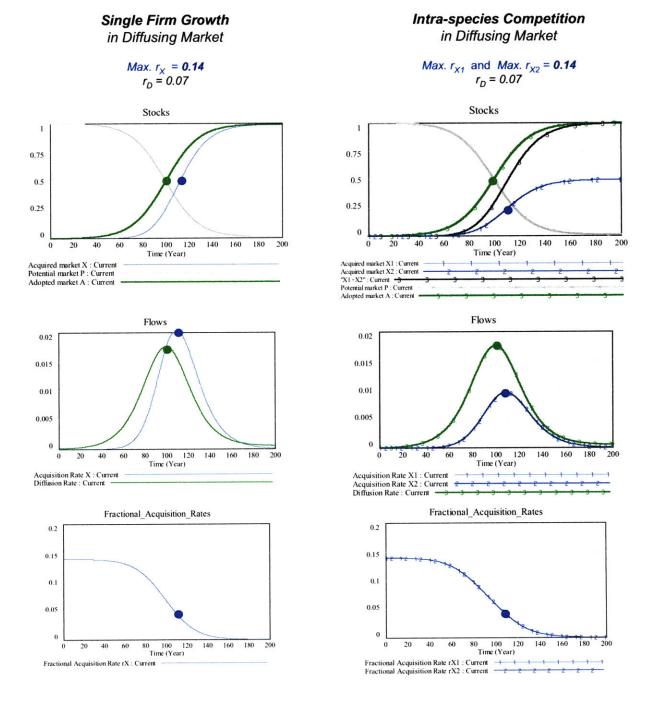


Figure 317: Dynamic Behavior of a Single Firm and Intra-species Competition in a Diffusing Market

Figure 318 below illustrates the dynamic behavior of intra-species competition between homogeneous firms in a logistically diffusing market, having identical but increasing maximum fractional acquisition rates, r_x . First in looking at the stocks, note that identical competitors continue to split the market 50%-50%. Next in looking at the stocks and flows, note that a phase lag develops between demand and supply, i.e. the Adopted market A, and the sum of the competitors' Acquired markets X, when the firms' maximum fractional acquisition rates are relatively low. Finally note that when firms' Fractional Acquisition Rates are very high (i.e. 1.0), the FARs initially drop very fast, because initially the firms are growing much faster than the market is diffusing, in order to make up for the initial gap made by the finite A at time 0 (a start-up problem).

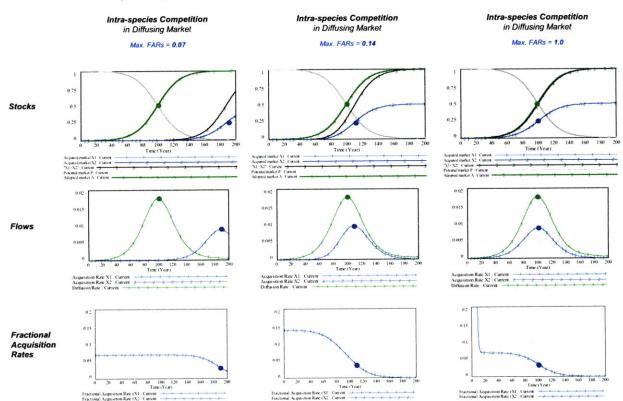


Figure 318: Dynamic Behavior of *Intra*-species Competition in a *Diffusing* Market (with Increasing Homogeneous Maximum Fractional Acquisition Rates)

Figure 319 below illustrates the fractional acquisition rates r_X as a function of the available carrying capacity of two heterogeneous competitors (i.e. one is more efficient than the other) engaged in intra-species competition.

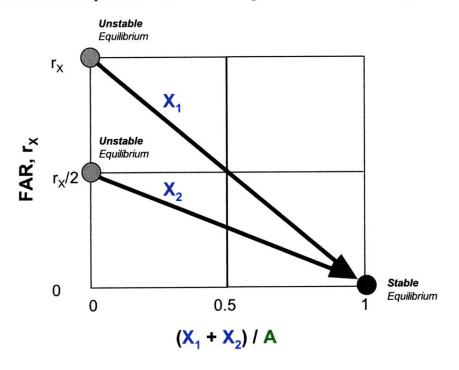


Figure 319: Fractional Acquisition Rates of Heterogeneous Firms in Intra-species Competition

Figure 320 below illustrates the dynamic behavior of intra-species competition between homogenous firms in a logistically diffusing market, having heterogeneous maximum fractional acquisition rates, r_x . Here, when the firms have heterogeneous Maximum Fractional Acquisition Rates, the principle of Competitive Exclusion again occurs.

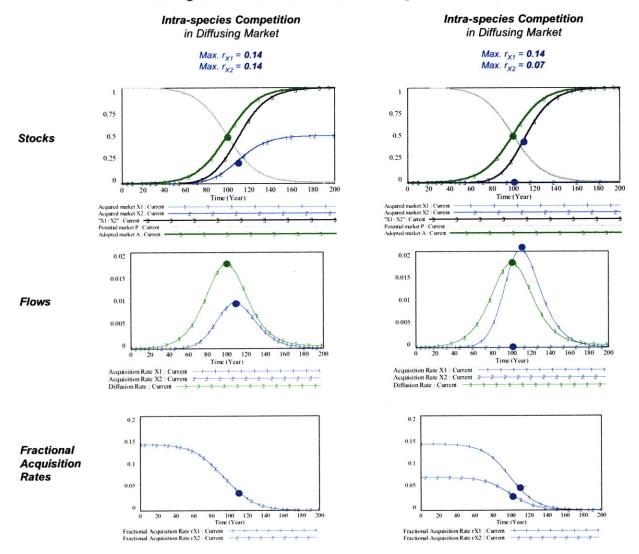


Figure 320: Dynamic Behavior of *Intra*-species Competition in a *Diffusing* Market (with Heterogeneous Maximum Fractional Acquisition Rates)

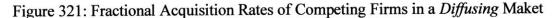
7.2.4 Inter-species Competition in a Diffusing Market

Since in the previous stage, we have allowed the environment to grow logistically, we can now acknowledge the possibility of variation in organizational forms as a consequence of variation in environmental rates of growth. This gives rise to the potential for dominance switching: i.e. the late entry of a new species of organization, and the associated early exit of the incumbent species. The two types of competing organizational species modeled therefore reflect either increasing rates or decreasing rates of environmental growth.

The new, coupled system of differential equations is shown below:

$r_X > r_Y$ when $(X+Y) < K/2$	$dX/dt = r_X X - r_X X^2 / \mathbf{K} - r_X X \mathbf{Y} \alpha_{XY} / \mathbf{K}$	(7a)
	$dY/dt = r_Y Y - r_Y Y^2/K - r_Y XY \alpha_{YX}/K$	(7b)
	$dP/dt = RR - DR = A/L - (r_dPA/K + r_{ds}P)$	(7c)
	$dA/dt = DR - \frac{RR}{R} = (r_d PA/K + r_{ds}P) - A/L$	(7d)

The incumbent species, X which builds the market is known in bio-ecology as an *r-strategist*, and the late-entrant challenger species, Y which takes the market is known as a *K-strategist* (MacArthur and Wilson, 1967). The primary difference between this formulation and the previous, is that each competitor's fractional net growth rates are no longer linearly density-dependent, with the (*Modular*) *r-strategist* growing faster when the environment is experiencing rapid growth, and the (*Integral*) *K-strategist* growing faster when the environment's rate of growth is slowing down, as shown in Figure 321 below.



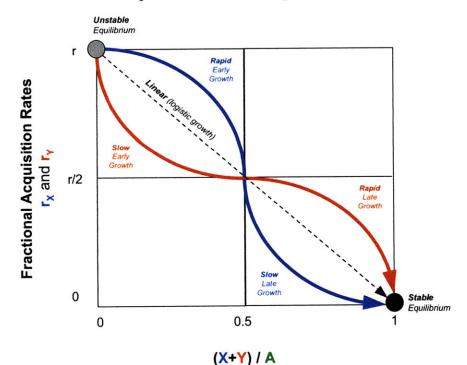


Figure 322 below summarizes the causal structure of this nonlinear *third*-order formulation which results in S-shaped (but no longer logistic) growth for the competitor's state variables. Crucially note that the r-strategist tends to exit when the growth rate of the market begins to drop below its own growth objectives. Environmental variance therefore produces variance in the architectures of the organizational sets, which creates symbiotic inter-species competition, with a more complex theory of competitive exclusion.

Figure 322: Model Structure of Inter-species Competition in a Diffusing Market

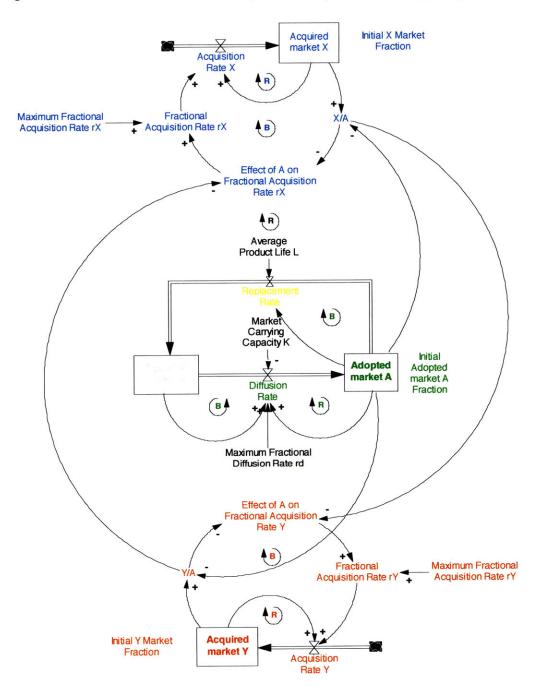
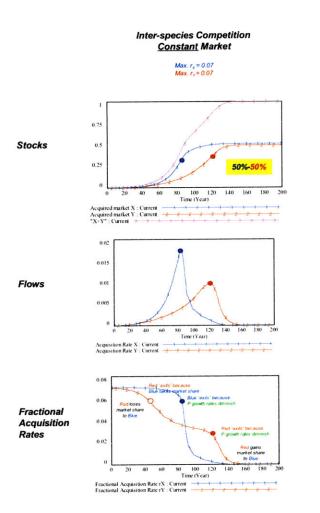


Figure 323 below compares the dynamic behavior of inter-species competition between heterogeneous firms in constant and diffusing markets.

Figure 323: Dynamic Behavior Comparing Inter-species competition in Constant & Diffusing Markets



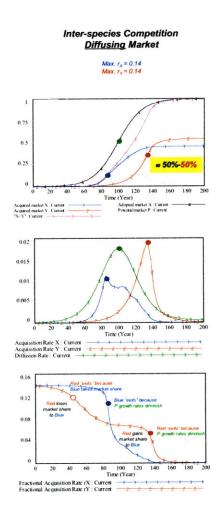


Figure 324 below illustrates the dynamic behavior of of inter-species competition between heterogeneous firms in a diffusing market, in which both competitors have the same maximum fractional net growth rates.

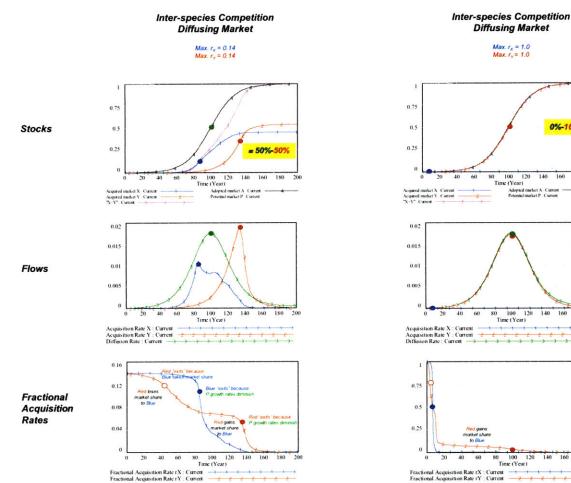
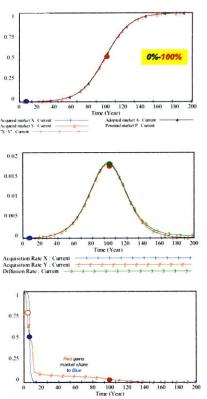


Figure 324: Dynamic Behavior Comparing Inter-species competition in a Diffusing Market



2 2

Diffusing Market

Max. r_x = 1.0 Max. r_y = 1.0

7.3 Competition in a *Commoditizing* Market (Quality)

7.3.1 Commoditizing Market (Quality)

Having permitted the carrying capacity of the market, K to grow logistically, we now go back to a constant market assumption, but instead allow the *quality* of the market customer preferences to diffuse (or commoditize) from high-performance *differentiated* products and services towards *low-cost* products and services (Abernathy and Utterback, 1978; Christensen, 1997). This in effect allows market niches to evolve, which has the potential to shape the entry and exit of different species of organizational sets or enterprise architectures.

In the model of market diffusion discussed previously, the potential market is assumed to decay *logistically* (and the associated adopted market is assumed to grow logistically). This makes some intuitive sense, as market growth initially builds slowly with increasing speed, as the customers become more aware of the product/service, and as the suppliers build capacity/capabilities on an increasing returns basis. These increasing rates of growth eventually give way to slowing rates of growth due the approach of the finite carrying capacity of the market. Such causal structure generates logistic behavior.

A legitimate question arises however regarding the commoditization in a market, namely does the supply/demand for high-performance differentiated goods/services decay exponentially, or logistically (like quantity growth). Do the rates of commoditization initially begin at their maximum, or is there initially a slow period of commoditization (caused by entrepreneurially innovative inertia) before the onset of commoditization?

In order to build a model of such commoditization, we begin with a simple, single-loop (balancing) producing exponential decay of the differentiated products niche, before we move onto a more complex double-loop (balancing and reinforcing) producting logistic decay of the differentiated products niche. The governing causal logic will ultimately be determined via careful longitudinal empirical data collection and analysis.

7.3.1.1 Single-Loop *Exponential* Decay

The differential equations defining exponential decay are shown below:

$$dD/dt = -CR = -r_cD$$
(8a)

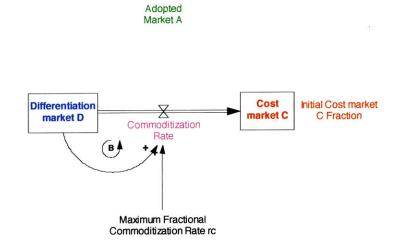
$$\frac{dC}{dt} = \frac{CR}{cR} = r_c D \tag{8b}$$

Where:

- D = the market for *differentiated* products & services
- C = the market for *cost-leadership* in products & services
- dD/dt = the rate of change of the market for *differentiated* products & services
- dC/dt = the rate of change of the market for *cost-leadership* in products & services
- CR = commoditization of market (the outflow from D, the inflow into C)
- r_c = maximum fractional commoditization rate of the market

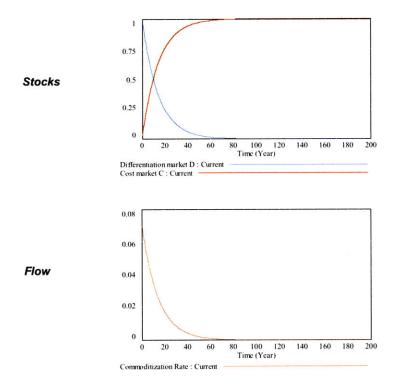
The basic single-loop commoditization model is shown in Figure 325 below. Note that the carrying capacity of the adopted market, A plays no role here, with the fractional commoditization rate r_c not being reduced.

Figure 325: The Structure of a Commoditizing Market (with Exponential Decay)



The dynamic behavior of a commoditizing market with exponential decay of the original differentiation niche is shown in Figure 326 below.

Figure 326: Dynamic Behavior of a Commoditing Market (with Exponential Decay)



7.3.1.2 Double-Loop Logistic Decay

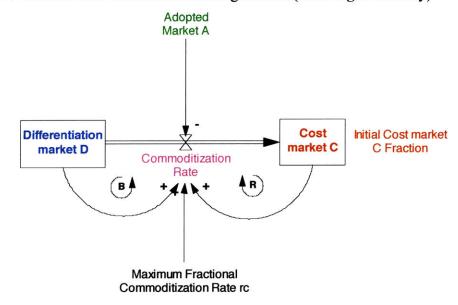
Next, we add a reinforcing loop on the inflow to the cost market. The differential equations defining logistic decay are shown below:

$$dD/dt = -CR = -r_cC(1 - C/A)$$
(8c)

noting D = A - C $= -r_c DC/A$ $dC/dt = CR = r_c C (1 - C/A)$ $= r_c DC/A$ (8d)

The double-loop commoditization model is shown in Figure 327 below.

Figure 327: The Structure of a Commoditizing Market (with Logistic Decay)



The dynamic behavior of a commoditizing market with logistic decay of the original differentiation niche is shown in Figure 328 below. The behavior of this nonlinear *first*-order formulation, again results in sigmoid or S-shaped growth for the transforming resource environment.¹⁰⁰¹ Note, the addition of a reinforcing loop acts to slow down the commoditization, by reducing the fractional commoditization rate, r_c as the cost market, C approaches the carrying capacity of the adopted market, A.

¹⁰⁰¹ Again, as in the characterization of the diffusing market, the commoditizing market's sigmoid growth is assumed to proceed logistically, for analytical simplicity.

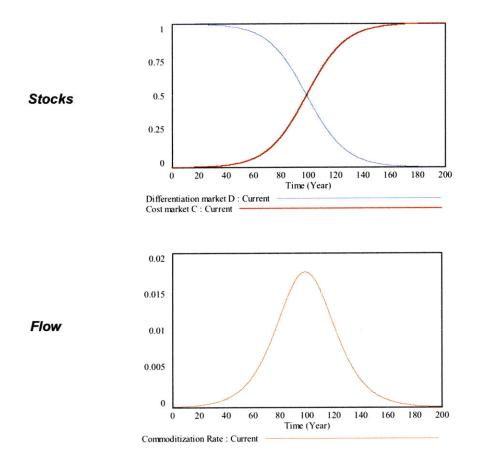
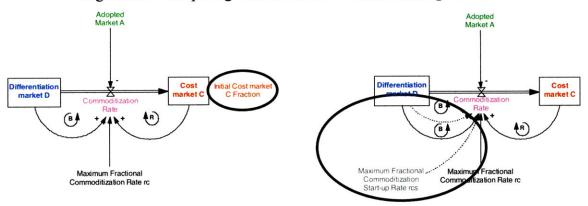
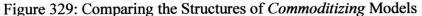


Figure 328: Dynamic Behavior of a Commoditizing Market (with Logistic Decay)

7.3.1.3 Bass Industry Commoditization Model

Finally, in order to avoid the start-up problem, as we did in the formulation of the industry diffusion model, we add another balancing loop which captures the effects of awareness. The two model structures are compared in Figure 329 below.

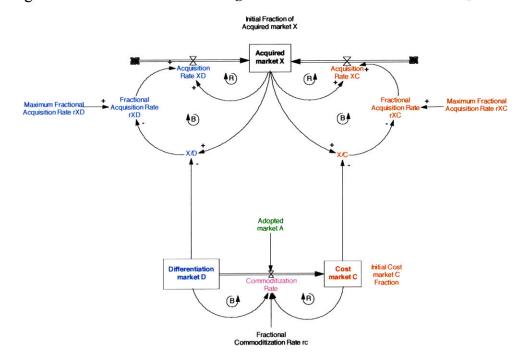




7.3.2 Single Firm Growth in a Commoditizing Market

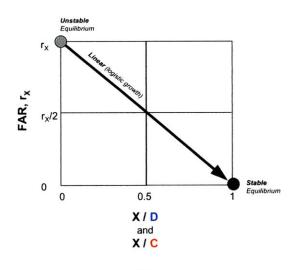
Next, we study how a single firm grows in a commoditizing market, before we proceed to investigate competition in a commoditizing market. The model structure is shown in Figure 330 below.

Figure 330: Model Structure of Single Firm Growth in a Commoditizing Market



The Fractional Acquisition Rates of Firm X are assumed to be a linear function of the carrying capacities of the two market niches D and C, as shown in Figure 330 below. We will relax this assumption later, when we investigate inter-species competition.

Figure 331: Fractional Acquisition Rate of a Single Firm in a Commoditizing Market



The dynamic behavior of a single firm in a commoditizing market is summarized in Figure 332 below, where the maximum Fractional Acquisition Rates for market niches D and C are assumed to be identical (i.e. the firm is equally efficient in acquiring Differentiated niches as it is in acquiring Cost niches). From left to right, we explore the effects of increasing pairs of maximum Fractional Acquisition Rates.

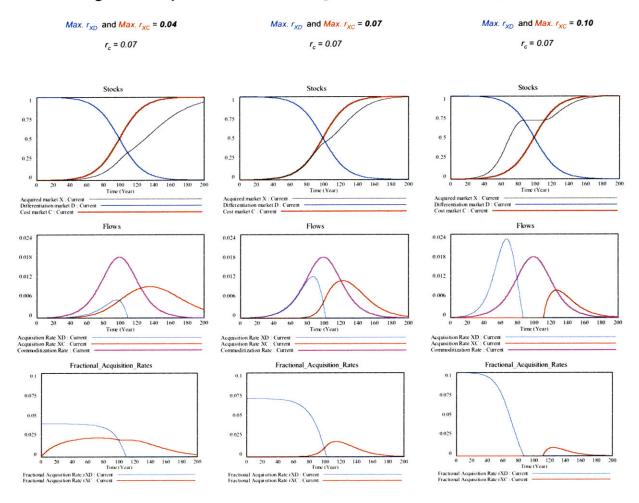


Figure 332: Dynamic Behavior of Single Firm in a Commoditizing Market

As can be seen, when the firm grows *slower* than the commoditization rate (*left* column), the stock of X market acquired begins to approximate a *single* logistic curve, as it expands into the *Cost market C*.

Conversely, when the firm grows *faster* than the commoditization rate (*right* column), the stock of X market acquired begins to approximate *double* logistic curves, as it expands rapidly first into D, and then rapidly into the *Cost market* C (after it develops).

The dynamic behavior of a single firm in a commoditizing market having differing abilities to acqhire a Differentiated market D is summarized in Figure 333 below. From left to right, we explore the effects of increasing maximum Fractional Acquisition Rates for the Differentiated market, D, while holding the maximum Fractional Acquisition Rates for the Cost market, C constant.

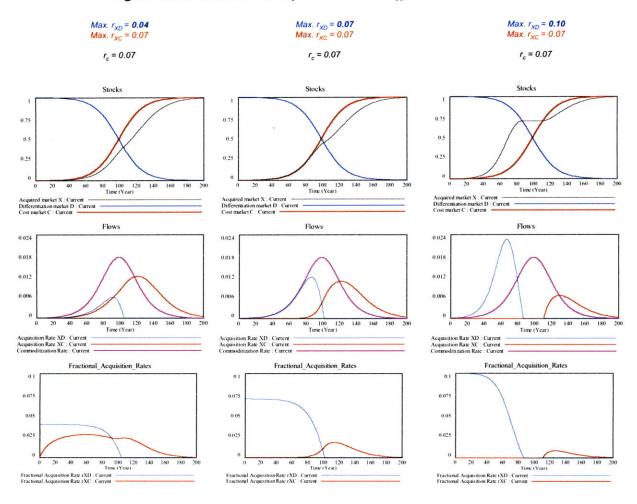


Figure 333: Parametric Study of FARs on Differentiation Market

As can be seen, when the firm grows *slower* than the diffusion rate (*left* column), the stock of X market acquired is shifted initially to the right of the *Cost market C*.

Conversely, when the firm grows *faster* than the diffusion rate (*right* column), the stock of X market acquired is shifted initially to the left of the *Cost market* C.

The dynamic behavior of a single firm in a commoditizing market having differing abilities to acqhire a Cost market C is summarized in Figure 334 below. From left to right, we explore the effects of increasing maximum Fractional Acquisition Rates for the Cost market, C, while holding the maximum Fractional Acquisition Rates for the Differentiated market, D constant.

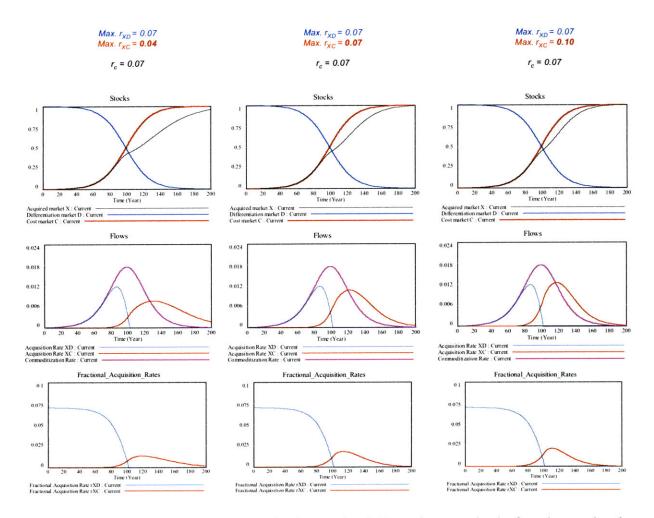


Figure 334: Parametric Study of FARs on Cost Market

Here the effects are most clearly seen in the stock of X market acquired after the market has developed a stock of Cost market C, (i.e. in the second half of the industry lifecycle).

7.3.3 Intra-species Competition in a Commoditizing Market

In the previous stage, the resource environment was characterized as existing in one dimension: the rate of change of *market* growth, dK/dt. This formulation extends the model to include a second dimension: the rate of change of *technology* commoditization, dC/dt. This captures the construct of a *dominant design* in the product offering (Abernathy and Utterback, 1978), which marks the shift in market demand from increasing rates of change of improvement in product performance, where competition is based on *product* innovation, to increasing rates of change of improvement in product cost, where competition is based on *process* innovation.¹⁰⁰² In order to control for the previous effects of market growth, we hold the market size, K constant.¹⁰⁰³ The new coupled system of differential equations is shown below:

$$dX_{1}/dt = r_{X1}X_{1} - r_{X1}X_{1}^{2}/D - r_{X1}X_{1}X_{2}\alpha_{12}/(D + C)$$
(9a)

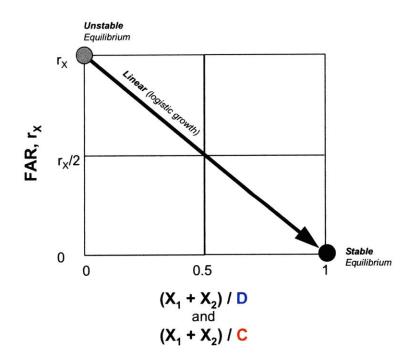
$$dX_2/dt = r_{X2}X_2 - r_{X2}X_2^2/C - r_{X2}X_2X_1\alpha_{21}/(D + C)$$
(9b)

$$dD/dt = -r_c C (1 - C/A)$$
(9c)

$$dC/dt = r_c C (1 - C/A)$$
(9d)

Figure 335 below illustrates the fractional acquisition rates r_{X1} and r_{X2} as a function of the available carrying capacity of the two competitions engaged in *intra*-species competition.





¹⁰⁰² Although a "dominant design" is often seen as a *discrete* event, the market is modeled as a *continuously* evolving.

¹⁰⁰³ This control will relaxed in the next section, where both market size, K and type, C will grow logistically.

Figure 336 below summarizes the causal structure of this nonlinear *third* order formulation¹⁰⁰⁴ which results in sigmoid or S-shaped transition from a market dominated by sales of products/services based on *differentiation*, D to a market dominated by sales of products/services based on *cost*, C. This this formulation represents *direct* competition between organizations within the environment. Note the two system-wide reinforcing loops operating on each niche.¹⁰⁰⁵

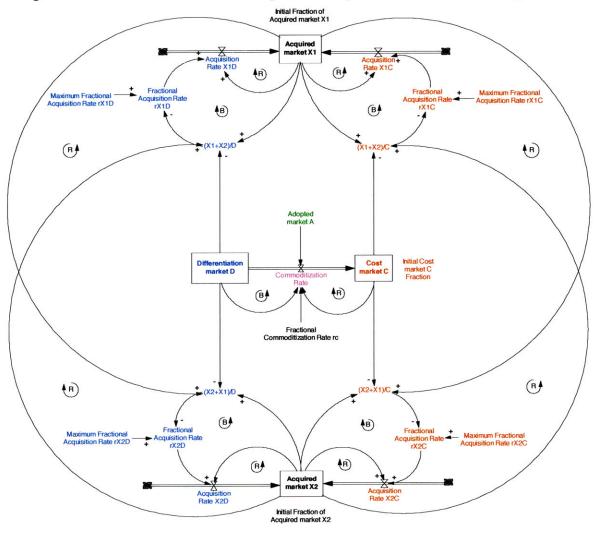
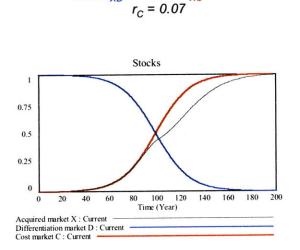


Figure 336: Model Structure of Intra-species Competition in a Commoditizing Market

Figure 337 below illustrates the previous dynamic behavior of a single firm in a commoditizing market (on the left) with *intra*-species competition in a *commoditizing* market (on the right). As can be seen on the right, although X1 and X2 separately grow at the commoditization rate of 0.07 (traking the red Cost market C curve), together they grow faster than the red curve taking the market at a rate of 0.14.

¹⁰⁰⁴ The addition of two state variables is only a first-order addition as one is completely determined by the other. ¹⁰⁰⁵ Note that the causal arrows representing competition are drawn from stocks X_1 and X_2 to the respective competitor's available market quotient. Although this is a different visual formulation from previous pages (where the causal arrows linked available market quotient to available market quotient), the mathematics are the same.

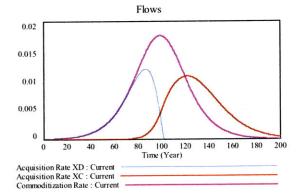
Figure 337: Dynamic Behavior of a Single Firm and Intra-species Competiton in a Commoditizing Market

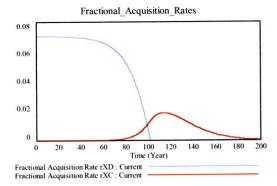


Single Firm Growth

in Commoditizing Market

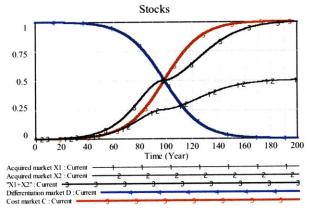
Max. r_{XD} and Max. r_{XC} = 0.07

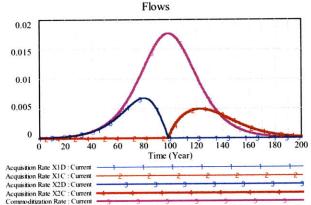




Intra-species Competition in Commoditizing Market

Max. r_{X1D} and Max. r_{X1C} = 0.07 Max. r_{X2D} and Max. $r_{X2C} = 0.07$ $r_{c} = 0.07$





0.08 0.06 0.04 0.02 0 140 160 120 180 200 0 20 40 60 80 100 Time (Year) Fractional Acquisition Rate rX1D : Current Fractional Acquisition Rate rX1C : Current Fractional Acquisition Rate rX2D : Current Fractional Acquisition Rate rX2C : Current

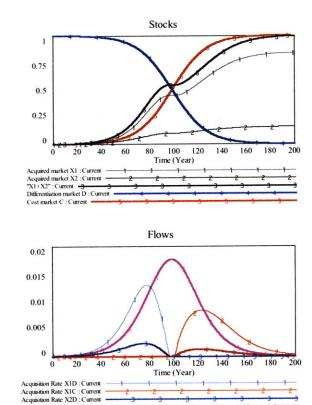
Fractional Acquisition_Rates

Next, we compare the maximum Fractional Acquisition Rates of X_1 and X_2 in intra-species competition, as can be seen in Figure 338 below. On the left, both competitors are identical and therefore split the market 50-50, while on the right, X_1 is more efficient than X_2 in all market niches, leading to competitive exclusion.

Figure 338: Parametric Study of FARs in Intra-species Competition in Commoditizing Markets

Max. r_{x1D} and Max. r_{x1C} = 0.07 Max. r_{X2D} and Max. $r_{X2C} = 0.07$ $r_{c} = 0.07$ Stocks 1 0.75 0.5 0.25 0 100 120 140 180 200 160 20 40 60 80 Time (Year) Acquired market X1 : Current — Acquired market X2 : Current — "X1 + X2" : Current — Differentiation market D : Current Cost market C : Curren Flows 0.02 0.015 0.01 0.005 0 140 160 180 200 120 20 60 80 100 40 Time (Year) Acquisition Rate XID : Current Acquisition Rate XTD : Current Acquisition Rate X1C : Current Acquisition Rate X2D : Current Acquisition Rate X2C : Current Commoditization Rate : Curren Fractional_Acquisition_Rates 0.08 0.06 0.04 0.02 0 100 120 140 160 180 200 20 40 60 80 0 Time (Year) Fractional Acquisition Rate rX1D : Current Fractional Acquisition Rate rX1C : Current Fractional Acquisition Rate rX2D : Current

Fractional Acquisition Rate rX2C : Current

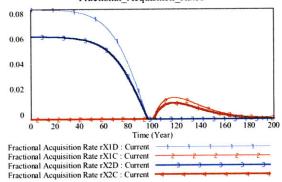


Max. r_{X1D} and Max. $r_{X1C} = 0.08$

Max. r_{X2D} and Max. $r_{X2C} = 0.06$ $r_c = 0.07$

Fractional_Acquisition_Rates

isition Rate X2C : Current modifization Rate : Current



7.3.4 Inter-species "Competition" in a Commoditizing Market

In the previous stage, both competitors were assumed to be of the same species, and therefore broadly able to compete in both the differentiation-based and cost-based niches (i.e. the competition coefficients α were at or near 1) – for example both intra-species competitors, *GM* and *Ford* can transition from a differentiated product focus towards a cost focus. However, the emergence of a new species, having an integral enterprise architecture (like *Toyota*) is much better suited towards cost-leadership, making their competition coefficient α approach zero. In this extreme case of inter-species competition, each species focuses on the niche that they are best suited to, and "competition" takes on a symbiotic nature, due to the presence of architectural inertia and its impact on the enterprise's efficiency frontiers.¹⁰⁰⁶ The new coupled system of differential equations is shown below:

$$dX/dt = r_X X - r_X X^2/D$$
(10a)

$$\frac{dY}{dt} = r_Y Y - r_Y Y^2 / C \tag{10b}$$

$$dD/dt = r_c D (1 - D/A)$$
(10c)

$$dC/dt = r_c C (1 - C/A)$$
(100)

Figure 339 below illustrates the fractional acquisition rates r_X and r_Y as a function of the available carrying capacity of the two competitions engaged in inter-species competition.

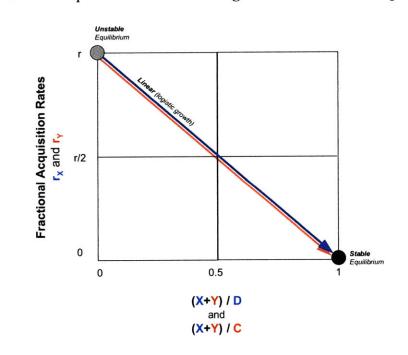
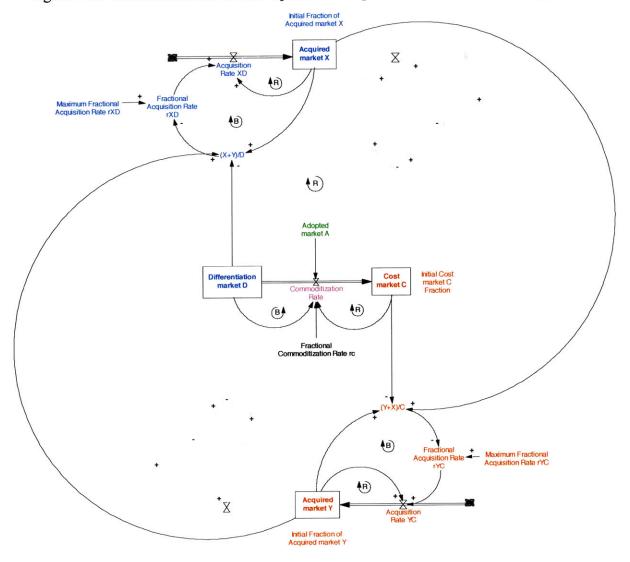


Figure 339: Fraction Acquisition Rates of Heterogeneous Firms in Inter-species Competition

¹⁰⁰⁶ Although in inter-species competition in *quantity* space, where we had nonlinear FAR functions with respect to available carrying capacities, here we revert back to linear FAR functions, and differentiate inter-species competition in *quality* spcae as niche-specific only. The combination of *quantity* and *quality* interspecies competition will be covered later.

Figure 340 below summarizes the causal structure of this nonlinear *third* order formulation¹⁰⁰⁷ which results in sigmoid or S-shaped transition from a market dominated by sales of products/services based on *differentiation*, D to a market dominated by sales of products/services based on *cost*, C. Note that in the limit, when the competition coefficients go to 0 - that is, one species is far superior than the other in a particular niche, this formulation represents *indirect* competition between organizations occupying different niches within the environment,

Figure 340: Model Structure of Inter-species "Competition" in a Commoditizing Market

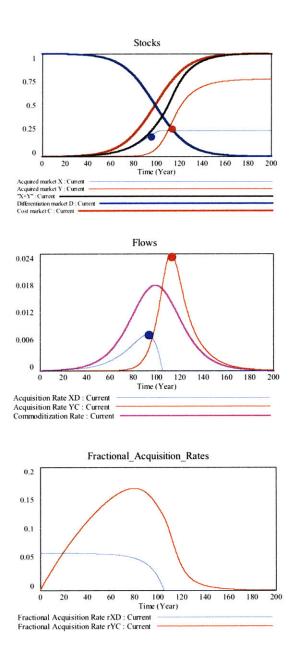


¹⁰⁰⁷ The addition of two state variables is only a first-order addition as one is completely determined by the other.

Figure 341 below illustrates the dynamic behavior of *inter*-species competition in a *commoditizing* market.¹⁰⁰⁸

Figure 341: Dynamic Behavior of Inter-species Competition in a Commoditizing Market





¹⁰⁰⁸ The Maximum Fractional Acquisition Rates, $r_X = 0.06$ and $r_Y 0.34$ were chosen to approximate production rates of *Boeing* and *Airbus* in the commercial airplanes duopoly. Note that these prarameter choices also generate 25% and 75% final market shares respectively.

Note that X's Acquired market plateaus before it reaches the Differentiation market D. This is because Y's Acquired market has begun to take some of the commoditized Cost market C, thus reducting the Adopted market A for both X and Y. We can see that when X+Y hits D, then X plateaus, and later when X+Y hits C, then Y plateaus.

By observing the Fractional Acquisition Rate time histories (at the bottom of the figure), we can see that X's FAR remains relatively unchanged for the first 80 years, until D rapidly falls toward X, coupled with Y's growth in taking C (which also reduces A for both). The resulting FAR time history is only half of the classic "reverse S-shape".

Conversely, Y's FAR does not start with a classic flat plateau, but instead starts at 0 and begins to build up towards it Maximum FAR of 0.34. Y's FAR starts at 0 because X, Y and C begin at 0, making X+Y/C = 1, the stable equilibrium. As C grows faster, earlier than X and Y, X+Y/C approaches 0, the unstable equilibrium. After 80 years, Y's FAR time history begins to look like the classic "reverse S-shape."¹⁰⁰⁹

¹⁰⁰⁹ Note: under extreme conditions tests (Sterman, 2000, pg. 869), if X is parameterized to grow faster than C, then X+Y/C > 1, which is past the stable equilibrium, where Y's FAR would become negative under linear assumptions (which is unrealistic). Therefore, in order to ensure that Y remains non-negative, we introduce a bi-linear relationship with a MIN function. Similar logic applies to X.

7.4 Competition in a Diffusing, Commoditizing Market (Quantity and Quality)

7.4.1 Diffusing, Commoditizing Market (Quantity and Quality)

We now combine the previous two descriptions of the market environment, where the *quantity* of the market, K grows logistically (Bass, 1969), while simultaneously, the *quality* of the market customer preferences diffuses from high-performance *differentiated* products and services towards *low-cost* products and services (Abernathy and Utterback, 1978). This allows the entry and exit of different species of organizational sets for two reasons: the rate of change in market *quantity* and the rate of change in technological *quality* enable market niches to evolve.

7.4.1.1 Comparing Single- vs. Double-loop Diffusing, Commoditizing Models

The new, coupled system of differential equations is shown below:

$$dP/dt = -r_d A (1 - A/K)$$
(11a)

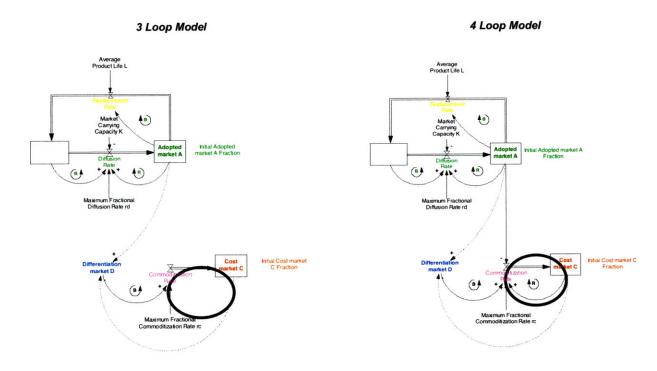
$$dA/dt = r_d A (1 - A/K)$$
(11b)

$$dD/dt = -r_c C (1 - C/A)$$
(11c)

 $dC/dt = r_c C (1 - C/A)$ (11d)

Figure 342 below compares the two different causal structures of this nonlinear *second*-order formulation, developed previously.

Figure 342: Comparing Model Structures of Diffusing, Commoditizing Markets



The dynamic behavior of a diffusing, commoditizing market is illustrated below in Figure 343.

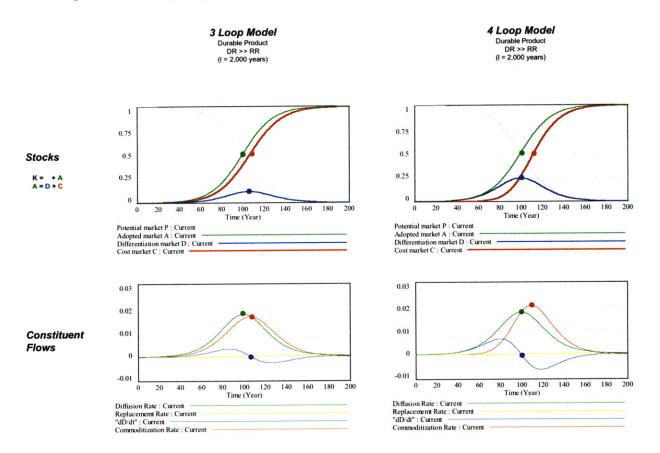


Figure 343: Comparing the Dynamic Behavior of Diffusing, Commoditizing Markets

Note that in the 3-loop model (on the left), without a reinforcing loop on C, D exponentially decays, which has the effect of *increasing* commoditization. Metaphorically, this is like a cold bathtub warming to room temperature.

Conversely, in the 4-loop model (on the right), with a reinforcing loop on C, D logistically decays, which has the effect of decreasing commoditization. Metaphorically, this is like a cold bathtub with ice warming to room temperature. The extra reinforcing loop represents the power of entrepreneurially innovative supply markets.

7.4.1.2 Comparing Diffusion vs. Commoditization Rates

Figure 344 below illustrates the model structure comparing the relative effects of *diffusion*, vs. *commoditization* rates.



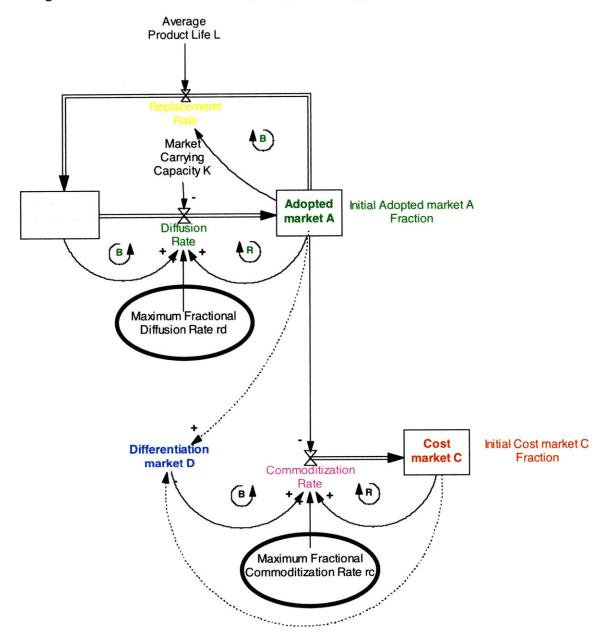


Figure 345 below illustrates the dynamic behavior of a parametric study comparing the relative effects of *diffusion* vs. *commoditization* rates.

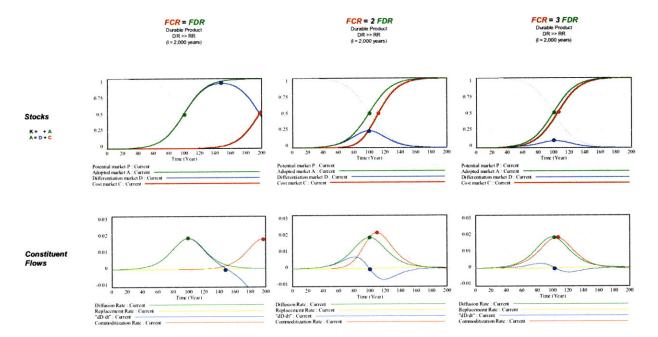


Figure 345: Dynamic Behavior of Diffusion vs. Commoditization Rates

Although the Adopted market, A results in logistic sigmoid or S-shaped growth, niche D rises and falls, while niche C rises in S-shaped growth to eventually characterize the entire market. The Cost market C is a double logistic, i.e. it is logistic growth into a logistically diffusing market A. Note, however that if the maximum fractional diffusion rate, $r_d >>$ than the maximum fractional commoditization rate, r_c , then the behavior approaches that in a commoditization-only market.

It is important to remember when looking at the flow diagrams (at the bottom), that these are not annual firm production curves (which obviously could not become negative). But in the case of D market, which goes negative, it merely illustrates the shifting preference of the market. For example when looking at the stocks (across the top) at time = 100 years, we can see that on the left, of the say 50 people who want widgets, everyone wants Differentiated or high-performance widgets; in the middle, of the say 50 people who want widgets, 25 people want Differentiated or high-performance widgets, while 25 people want to buy based on Cost; on the right, of the say 50 people want widgets, 5 people want Differentiated or high-performance widgets, while 45 people want to buy based on Cost.

7.4.1.3 Parametric Study: Product Durability

Figure 346 below illustrates the model structure examining product durability in a diffusing, commoditizing market.

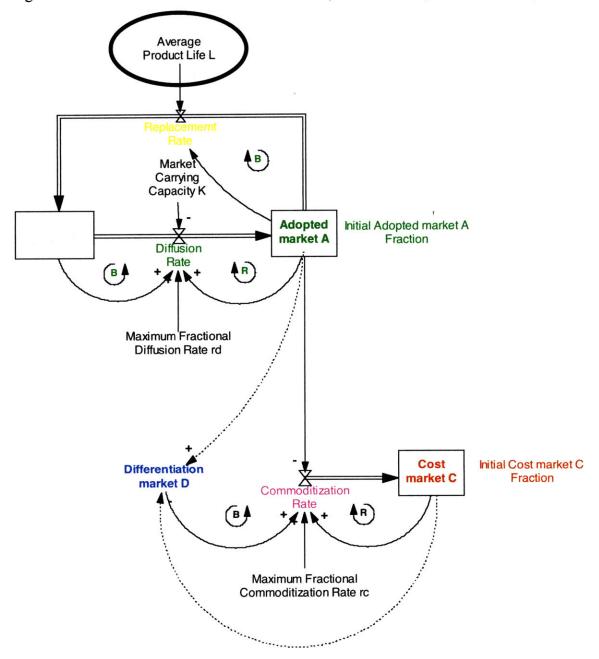


Figure 346: Model Structure of Product Durability in a Diffusing, Commoditizing Market

Figure 347 below illustrates the dynamic behavior of parameterized study investigating product durability in a diffusing, commoditizing market.

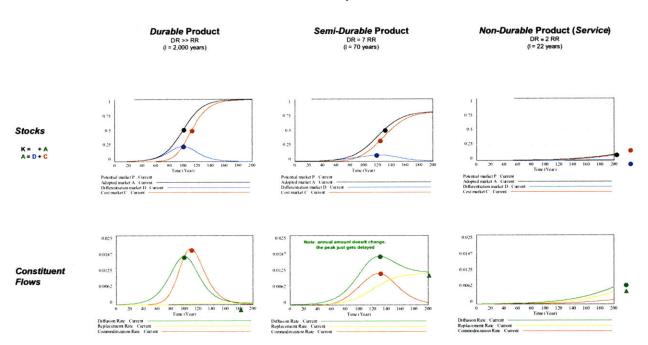
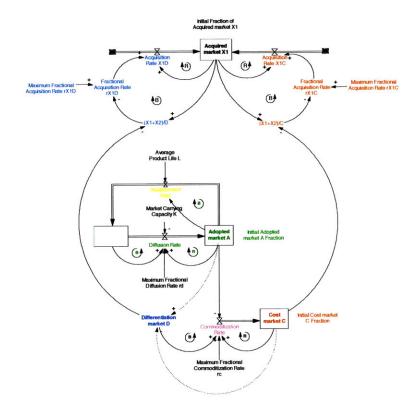


Figure 347: Dynamic Behavior of a *Diffusing, Commoditizing* Market with Varying Product Durability

7.4.2 Single Firm Growth in a Diffusing, Commoditizing Market

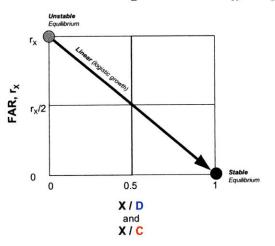
Next, we study how a single firm grows in a diffusing, commoditizing market, before we proceed to investigate competition in a diffusing, commoditizing market. The model structure is shown in Figure 348 below.

Figure 348: Model Structure of Single Firm Growth in a Diffusing, Commoditizing Market



The Fractional Acquisition Rates of Firm X are assumed to be a linear function of the carrying capacities of the two market niches D and C, as shown Figure 349 below. We will relax this assumption later, when we investigate inter-species competition.

Figure 349: Fractional Acquisition Rate of a Single Firm in a Diffusing, Commoditizing Market



The dynamic behavior of a single firm in a diffusing, commoditizing maket is summarized in Figure 350 below, where the maximum Fractional Acquisition Rates for market niches D and C are assumed to be identical (i.e. the firm is equally efficient in acquiring Differentiated niches as it is in acquiring Cost niches). We compare the behavior of a single firm in only a commoditizing market (from before) to the behavior in a diffusing, commoditizing market.

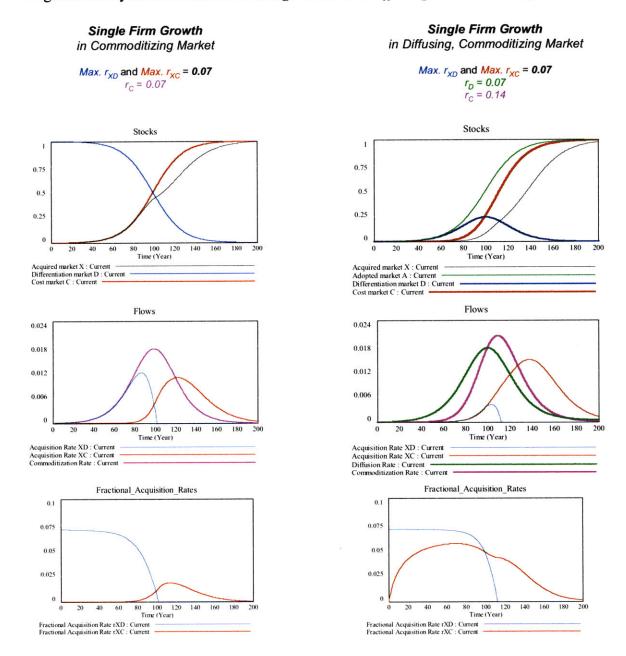


Figure 350: Dynamic Behavior of a Single Firm in a Diffusing, Commoditizing Market

As can be seen by comparing the stocks (top graphs), the Differentiation market, D now grows and shrinks, making X's acquisition rate lower (middle graphs). Also, as X is not acquiring D early, X's FAR for C is much higher, much earlier (lower graphs).

7.4.3 Intra-species Competition in a Diffusing, Commoditizing Market

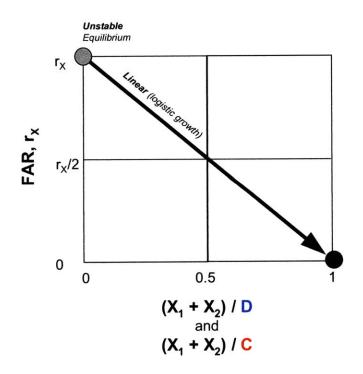
The model now has two different ways of defining the state of evolutionary maturity of the environment: *quantity* and *quality* – that is, *how much* product is produced/consumed, and *what type* of product is produced/consumed. This section therefore combines these two characterizations of the market environment into one model, where two firms of the same species (characterized by the architectures of their respective extended enterprises) compete. The extent of competitive intensity is defined by the ability of each firm to overcome architectural inertia and transition from niche D to niche C as the market evolves. A summary of the coupled system of differential equations is shown below.

$dX_{1}/dt = r_{X1}X_{1} - r_{X1}X_{1}^{2}/D - r_{X1}X_{1}X_{2}\alpha_{12}/K - r_{X1}X_{1}X_{2}\alpha_{12}/(D + C)$	(12a)
$dX_2/dt = r_{X2}X_2 - r_{X2}X_2^2/C - r_{X2}X_1X_2\alpha_{21}/K - r_{X2}X_2X_1\alpha_{21}/(D + C)$	(12b)
$dK/dt = r_d K (1 - K/CC)$	(12c)
$dD/dt = -r_c D (1 - D/K)$	(12d)
	(10)

$$\frac{dC}{dt} = r_c C \left(1 - C/K\right) \tag{12e}$$

The Fractional Acquisition Rates as a function of the available carrying capacies of the two market niches D and C are illustrated in Figure 351 below.

Figure 351: Fractional Acquisition Rates of Homogenous Intra-species Competitors in a Diffusing, Commoditizing Market



The causal structure of this nonlinear *fourth*-order formulation is summarized in Figure 352 below.

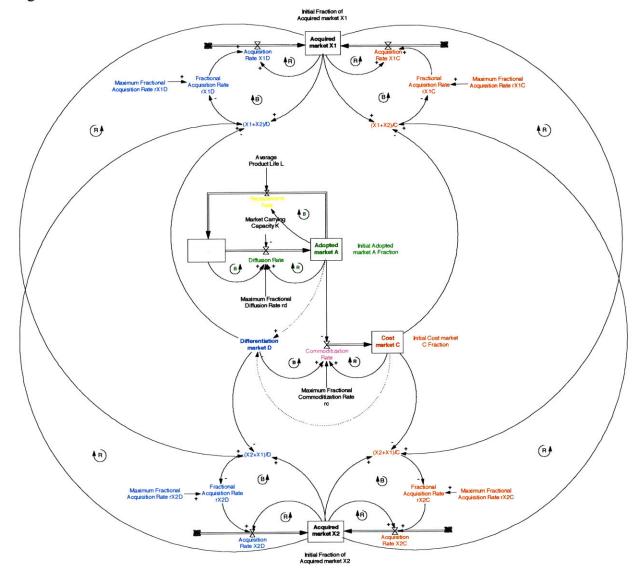
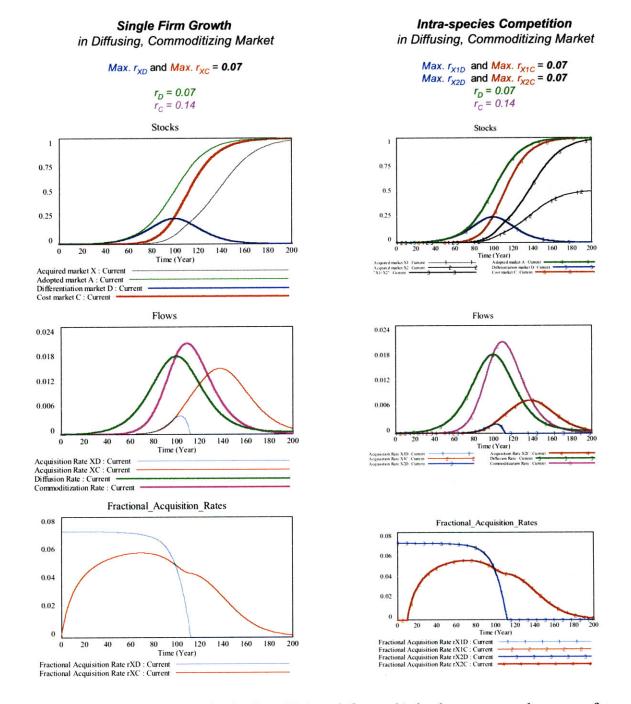


Figure 352: Model Structure of Intra-species Competition in a Diffusing, Commoditizing Market

Figure 353 below compares the dynamic behavior of a single firm (on the left) with *intra*-species competition (on the right) in a *diffusing, commodizing* market.

Figure 353: Dynamic Behavior of a Single Firm and Intra-species Competition in a Diffusing, Commoditizing Market

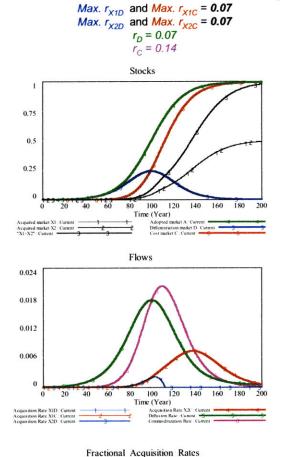


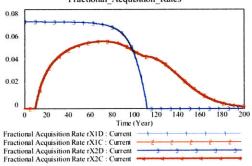
Note how the behavior of a single firm X (top left graph) is the same as the sum of two competitors X_1 and X_2 who split the market 50%-50% (top right graph), with the X's FAR's (middle, left graph) being twice that of the FAR's of X_1 and X_2 .

Next, we compare the maximum Fractional Acquisition Rates of X_1 and X_2 in intra-species competition, as can be seen in Figure 354 below. On the left, both competitors are identical and therefore split the market 50%-50%, while on the right, X_1 is more efficient than X_2 in all the market niches, leading to competitive exclusion.

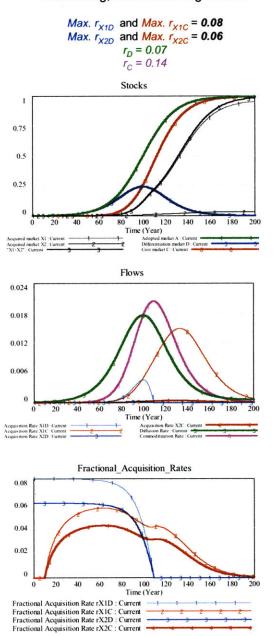
Figure 354: Parametric Study of FARs in *Intra*-species Competition in *Diffusing, Commoditizing* Markets

Intra-species Competition in Diffusing, Commoditizing Market





Intra-species Competition in Diffusing, Commoditizing Market

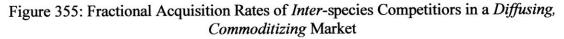


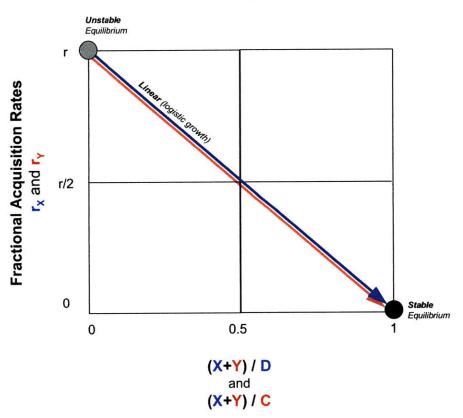
7.4.4 Inter-species Competition in a Diffusing, Commoditizing Market

The model now has two different ways of defining the state of evolutionary maturity of the environment: *quantity* and *quality* – that is, *how much* product is produced/consumed, and *what type* of product is produced/consumed. This final section therefore combines these two characterizations of the market environment into one model, where two different species of firms (characterized by the architectures of their respective extended enterprises) compete. The extent of competitive intensity is defined by the ability of each firm to overcome architectural inertia and transition from niche D to niche C as the market evolves. A summary of the coupled system of differential equations is shown below.

$r_X > r_Y$ when $(X+Y) < K/2$	$dX/dt = r_X X - r_X X^2/D - r_X X Y \alpha_{XY}/K$	(13a)
$r_X < r_Y$ when $(X+Y) > K/2$	$dY/dt = r_Y Y - r_Y Y^2/C - r_Y XY \alpha_{YX}/K$	(13b)
	$dK/dt = r_d K (1 - K/CC)$	(13c)
	$dD/dt = -r_c D (1 - D/K)$	(13d)
	$\frac{dC}{dt} = r_c C \left(1 - C/K\right)$	(13e)

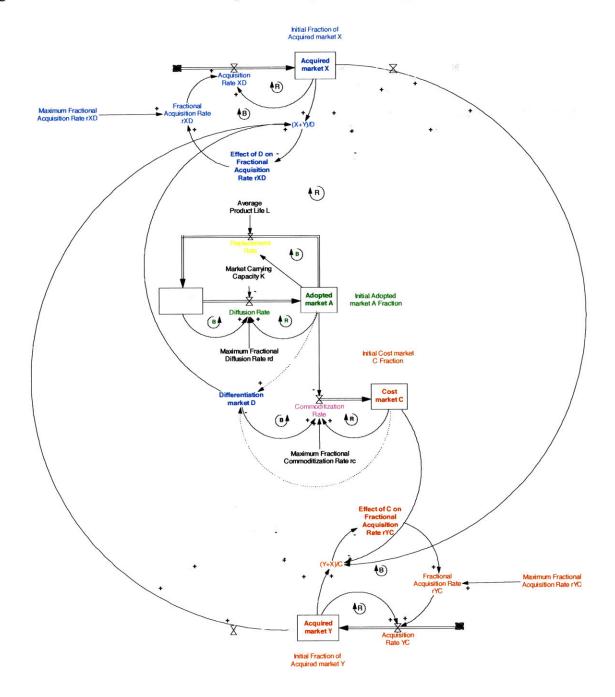
The Fractional Acquisition Rates as a function of the available carrying capacities of the two market niches D and C are illustrated in Figure 355 below.





The causal structure of this nonlinear *fourth*-order formulation is shown in Figure 356 below. Note, we have added a nonlinear relationship between Fractional Acquisition Rates and Available Market, which is represented by the variables: "Effect of D (or C) on Fractional Acquisition Rate r"¹⁰¹⁰

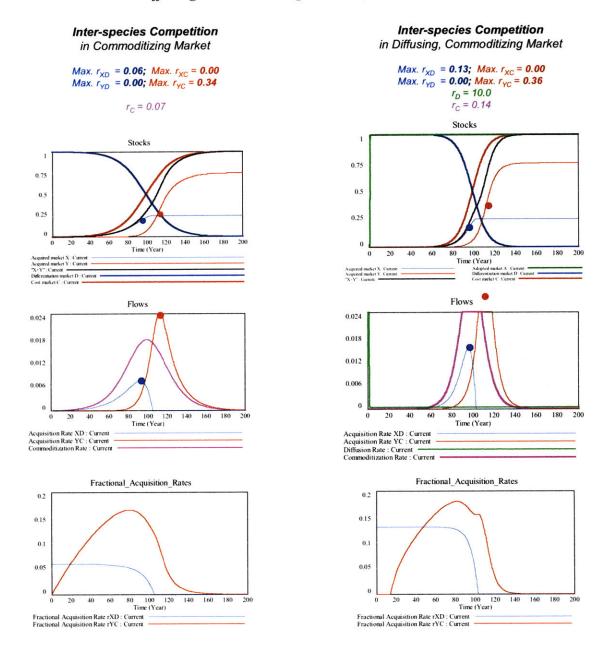
Figure 356: Model Structure of Inter-species Competition in a Diffusing, Commoditizing Market



¹⁰¹⁰ In Vensim, the system dynamics modeling software, this is known as a "look-up table".

Figure 357 below compares the dynamic behavior of *inter*-species competition in a *commoditizing* market with that in a *diffusing*, *commoditizing* market (with diffusion suppressed).

Figure 357: Comparing Dynamic Behavior of *Inter*-species Competition in a *Commoditizing* Market and a *Diffusing*, *Commoditizing* Market (with Diffusion suppressed)



We test the inter-species competition model in a diffusing, commoditizing market (right column), by first ensuring that it generates similar results as for the simpler commoditizing market (left column). We do this by imposing extremely rapid diffusion (on the right column), and note that by slightly modifying parameters, one can generate similar behaviors in both scenarios, with X taking 25% of the market, and Y taking 75% of the market.

Next, we compare both models of inter-species competition having identical parameters in commoditizing-only market and diffusing, commoditizing markets, (so that diffusion is no longer suppressed) as is shown in Figure 358 below.

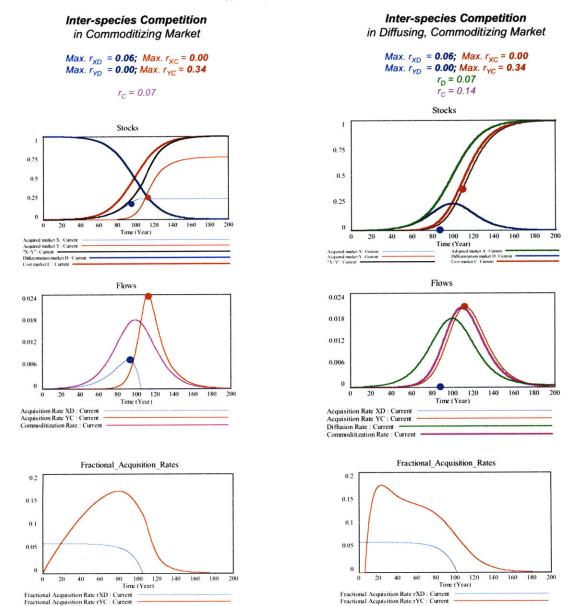
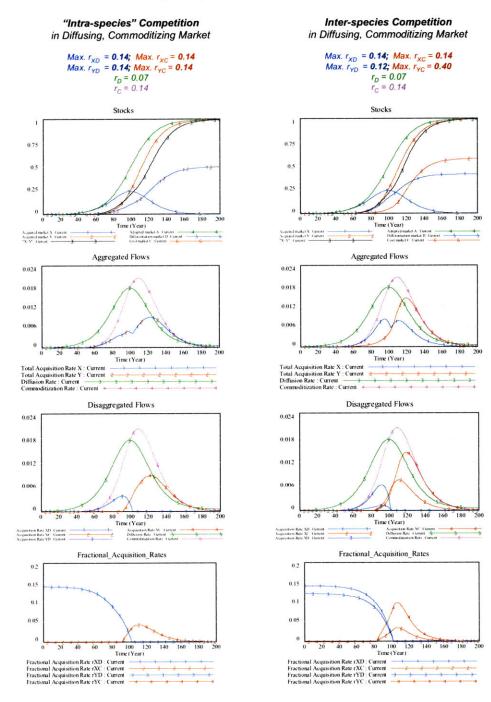


Figure 358: Comparing Dynamic Behavior of Inter-species Competition in a Commoditizing Market and a Diffusing, Commoditizing Market

As can be seen, when we let the Adopted market A diffuse (in the right column of figures), the D market no longer starts out large, and in fact is too small (given the parameters) for X to grow. Competitor Y no longer takes 75% of the market (left), now it takes 100% of the market.

Next, we compare a case where two identical "intra-species" competitions in a diffusing, commoditizing market with to subtly different inter-species" competitors, having different growth capabilities in different niches, as shown in Figure 359 below. Again note, that even subtle differences in parameters can cause late "entry" and early "exit".

Figure 359: Comparing Dynamic Behavior of Intra-species and Inter-species Competition in a Diffusing, Commoditizing Market



Finally, we explore the more general condition of inter-species competition in diffusing, commoditizing markets, where the Fractional Acquisition Rates can be a nonlinear function of the available market as is shown in Figure 360 below. In fact, in this exploration, we do not restrict X growth to niche D only, nor do we restrict Y growth to niche C only.

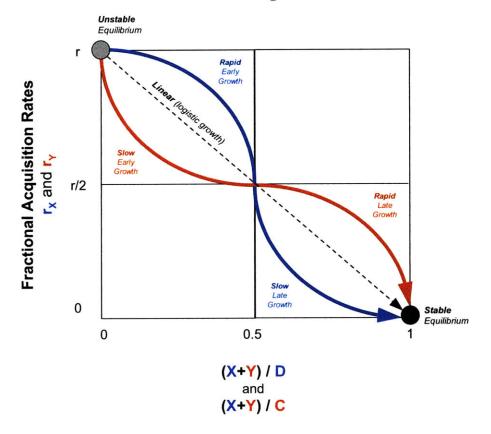
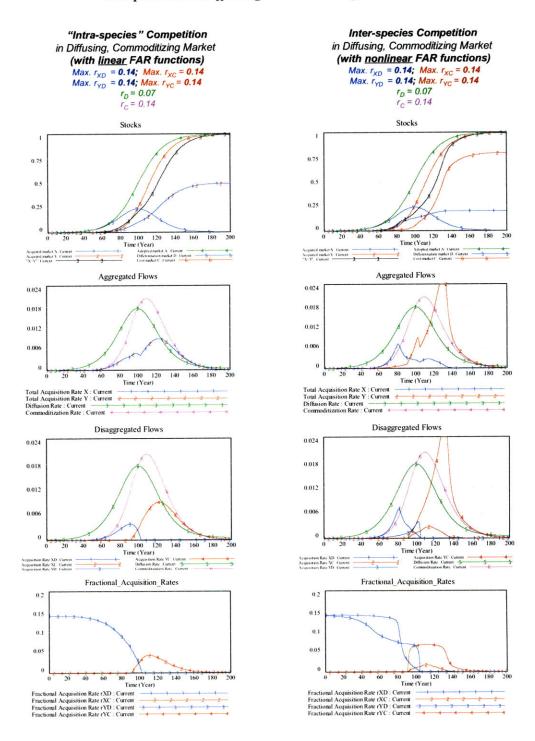


Figure 360: Fractional Acquisition Rates of Inter-species Competition in a Diffusing, Commoditizing Market

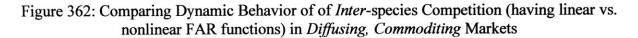
First we compare homogeneous intra-species competition in a diffusing, commoditizing market having identical linear Fractional Acquisition Rate functions, with inter-spacies competition having identical maximum FARs in each niche, however, having different shaped functions. The dynamic behavior is shown in Figure 361 below.

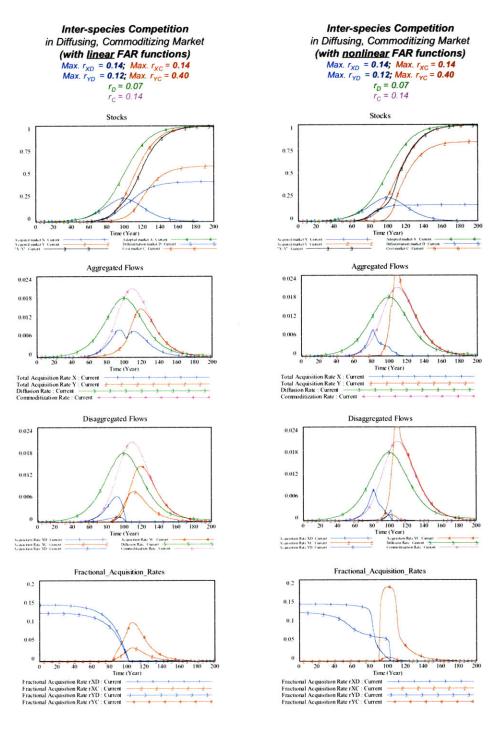
Figure 361: Comparing the Dynamic Behavior of Intra-species Competition and Inter-species Competition in Diffusing, Commoditing Markets



As can be seen on the left, identical intra-species competitors split the diffusing, commoditing market equally, as is to be expected. However, just by changing the growth profiles of each competitor, without changing the maximum Fractional Acquisition Rates, results in late-entry of Y, and early exit of X, with Y taking 75% of the market.

Finally, when we compare inter-species competition on the basis of varying Maximum FARs only with inter-species competition on the basis of varying Maximum FARs plus nonlinear, "mass-dependent" FARs, we see an even more exaggerated difference in dynamic behavior as illustrated in Figure 362 below.





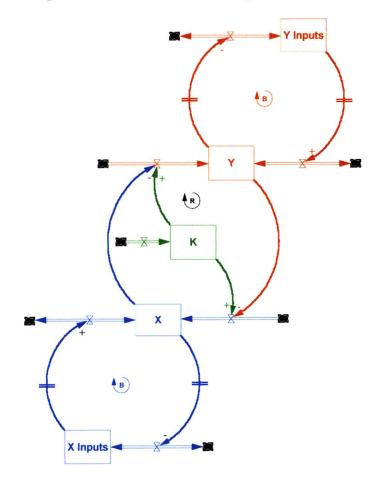
7.5 Advanced Topics

7.5.1 Firm-sector Topics

7.5.1.1 Oscillation: Demand and Supply Lags

Until now, we have considered only the acquiring of market, which implies the winning of sales or orders. This quantity may be considered to equate to a firm's production output, assuming that there are no time delays or lags between market demand and firm supply (or conversely firm demand for revenues and market supply of revenues). A new causal structure is now required which explicitly captures the equilibrating of demand and supply – a balancing loop. If such delays do exist and are large enough relative to the dynamics under consideration, they can result in an oscillation mode of behavior which is superimposed onto the underlying growth modes that we have already discussed. In addition, additional reinforcing feedbacks may exist between the markets of demand and supply which can act to amplify any oscillatory behavior. Figure 363 below illustrates the conceptual model of oscillation.¹⁰¹¹

Figure 363: Conceptual Model Structure of a Single Firm Growth and Oscillation



¹⁰¹¹ Based on Sterman (2000).

7.5.1.1.1 Single Firm Experiencing Undamped Oscillation

Figure 364 below illustrates the causal structure of this linear *second*-order formulation, which results in *undamped* oscillation of the firm's production output.

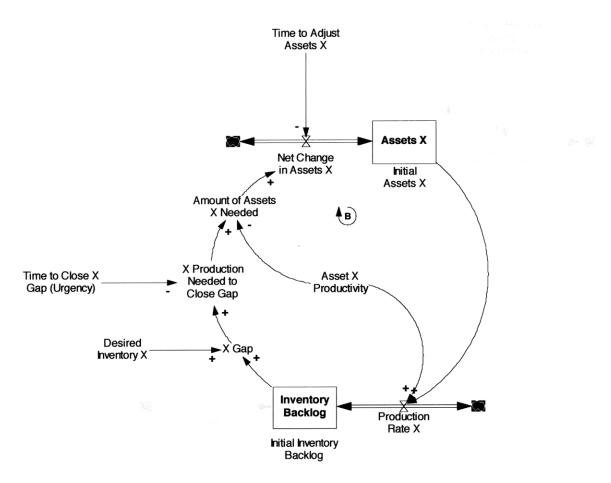


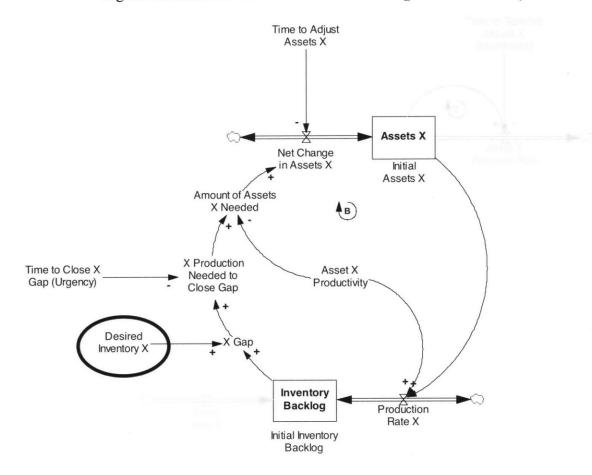
Figure 364: Model Structure of a Single Firm Undamped Oscillation

As can be seen, the causal structure forms a closed-loop structure, with balancing feedback. The presence of an second stock accumulating time delays causes oscillation of the system.

In the following sections, to better understand the model, we will explore the dynamic behavior of this model via parametric analyses of Goal Setting (of desire inventory) and of Asset Productivity.

7.5.1.1.1.1 Parametric Study of Goal-Setting

Next we exlopre the effects of goal-setting. The specific part of the model structure which we will investigate is the desired inventory as shown in Figure 365 below.





The dynamic behavior is shown in Figure 366 below. As can be seen, decreasing the goal (moving down the figures) decreases the amplitude of oscillation of both stocks of inventory (left hand column) and assets (right hand column), without changing its period or damping. Note that the two stocks of Inventory and Assets are out of phase, not unlike displacement and velocity in a pendulumn.

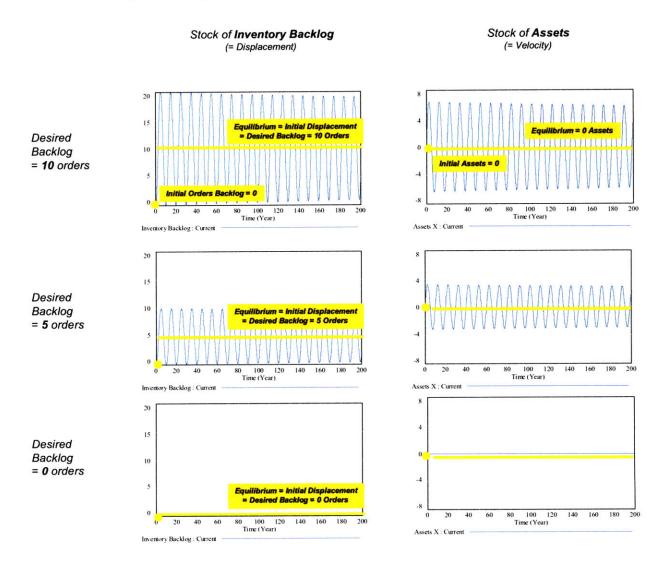


Figure 366: Dynamic Behavior of the Goal-Setting Parametric Study

7.5.1.1.1.2 Parametric Study of Productivity

Next we exlopre the effects of productivity. The specific part of the model structure which we will investigate is the asset productivity as shown in Figure 367 below.

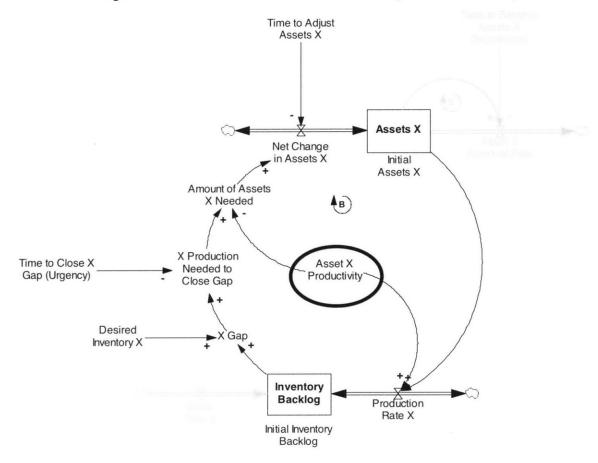


Figure 367: Model Structure of the Productivity Parametric Study

The dynamic behavior is shown in Figure 368 below. Note that if the asset productivity increases (going downward through the figures), then firm X can product the same amount (i.e. Stock of Inventory Backlog in the left hand column) with fewer assets (right hand column). Again, note that the two stocks of Inventory and Assets are out of phase, not unlike displacement and velocity in a pendulumn.

Changing the asset productivity does not affect the period or damping, just the amplitude of the stock of assets.

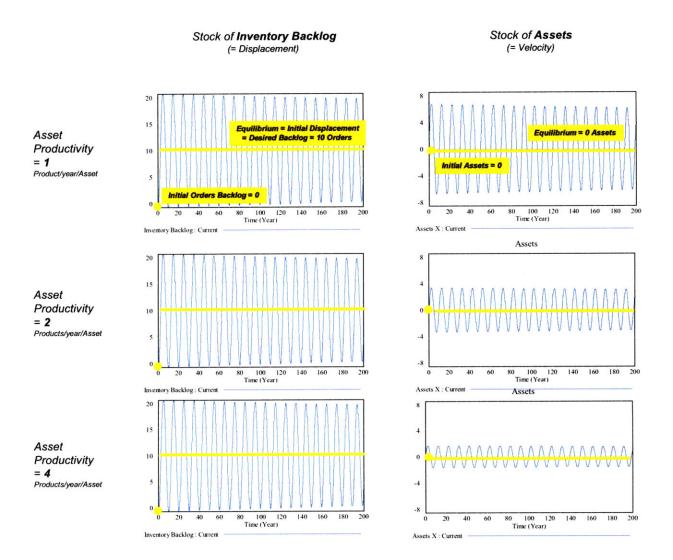


Figure 368: Dynamic Behavior of the Productivity Parametric Study

7.5.1.1.2 Single Firm Experiencing Damped Oscillation

Figure 369 below illustrates the causal structure of this linear *second*-order formulation, which results in damped oscillation of the firm's production output.

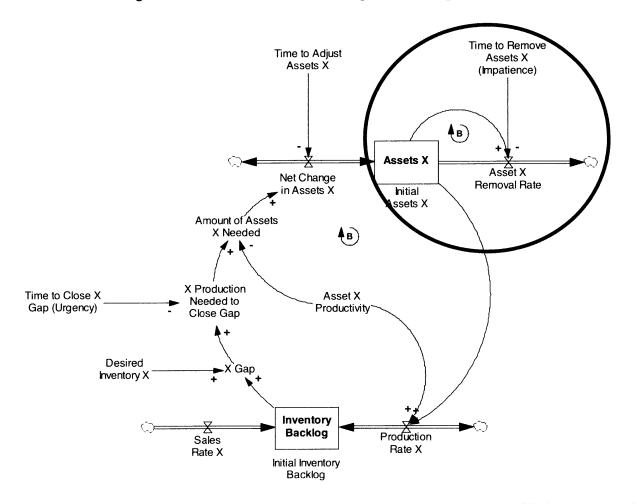


Figure 369: Model Structure of a Single Firm Damped Oscillation

Previously, we saw that a balancing loop with a delay resulted in oscillation. Here the additional outflow on the stock of assets, acts to potentially remove energy from the system, via damping. The more patient the enterprise architecture, the shorter the time to remove Assets, the larger the outflow. This effectively turns off the demand-supply balancing loop so that Sales Rate = Production Rate.

The dynamic behavior of this causal structure is shown in Figure 370 below, where we compare a range of responses from undamped (top) to highly damped (bottom).

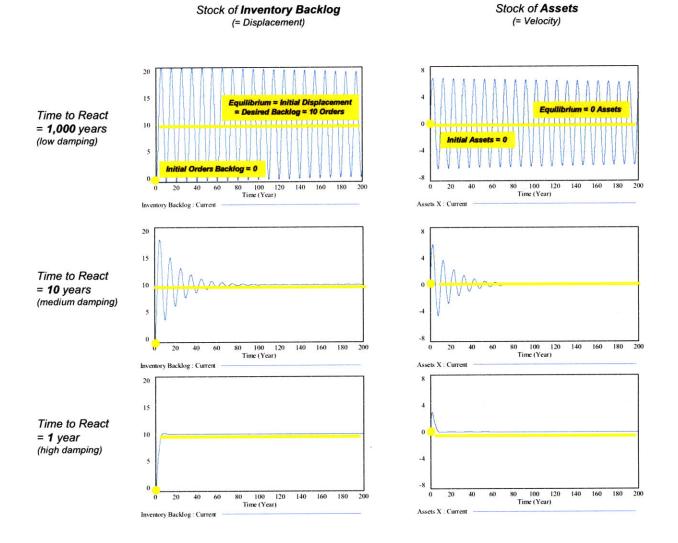


Figure 370: Dynamic Behavior of Damping in an Oscillating System

7.5.1.1.3 Single Firm Experiencing Growth and Damped Oscillation

Figure 371 below illustrates the causal structure of this linear *second*-order formulation, which results in logistic growth of the firm's market acquisition and oscillation of the firm's production output. In the firm *growth* portion of the model, the presence of only an inflow on the stock of acquired market (which is controlled by both reinforcing and balancing loops) results in firm growth only. In the *oscillation* portion of the model, however inflows and outflows on the stocks of both the assets and inventory results in a balancing loop with a delay – the structure responsible for producing the behavior or oscillation.

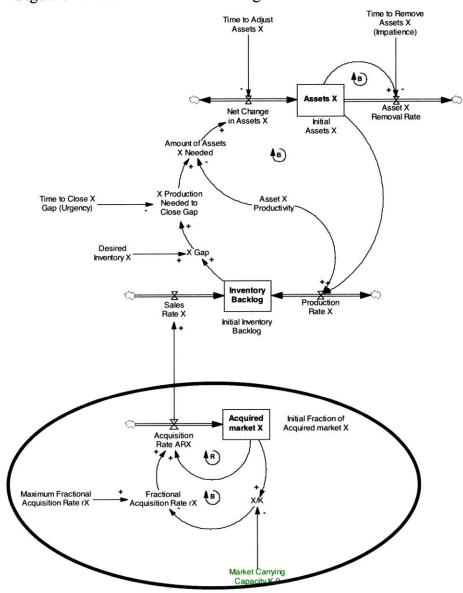


Figure 371: Model Structure of a Single Firm Growth and Oscillation

Finally, we compare the dynamic behavior of firms experiencing long term (e.g. 100 year) market growth, which serve that demand with medium term (e.g. 10 year) oscillatory cycles, as shown in Figure 372 below.

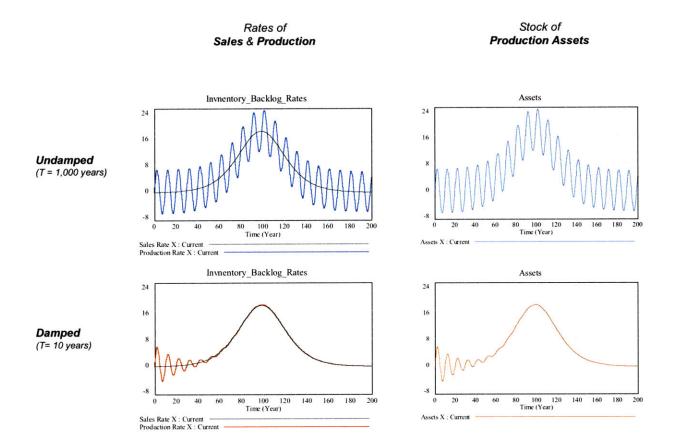


Figure 372: Comparing Damping in Firm Growth with Oscillation

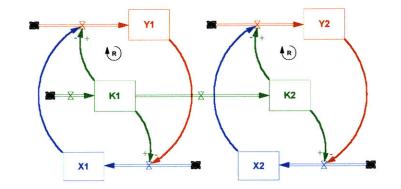
7.5.2 Market-sector Topics

7.5.2.1 Market Diffusion and Obsolescence

Having described earlier how markets *grow* in the model of market *diffusion*, we now begin to describe how markets "*die*" or are substituted for by new technologies in a model of market *obsolescence*. Clearly, this an ambitious task, as the origins of radical innovation are generally seen to be random at best, the causes are undoubtedly exogenous to our current parsimonious model, and the resulting dynamic behavior described as "discontinuity". Given this, we will begin to lay the foundations for such a model by building from the endogenous model presented thus far.

Figure 373 below illustrates the conceptual model, whereby one market K_1 (which is supplied by the species X_1 and Y_1) gives way to a subsequent market K_2 (which is supplied by the species X_2 and Y_2).





We will now focus however on how market K_1 diffuses and is subsequently rendered obsolete by market K_2 . Previously in the diffusion model, the Potential market P diffused into the Adopted market A in a logistic manner, controlled by both a balancing and reinforcing loop. Now, we add another stock, L representing the Lost market. In this way we have now gone from a two-stock model where the entire Potential market P eventually becomes Adopted market A (which is akin to the SI model of *chronic* infectious diseases, where the entire population eventually gets infected) to a three-stock model where the Adopted market A may not realize its full potential P (which is akin to the SIR model of *acute* infectious diseases, where the entire population may not become infected).

Next, we must define the causal structure that controls the *obsolescence* rate from Adopted market A to Lost market L. Here we could model a single balancing loop on the outflow of Adopted market A, which would generate exponential deacay in A, with rapid initial losses (i.e. it does not take time for the new market to gain momentum). Or conversely, we could model balancing and reinforcing loops as was modeled in the P-A diffusion model, which would generate logistic decay in A (i.e. it takes time for the new market to gain momentum).

7.5.2.1.1 Three-loop Representation (S-I-R)

First, we represent obsolescence as a simple balancing loop on the outflow of the Adopted market, A. This formulation is similar to the S-I-R model of *acute* infectious diseases. Figure 374 below compares the model structures and dynamic behaviors of the two-stock diffusion and three stock, one-loop diffusion-obsolescence models. As we can see, the behavior of the stock of Adopted market, A is not symmetric. As we will see when we compare this model to one in which an additional reinforcing loop is added, this formulation represents a rather severe exodous from the Adopted market, A as there is no feedback reducing the fractional substitution rate, r_s .

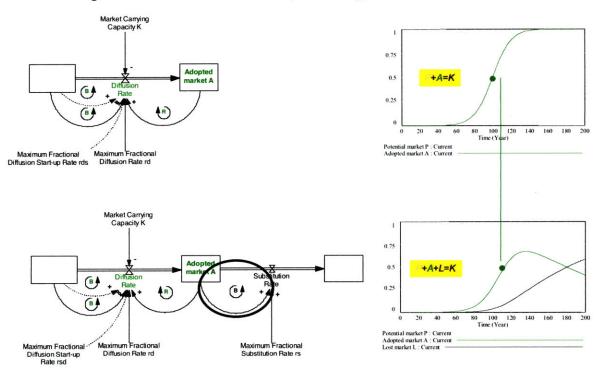


Figure 374: Market Diffusion & (Three-loop) Diffustion-Obsolescence

In Figure 375 below, we present a parametric study of the relative effects of maximum fractional diffusion rates r_d and maximum fractional substitution rates r_s . As can be seen, there exists a "tipping point", or a critical ratio of maximum fractional diffusion rate r_d to maximum fractional substitution rate r_s , where the balacing loops dominate the reinforcing loop, which acts to inhibit the development of the Adopted market, A.

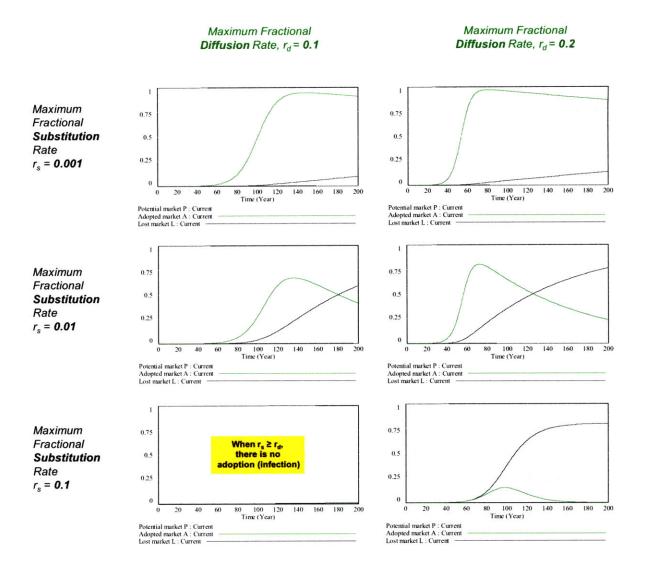


Figure 375: Parametric Analysis comparing Diffusion and Substitution Rates

7.5.2.1.2 Four-loop Representation (Single Bass)

Next, we represent obsolescence as a balancing loop on the outflow of the Adopted market, A plus a reinforcing loop on the Lost market, L. (Note, however that we do not avoid the "start-up problem" with a Bass formulation, this will be demonstrated in the following section.) Figure 376 below compares the model structures and dynamic behaviors of the two-stock diffusion and three stock, two-loop diffusion-obsolescence models. As we saw when we compared this model to one without the additional reinforcing loop, this formulation represents a less severe exodous from the Adopted market, A as there is now feedback reducing the fractional substitution rate, r_s .

Market Carrying 0.75 Adopted 0. market A Dif • Rate 0.25 (.) 100 120 Time (Year) 140 160 180 ential market P : Curren Maximum Fractional Maximum Fractional Adopted market A : Current Diffu Diffusion Start-up Rate rds sion Rate rd Market Carrying Cap city K Initial Lost market L Fraction 0.75 Adopted market A 0.5 Diffusion Sub • 0.25 0 (R) 6 180 20 40 60 80 100 120 140 Time (Year) 160 200 Potential market P : 0 Adopted market A : 0 Fost market L : Curr Maximum Fractional actiona Start-up Rate rsd Substitution Rate rs Diffusion Rate rd

Figure 376: Market Diffusion & (Four-loop) Diffustion-Obsolescence

In Figure 377 below, we present a parametric study of the relative effects of maximum fractional diffusion rates r_d and maximum fractional substitution rates r_s . Note, the maximum fractional substitution rates r_s are an order of magnitude faster than presented in the one-loop model. Note that as the maximum fractional substitution rates r_s increases, the peak Adopted market, A reduces and occurs earlier in time.

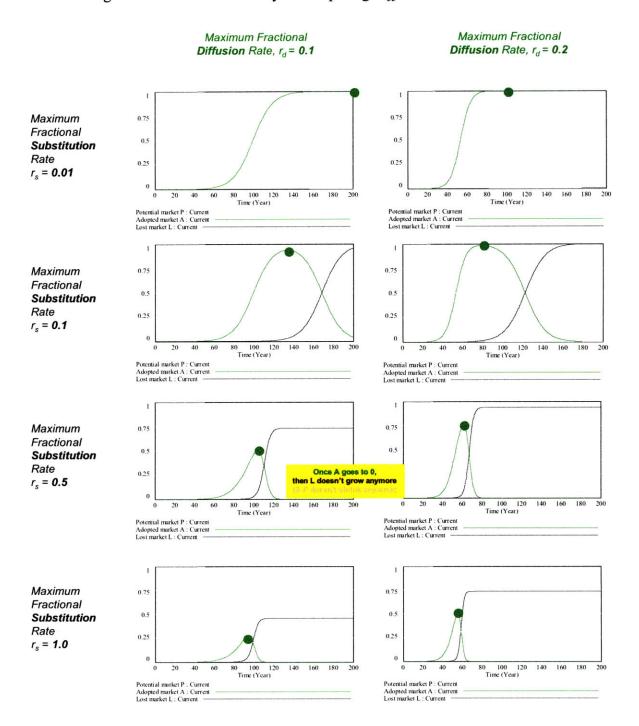
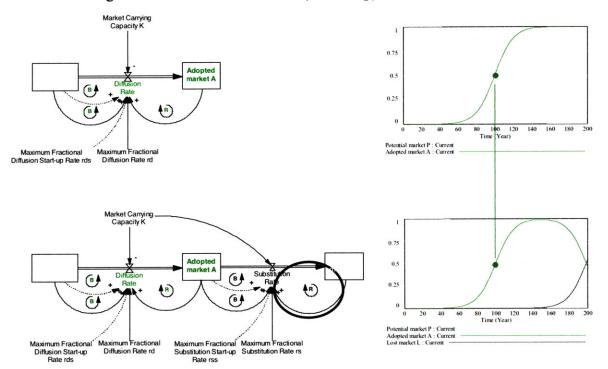


Figure 377: Parametric Analysis comparing Diffusion and Substitution Rates

7.5.2.1.3 Four-loop Representation (Double Bass)

Finally, we represent obsolescence as a balancing loop on the outflow of the Adopted market, A plus a reinforcing loop on the Lost market, L. Now, however that we avoid the "start-up problem" with a Bass formulation. Figure 378 below compares the model structures and dynamic behaviors of the two-stock diffusion and three stock, two-loop (Bass) diffusion-obsolescence models. Again, as we saw when we compared this model to one without the additional reinforcing loop, this formulation represents a less severe exodous from the Adopted market, A as there is now feedback reducing the fractional substitution rate, r_s .

Figure 378: Market Diffusion & (Four-loop) Diffustion-Obsolescence



In Figure 379 below, we present a parametric study of the relative effects of maximum fractional diffusion rates r_d and maximum fractional substitution rates r_s . Again note, the maximum fractional substitution rates r_s are an order of magnitude faster than presented in the one-loop model. Note that as the maximum fractional substitution rates r_s increases, the peak Adopted market, A reduces and occurs earlier in time. As expected, there are no significant differences in the dynamic behavior of the models with or without a Bass start-up, there is merely a difference in theorical justification.

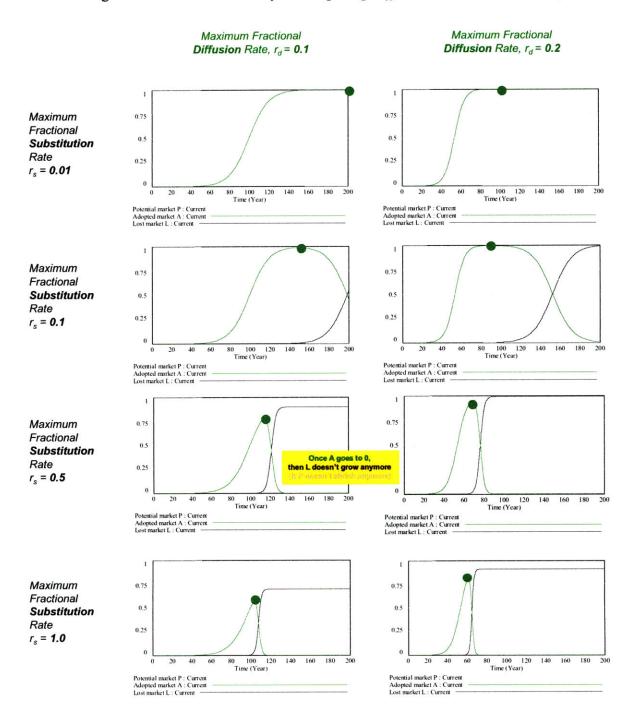


Figure 379: Parametric Analysis comparing Diffusion and Substitution Rates

7.5.2.1.4 Summary of Parametric Study

Finally, Figure 380 below summarizes the comparison of the three causal structures of market diffusion and obsolescence that we presented previously.

Figure 380: Summary of Model Structures of Market Diffusion and Obsolescence

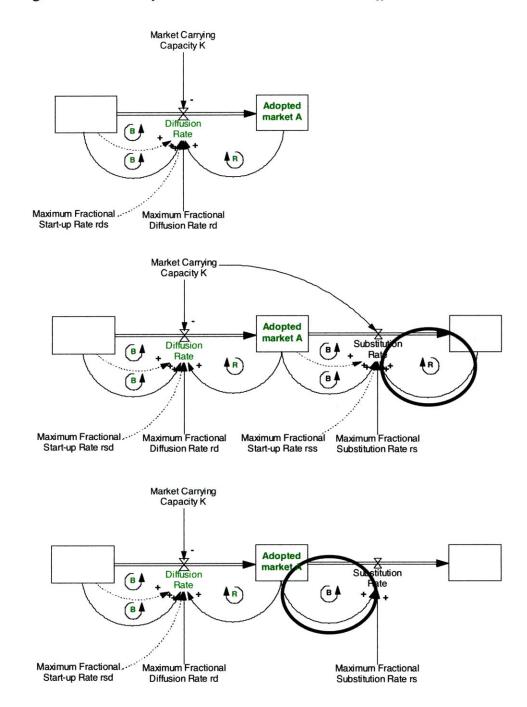
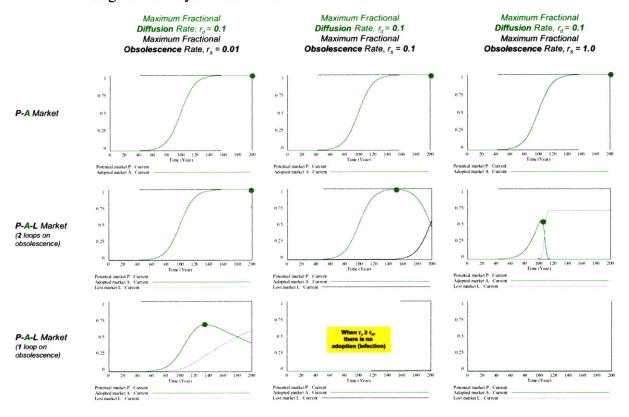


Figure 381 below illustrates the dynamic behavior of the model structures under the parameters of varying fractional diffusion and obsolescence rates. As can be seen, the two loop obsolescence structure begins to limit the peak size of the Adopted market A (relative to the P-A model), while the balancing loop only obsolescence structure is much more severe on A, as it can prevent A's emergence entirely.





7.5.2.2 Overshoot and Collapse: 200-year Global Market

Previously, in the market diffusion model, we assumed the scenario of a new product/service that either:

1) diffuses logistically throughout a constant population of potential consumers (Bass, 1969), or

2) diffuses instantaneously through a logistically-growing population of potential consumers (Verhulst, 1838), or

3) some combination of the two.

Since the world population of potential adopters for a specific global product produced by global suppliers (e.g. commercial airplanes or automobiles) is not constant over the evolutionary times scales of interest (e.g. 1900-2100), we need to capture the growth (and possible decay) of this population. One can then combine a bass diffusion of a technology into a population of consumers, which itself is diffusion into its own environment (the earth) having its own ecosystem carrying capacity. Figure 382 Below illustrates the dynamic behavior of two scenarios of complex system dynamics model (Meadows et al., 1972, 1992, 2004) which illustrates the population and industrial growth from 1900-2100.

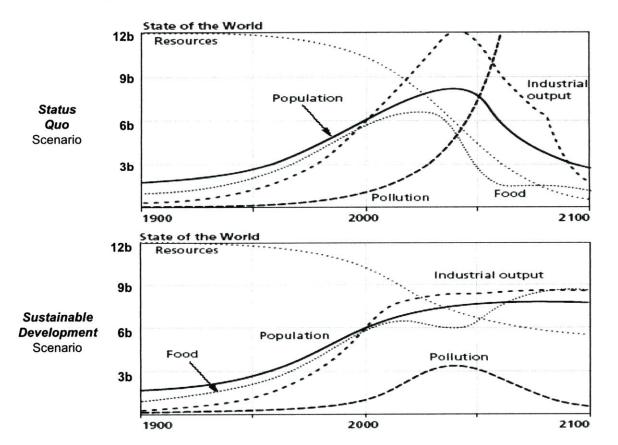
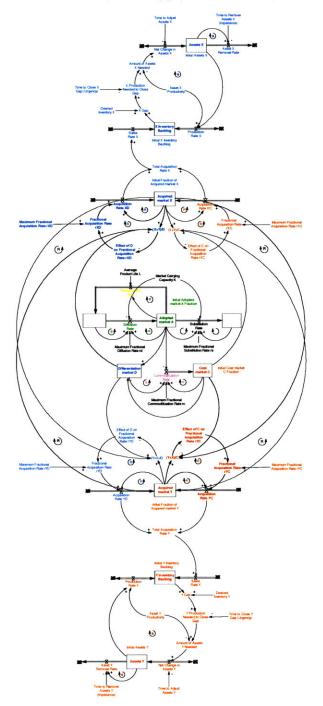


Figure 382: Global Carrying Capacity into which Global Technologies Diffuse

7.5.3 Summary

Having defined various firm and market (organization and environment) interaction sector models, we can now summarize the model as shown in Figure 383 below.

Figure 383: Full Model Structure of *Inter*-species Competition in a *Diffusing, Commoditizing* Market (with Supply-Demand Lags)



Chapter 8 Summary and Conclusions

8.1 Framework Summary

Chapters three to six described the four constructs and potential linking propositions, which form the basis of the theoretical framework. Chapter seven attempted to bring mathematical clarity to the expression of the framework, with *quantitative* modeling to demonstrate how evolution of business ecosystems might work. This chapter is a *qualitative* summary of the theoretical framework.

The theoretical framework endogenously traces the evolution from its system properties of *fit*, *form* and *function* (or *ecology*, *morphology* and *physiology*) using the evolutionary processes of *variation*, *selection* and *retention* as shown in Figure 384 below.

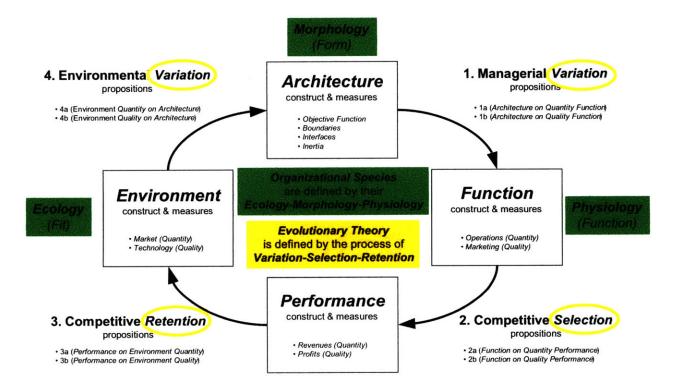


Figure 384: Summary of the Theoretical Framework as *Evolutionary Ecology*

The framework decomposes and characterizes the evolution of business ecosystems along two dimensions: market quantity (what type), and technological quality (what type), as shown in Figure 385 below.

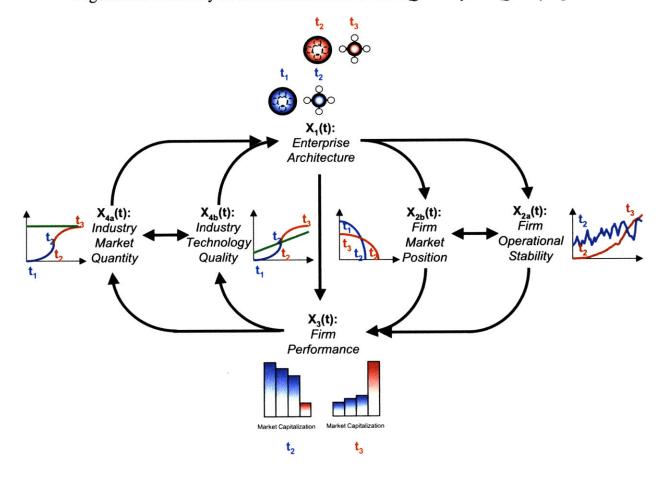


Figure 385: Summary of Theoretical Framework in Quantity and Quality Space

We now show each loop separately, with quantity in Figure 386 and quality in Figure 387 below. Figure 386: Theoretical Framework in *Quantity* Space

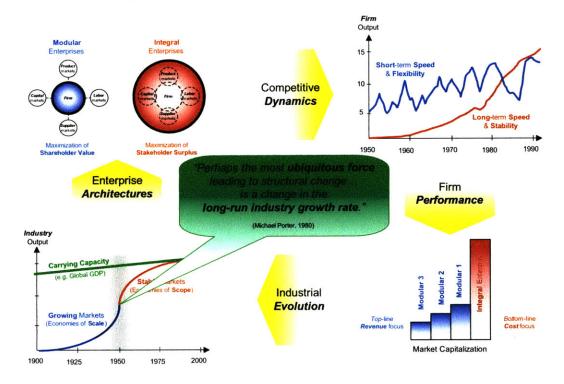
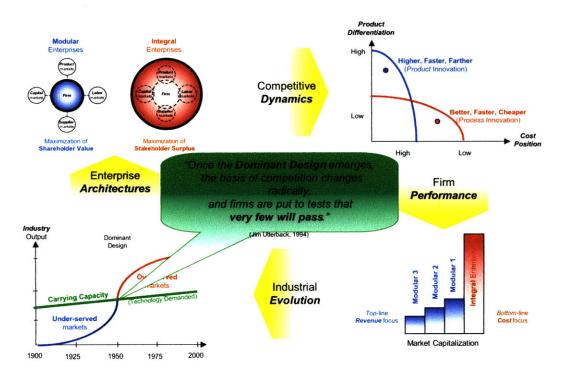


Figure 387: Theoretical Framework in Quality Space



In Figure 388 below, the path of evolution is traced longitudinally, mapping out the first half of the "double helix" corresponding to the *growth* phase of an industry's development.

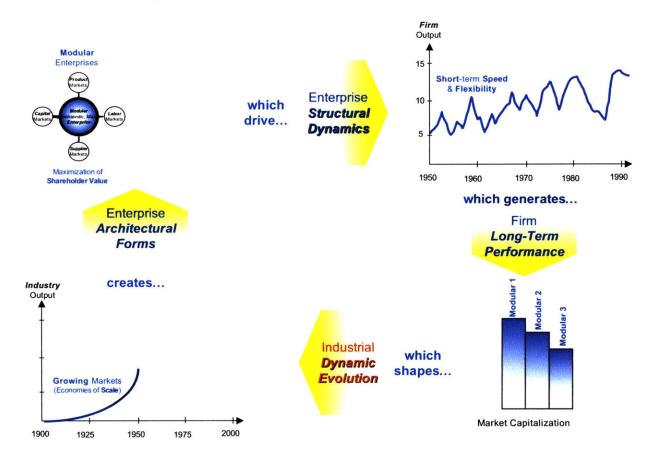


Figure 388: Growth Phase of the Industry-Firm Evolution

In Figure 389 below, the path of evolution is traced longitudinally, mapping out the second half of the "double helix" corresponding to the *maturity* phase of an industry's development.

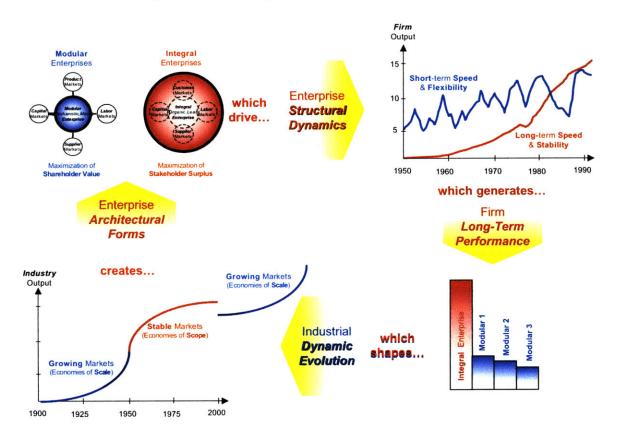


Figure 389: Maturity Phase of the Industry-Firm Evolution

The previous two figures can be combined into one figure, which traces out a "double helix" as shown in Figure 390 below.¹⁰¹²

 $^{^{1012}}$ The notion of "double helix" is borrowed from Fine, C.H. (1998).

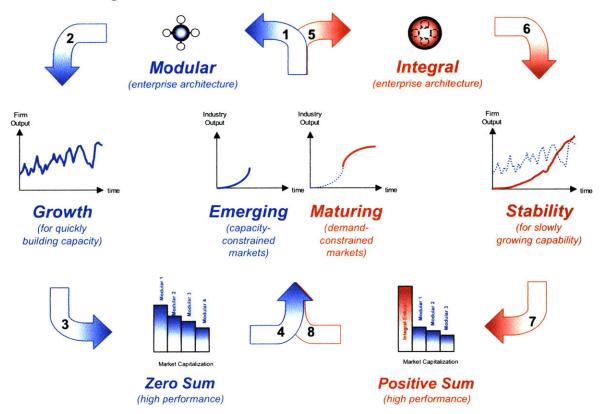


Figure 390: The Two-Phase Framework as a "Double Helix"

Again, returning the design theory metaphor in the design of an enterprise to win a motor sport race, one can see how the two-phase framework produces a double helix as shown in Figure 391 below. At first, exponentially-growing markets are those whose rate of change of output (i.e. speed) are increasing each time period. This is like a fast, smooth racetrack. The architectural form is therefore simply an enterprise that has high speed and low torque, like a racehorse (or hare, to use a literary metaphor). The actual execution of this concept takes the reality of a racecar – well-suited to the racetrack. In order to win in this environment, to capture the most of rapidly-growing markets, one must design, build and operate a system or enterprise that can move fast.

Subsequently, after much racing, the racetrack begins to slow down, either endogenously as the competing cars wear down the surface and deposit tire debris, or exogenously as the rain and other elements outside the control of the competitors begin to turn the racetrack into a mud bog. This will create the second half of the industrial S-curve, in which the market is no longer exponentially-growing, but is now saturating. The rate of change of output (i.e. speed) is now decreasing with each time period. The architectural form best suited to this environment is simply an enterprise that has low (short-term) speed and high torque, like an ox (or tortoise, to use the literary metaphor). The actual execution of this concept takes the reality of a tractor. In order to win in this environment, to capture the most of saturating markets, one must design, build and operate a system or enterprise that can move slowly but powerfully.

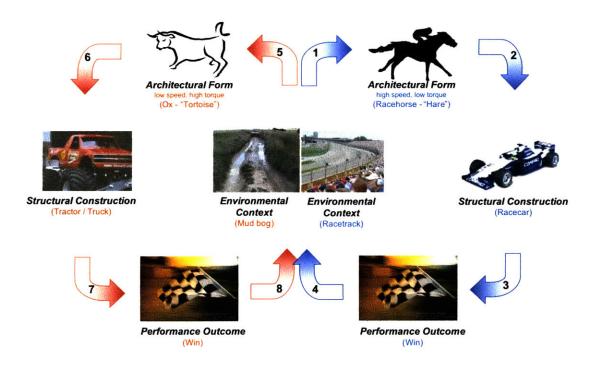


Figure 391: Conceptualization of the Two-Phase Framework as a "Double Helix"

Fine (1998) put forth an interesting and compeling causal mechanism - known as the "double helix" - relating how industries evolve (or integrate and disintegrate) over time. The research herein complements Fine's original work, in focusing the research lens not on a collection of industries or value chain, but rather on a single industry as firms enter and exit.

8.2 Theory Evaluation

Phil Rosenzweig (2007) offers a compelling list of nine "business delusions" which not only plague managers, but research in management. The following is a brief description of each followed by a brief explanation of how the theory presented herein attempted to mitigate the delusions.

8.2.1 The Halo Effect

The halo effect refers to the tendency to make inferences about specific traits on the basis of a general impression. For example, when a company appears to be successful, most, if not all of its attributes (e.g. leadership, culture, strategy, operations) are deemed to be successful as well – it can do no wrong.

In order to counter this, the logic of this research endogenously builds and destroys "halos" over long time horizons. Not every aspect of a successful firm needs to be successful, and the firms success raises and falls over time, endogenously, without changing theories to explain both phenomena.

8.2.2 *The Delusion of* Correlation and Causality

Correlation is relatively easy to demonstrate, while causality is rather more difficult, especially, when in most complex systems the causality is bi-directional.

In order to counter this, this research uses circular, closed-loop feedback logic, with co-evolution of the organization and its environment.

8.2.3 *The Delusion of* Single Explanations

Most theories emphasize one causal link, whereas in most complex phenomena, multiple, concurrent causes are interacting and equally important.

In order to counter this, this research uses multiple, concurrent causality, highlighting the two broad dimensions of quantity and quality in the characterization of the environment and the organizations within it.

8.2.4 *The Delusion of* Connecting the Winning Dots

Searching for what a group of successful companies have in common, will not yield compelling causal mechanisms unless they are compared with less successful companies.

In order to counter this, this research compares pairs of successful and unsuccessful companies over time. Clusters of incumbent (now modular) companies are compared with clusters of their challenger (now integral) companies over time.

8.2.5 The Delusion of Rigorous Research

Low quality data, no matter how high the quantity will yield low quality theories.

In order to counter this, this research uses multiple methods and triangulates over stakeholder space and time to secure high quality data.

8.2.6 The Delusion of Lasting Success

Almost all high-performing outliers regress to the mean over time.

In order to counter this, this research explains the rise and fall of high-performing companies.

8.2.7 The Delusion of Absolute Performance

Company performance is relative to its rivals, not absolute.

In order to counter this, this reseach explains why high-performing companies both can improve and simultaneously lose relative to their rivals.

8.2.8 The Delusion of the Wrong End of the Stick

Noting that focused or committed companies outperform flexible companies, does not factor in the relatively high risk of these strategies. When numbers of firms in each category are included, a different conclusion may be drawn.

In order to counter this, this research explains how a large number of Foxes (or r-strategists) and a small number of Hedgehogs (or K-strategists) can dominate an industry at different phases of its evolution.

8.2.9 The Delusion of Organizational Physics

Business organizations are so complex, that their performance can't be predicted with the certainty of deterministic physics.

In order to counter this, this research is a theory of chaos: deterministic order within stochastic "orbits."

8.3 Further Research

"Now this is not the end. It is not even the beginning of the end. But it is, perhaps, the end of the beginning."¹⁰¹³

8.3.1 Past Empirical Case Studies

Few empirical studies have attempted to define and measure enterprise architectures, and none have done so longitudinally. One notable exception is Schilling and Steensma (2001), which tests previous theory of organizational modularity Schilling (2000). Schilling and Steensma first define modular organizational forms as those which empirically possess greater contract manufacturing, alternative work arrangements and alliances. They then demonstrate that in a wide range manufacturing industries, modular organizational forms flourish when supply and demand are heterogeneous, particularly in the presence of industry standards, technological change and competitive intensity.

"In many industries, integrated hierarchical organizations have been replaced by **nonhierarchical** entities that are permeable, interconnected and modular. Other industries, however, maintain relatively high levels of integration. We use the logic of general systems modularity to explain why in some industries there is greater use of modular organizational forms, including contract manufacturing, alternative work arrangements, and alliances, than in other industries. This model was tested using data from 330 U.S. manufacturing industries."¹⁰¹⁴

Their description of modular organizational forms as: "nonhierarchical entities that are permeable, interconnected" as well as their chosen measures of: greater contract manufacturing, alternative work arrangements and alliances might ironically refer to what we describe herein as late entrant integral enterprise architectures. Their paper seems to describe how incumbent integral enterprise architectures disintegrate towards more modular enterprise architectures.

The following is a brief critique of Schilling and Steensma (2001) relative to our research efforts.

- 1) It is one of the few papers that attempts define and measure "organizational modularity" empirically.
- 2) It deomonstrates which industries (as specified by their heterogeneity of supply and demand) are likely to have more modular organizations.
- 3) It is not explicitly longitudinal, and therefore does not demonstrate "disintegration" or "modularization". It only infers such disintegration in that "integrated hierarchical organizations have been replaced by entities that are modular". By replace do they imply disintegration or replacement through changing mortality and founding rates?
- 4) It doesn't have firm performance as a dependent variable. Therefore although it attempts to explain the conditions under which modular organizations exist, it doesn't explicitlyly demonstrate whether or not they are the high or low performing firms. For example, a late entrant integral enterprise architecture like *Toyota Motors* or *Southwest Airlines* could be outperforming the population of modular competitors.

¹⁰¹³ Winston Churchill, speech (1942).

¹⁰¹⁴ Schilling and Steensma. (2001), pg. 1149.

8.3.2 Future Empirical Case Studies

While the present study has been confined to three pairs of incumbent-challenger companies in as many industries (*GM-Toyota, United-Southwest, Boeing-Airbus*), future research on industries representing extremes of the enterprise architecture typology may include those shown in Figure 392 below, where enterprise architectural differences may account for more variance in long-term firm performance than merely that associated with differences in strategy or operations.

Integral Modular **Enterprise Architecture Enterprise Architecture** Product narkets Product markets Labor Capital Capital Labor Firm Firm narkets markets market narkets Supplie Supplie narkets Lkhd. McD. Boeing Airbus Bombardier Embraer Ford GM Chrysler Daimler/Chrysler Honda Nissan Toyota (1990s) Lufthansa Singapore Southwe United British Jet Blue Airlines Airways Airlines Airways Airlines **IBM** Dell FedEx UPS Walmart Costco Hershevs Mars

Figure 392: Future Empirical Case Studies

Examples of existing research which can be used to test, refine and extend this framework include:

- Fiat and Alpha Romeo. Locke, R.M. (1992).
- Microsoft. Cusumano & Selby (1995)
- Honda and Nissan. Sako, M. and Helper, S. (1998).
- Chrysler. Dyer, J. (2000).
- Lufthansa and British Airways. Lehrer, M. (2001).
- Singapore Airlines. Heracleous, L., Wirtz, J., and Pangarkar, N. (2005).
- John Deere, William J. Holstein, (Strategy+Business) Booz Allen Hamilton Inc., (2008).

Examples of companies include:

Automotive Industry:

• *BMW & Porsche*: early entrant (to the automobile industry) integral explorers, moving from niche to niche.

Airline Industry:

- *People Express:* a late entrant r-strategist (with initial aspirations for integral enterprise architecture, but rapidly disintegrating / modularizing)
- British Airways vs. Singapore/Virgin Atlantic: late entrants
- *RyanAir*: a late entrant r-strategist, modular exploiter focused on the mass market).

Airplane Engine Industry:

• *General Electric*: An early entrant integral-turned-modular exploiter moving from niche to niche and from field to field. Now possibly attempting re-integration? Note that *GE/Snecma* appears to be late-entrant integral.

Computer Industry:

- *Apple:* an early entrant (to the PC hardware & software industry) integral explorer focused on niches.
- *Dell:* a late entrant (to the PC hardware industry) modular exploiter focused on the mass market.
- *Microsoft:* an early entrant (to the PC software industry) integral explorer-turning modular exploiter focusing on the mass market. Cusumano notes that *Microsoft* has much in common with *Toyota*'s process, not product innovation, etc. This may refer to their genotypic integral forms.
- *Intel:* an early entrant (to the semiconductor industry) integral-turning-modular exploiter focusing on the mass market.

US steel industry:

• US Steel (1901) modular vs. Nucor (1940) integral Global steel industry:¹⁰¹⁵

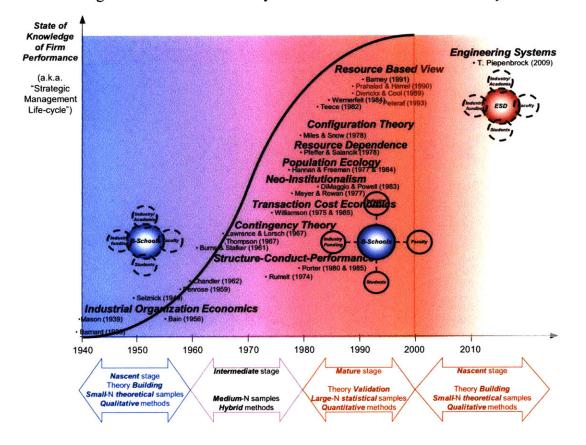
• Mittal: a late entrant (to the steel industry) modular exploiter focused on the mass market.

¹⁰¹⁵ Thanks to Aksat Mathur, MIT SDM student.

8.4 Toward a Theory of the Evolution of Research Ecosystems

"While your research project represents the raison d'être of our school – and of all business schools in general – the architecture of our enterprise, to use your lexicon – does not enable, and in fact constrains us to not solve the fundamental problems that are at the core of our disciplines. We have become too disintegrated, too functionally specialized, to short-term... What we will need is an entirely new integral organizal form, lead by a bold, ambitious vision..."

Although the theory presented herein is focused on the evolution of business ecosystems, it can be reflexively applied to a theory of the evolution of research ecosystems, which study business ecosystems. As the intellectual environment of strategic management is in a rather mature state, populated by once integral research organizations (business and management schools) that are now modularized into functional or discipline-based silos, incented toward short-term goals, under contractual arrangements, there are opportunites for new integral organizational forms of research enterprises which are multi-disciplinary, long-term relationally-based, and possess the possibility of radically transforming the competitive landscape in terms of knowledgedevelopment and dissemination, as illustrated in Figure 393 below. I have been privileged to have been a part of such an integral enterprise architecture, in a mature environment.





¹⁰¹⁶ Conversation with anonymous professor.

8.5 Conclusions

"Our hope and intention has not been to state eternal truths, but to focus theoretical and empirical attention on organizational action by stating as forcibly as possible **the need to study organizations in toto** and, for that purpose, the significance of the **open system approach** and the **certainty/uncertainty dimension**."¹⁰¹⁷

The research set out to address the origins and mechanisms of competitive advantage and longterm firm performance from both economic and sociological perspectives, attempting to resolve the micro-macro debates within both fields. The *economic* questions centered on explanation for firm performance residing within the firm or its environment, while the *sociological* questions centered on explanation of strategic choice as resident within the firm (free-will) or the environment (determinism).

In the process, a meta-theoretical framework has been constructed which attempts to link the firm and its environment in a co-evolutionary way, using dual meso-level constructs of *enterprise architecture* coupled with *structuration theory*.

The answer to the above debates appears not to lie either in macro- or micro- explanations, but in an explanation which covers both at different times and for different reasons. In fact, the one place the answer does not reside, is in the middle of the extremes (see Figure 394 below).¹⁰¹⁸

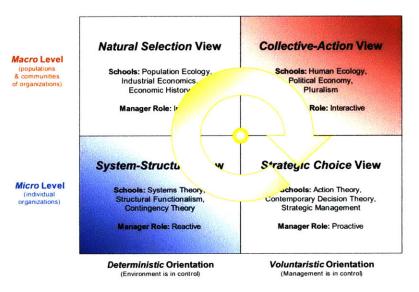


Figure 394: Resolving the Central Debates

This however does not point to a compromise centrist solution. Unlike traditional linear, static, positivist, reductionist thinking which collapses complexity into a neat weighted average "centroid", the framework presented herein takes a nonlinear, dynamic, interpretivist, holistic thinking approach.

¹⁰¹⁷ Thompson, J.D. (1967), pg. 163.

¹⁰¹⁸ This fact is not evident in the figure, as time is not represented.

This dissertation attempted to contribute toward the building of a theory of the evolution of business ecosystems. In the process, it addressed a question that has been posed by evolutionary theorists in the economics and sociology literatures for decades: "Why do firms in the same industry vary *systematically* in performance *over time*?" Seeking a *systematic* explanation of a *longitudinal* phenomenon inevitably required characterizing the evolution of the industrial ecosystem, as both the organization (firm) and its environment (industry, markets and institutions) are co-evolving. This question was therefore explored via a theoretical sample in three industrial ecosystems covering manufacturing and service sectors, with competitors from the US, Europe and Japan: commercial airplanes, motor vehicles and airlines. The research was based primarily on an in-depth seven-year, multi-level, multi-method, field-based case study of both firms in the large commercial airplanes industry *mixed* duopoly as well as the key stakeholders in their extended enterprises (i.e. customers, suppliers, investors and employees). This field work was supplemented with historical comparative analysis in all three industries, as well as nonlinear dynamic simulation models developed to capture the essential mechanisms governing the evolution of business ecosystems.

A theoretical framework was developed which endogenously traces the co-evolution of firms and their industrial environments using their highest-level system properties of *form, function* and *fitness* (as reflected in the system sciences of *morphology, physiology* and *ecology*), and which embraced the evolutionary processes of *variation, selection* and *retention*. The framework captures the path-dependent evolution of heterogeneous populations of enterprise architectures engaged in *symbiotic inter-species competition* and posits the evolution of *dominant designs* in enterprise architectures that oscillate deterministically and chaotically between *modular* and *integral* states throughout an industry's life-cycle. Architectural innovation – at the extended enterprise level – is demonstrated to contribute to the failure of established firms, with causal mechanisms developed to explain tipping points.

This research lies at the intersection of the intellectual domains of strategic management, organization science and complex systems theory. It aimed to contribute to fundamental debates in these fields regarding the sources of superior long-term performance. Specifically, do the sources reside within the firm or in the firm's environment (i.e. industry structure)? What are the roles of managerial adaptation and environmental selection in the creation and sustainment of such performance? Furthermore, how does this shape our understanding of strategic leadership? Our empirical findings suggest that sources of superior firm performance lie neither exclusively within the firm, nor in its industrial environment, but in *how* the firm interacts with its environment – i.e. in the network *architecture* of the firm's extended enterprise. It appears that these enterprise architectures, which both enable and constrain managerial agency and adaptation through spatially and temporally bounded rationality, give rise to architectural inertia and the power of environmental selection, as shown in Figure 395 below. Finally, the data suggest that the qualities of strategic leadership, which maximize firm performance over the industry's evolution, are architectural: namely the definition and maintenance of enterprise objective functions, boundaries and interfaces.

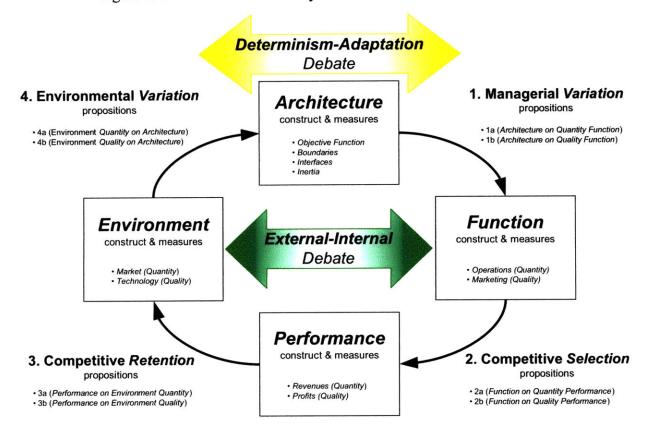


Figure 395: Framework Summary and Contributions to the Literatures

Part IV: APPENDICES

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B. Sources of Profitability: Industry vs. Firm

A number of recent empirical studies have attempted to quantify the sources of firm profitability (Hansen and Wernerfelt, 1989; Rumelt, 1991; Powell, 1996; Roquebert et al., 1996; McGrahan and Porter, 1997; Hawawini et al., 2003). These are summarized in Figure 396 below:

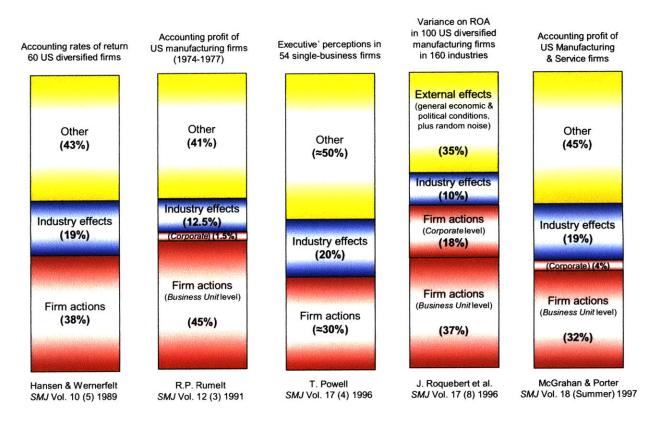


Figure 396: Sources of Firm Profitability: Empirical Studies

C. Placement of Research within the Strategic Management Field

The following table highlights those works (in bold) of the 50 most cited publications in strategic management (Ramos-Rodriguez and Ruiz-Navarro, 2004) that have had the greatest impact on this dissertation.

Of the thirteen most influential works highlighted, four represent the field of economics, and in particular two schools of the resource-based tradition: the "dynamic" school (Penrose, 1959; Dierickx and Cool, 1989) and the evolutionary school (Nelson & Winter, 1982)

The remaining nine represent the field of sociology, particularly the contingency theorist (Burns and Stalker, 1961; Lawrence and Lorsch, 1967; Thompson, 1967) and population ecologists (Hannan and Freeman, 1977, 1984).

No.	Authors	Date	Title	Journal	Field	Sub-field
1	Porter	1980	Competitive Strategy	-	Econ.	ΙΟ
2	Rumelt	1974	Strat., Struct. & Econ. Perf.	-	Econ.	Div.
3	Porter	1985	Competitive Advantage	-	Econ.	ΙΟ
4	Chandler	1962	Strategy & Structure	-	Econ.	Div.
5	Williamson	1975	Markets & Hierarchies	-	Econ.	TCE
6	Nelson & Winter	1982	Evol. Theory of Econ. Change	-	Econ.	ЕТ
7	Pfeffer & Salancik	1978	Resource Dependence	-	Socio.	RD
8	Miles & Snow	1978	Org. Strat., Struct. & Process	-	Socio.	Cnfg.
9	Cyert & March	1963	Behavioral Theory of the Firm	-	Psych.	Beh.
10	Thompson	1967	Organizations in Action	-	Socio.	СТ
11	Hofer & Schendel	1978	Strategy Formulation	-	Socio.	
11	Wernerfelt	1978	"Resource-Based View"	SMJ	Econ.	RBV
12		1984	"Firm Resources"	JOM	Econ.	RBV
	Barney Lawrence & Lorsch	1991	Org. & Env.: Differ. & Integr.	-	Socio.	CT
14		1907	Concept of Corporate Strategy	-	Socio.	
15	Andrews	1971	Theory of Growth of the Firm	-	Econ.	RBV
16	Penrose	1959		-	Econ.	KDV
17	Ansoff		Corporate Strategy		Econ.	TCE
18	Williamson	1985	Relational Contracting	-	Econ.	IO
19	Scherer	1980	Industrial Market Structure	-		10
20	Quinn	1980	Change: Incrementalism	-	Psych.	DDV
21	Prahalad & Hamel	1990	"Core Competence of Corp."	HBR	Econ.	RBV
22	Dierickx & Cool	1989	"Asset Stock Accumulation"	MS	Econ.	RBV
23	Jensen & Meckling	1976	"Agency Costs & Ownership"	JFE	Econ.	AT
24	Weick	1969	Social Psych. of Organizing	-	Socio.	
25	March & Simon	1958	Organizations	-	Socio.	
26	Mintzberg	1978	"Strategy Formulation"	MS	Psych.	
27	Bower	1970	Resource Allocation	-	Socio.	
28	Child	1972	"Role of Strategic Choice"	JBSA	Socio.	
29	Aldrich	1979	Organizations & Environments	-	Socio.	PE
30	Barney	1986	"Strategic Factor Markets"	MS	Econ.	RBV
31	Hannan & Freeman	1984	"Structural Inertia"	ASR	Socio.	PE
32	Lippman & Rumelt	1982	"Uncertain Imitability"	BJE	Econ.	RBV
33	Mintzberg et al.	1976	"Struct. & Unstruct Decision"	ASQ	Socio.	
34	Burns & Stalker	1961	Management of Innovation	-	Socio.	СТ
35	Cohen & Levinthal	1990	"Absorptive Capacity: Learning"	ASQ	Econ.	RBV
36	Hambrick & Mason	1984	"Org. as Reflect. of Top Mgrs."	AMR	Socio.	
37	Rumelt	1984	"Toward Strat. Theory of Firm"	in book	Econ.	RBV .
38	Buzzell et al.	1975	"Market-share: a Key to Profit."	HBR	Econ.	
39	Tushman & Anderson	1986	"Tech. Discon. & Org. Env."	ASQ	Socio.	
40	Hannan & Freeman	1977	"Population Ecology of Orgs."	AJS	Socio.	PE
41	Schendel & Hofer	1979	Strat. Mgmt.: A New View	-	Socio.	
42	Palepu	1985	"Diversification Strategy"	SMJ	Econ.	Div.
43	Rumelt	1991	"Does Industry Matter?"	SMJ	Econ.	
44	Christensen & Montgomery	1981	"Diversification vs Mkt. Struct."	SMJ	Econ.	Div.
45	Wrigley	1970	Divis. Auton. & Diversification	- (PhD)	Econ.	Div.
46	Peteraf	1993	"Resource-based View"	SMJ	Econ.	RBV
47	Porter	1987	"Comp. Adv. to Corp. Strat."	HBR	Econ.	Div.
48	Rumelt	1982	"Diversification Strategy"	SMJ	Econ.	Div.
					Econ.	RBV
49	Teece	1982	"Theory of Multiproduct Firm"	JEBO	ECOD.	I KBV

Table 20: Most Influential Research (of the 50 most influential publications in Strategy)

No.	Authors	Date	Title	Data
1	Porter	1980	Competitive Strategy	
2	Rumelt	1974	Strat., Struct. & Econ. Perf.	
3	Porter	1985	Competitive Advantage	
4	Chandler	1962	Strategy & Structure	4 firms
5	Williamson	1975	Markets & Hierarchies	
6	Nelson & Winter	1982	Evol. Theory of Econ. Change	
7	Pfeffer & Salancik	1978	Resource Dependence	
8	Miles & Snow	1978	Org. Strat., Struct. & Process	
9	Cyert & March	1963	Behavioral Theory of the Firm	
10	Thompson	1967	Organizations in Action	
11	Hofer & Schendel	1978	Strategy Formulation	
12	Wernerfelt	1984	"Resource-Based View"	
13	Barney	1991	"Firm Resources"	
14	Lawrence & Lorsch	1967	Org. & Env.: Differ. & Integr.	6 firms (3 pairs)
15	Andrews	1971	Concept of Corporate Strategy	
16	Penrose	1959	Theory of Growth of the Firm	1 firm
17	Ansoff	1965	Corporate Strategy	
18	Williamson	1985	Relational Contracting	
19	Scherer	1980	Industrial Market Structure	
20	Quinn	1980	Change: Incrementalism	
21	Prahalad & Hamel	1990	"Core Competence of Corp."	
22	Dierickx & Cool	1989	"Asset Stock Accumulation"	
23	Jensen & Meckling	1976	"Agency Costs & Ownership"	
24	Weick	1969	Social Psych. of Organizing	
25	March & Simon	1958	Organizations	
26	Mintzberg	1978	"Strategy Formulation"	
27	Bower	1970	Resource Allocation	
28	Child	1972	"Role of Strategic Choice"	
29	Aldrich	1979	Organizations & Environments	
30	Barney	1986	"Strategic Factor Markets"	
31	Hannan & Freeman	1984	"Structural Inertia"	
32	Lippman & Rumelt	1982	"Uncertain Imitability"	
33	Mintzberg et al.	1976	"Struct. & Unstruct Decision"	
<u>34</u>	Burns & Stalker	1961	Management of Innovation	
35	Cohen & Levinthal	1990	"Absorptive Capacity: Learning"	
36	Hambrick & Mason	1990	"Org. as Reflect. of Top Mgrs."	
37	Rumelt	1984	"Toward Strat. Theory of Firm"	
38	Buzzell et al.	1975	"Market-share: a Key to Profit."	
39	Tushman & Anderson	1986	"Tech. Discon. & Org. Env."	3 industries
40	Hannan & Freeman	1977	"Population Ecology of Orgs."	
41	Schendel & Hofer	1979	Strat. Mgmt.: A New View	
42	Palepu	1985	"Diversification Strategy"	
43	Rumelt	1991	"Does Industry Matter?"	
44	Christensen & Montgomery	1981	"Diversification vs Mkt. Struct."	
45	Wrigley	1970	Divis. Auton. & Diversification	
46	Peteraf	1993	"Resource-based View"	
47	Porter	1987	"Comp. Adv. to Corp. Strat."	
48	Rumelt	1982	"Diversification Strategy"	
49	Teece	1982	"Theory of Multiproduct Firm"	
50	Caves & Porter	1977	"Mobility Barriers"	
50	Caves & I Ulter	17/1	Moonity Darrors	

Table 21: Empirical Bases (of the 50 most influential publications in Strategy)

D. Literature Review of Mixed Duopoly Economics

The literature on firms with an objective function other than the classical "profit-maximizing" (PM) is recent and sparse, namely 'labor-managed" (LM). Much of it comes from recent work on comparing "mixed" duopoly studies which are summarized in Table 22 below:

Date	Authors	uthors Title		Key Take-away		
1983	Law & Stewart	"Stackelberg Duopoly with an Illyrian & PM Firm."	Cournot- Stackelberg			
1989	Mai & Hwang	"Export Subsidies & Oligopolistic Rivalry Between LM & Capitalist Economies."	?			
1991	Horowitz	owitz "On the Effects of Cournot Rivalry Between Entrepreneurial & Cooperative Firms."				
1991	Stewart	"Strategic Entry Interactions Involving PM and LM Firms."	?			
1991	Stewart	Stewart "Management Objectives and Strategic Interactions among Capitalist and LM Firms."				
1992	Cremer & Crémer	"Duopoly with Employee-controlled & PM Firms: Bertrand & Cournot Competition."	Cournot & Bertrand			
1994	Futagami & Okamura	"Strategic Investment: the LM Firm & the PM Firm."	?			
1995	Delbono & Scarpa	"Upward-Sloping Reaction Functions Under Quantity Competition in Mixed Oligopolies."	Cournot	LM dissuades PM from increasing output by matching - making prices fall.		
1995	Lambertini & Rossini	"Are LM Firms Really Able to Survive Competition with PM Firms?"	Cournot	LM can't survive competition with PM when starting from scratch. It won't enter.		
1996	Neary & Ulph			PM profitability implies LM profitability; not conversely.		
1995	Lambertini "Cournot vs. Stackelberg Equilibria Enterpreneurial and LM Firms."		Cournot- Stackelberg & Bertrand Cournot	PM's lead & LM's follow in Cournot competition. Both follow in Bertrand competit.		
1998	Lambertini & Rossini	1		PM firm under-invests while LM firm over-invests.		
2002	De Fraja & Delbono	5		LM firms can increase social welfare for governments.		

Table 22: Literature Review of Mixed Duopoly Economics

E. Literature Review of System Dynamics Modeling of Firm Competition

System Dynamics has been developed and used over the past 50 years to model complex feedback dynamics in social and socio-technical systems. Many of the early seminal works considered the performance of firms and industries (Forrester, 1961, 1966), however the treatment of competition between firms was not captured explicitly and endogenously. More recent research has begun to explicitly model competition between firms explicitly and endogenously, and of importance to this research dissertation, has begun to model firm heterogeneity. Table 23 below summarizes some of the key research efforts in this area.

SD Model		Competition	Market-	Insights / Summary	
	Industry Types Structure (heterogeneity		How Modeled		
<i>Industrial</i> <i>Dynamics</i> Forrester, 1961	Many competitors, small feedbacks	Homogeneous (Het. discussed) (pg. 336-37, 340- 41)	Not		Oscillation between value chain firms
<i>Market</i> <i>Growth</i> Forrester, 1968	Many competitors, small feedbacks	Homogeneous	Implicitly / Exogenously via benchmark	Delivery delay	<i>Growth</i> failure, even in unlimited market
Sys. Pathology of Organizatns. Hall, 1976	Many competitors, small feedbacks	Homogeneous	Implicitly / Exogenously via benchmark		<i>Growth</i> failure, even in unlimited market
Corporate Planning Lyneis, 1980	Many competitors, small feedbacks	Homogeneous	Implicitly / Exogenously via benchmark	Production, Availability & Price	
B&B Enterprises Paich & Sterman, 1993	Duopoly, large feedbacks	Heterogeneous?	Explicitly / Endogenously	Price & Availability?	Market dynamic complexity defines successful strategy
<i>Duopoly</i> <i>Competition</i> Sice & Mosekilde, 2000	Duopoly, large feedbacks	Homogeneous (pg. 116)	Explicitly / Endogenously	Product quality	Faster reactions lead to limit cycles & chaos
Dyn. of Comp. Industries Kunc & Morecroft, 2004					
<i>Evolution of</i> <i>Industries</i> Kunc, 2004		Heterogeneous? (Differentiated or Low Cost)			
Dyn. of Innov. Industries Weil & Utterback, 2005					Competition is among firms & technologies. Includes firm entry & exit
Getting Big Too Fast Sterman & Henderson, 2007	Duopoly, large feedbacks	Heterogeneous? (Aggressive or Conservative)	Explicitly / Endogenously	Price & Availability? (pg. 9)	Market dynamic complexity defines successful strategy

Table 23: Literature Review of System Dynamics Modeling of Firm Competition

F. Mathematical Equations of Numerical Model (Vensim)

P-A-L Diffusing Market Sector

Market Carrying Capacity K=

1

~ Market [0,20000,1000]

~ N is the total population in the community

Potential market P= INTEG (

Replacement Rate-Diffusion Rate,

Market Carrying Capacity K-Initial Adopted market A Fraction*Market Carrying

Capacity K\

) Market

Adopted market A= INTEG (

Diffusion Rate-Replacement Rate-Substitution Rate,

Initial Adopted market A Fraction*Market Carrying Capacity K)

~ Market

Initial Adopted market A Fraction=

0.001

- Market [0,1,0.0001]

Diffusion Rate=

(Potential market P*Maximum Fractional Diffusion Rate rd)*Adopted market A/Market Carrying Capacity K

~ Market/Year

Maximum Fractional Diffusion Rate rd=

0.07

 \sim 1/Year [0,10,0.01]

Replacement Rate=

Adopted market A/Average Product Life L

Average Product Life L= 2000 ~ [0,2000,1]

Lost market L= INTEG (Substitution Rate, Initial Lost market L Fraction*Market Carrying Capacity K) Initial Lost market L Fraction= 0.001

Substitution Rate=

(Adopted market A*Maximum Fractional Substitution Rate rs)*Lost market L/Market Carrying Capacity K

Maximum Fractional Substitution Rate rs=

0 ~

[0,1,0.01]

D-C Commoditizing Market Sector

Cost market C= INTEG (

Commoditization Rate,

Initial Cost market C Fraction*Adopted market A)

~ Market

Initial Cost market C Fraction=

0.001

~ Market [0,10,0.5]

Differentiation market D=

Adopted market A-Cost market C

~ Market

Commoditization Rate=

(Differentiation market D*Maximum Fractional Commoditization Rate rc)*Cost market

 $C \land$

Adopted market A

Market/Year

Maximum Fractional Commoditization Rate rc=

0.14

 \sim

~ 1/Year [0,1,0.01]

Competitor X Growth Sector

Acquired market X= INTEG (Acquisition Rate XC+Acquisition Rate XD, Initial Fraction of Acquired market X * Adopted market A) Market Initial Fraction of Acquired market X= 0.001Dimensionless [-1,1,0.001] ~ Acquisition Rate XD= Fractional Acquisition Rate rXD * Acquired market X Market/Year ~ Fractional Acquisition Rate rXD= Maximum Fractional Acquisition Rate rXD*Effect of D on Fractional Acquisition Rate rXD 1/Period ~ Maximum Fractional Acquisition Rate rXD= 0.14 1/Period [0,1,0.01] \sim Acquisition Rate XC= Fractional Acquisition Rate rXC*Acquired market X Maximum Fractional Acquisition Rate rXC= 0.14 [0,1,0.01]~ Fractional Acquisition Rate rXC= Maximum Fractional Acquisition Rate rXC*Effect of C on Fractional Acquisition Rate rXC Effect of C on Fractional Acquisition Rate rXC= WITH LOOKUP ("(X+Y)/C", ([(0,0)-(1,1)],(0,1),(0.25,0.9375),(0.33,0.9125),(0.385,0.875),(0.425,0.82),(0.45,0.75)),(0.5,0.5),(0.55,0.25),(0.575,0.18),(0.615,0.125),(0.67,0.0875),(0.75,0.0625),(1,0)))) Effect of D on Fractional Acquisition Rate rXD= WITH LOOKUP ("(X+Y)/D", ([(0,0)-(1,1)],(0,1),(0.25,0.9375),(0.33,0.9125),(0.385,0.875),(0.425,0.82),(0.45,0.75)

),(0.5,0.5),(0.55,0.25),(0.575,0.18),(0.615,0.125),(0.67,0.0875),(0.75,0.0625),(1,0())))

"(X+Y)/C"=

MIN((Acquired market X+Acquired market Y)/Cost market C, 1)

"(X+Y)/D"=

MIN((Acquired market X+Acquired market Y)/Differentiation market D, 1)

Competitor Y Growth Sector

Acquired market Y= INTEG (

- Acquisition Rate YC+Acquisition Rate YD,
 - Initial Fraction of Acquired market Y * Adopted market A)
- Market

Initial Fraction of Acquired market Y=

0.001

- ~ Dimensionless [-1,1,0.001]
- ~ The initial population as a fraction of the carrying capacity.

Acquisition Rate YC=

- Fractional Acquisition Rate rYC*Acquired market Y
- ~ Market/Year

Maximum Fractional Acquisition Rate rYC=

0.14

~ 1/Period [0,1,0.01]

Fractional Acquisition Rate rYC=

Maximum Fractional Acquisition Rate rYC*Effect of C on Fractional Acquisition Rate

rYC

- \sim 1/Period
- The fractional net growth rate is a linearly declining function of the \ market relative to available market (carrying capacity). This generates \ logistic growth.

Acquisition Rate YD=

Fractional Acquisition Rate rYD*Acquired market Y

Maximum Fractional Acquisition Rate rYD=

 $0.14 \sim [0,1,0.01]$

Fractional Acquisition Rate rYD=

Maximum Fractional Acquisition Rate rYD*Effect of D on Fractional Acquisition Rate rYD

```
Effect of C on Fractional Acquisition Rate rYC= WITH LOOKUP (

"(Y+X)/C",

([(0,0)-

(1,1)],(0,1),(0.0625,0.75),(0.0875,0.67),(0.125,0.615),(0.18,0.575),(0.25,0.55)

),(0.5,0.5),(0.75,0.45),(0.82,0.425),(0.875,0.385),(0.9125,0.33),(0.9375,0.25),(1,0)

)))
```

Effect of D on Fractional Acquisition Rate rYD= WITH LOOKUP ("(Y+X)/D", ([(0,0)-(1,1)],(0,1),(0.0625,0.75),(0.0875,0.67),(0.125,0.615),(0.18,0.575),(0.25,0.55)),(0.5,0.5),(0.75,0.45),(0.82,0.425),(0.875,0.385),(0.9125,0.33),(0.9375,0.25),(1,0))))

"(Y+X)/C"=

MIN((Acquired market Y+Acquired market X)/Cost market C, 1)

"(Y+X)/D"=

MIN((Acquired market Y+Acquired market X)/Differentiation market D, 1)

Competitor X's Demand-Supply Sector

Initial Assets X= 0 Assets [0,100,1] ~ "Time to Close X Gap (Urgency)"= 1 Years [0,100,1] ~ Production Rate X= Assets X*Asset X Productivity Market/Year ~ Desired Inventory X= 10 ~ Widgets [0,100,1] Initial X Inventory Backlog= 0 ~ [0, 1000, 1]Asset X Removal Rate= Assets X/"Time to Remove Assets X (Impatience)" Assets/Year \sim Time to Adjust Assets X= 2.5 Years [0,100,1] ~ Net Change in Assets X= Amount of Assets X Needed/Time to Adjust Assets X "Time to Remove Assets X (Impatience)"= 1000 Years [0,1000,1] ~ Amount of Assets X Needed= X Production Needed to Close Gap/Asset X Productivity Assets ~ Asset X Productivity= 1 Sales Rate X= Total Acquisition Rate X

~ Market/Year

Assets X= INTEG (Net Change in Assets X-Asset X Removal Rate, Initial Assets X)

X Inventory Backlog= INTEG (Production Rate X-Sales Rate X, Initial X Inventory Backlog)

X Production Needed to Close Gap= X Gap/"Time to Close X Gap (Urgency)" ~ Widgets/Year

X Gap= Desired Inventory X-X Inventory Backlog

Total Acquisition Rate X= Acquisition Rate XD+Acquisition Rate XC

Competitor Y's Demand-Supply Sector

```
Total Acquisition Rate Y=
      Acquisition Rate YD+Acquisition Rate YC
Y Production Needed to Close Gap=
      Y Gap/"Time to Close Y Gap (Urgency)"
             Widgets/Year
      ~
"Time to Remove Assets Y (Impatience)"=
      1000
             Years [0,1000,1]
      ~
Sales Rate Y=
      Total Acquisition Rate Y
      ~
             Market/Year
Initial Y Inventory Backlog=
      0
              [0,1000,1]
      ~
Desired Inventory Y=
      10
      ~
             Widgets [0,100,1]
Time to Adjust Assets Y=
      2.5
             Years [0,100,1]
      ~
Asset Y Removal Rate=
      Assets Y/"Time to Remove Assets Y (Impatience)"
             Assets/Year
      ~
"Time to Close Y Gap (Urgency)"=
       1
             Years [0,100,1]
      ~
Assets Y= INTEG (
       Asset Y Removal Rate-Net Change in Assets Y,
             Initial Assets Y)
Production Rate Y=
       Assets Y*Asset Y Productivity
             Market/Year
       ~
Amount of Assets Y Needed=
```

Y Production Needed to Close Gap/Asset Y Productivity \sim Assets

Y Gap=

Desired Inventory Y-Y Inventory Backlog

Y Inventory Backlog= INTEG (Sales Rate Y-Production Rate Y, Initial Y Inventory Backlog)

Asset Y Productivity=

Net Change in Assets Y= Amount of Assets Y Needed/Time to Adjust Assets Y ~ Assets/Year

Initial Assets Y=

0

~ Assets [0,100,1]

.Control

Simulation Control Parameters

FINAL TIME = 200

- ~ Year
- \sim The final time for the simulation.

INITIAL TIME = 0

- ~ Year
- \sim The initial time for the simulation.

SAVEPER =

TIME STEP

- ~ Year
- \sim The frequency with which output is stored.

TIME STEP = 0.0078125

- ~ Year
- \sim The time step for the simulation.

G. Interview Participants

The Boeing Company

The Boeing Company served as the most encouraging and supportive learning laboratory that one could hope for. I am indebted to those at *Boeing* with whom I have had the privilege to learn along side with. They are listed below alphabetically, grouped according to their informal networks or formal corporate divisions:

- World Headquarters / Corporate Offices
 - Mike Cave (EVP, Strategy and Business Developent), Paul Gray (Board of Directors), Shephard Hill (EVP, Strategy and Business Development).
- Boeing Commercial Airplanes Leadership Team
 - Mike Bair (VP, Business Strategy and Marketing), Dan Becker (VP, Manufacturing; VP Twin Aisle Programs), Scott Carson (VP, Sales; President & CEO), Mike Cave (VP, Airplane Programs; VP, Business Strategy and Marketing), Ray Conner (VP, Sales), Carolyn Corvi (VP 737 Program; VP, Airplane Programs), Jan Fisher (VP, Boeing International), Karen Freeman (VP), Doug Kight (VP, Human Resources), Jim Jamieson (VP, Airplane Programs; COO), Fred Kiga (VP, Government Relations), Jim Morris (VP, Supplier Management), Rob Pasterick (VP, Finance), Nicole Piasecki (VP, Business Strategy and Marketing), Clay Richmond (VP), Jim Schlueter (VP, Communications), Scott Shearer (VP).
- Commercial Airplane Programs Leadership Team
 - Jerry Allyne (VP, Finance), Dan Becker (VP, Manufacturing; VP Twin Aisle Programs), Ross Bogue (VP, 757 Program; VP, Fabrication; VP 747 Program), Carolyn Brandsema, Mike Cave (VP, Airplane Programs), Wade Cornelius (VP, Global Strategy), Carolyn Corvi (VP 737 Program; VP, Airplane Programs), Kris Fellrath (VP, Program Management Office), Jim Jamieson (VP, Airplane Programs), Paula Janson, (VP, Human Resources), Mark Jenkins (VP, 737 Program), Jacki Konesky, David Leonhardi, Larry Loftis (VP, 777 Program), Pat McKenna (VP, 717 Program; VP Fabrication), David Moore (VP, Information Technology), Mike Olszewski, Laura Peterson, (VP, Global Strategy), Sandy Postel (VP, Propulsion Systems; VP Lean Enterprise Office), Steve Schaffer (VP, Supplier Management) Richard Wynne, Bev Wyse (VP, 767 Program), Russ Young (VP, Comunications).
- Airplane Production
 - Carolyn Corvi, Bill Cogswell, Steve Connelly, Saundra Cope, Wade Cornelius, Rich DeLappe, Lindsey Douglas, Diane Easley, Bruce Florsheim, Debbie Gavin, Jon Geiger, Rick Gross, Mike Hersher, Scott Hoge, Kay Lui, George Maffeo, Craig Martin, Carleton Mason, Dave Moore, Sandy Postel, Jennifer Sumner, Steve Thorson

- o 747/767/777
 - Dan Becker, Ross Bogue, Stephen Connelly, Michael Delaney, Debby Kinsley, Jeff Klemann, George Maffeo, Dwight Miller, Atsuo Miyake, Larry Loftis, Dan Mooney, David Moore, Don Morgan, Paul Nuyen, John Quinlivan, Jeff Piece, Bev Wyse
- 0 737/757
 - Mark Jenkins, Jerry Allyne, Lindsay Anderson, Bill Cogswell, Mike Delaney, Peter Doman, Kris Fellrath, Valerie Jensen, Larry Loftis, Candace Lydston, Scott Peiper, Castel Pittman, Marie Western
- o 717
 - Pat McKenna
- Fabrication Division
 - Ross Bogue, Gary Bomhoff, Tony Carolan, John Cornish, Scott Cruikshank, Doug Dahl, Deborah Dustman, Tim Ferris, Jim Frankland, Jon Geiger, Lew Hustead, Pat McKenna, Andy Moskowitz, Liz Otis, Mick Norris, Dave Pickering, Jenette Ramos, Mark Ross, Owen Sakima, Jim Paige, Rielda Savage, Jon Self, Kim Smith, Drea Stoner
- Propulsion Systems Division
 - o Mo Yahyavi, Sandy Postal, Karyl Bartlett
- Supplier Management
 - o Steve Schaffer, Valery Feliberti, Jeff Luckey, Gary Mesick, Ren Nanstad
- Wichita Division (now Spirit Aerosystems)
 - Jeff Turner, Ron Brunton, Don Blake, Dennis Dietz, Tom Greenwood, Carolyn Harms, Marci Johnson, Randy Kysar, John Pilla, Kip Schmidt, Bob Waner, Dan Wheeler
- Engineering / Manufacturing

 Jim Morris, Dan Mooney, Mark Jenks
- Commercial Aviation Services
 - Tim Copes
- Sales
 - Marty Bentrott, Scott Carson, Ray Connor.
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 - Susan Abbott, Susan Andrews, Curt Brusto, Jeannie Denbo, Joelle Denney, Becky Evans, Mel Fortson, Bill Hartman, Rich Hartnett, Terri Hoge, Bruce Jackson, Paula Janson, Doug Kight, Carey McFarlane, BV McGrue, Duane Shireman, Darlene Thomas, Chris Villiers, Teresa Yoneyama.
- Marketing & Business Strategy

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- Phantom Works
 - Mark Augustyniewicz
- Lean+ / Lean Enterprise Office
 - o Mike Hersher, Sandy Postal
- The Boeing MIT-Leaders For Manufacturing (LFM) Alumni:
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- The *Boeing* Career Foundation Program (BCFP):
 - Kate Beale, Annie Beck, Gretchen Bodine, Kirsten Bowen, Alexa Burns, Michael Cram, Mark Cypher, Leann Decker, Carla Deutsch, Meghan Fiore, Mackenzie Fisher, April Garza, Lauren Henriksen, Rae Kang, Art Livermore, Robert Long, Abbey Louie, Rachel Martin, Josh McDonald, Keely McIlwain, Michelle Mulcahy, Chresten Petersen, Lindsay Petersen, Herb Portillo, Dustin Robinson, Ryan Rubenstein.
- Alteon
 - o Sherry Carbary, President
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Production Director – Govan; Steve Worsnip, Assistant Director – Typhoon Support Programmes; Simon Wright, Head of Engineering.

H. Selected Sample of Qualitative Data for *Discourse & Textual* Analysis

In Table 24 below is a selected sample of qualitative data gathered from publically available sources for firms in both the primary and secondary samples. This data complements the qualitative data collected via interviews and direct observation. The data are arranged chronologically, and are categorized by stakeholder interaction and coded for concepts embodied in the theoretical framework developed herein: fit, form, function, performance. Bold font has been added to highlight the more relevant coding information.

As social "reality" is an enacted phenomena rooted in interactions between entities (i.e. individuals or organizations) which are *behaviorally* complex (i.e. they possess a wide variety of "intentions", including among other complex properties, "deception"), constructing grounded theory systematically and scientifically is an extremely challenging task for a researcher of political organizational phenomena (who also possess their own set of intentions) where power is the central organizational construct.

As has been demonstrated in numerous research studies on organizations since the classic Hawthorne studies (Mayo, 1949), when one measures social phenomena, it can move precisely because it is aware that it is being measured. Capturing "the truth" or high-fidelity data in power-laden levels of complex organizations, requires the building relationships with the actors (individuals and organizations), the establishment of trust through the advancement (and not harm) of their interests, recognizing that these are often in conflict within a firm and between the participants in its extended enterprise.

High fidelity data comes from multiple sources triangulated both within and between stakeholders and longitudinally over time. Such sustained access for the research requires high degrees of emotional intelligence and special skills of empathy and trust-building. It requires the ability to appear to the research participants to "go native" (the bane of ethnographers), while maintaining objective detachment.

The quotations presented in the table below, therefore are not randomly gathered to obtain statistical precision, but to demonstate trends in the qualitative data. The fidelity of any such dataset, whether collected as a random or theoretical sample, will have significant variance, and is a function of the observer and the observed and the quality of their interaction.

Date	Source	Person / Title	Stake- holder (Categ ory)	Fi r m	Key Data	Con- cepts
1919	<i>FT</i> <i>Magazi</i> <i>ne</i> , 11 June 2005,	Henry Ford, CEO, Ford Motor	Firm- Investo rs	α	" to do as much good as we can, everywhere, for everybody concernedand incidentally to make money."	On the plural objectiv e function

Table 24: Selected Sample of Qualitative Data for Discourse & Textual Analysis

	1.			-		
	issue	Compa				of an
	no. 109,	ny				integral
	pg. 22.					enterprs
						ei
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						ture,
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						ed by
						the
						CEO,
						when he
						was
						defendi
						ng
						himself
						from a
						lawsuit
				23		by
						sharehol
						ders for
						suspend
						ing dividen
						d
						paymen
						ts.
Jan.	FT	Owen	Firm-	α	"If you will pardon me for being personal, it makes a	On the
1929	Magazi	D.	Investo		great difference in my attitude towards my job as an	plural
	ne, 11	Young	rs		executive officer of the General Electric Company	objectiv
	June	,			whether I am a trustee of the institution or an attorney	e
	2005,	Preside			for the investor. If I am a trustee, who are the	function
	issue	nt and			beneficiaries of the trust? To whom do I owe my	of an
	no. 109,	Chair			obligations?	integral
	pg. 22.	man,				enterprs
		Gener			My conception of it is this: That there are three groups	ei
		al			of people who have an interest in that institution. One	architec
		Electri			is the group of fifty-odd thousand people who have put	ture,
		с			their capital in the company, namely, its stockholders.	express
		Compa			Another is a group of well toward one hundred thousand	ed by
		ny			people who are putting their labor and their lives into	the
					the business of the company. The third group is of	CEO.
					customers and the general public.	0.0000000000000000000000000000000000000
					energy and the statistic statistic of the statistic fraction of the statistic statistic statistics of the stat	
					Customers have a right to demand that a concern so	
					large shall not only do its business honestly and	
					properly, but, further, that it shall meet its public	
					obligations and perform its public duties — in a word,	
					vast as it is, that it should be a good citizen."	
15	United	Frederi	Firm-	α	"United Aircraft & Transport Corporation is a holding	On a
Mar.	Aircraft	ck B.	Investo	~	company controlling, through stock ownership, various	
1930	and		and been made to be a second			disinteg
1930	100010-19-07-2033	Rentsc	rs		subsidiary companies of outstanding importance in	rating
	Transpo	hler,			aviation. It occupies a unique and possibly the	integral
	rt C	Preside			strongest position in the aeronautical field of any	enterpri
	(ornor	nt,			company in the world. Among its subsidiaries are	60
	Corpor ation,	United			airplane, aircraft engine and propeller manufacturers,	se architec

-	1					
1961	First Annual Report to Stockho Iders, 1929 Boeing	Aircraf t & Transp ort Corpor ation Willia	Firm-	α	as well as companies engaged in the operation of air transport lines, aeronautical schools, airports, experimental laboratories, etc. Almost fifty percent of the total volume of 1929 aeronautical exports from the United States, consisted of products of United Aircraft. Commercial transport operations more than doubled in mileage in 1929 over 1928." "In view of the heavy demands for funds for	ture.
	Annual Report	m Allen, Preside nt, <i>Boeing</i>	Investo rs		investment in facilities and new programs forseen for the coming years, your management continues to believe it desirable to maintain a conservative policy with respect to the percentage of earnings retained for reinvestment in the company's operations." "Research and development, from the company's earliest days, have been the foundation which <i>Boeing's</i> pioneering achievements have been built." "The company's basic and applied research programs are directed toward keeping abreast of many facets of the rapidly advancing technology of the aerospace age."	relative integrali ty of the currentl y modular enterpri se architec ture.
1961	Boeing Annual Report	Willia m Allen, Preside nt, <i>Boeing</i>	Firm- Investo rs	α	"Boeing is faced with very strong competition both from British and French firms with governmental backing. This is especially important in the short-to- medium range field were French and Engligs aircraft are directly competitive with the 727." "Still another factor with respect to our commercial program is foreign competition which is becoming more intense. Certain foreign companies have developed competence in our fields, and are in active competition with us. These companies are government-owned or government-supported, and operate at wage levels substantially below ours."	On a modular enterpri se architec ture's views of the stakhold er of govern ment.
1961	Boeing Annual Report	Willia m Allen, Preside nt, <i>Boeing</i>	Firm- Emplo yees	α	"Finally, the company's most valuable asset is the people of <i>Boeing</i> . It is our belief that our employees have a competence and a dedication without parallel in the industry."	On the relative integrali ty of the currentl y modular enterpri se architec ture.
1964	Boeing Annual Report		Firm- Custo mers	α	"The company can sustain its position in the commercial aircraft market only by the timely introduction of improvements in aircraft design. This can be achieved only by the maintenance of a high degree of technological capability and a thorough understanding of airline requirements."	On perceive d market niche of a modular enterpri se

						architec ture.
1965	Boeing Annual Report		Firm	α	"On July15, 1966 The Boeing Company will observe its fiftieth anniversary. It is difficult to conceive any other half century in man's history more stimulating, challenging and more rewarding than the span from 1916 to 1966. In those fifty years man's scientific and technological progress has surpassed the total of such advancement in all previous history, and Boeing is proud to have played a leading role in that fantastic acceleration. There is a moment now for a proud glance at the past and a rededication to the next fifty years, and the next, and the next"	On perceive d market niche of a modular enterpri se architec ture.
1978	Toyota Product ion System: Beyond Large Scale Product ion (pp. 2, 9, 114- 115)	Taiichi Ohno, "Fathe r" of the <i>Toyota</i> Produc tion System , <i>Toyota</i> <i>Motors</i>	Firm	ß	"Slow growth is scary." "During a high period of economic growth, any manufacturer can achieve lower costs with higher production. But in today's low growth period, to achieve any form of cost reduction is difficult." "In a high-growth period, productivity can be raised by anyone. But how many can attain it during the more difficult circumstances induced by low-growth rate? This is the deciding factor in the success or failure of an enterprise." "There must be hundreds of people aroud the world who can improve productivity and efficiency by increasing production quantity. We, too, have such foremen at <i>Toyota</i> . But few people in the world can raise productivity when production quantities decrease. With even one such person, the character of a business operation will be that much stronger. People prefer working with large quantities, however. It is easier than having to work hard and learn from producing small quantities. I think it is more worthwhile in a company to work in the area where there are problems due to dwindling sales than in an area where sales are rising."	On an Integral Enterpri se Archite cture's design for <i>slow</i> growth environ ments.
1978	Toyota Product ion System: Beyond Large Scale Product ion (pp. 62-63)	Taiichi Ohno, "Fathe r" of the <i>Toyota</i> Produc tion System , <i>Toyota</i> <i>Motors</i>	Firm	ß	"The Tortoise and the Hare: The slower but consistent tortoise causes less waste and is much more desirable than the speed hare who races and then stops occasionally to doze. The <i>Toyota</i> production system can be realized only when all the workers become tortoises. Speed is meaningless without continuity. Just remember the toroise and the hare."	On an Integral Enterpri se Archite cture's design for slow growth environ ments, requirin g <i>slow</i> action by employ

1070	<i>T</i> .	m ·· 1 ·		0		ees.
1978	Toyota Product ion System: Beyond Large Scale Product ion (pg. 36)	Taiichi Ohno, "Fathe r" of the <i>Toyota</i> Produc tion System , <i>Toyota</i> <i>Motors</i>	Firm	ß	"Mountains should be low and valleys should be shallow."	On Integ Enter se Archi cture quest for <i>stabil</i>
1978	Toyota Product ion System: Beyond Large Scale Product ion (pp. 8-9, 53, 62)	Taiichi Ohno, "Fathe r" of the <i>Toyota</i> Produc tion System , <i>Toyota</i> <i>Motors</i>	Firm	ß	"Cost Reduction is the Goal: At <i>Toyota</i> , as in all manufacturing industries, profit can be obtained only by reducing costs. Cost reduction must be the goal of consumer products manufacturers trying to survive in today's marketplace." "The goal, as I have often said is cost reduction." "cost reduction, the most critical condition for a business' survival and growth the criterion of all decisions is whether cost reduction can be achieved."	On Intega Enter se Archi cture' focus <i>cost-</i> <i>leade</i> <i>hip</i> .
1978	Toyota Product ion System: Beyond Large Scale Product ion (pp. 53)	Taiichi Ohno, "Fathe r" of the <i>Toyota</i> Produc tion System , <i>Toyota</i> <i>Motors</i>	Firm	ß	"In the <i>Toyota</i> Production system, we think of economy in therms of manpower reduction and cost reduction. The relationship between these two elements is clearer if we consider a manpower reduction policy as a means of realizing cost reduction, the most critical condition for a business' survival and growth. Manpower reduction at <i>Toyota</i> is a company-wide activity whose purpose is cost reduction. Therefore all considerations and improvement ideas, when boiled down, must be tied to cost reduction. Saying this in reverse, the criterion of all decisions is whether cost reduction can be achieved."	On Integr Enter se Archi cture' treatm nt <i>emplo</i> <i>ment</i> <i>stabil</i> in servic of <i>co</i> <i>leaded</i> <i>hip</i> .
1988	MIT Sloan Fellows SM Thesis, Carolyn Corvi, <i>The</i> <i>Boeing</i> <i>Compan</i> <i>y</i>	The Boeing Compa ny	Firm	α	"First and foremost, management needs to stabilize the organization. Successful strategy implementation lies in adherence to long-term strategies, not short-term goals or revenue targets. Achievement of short-term goals, often overrides the strategic direction established at top levels for the organization. There is less incentive for executive management to stick to the strategy, but rather more incentive to manage 'by the numbers'. The result is that tactics become more important than strategy. The bottom line and profitability become more important than establishing market presence, etc."	On integr enterp se archit t's assess ent of modu enterp se archit

	Annual Report (pp. 21- 22)				European capabilities and technological resources to build an aircraft that would reliably and cost-effectively carry passengers in true wide-body comfort. The name Airbus is synonymous with lower operating costs for airlines. Airbus has continually increased its market share. Why? Operational efficiency is the first and last word in analyzing Airbus's unique market success. This performance highlights Airbus's ability to meet sustained growth targets by steadily increasing production output."	integral enterpri se architec ture's market niche.
2001		Richar d Aboula fia, analyst , <i>Teal</i> <i>Group</i>	Firm- Custo mers	α	"'A potent combination of over-investment in recent years and a well-founded concern about profitability may well lead airlines to defer many orders,' wrote Aboulafia in a monthly letter to clients. Given that, Aboulafia said, the order backlog isn't all that secure. 'All told, about half the backlog is less than firm,' Aboulafia said. 'And even the truly firm orders can be deferred, with no real cost to the buyer.'"	On tempora l inconsis tencies in analysts of modular enterpri se architec tures. (Compa re with same analyst' s stateme nts in March 2008 and 17 Dec. 2008.)
3 Aug. 2001	Seattle Post- Ingellig encer	Caroly n Corvi, VP/G M, Boeing Comm ercial Airpla nes	Firm	α	"At a time when airplane orders are down and deliveries of new planes are expected to follow, <i>The Boeing Co.</i> is about to do something it has never done beforethe 737 production rate will reach 28 planes a month At first glance, it might seem odd that <i>Boeing</i> is increasing the production rate of its 737 to record levels during a severe downturn in the airline industry, when many analysts predict that orders for single-aisle jets such as the 737 will be down substantially over the next couple of years. Last year, <i>Boeing</i> won 391 orders for the 737. So far this year, customers have placed only 83 firm orders And the more airplanes <i>Boeing</i> can turn out a month, the greater the opportunity to capitalize on the many cost-savings that have been made in the production of the world's most frequently flown jetliner. 'The more airplanes that go outthe factory door, the better the benefits,' Corvi said We always want to avoid jerking rates up or down,' Corvi said. 'That's's not only counterproductive but expensive. As we work to manage our production system,	On an integral architec t trying to manage stably within a modular enterpri se architec ture.

					one of the things we always look at is how do we manage the rates in such a way that allows us to support the demand from the market and at the same time allows	
					us to manage our production so that it's not costing us	
					a fortune to build the airplane.'	
20	ATI	Philipp	Firm	ß	"We've always been more careful about production	On an
Sept.		e			rates. We do see peaks and troughs but we've always	Integral
2001		Camus			managed to limit the highs and lows better than they	Enterpri
		&			do in the USA."	se
		Rainer				Archite
		Hertric h,				cture's relativel
		EADS				y more
		Co-				stable
		Chair				producti
		men				on.
21	Financi	Rainer	Firm	ß	"We do not need to fire people, and it is not the	On an
Sept. 2001	al Times	Hertric			European way,' declared Hertrich."	Integral Entprise
2001		h, <i>EADS</i>				Archite
		Co-				cture's
		Chair				view of
		man				labor
						stability
21	AFX	Noel	Firm	ß	"'I am always a bit surprised by the speed with which	On an
Sept.	News	Forgea	FIIII	G	Americans take decisions: that in three days (after the	Integral
2001	110.05	rd,			attacks) they announce 25,000 layoffs at <i>Boeing</i> seems to	Enterpri
		Airbus			me totally stupefying,' Forgeard said. Forgeard said his	se
		CEO			company's situation is different 'because Airbus has a	Archite
					bigger order book than <i>Boeing</i> and growing market	cture's
					share."	relativel y slower
						decision
						making
						and its
						concern
						for
						protecti ng other
						stakehol
						ders
						(e.g.
24	4	A 1-	P:		"De tra anti-la anna da	labor).
24 Sept.	Aviation Week	Alan Mulall	Firm		"Boeing quickly moved last week to cut commercial transport delivery estimates through 2002 by what could	On a Modula
2001	W CCK	y,			more than 100 aircraft in an announcement that surprised	r
		Boeing			even some veteran <i>Boeing</i> -watchers by its swiftness and	Enterpri
		Comm			scope. At a hastily arranged news conference Sept. 18,	se
		ercial			one week after the terrorist attacks in the U.S., the	Archite
		Airpla			company said it could also lay off up to nearly one-third of	cture's
		nes CEO			its commercial aircraft workforce. The decision to reduce the workforce by 20,000-30,000 jobs in the next 15	relativel y faster
		CEO			months results from plans by U.S. airlines to decrease	decision
					operational capacity by about 20% due to traffic	making
						0

					reductions. Alan R. Mulally, <i>Boeing</i> president and CEO of <i>Boeing Commercial Airplanes</i> , said the layoffs would begin during the last quarter of this year. 'When you order airplanes today, depending on the model, the lead time is anywhere from 10-14 months, so we need to make these decisions for production next year as soon as possible.' On Sept. 19, Mulally said no orders have been canceled to date and denied that the company had been planning a similar type of job action prior to the airlines' current problems. A primary goal of the company is to keep the market from becoming overloaded with new aircraft it can't use, thereby worsening airlines' financial positions, he added."	and its lack of concern for protecti ng other stakehol ders (e.g. labor).
2 Oct. 2001	Le Figaro	Philipp e Camus , <i>EADS</i> Co- Chair man	Firm	ß	"The respective reactions of <i>Boeing</i> and <i>Airbus</i> [to 9-11] are asymmetrical because we are starting from asymmetrical positions."	On an Integral Entprise Archite cture's view of labor stability
26 Nov. 2001	Forbes		Firm	ß	"Airbus says holding on to employees is the right strategy. 'This thing will turn around, and you can't risk losing skilled people when the upturn comes.""	On an integral entprise architec ture's view of labor stability
15 Dec. 2001	Radio Classiq ue	Noel Forgea rd, <i>Airbus</i> CEO	Firm	ß	"Even with reductions, <i>Airbus</i> remains a company with a lot fewer staff than <i>Boeing</i> , but we cannot make too many comparisons, because we rely much more upon sub-contractors."	On an Integral Entprise Archite cture's differen t make- buy boundar y.
17 Dec. 2001	Times of London	Noel Forgea rd, <i>Airbus</i> CEO	Firm	ß	"'We are introducing massive cost savings based on measures that do not involve forced departures,' Forgeard said."	On an Integral Entprise Archite cture's view of labor stability
17 Dec. 2001	Aviation Week	Rainer Hertric h, <i>EADS</i> CEO	Firm	ß	"We want to protect our profitability and jobs at the same time,' said Hertrich."	On an Integral Entprise Archite cture's

Jan. S 2002 J	Vall Street Journal	Noel Forgea rd, <i>Airbus</i> CEO	Firm	ß	"Forgeard said that because <i>Airbus</i> has long been preparing for a slump in the highly cyclical business , it can avoid following the lead of <i>Boeing</i> ."	view of labor stability On an integral enterpri se architec tur's strategy to smooth environ mental instabili ty
Feb. 7 2002 7 1 1 1 1 1 1 1 1 1 1 1 1	Vew Vork Fines, Finto Chin Air" Roger Lowens ien)	Richar d Ferris, CEO of United Airline s; Stephe n Wolf, CEO of United Airline s; Gerald Green wald, CEO of United Airline s; Jack W. Creigh ton Jr., CEO of United Airline s; Jack W. Creigh ton Jr., CEO of United Airline s; Jack W.	Firm	α	"On the evening of Sept. 10, negotiators for the C.E.O. of <i>United Airlines</i> , James Goodwin, huddled in Washington with union officials representing <i>United's</i> 30,000 baggage handlers, customer-service representatives and reservation agents. They were putting the finishing touches on an agreement for a hefty double-digit wage increase, and Goodwin, a tall, likable West Virginian who had been with the company 34 years, was waiting for a call to give his O.K. It didn't matter that <i>United</i> , which had lost \$605 million in the first half of 2001, was in a financial tailspin: when airline unions are due for a raise, they get one. If you don't understand why, then you don't understand the airline business. As it happened, the talks dragged on, and at 5:30 on the morning of the 11th, the negotiators trudged off to get a few winks. Randy Canale, a union negotiator, returned to his hotel, the Capital Hilton, not far from the Pentagon, figuring they would sign later that day. He awoke earlier than expected, to the sound of sirens. 'Boy, it sounds awful close,' Canale murmured. Someone was banging on his door, and puffs of smoke were visible from the hotel window. Two of <i>United's</i> jets were down, the wage hike was history and so was the 57-year-old Goodwin's career. Seven weeks later, he was dismissed by <i>United's</i> board. It hardly mattered that <i>United's</i> directors would have approved the agreement and were as much to blame as Goodwin. They were letting him go for a way of doing business that has tormented <i>United</i> and the entire industry for decades.	On the disinteg ration and attempt ed reintegr ation of a modular enterpri se architec ture in airline industry

	<i>s</i> ;	failing basic changes it will have helped to perpetuate.
	Rick	Indeed, even as it reels from last year's record \$3.8 billion
	Dubins	operating loss, United is facing the possibility of a strike
	ky,	by its mechanics, pending a vote on a proposed 37 percent
	head	wage hike this past week. If this rings faintly of 'Alice in
	of the	Wonderland,' well, that is because airlines are not like
	AirLin	other businesses, where competition breeds variety and
	e	choice for consumers and profits for business. They are
	Pilots	more like flying utilities. As passengers, we demand
	Associ	quality service on-time takeoffs, edible food, plenty of
	ation	leg room and don't much care who provides it, as long
	at	as they make it cheap. That leaves the airlines with the
	United	dubious honor of competing to be the Ma Bell, the Con
	Airline	<i>Ed</i> , of the sky.
	S	
		One reason the major airlines find themselves in this
		predicament is that they use huge amounts of fixed
		capital wide-body jets go for \$100 million each and
		can't be readily liquidated. They also depend on a
		skilled labor force. The two problems exacerbate each
		other. Since airlines cannot afford to let planes sit idle,
		they can ill suffer strikes. That makes their unions
		unusually powerful. Consider some other businesses for a
		moment: Microsoft has highly skilled programmers but
		little invested capital. Merrill Lynch has both, but its assets
		stocks and bonds mostly could be liquidated
		overnight. Steel has high fixed capital, but it can replace
		its workers more easily. Airline pilots (and mechanics
		too) are not so replaceable. Stringent safety codes
		strengthen the unions further by introducing a stickiness
		into the rules that govern hiring and firing. Any other
		industry would compensate by raising fares, but air travel
		is a commodity, so the temptation is always to cut fares to
		fill seats. None of this was caused by the attack on the
		World Trade Center. But until then, it was possible to
		believe that airlines were turning a corner. Even though
		they were losing money in 2001, they had recently enjoyed
		some good years, thanks to genuine improvements in their
		operations. They had learned to manage their fleets more
		efficiently, they had structured their routes better and they
		had cut overhead. United was emblematic of the
		airlines' ephemeral prosperity. In the late 1990's, it
		reported \$4 billion in profits, and its route map,
		stretching over four continents, was the envy of the
		industry. Most strikingly, it had ventured a daring
		solution to the industry's thorniest problem labor
		by selling a majority of its stock to its employees. But
		despite this groundbreaking arrangement, United was
		never able to fully align the interests of its employees,
		particularly the pilots, with its own. Rick Dubinsky,
		longtime head of the AirLine Pilots Association at
		United, made this clear when he and Goodwin began a
		recent wage negotiation. 'We don't want to kill the
		golden goose,' Dubinsky told Goodwin. 'We just want
		to choke it by the neck until it gives us every last egg.'
		On Sept. 11, the goose ran out of eggs. In five months,
I		en espairi, me geore fuit out et egger in fire montais,

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	United's traffic has shrunk by, on average, a quarter, fares are down and two of its fleets lie mothballed in the middle of the Mojave Desert. Meanwhile, it has been begging senior pilots, who can earn close to \$300,000 a year, to sit home and collect a full 80 percent of their pay for doing nothing; otherwise, they can remain on the premises, though inactive, at full pay. This is why by the end of 2002 United stands to lose every penny it made in the previous five years and why bankruptcy for one of the nation's largest and most venerable airlines looms as a real possibility. United's modern history started in 1985, when Richard Ferris, the C.E.O. at the time, boldly challenged his pilote.	
	pilots. The underlying issue then, and in every subsequent dispute was management's desire to break the contractual stranglehold inherited from regulation. Before 1978, fares were set by the Civil Aeronautics Board, which generally let carriers pass along their costs. Such a cozy set-up naturally bred inefficiency (banks were similarly slothful in the days of managed interest rates), and airlines got used to rubber-stamping union demands. Eventually, they approved a byzantine system of work rules sought by pilots and other employees. Come deregulation, competition intensified, air fares dropped and more people started flying. But the stifling work rules remained and so, of course, did safety constraints and also entitrust concerns proventing memory.	
	constraints and also antitrust concerns preventing mergers. In effect, aviation became deregulated only on one side: free competition for revenue; costs largely immovable. Ferris tried to win points by befriending the pilots. He started flying, got a license and took some union members under his wing. For a while, it worked. Attacking a brazen case of featherbedding, he got the union to agree to cut the number of pilots in the cockpits of Boeing 737's from three to two. But when he tried to impose a lower wage scale for newly hired pilots as Robert Crandall had done at <i>American</i> the pilots went on strike. The head of the union's strike committee, Dubinsky, was nicknamed Mad Dog. The son of a butcher, he was hired by United in 1965 at a measly \$500 a month. He flew the tobacco route:	
	Winston-Salem, Raleigh-Durham, Chattanooga. In the pilot culture of the day, captains were virtual gods and young flight engineers like Dubinsky received barely more respect than the stewardesses. Dubinsky, though, found a vent for his aggressiveness. He started doing small chores for the <i>AirLine Pilots Association</i> and then handling grievances, and the union discovered that he was a badger. By 1985, he was brimming with class-conscious fervor. The pilots, despite their political conservatism and sense of themselves as professional people, heeded him. Pilots make good money but lack the free agency of other professionals. If a <i>United</i> pilot moves to <i>Delta</i> or <i>American</i> , he loses his seniority and most of his pay. That makes him utterly dependent on the union and makes the union a potent force. Ferris hired replacements to keep	

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	United flying, and the pilots returned after 29 days, taking	
	the offer Ferris had on the table. The strike was over, but	
	permanent damage had been done. A certain culture,	
	an implacable Arab-Israeli-like hatred, took hold at the	
	airline, and nobody has been able to dislodge it since.	
	More significant, United's experience helped spread fear	
	through the industry. Airlines began to leapfrog one	
	another, granting successively better terms at each	
	negotiation anything to avoid a strike. Today, thanks to	
	generous vacations, sick-leave provisions and clauses that	
	fix minimums for days worked and trips flown, United	
	pilots get paid for 81 hours a month but actually fly, on	
	average, only 50 hours. Considering that a Boeing 747-400	
	captain gets a top rate of \$302 an hour, you can see what a	
	drain this is. Though pilots spend many nights away from	
	home, a hardship that is worth some extra compensation,	
	they freely admit that flying, on most days, is hardly the	
	risky proposition it was when the first contracts were	
	penned. 'It's not a hard job for a guy that has been around,'	
	says one 40-year-old United pilot I talked to. 'Because of	
	advances in technology, we have great airplanes to fly.'	
	Their flexible schedules allow many pilots to carry on	
	second careers. By 1986, Ferris decided that United	
	couldn't make money just flying planes. So he stitched	
	together a hotel and car-rental conglomerate, aiming to use	
	the airline to feed the travel businesses synergy! He paid	
	a consultant \$7 million to rename United's parent the	
	Allegis Corporation. Wall Street snickered. The pilots did	
	not. They feared that Ferris would divert capital into the	
	other divisions until the airline was a rump operation and	
	then start cutting jobs. The ALPA adviser was the	
	illustrious F. Lee Bailey, and he told them that their jobs	
	would never be safe unless they really took control a	
	message that the pilots, being pilots, were happy to hear.	
	Dubinsky and Bailey flew to Chicago to meet with a	
	leader of the International Association of Machinists and	
	dropped a proposal for an employee buyout into his lap.	
	The machinists didn't like it. Presciently, they saw the plan	
	as leaving workers to bargain with themselves, an obvious	
	conflict. But Dubinsky made his bid public. It was a	
	strange time on Wall Street, in which anybody could	
	seemingly acquire anyone else and companies were said to be worth more dead than alive. Coniston Partners, a	
	hedge fund, bought a chunk of stock and agitated for a	
	breakup. The board, feeling pressured, sacked Ferris and	
	agreed to sell the travel assets. Stephen Wolf, a veteran of	
	two previous airline turnarounds, was named C.E.O. late	
	in 1987. After briefly joining with ALPA to attempt a	
	high-priced buyout (which, when it failed, set off the	
	stock-market crash of October 1989), Wolf embarked on	
	an expansion kick, snatching up international routes and	
	ordering \$22 billion worth of equipment. His competitors	
	followed suit. Since wages rise sharply with experience,	
	airlines were desperate to hire younger crews. 'So how do	
	you get more new pilots?' says Harry C. Pinson, an	
	investment banker who worked with Wolf. 'You grow the	
	investment banker who worked with wolf. Tou grow the	

airline.' The logic was so compelling that airlines bought	
many more planes than they needed. In aviation, such	
capital mistakes don't go away. Equipment is so expensive	
that once a plane is delivered it must be flown. Even	
carriers that file for bankruptcy limp along for years,	
usually operating at lower costs and undercutting the rest. Wolf discovered this in 1990, when conflict in the Mideast	
and a recession at home (sound familiar?) sent the industry	
into a nose dive. Making matters worse, <i>Southwest</i> , then a	
relative upstart, was tormenting the industry and, in	
particular, stealing United's traffic in California. As losses	
mounted, Wolf clamored for union givebacks. He and	
Dubinsky began to shadowbox. When United ordered new	
747's, a dispute with the pilots' union kept them parked on	
a ramp. When United tried to start service to India, the	
pilots delayed it by demanding private restrooms and	
Western food. Dubinsky kept up the pressure, but his time	
was running out. His term at ALPA expired. (He lost an	
effort to rescind a term-limits clause and wrote an acid	
farewell remembered within the union as "the Nixon	
letter.") Wolf, a tall, aloof C.E.O. who arrived at United's	
headquarters near O'Hare Airport at 6 each morning,	
seized the opportunity. He sold off the flight kitchens,	
which made the machinists fear that their jobs would be	
next. Then, with their cooperation, Wolf and the pilots,	
now led by Roger Hall, a less tempestuous chief, cobbled	
together an audacious employee stock-ownership plan . Similar ideas had been tried at <i>Northwest</i> and <i>Eastern</i> , but	
never with workers in control that was what bred such	
hope at United. The pilots, machinists and nonunion	
salaried employees (the flight attendants opted out) got	
three board directors, various control provisions and,	
critically, 55 percent of the stock. The pilots, the biggest	
bloc, got 25 percent, in exchange for an equivalent	
percentage cut in wages and benefits. A new era of	
worker-management cooperation was born. Optimism	
ran high. Robert Reich, the secretary of labor in the	
Clinton administration, gushed that the employee-	
ownership plan 'could change the face of the airline	
industry.' But there was one devastating oversight: yes, you could turn employees into owners, but could you	
get them to act that way? Could you get them to place	
the same value on their stock as on their weekly	
paychecks? The difficulty, as Dubinsky would shrewdly	
observe when he was back battling United management, is	
that 'you can't eat stock' particularly when employees	
were barred from selling their shares until retirement. In	
any case, airlines had never generated value for their	
stockholders. Donald Washburn, a former executive at	
Northwest Airlines, has observed that airlines are merely	
'cash accumulators for other constituencies' the	
various government entities that tax it, the cartel that	
sells it equipment and the industry's bankers. Its	
hungriest constituent is labor, which gobbles up nearly	
40 percent of operating expenses. The employee buyout	
temporarily lowered wages, but it didn't change these	

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	dismal economics. Arguably, it weakened United. The	
	pilots had always sought control; now they could	
	pursue it from inside the boardroom. As owners, the	
	pilots could pick their own C.E.O., and they did: Gerald	
	Greenwald, famed for helping save Chrysler and fresh	
	from running a trucking concern in newly capitalist	
	Czechoslovakia. When Greenwald told his Czech	
	managers that he was leaving to take over the new worker-	
	owned United, one of them stared incredulously. 'We just	
	finished with all that,' he said. Greenwald figured that	
	with workers owning a stake, their interests would have	
	to shift. So he invited pilots and mechanics into	
	strategy sessions and consulted with Fortune to learn how	
	to qualify for the magazine's list of 100 most desirable	
	companies to work for. Many pilots caught the spirit.	
	Absenteeism declined. A captain in Chicago cleaned food	
	trays to shorten turnaround times. And miraculously the	
	good times started to roll. United's stock, \$22 when the	
	ownership plan began, broke \$90 three years later.	
	(Today it is \$12.) Partly, airlines were the beneficiaries of	
	good fortune: fuel prices were low and the economy was	
	strong. But they also had learned to be more efficient,	
	eliminating frills, reducing commissions to travel agents,	
	reaping savings from automatic check-in. Unlike in the	
	previous decade, most avoided the trap of overexpanding.	
	Greenwald strengthened his hubs and eliminated	
	unprofitable, marginal routes. He also enhanced United's	
	unmatched network overseas. These were heady days for	
	the big airlines, as they finally capitalized on the promises	
	of deregulation. Except for one little thing. They still	
	could not keep wages under control. Through the 90's,	
	airline wages rose 43 percent, just slightly above inflation.	
	Not bad until you consider that air fares rose only 6	
	percent. This was, significantly, a time when other	
	industries were holding the line on every conceivable	
	employee benefit. Only the airline industry, shackled by	
	40-year traditions, continued to kneel to its unions. The	
	regional airlines are a perfect illustration. These carriers,	
	like American Eagle or United Express, fly under the	
	majors' flags and serve an essential role connecting	
	smaller cities to hubs. They also pay their pilots, most of	
	whom are represented by ALPA, significantly lower	
	wages. The business has grown smartly, thanks to a new	
	generation of high-performance jets, but the unions don't	
	like these smaller planes and the lower wages that go with	
	them, so they have successfully negotiated 'scope clauses'	
	that limit the size and number of regional jets that a major	
	can hire out. If it were up to the market, a new-generation,	
	50-seat Canadair might fly from New York to Chicago at	
	off hours, when there wasn't demand for a DC-9 or a	
	Boeing 737. Presumably, that would result in more	
	flexibility and choice for customers. But scope clauses, a	
	bit of protectionism that seems wildly out of place in the	
	21st century, make it extremely difficult. With their hands	
	tied on costs, airlines turned their attention to revenues. In	
	the 90's, they perfected the art of 'yield management,'	
	and you, and perfected the art of yield management,	

	exploiting computers to monitor bookings continuously	
	and adjust ticket prices according to availability. Yield	
	management is why you can pay \$1,000 to fly coast to	
	coast and sit next to someone who paid \$200. It is also	
	why so many people hate the airlines. It may seem unfair,	
	but to an airline economist, the passenger say a student	
	heading home for the holidays who books in advance	
	and the executive who sidles up to the counter without a	
	reservation are not buying the same 'product,' even if they	
	are on the same flight. One is buying a surplus seat, akin	
	to last year's sweater on the bargain rack. The other is	
	buying that sweater when it's hot. It is a good business	
	tactic, but the airlines overplayed it. During the late 90's,	
	they jacked up the premium for business fares as never	
	before. I.P.O. money rained on Wall Street, and plenty of	
÷	it got spent on plane tickets. United's San Francisco hub, a	
	gateway to Silicon Valley, became a gold mine. Airline	
	unions exploited the boom to demand higher wages, but	
	the good times for airlines flying utilities, remember?	
	were never good enough. In one recent year, carriers filled	
	72.4 percent of their seats, just a tad more than their break-	
	even level of 70.4 percent. What this means is that on a	
	typical flight, the entire profit was generated by the last	
	three passengers. From 1995 to 1999, the industry's best	
	half-decade ever, airlines earned only 3 1/2 cents on every	
	dollar of sales, whereas American industry typically earns	
	6 cents. And through the full cycle that is, for all of the	
	1990's airlines made less than a pitiable penny for every	
	dollar of sales. If this were another industry, C.E.O.'s	
	would be forced to resign in disgrace, but airline execs	
	were buoyed. At United, Greenwald gave the pilots and	
	machinists consecutive 5 percent wage hikes, the	
	maximum allowed by the terms of the ownership plan.	
	Then the unions demanded a 'snap back' to take effect in	
	2000, restoring them to pre-ownership levels. Greenwald	
	consented and, remarkably, so did <i>United's</i> board. It may	
	be unkind to say the company lived in fear of upsetting	
	its employees, but everyone, especially at United, knew	
	what the unions were capable of doing. Meanwhile,	
	management's relations with the AirLine Pilots	
	Association deteriorated. As Greenwald neared	
	retirement from United in 1999, the union nixed his choice	
	of successor; instead, the pilots tapped Goodwin, a	
	company man that many deemed controllable. As	
	negotiations started for the first post-ownership contract,	
	the drumbeat rose for a more confrontational approach -	
	- rose, that is, for Dubinsky. The rank and file were mostly	
	unaware that while out of office, Dubinsky had been busy	
	suing his own union. He would soon collect a six-figure	
	settlement paid from his pilots' dues. No matter. With a	
	big negotiation looming, the union's 26-member governing	
	body voted him in. United's pilots were counting on a	
	contract by April 2000, when the ownership plan expired.	
	The deadline was unrealistic, and it gave Dubinsky a	
	cudgel to wield against the company. Goodwin	
	compounded his problem when, late in 1999, he and Wolf	
	 compounded ins problem when, late in 1999, he and woll	

who was now running US Airways began to plot a	
merger. The timing was suicidal. Dubinsky, as a board	
member, was informed of the talks but could not disclose	
them to the rank and file. He certainly knew the pilots	
would oppose a merger, because many would lose	
seniority to US Airways pilots. Thus, Dubinsky had every	
reason not to conclude a contract until the merger was	
announced. By early 2000, wage negotiations, predictably,	
had stalled, and <i>United's</i> increasingly impatient pilots were	
getting stickers from the union reading, 'On Top/On	
Time.' They put them on flight bags, in the cockpit,	
everywhere. As the deadline neared, Dubinsky reminded	
his pilots that they weren't obligated to fly overtime, as	
they normally did, and that they should fly '[to the letter of	
our agreement' a euphemism for going slow. Late	
flights began to mount. Passengers went nuts. Goodwin	
was living a nightmare. In May, he announced the merger,	
and the war with the pilots reignited. The nasty labor	
sore, bandaged but never healed, oozed with all the	
ugliness of the past. The pilots refused to fly overtime;	
some of them taxied at 3 knots instead of 15; others flew	
low, to burn more fuel, or opened landing gear	
prematurely, adding to wear and tear. Delays and	
cancellations soared; United, notably, suffered a fourfold	
increase in delays caused by pilots insisting on repairing	
inconsequential items, like a broken coffee maker or a	
burned-out reading light. A pilot in California walked off	
a full 747, claiming nerves. An executive from a	
competing airline tells the story of a United flight from	
Los Angeles to J.F.K. when the captain announced that	
because of 'low clouds' he wanted to recheck his	
instruments. They sat for three hours. The pilots were	
sabotaging their own company. They did have reason to	
be upset. United, having grown more quickly than US	
Airways, had far more newer hires. Pilots feared for	
their careers and were infuriated that their counterparts at a	
weaker airline might supplant them especially since,	
they reckoned, management was paying for the deal with	
the very money it had saved on pilot wages. Their anger	
was, of course, given a significant push from ALPA. Geoff	
Garrett, a <i>United</i> pilot from Seattle, says, 'I never received	
an order to slow down.' However, he admits, there was	
peer pressure. Pilots who flew overtime would see their	
names tacked to a bulletin board, and those who arrived on	
time got flack for 'not flying safe.' Mysteriously, an	
unsigned publication, <i>The Gardener</i> , began to turn up in	
cockpits, often in pilots' sun visors. The Gardener was a	
colored sheet written in country vernacular, reminding	
pilots to 'fly safe' and so forth. Many pilots think it was	
produced by the Industrial Relations Committee, a	
secretive wing of ALPA formed by Dubinsky during the	
strike. I asked Dubinsky about United's dismal summer	
20,000 flights were canceled and on-time	
performance fell to 40 percent, disruptions that cost	
the airline \$700 million. He said: 'The company was	
short on manpower; we told them that. And the	

weather was terrible. Also, our pilots decided to not fly	
overtime.' Does that mean there was no coordinated	
effort? 'That's what I'm telling you. If there had been, they could have taken us to federal court.' In fact,	
United's management had hotly debated whether to do	
that. Many were in favor, but Goodwin, who had the	
longest tenure and remembered the 1985 strike vividly,	
was unwilling to further antagonize the pilots. And so in	
August, Goodwin agreed to an immediate pay raise of 22	
to 28 percent and to additional 4.5 percent raises in each	
successive year through 2004. This pace-setting and lavish	
package stunned United's competitors, who had, of course,	
been guilty of no less in their turn. Then the bottom	
dropped out. By 2001, high tech had gone bust, and big	
corporations like <i>Hewlett-Packard</i> , <i>Cisco</i> and <i>Accenture</i> were taking a hatchet to travel budgets. "'We aren't talking	
about single-digit cuts," notes Jake Brace, United's chief	
financial officer. 'Some of them reduced their flying by 25	
to 50 percent.' These two grim developments were capped	
by a third misfortune when, last spring, the department of	
transportation blocked United's merger with US Airways.	
Thus, in the space of a year, United had suffered punishing	
blows from labor, the government and the economy a	
modest summary of the industry's troubles since	
deregulation. All that was before Sept. 11.	
After the tragedy, Goodwin eliminated 20,000 jobs, but a	
cruel twist of businesses with high fixed capital, like	
aviation, is that cutbacks often worsen the problem.	
Though United saved 23 percent in expenses, it lost a	
whopping 39 percent in revenue. One reason is that union	
rules dictate that each pilot be able to bid for a better	
assignment (the bigger the plane, the higher the pay)	
whenever a vacancy opens. So while <i>United</i> furloughed 591 of its 10,500 pilots, it was also forced to retrain	
hundreds for new assignments, an enormous waste. 'Now	
you have a ton of people being paid and not flying,' notes	
Herb Hunter, an ALPA spokesman. 'When they talk	
about laying off, you get to a point of diminishing	
returns.' This is why airlines cannot cut their way to	
solvency; needing cash to service debt on those \$100	
million jets, they must keep selling assets, a downward	
spiral charted by the dearly departed <i>Pan American</i> . Realizing this, Goodwin warned that without concessions	
from labor, <i>United</i> could 'perish.' The unions demanded	
his head. Over the years, major airlines have improved	
just enough for most to survive to limp from crisis to	
crisis, to turn a small profit occasionally but not to	
build lasting equity. And increasingly they are haunted	
by Southwest, haunted because they can never match it.	
Southwest is in a different business from United, and its	
model is infuriatingly simple: it flies a single aircraft	
type, greatly reducing the cost of training pilots and mechanics, with no frills or first class, mostly on point-to-	
point routes and usually from secondary, less congested	
airports. Its <i>Boeing</i> 737's land and take off in only 20	
anyona. To being 1515 hard and take off in only 20	

minutes -- unthinkable for planes connecting through hubs -- and its pilots usually fly more than 70 hours a month, far more than at American, Delta and United. The traditional carriers, whose systems are built around hubs, can't do this. United's Chicago hub, for instance, draws customers from all over the Midwest, including people in smaller cities connecting to the coasts. Like the old phone company, this fulfills a vital need, but it is much more costly. Jack W. Creighton Jr., United's new C.E.O., has become the latest chief to demand concessions from each employee group. He faces heavy sledding because United's mechanics, as well as its baggage personnel and ticket agents, are still working at pre-ownership-plan (1994) wages. They want a raise, like the pilots got, before they think about concessions. If the mechanics do not accept Creighton's offer and vote to strike, Congress, with the White House's authorization, could impose a settlement. And the White House has been signaling that it will tolerate fewer airline strikes in the future. So is government the answer to shareholders' prayers? Not exactly. Federal arbitration boards tend to resolve disputes by slicing down the middle, generally pleasing nobody. But they do force both sides to talk. And Creighton has held serious discussions with the AirLine Pilots Association. For now, they are talking only wage concessions -- not the work rule amendments that would be needed for United (and Delta, American, et al.) to join the rest of the 21st century. But the talks raise the germ of a possibility. ALPA is demanding something in return for wage cuts. Since the value of the employees' stock from the ownership plan has crashed from \$5 billion to about \$750 million, they certainly won't take more of that. But Creighton and the union have talked about linking wage cuts, in some fashion, to United's profits or revenues. This brings to mind something Dubinsky -- at year-end, when he was retiring -- told me over vodkas in a restaurant near O'Hare. People say the pilots are self-destructive, he acknowledged, 'but we aren't crazy.' Meaning even pilots will ultimately do what is in their interest. That is what's so interesting about Southwest, which has been able to co-opt its workers (who also are unionized) into behaving like owners. For sure, relationships with unions are multifaceted, but one difference at Southwest stands out, which is that workers get much of their annual profit sharing in cash. Maybe you can't eat stock, but you can eat cash. And if wages were to vary with performance, not only would United's labor costs stay tuned to the business cycle but its workers -- just maybe -- would also start to think differently about their employer. Over time, they, and potentially workers at other carriers as well, might be willing to fly more hours, to let the market determine the schedule for regional jets, to let airlines design their

networks with profits as the main consideration. It sounds rather radical -- downright subversive in this industry -

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huge short-term incentive to prop up its stock price.Taking advantage of an investment community willing to tolerate the company's opaque reporting system, executives managed to conceal fundamental operational problems for nearly a year - which raises the question of how swiftly they would let investors know if a similar problem arose today. As is often the case, none of the outside watchdoge ever barked. The board never forced Condit to come clean about the company's production problems. Stock analysts and business journalists underestimated them. An although the company's auditor Deloite & Touche, raised red flags about Boeing's troubles, it doesn't seem to have put much pressure on its big client to share this information with investors. As a result, Boeing's financial reporting in early 1997 bore little relationship to its business reality. When the company finally disclosed its problems, 11 was stunned, recalls Richard J. Glasebrook II, managing director of Oppenheimer Capital, owner of 5% of McDonnell at the time. '1 thought that Boeing had the building of commercial aircraft down cold.'The [production] problem was compounded in late 1994 when Boeing realized that rival Airbus Industrie, the European Consortium, was undercutting it on price, thanks to lower manufacturing costs, and government subsidies. By that year, Airbus had grabbed 30% of the global jet-plane market – up from less than 3% two decades earlier. It was a potentially devastating development, since lost customers in the airliner industry are hard to win back after they've spent a fortune training pilots and mechanics on rivals' equipment. Boeing was forced to knock down costs across the board. It made early retirement offers to 9,500 workers in 1995, slashing its staff of veteran mechanics and engineers. Execs. Also rolled out a bug-riden new computer system	
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virtually impossible to audit,' says Lynn E. Turner,
former chief accountant at the SEC. 'No one really knows
whether the company will produce as many planes as [are]
needed to recover the costs.' To mitigate this problem, the
rules require companies to take an immediate charge as
soon as they have evidence that a line's long-term profit
margin will disappear - or, in industry lingo, that the
program will be in a 'forward-loss' position. And that's
just what appears to have been happening to the 777 line
in early 1997. It had a development budget of \$5 billion
to \$7 billion for initial design, production tooling, and
flight-testing. By 1995, it had quietly overrun this budget by nearly 100%, according to two former high-
ranking <i>Boeing</i> managers. The prospect of a forward
loss in the 777 was galling to <i>Boeing</i> , since it was the
newest model – the plane that boasted the most
advanced technology, that was to drive the company's
performance in the next decade, and that carried
Condit's reputation. Downgrading the 777's forecast
would have been not only an embarrassment but also a
threat to the merger. To avoid this humiliation, the
company allegedly started to shift monetary revenues
from healthier aircraft programs to keep the 777 on
budget, according to the complaint and two former high-
ranking executives. Another method Boeing allegedly
used to stave off a 777 write-off was exaggerating the
effectiveness of some of the cost-savings initiatives it
had launched in the mid-1990s. Under the flexible rules of
program accounting, plane makers are permitted to make
projections about efficiency efforts and start tabulating the
benefits immediately. But this practice can run afoul of
the law. According to the plaintiff's complaint, Boeing
'arbitrarily manipulate[d] cost-savings figures upwards in
order to keep the 777 gross profit estimates from falling
into a [forward-] loss position' during the second quarter
of 1997. The complaint quotes a Deloitte working paper
that says Boeing's managers admitted the second-quarter
cost-reduction figures were 'a plug' to keep the 777
profit margins on target. Boeing's efforts paid off: the
company never declared a forward loss on the 777 in 1997
- and has not done so at any time since. Does that mean that the line met the original profitability targets? Not
necessarily. As a result of this situation, investors need to
be able to place an unusually high degree of faith in the
company's managers.
company o managero.
'You cannot reduce the cost of a wing if you don't know
where you are starting,' Stonecipher complained in an
April, 1999, interview with CFO magazine. 'You can
drive a truck through what's GAAP in aircraft
manufacturing,' says Heidi Wood, an aerospace analyst at
Morgan Stanley Dean Witter & Co. 'I think everybody
has grown weary of program accounting for a while.' At a
time when investors are seeking the maximum in
transparency, Boeing is note even close to that
standard.

2003	The Southwe st Airlines Way, pg. 66 (Jody Hoffer Gittell)	Senior Pilot, Americ an Airline s; Robert Cranda II, CEO, Americ an Airline s	Firm	α	"There is no trust for Crandall. He is nasty, mean . He's irascible , he points his finger, he's boiling inside. Crandall is not loyal to his employees . He has no respect for employees . We're not going to be loyal to the company or each other. When there is no love for the company, it translates to how you treat each other People do what they can get away with ."	On not trusting the chief enterpri se architec t in a Modula r Enterpri se Archite cture.
2003	The Southwe st Airlines Way, pg. 238 (Jody Hoffer Gittell)	Rakesh Gangw al, Preside nt, US Airway s	Firm	α	"'I don't' want to take advantage of the situation , but we have to do what is right for the company ,' Gangwal said in a conference call with analysts. 'And events of September 11 have opened certain doors for the company that were pretty much closed before.'"	On a Modula r Enterpri se Archite cture's rapid (zero- sum) respons e to an exogeno us shock.
2003	The Southwe st Airlines Way, pg. 56 (Jody Hoffer Gittell)	Ramp Manag er, Southw est Airline s	Firm	ß	"[Herb Kelleher and Colleen Barrett] have both got credibility. It's taken them a while to get to that point. They've created this level of honesty with us. If it's bad, they tell you its bad."	On trusting the chief enterpri se architec t in an Integral Enterpri se Archite cture.
2003	The Southwe st Airlines Way, pg. 2-3 (Jody Hoffer Gittell)		Firm	ß	"Southwest's business model, like that of Toyota, is to provide a low-cost product by utilizing its resources efficiently, while providing record levels of reliable service."	On the strategy of an Integral Enterpri se Archite cture.
2003	General Motors Annual Report (pp. 3		Firm	α	"Here's what's new about GM's strategy this year: Nothing." "GM brought brand differentiation to the world in the 1920s. As the decades passed, and our product portfolio	On a modular enterpri se architec

	and 0)		1		auronded we slowly duifted amon from that simple but	tuno'a
	and 8)				expanded, we slowly drifted away from that simple but effective strategy. Today the GM product revolution again is strengthening our brands, with more innovative marketing that better understands the customer."	ture's unwillin gness / inability to change.
19 June 2004	Kellogg School of Manage ment	James McNer ney, Chair man & CEO of 3M	Firm	α	"Touching on the recent spate of corporate scandals, McNerney advised graduates to 'fight to make sure the values you bring to work are the ones you use at work. The tragedy is that some of today's leaders are fundamentally good people who can't stand the pressure.' McNerney also spoke about the importance of cultivating a good work ethic. 'Have the courage to lead and the courage to fail, 'he said."	On a modular enterpri se architec ture's leadersh ip style
28 June 2004	Busines sWeek "Coveru p at Boeing? " (Stanley Holmes & Mike France)	Carol Jensen, Boeing emplo yee filing class- action suit against Boeing	Firm- Emplo yee	α	"Now that <i>Boeing</i> was faced with telling jurors why its own internal documents seemingly contradicted its legal theory, the company suddenly became accommodating. The documents reviewed by <i>BusinessWeek</i> suggest that <i>Boeing's</i> efforts to suppress evidence were far more elaborate. The company's tactics in the pay- discrimination lawsuit, Beck v. <i>Boeing</i> , also raise broader questions about the health of <i>Boeing's</i> corporate culture. Last year, the <i>U.S. Air Force</i> penalized the company for possessing 37,000 pages of sensitive competitive documents some of its employees had stolen from rival <i>Lockheed Martin Corp.</i> Before <i>Boeing</i> eventually acknowledged the theft, it denied any wrongdoing, then misled <i>Lockheed</i> for nearly a year about the amount of material stolen, according to the <i>Air Force.</i> 'We have felt extremely uneasy about the scandals that have plagued <i>Boeing</i> and led to the departure of its CEO,' wrote <i>Lehman</i> <i>Brothers Inc.</i> analyst Joseph Campbell Jr. in a June 7 report. "We have felt there has been a pattern of less than frank communication with the investment community, and more importantly with itself. But the culture started changing after its merger with the more aggressive McDonnell Douglas in 1997. 'These pay disparities were caused by their own practices,' Helgren says. 'None of this was by chance. And they continued for years and years to avoid the problem.' Among [Jensen's] nine children, she currently 'wouldn't let any of them work at <i>Boeing</i> .' The pay gap there may disappear one day. But one thing <i>Boeing</i> will never be able to erase is its long history of underpaying women."	On a modular enterpri se architec ture's lack of trust.
2005	EADS Annual Report, pg. 8	Thoma s Enders , CEO & Noel Forgea rd, CEO,	Firm- Investo r	β	"Dear Shareholders, Customers, Suppliers and Employees"	On the rhetoric of an integral enterpri se architec ture's plural

		EADS				objectiv e
						function
21 Mar. 2005	Busines s Week "Why Boeing' s Culture Breeds Turmoil " (Stanley Holmes)	·	Firm	α	"Boeing's board presented the ouster [of CEO Stonecipher] as evidence of a company so committed to ethical purity that under current circumstances it wouldn't tolerate even a consensual sexual relationship between the CEO and a female exec. Insiders tell another story. They describe an ongoing culture of unrestrained excess. The lack of restraint also led to rampant political infighting among senior managers. The board, meanwhile, seemed oblivious to the turmoil. 'We are committed to strong ethical leadership, and we have fought hard to restore our reputation.' Executive shenanigans and infighting are hardly unknown in Corporate America, but the degree to which they pervade Boeing is rare. In the midst of this turmoil, commercial division head Alan R. Mulally held court at a party in Kirkland, Wash., attended by 100 managers and employees three days before the Stonecipher bombshell. According to several attendees, Mulally talked openly about who would replace Stonecipher, calling it a two-horse race between himself and Jamse McNerney, who is the CEO of 3 <i>M</i> , a Boeing director, and a former top <i>General Electric Co.</i> exec. Those same people quote Mulally as saying: 'It's down to the GE guy or me. It's a fight to the death, and if it's him, I'm outta here.' Mulally wasn't the only exec plotting his ascent in recent years. In fact, one of his most serious rivals may have taken his machinations to such an extreme that they led him to unlawful conduct. Former CFO Michael Sears was sentenced to four months in prison for his role in the illegal job negotiations with Air Force procurement officer Darleen Druyen. Insiders say the controversy was part of his attempt to amass a power base at his rivals' expense. 'It was clear to everybody [that] Sears was anxious to be the successor to Phil to the point that it got pretty disgusting,' said a <i>Boeing</i> board member. 'You got tired of him acting like the heir apparent.' Sears also took control of <i>Boeing</i> 's famed in-house leadership center in St. Louis. Sears's stock rose in	On a modular enterpri se architec ture's low- trust environ ment.
					The back-stabbing was widespread among the top brass. 'It was everybody in the suite gunning for [<i>Boeing</i> CEO] Phil's job,' said a former senior Boeing executive	

					with direct knowledge of the situation. 'It was pretty destructive.' An unhealthy focus on internal politics wasn't <i>Boeing's</i> only culture problem. In March 2004, <i>Boeing</i> agreed to pay \$70 million to settle a sprawling class action alleging widespread sexual discrimination. Sexual misconduct by executives was a frequent topic of conversation among employees. As <i>BusinessWeek</i> reported in December, 2003, Condit settled at least one wrongful termination lawsuit brought by on a female employee with whom he had a relationship.	
					One of Stonecipher's top goals when he was brought out of retirement as CEO was to put ethics front and center. He created an internal governance office that reported to him and required every employee to sign an ethics statement. 'Without integrity you cannot conduct business successfully,' he wrote in June, 2004. 'Firing people who lack integrity is good business.' Words to live by."	
April 2005	Boeing Frontier s	Scott Carson , VP Sales, <i>Boeing</i> <i>Comm</i> <i>ercial</i> <i>Airpla</i> <i>nes</i>			"Our products bring better value to our customers, and our pricing reflects that value. We also have a responsibility to our shareholders, and that means pricing that allows us to make our financial goals. At the same time we have to be competitive in the marketplace. And we have to realize that our customers face great financial pressures, and price is a key factor in their decision- making. But it is only one factor, and it is critically important that we communicate to our customers on those other factors. Do I think that we will ever be the lower- price option? No. Do I think that should keep us from gaining more than 50 percent market share? I answer "no" to that as well. But let me say one more thing that is absolutely essential to our success in the marketplace. We simply must continue to lower the cost of making our products so we can offer the lowest possible prices to our customers. We must improve our productivity every day, every month, every year, forever. It's essential, it's a fact of life, and we all have a role to play."	On a modular enterpri se architct ure's strategy of <i>different</i> <i>iation</i> (as opposed to <i>cost-</i> <i>leaders</i> <i>hip</i>)
18 July 2005	Busines sWeek "I Like a Challen ge – And I've Got One" (Stanley Holmes)	James McNer ney, Chair man & CEO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm	α	"For McNerney, cleaning up <i>Boeing's</i> toxic culture is Job One. Insiders say a bureaucracy that stifles innovation, resists change, and tolerates rule bending remains largely intact. Adds <i>Lehman Brothers</i> aerospace analyst Joseph F. Campbell Jr.: "this is the <i>Boeing</i> that tolerated behavior that led to sexual harassment suits; debarment, and criminal prosecution." "McNerney says he isn't a big fan of buying for growth, blaming <i>Boeing's</i> recent troubles in part on "banging together a lot of acquisitions."	On a possibly more integral architec t than a modular enterpri se is accusto med.
Oct. 18, 2005	The Seattle Times		Suppli er	α & β	"Boeing spokeswoman Yvonne Leach said its one of 'the ironies of life' in the new global manufacturing market."	On Boeing' s outsour

	Business		Sumali	~	<i>"Boeing</i> spokeswoman Yvonne Leach did not see the	cing the 787's aft pressure bulkhea d to <i>Vought</i> <i>Aircraft</i> <i>Industri</i> <i>es</i> , who in turn outsour ced it to <i>EADS's</i> military - transpor t division : On
Oct. 19, 2005	Busines s Ticker		Suppli er	α & β	contract award as surprising. She said <i>Boeing's Hawker</i> <i>de Havilland</i> unit in Australia supplies some parts to <i>Airbus</i> .	competi tors as part of each other's enterpri se (supply chain) architec tures.
31 Jan. 2006	The Seattle Times, Transcri pt of Speech by Boeing' s Doug Bain	Doug Bain, Senior Vice Preside nt and Genera I Couns el, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm	α	"Good morning. Jim McNerney asked me to give you kind of a candid assessment of our major scandals and how we got there. As I walked up here, I think I heard [Boeing Chariman and CEO] Jim McNerney mutter, 'Here comes Dr. Death.' My overall message is fairly simple: We as the leaders of <i>The Boeing Company</i> get to choose what kind of culture we are going to have. And we make these choices every day by what we do and frankly what we choose not to do. I want to talk about these scandals not so much from the perspective of how we have tried to argue them or spin them, but from the perspective of the prosecutors and what they have told us. The recurring message we have gotten from the prosecutors and frankly everybody else we deal with is nne of shock and surprise. They say, 'You guys are <i>The Boeing Company</i> . You build things that are larger than life. You do things that are larger than life. You're not a sleazy company. How did this happen?' And the question that they always ask: Where was the leadership? <u>Evolved Expendale Launch Vehicle:</u> We did a poor job of the investigation, did a poor job of disclosing it to the government. Why was there two and a half years of silence? Why didn't somebody say something? Was	On ethics within a modular enterpri se architec ture.

there a culture of win at any cost? Was there a culture of silence? Where was management throughtout this? So what are the consequences? We lost \$1 billion to \$2 billion. And 1'll get to the criminal and civil issue in a minute. And we have a tury burdensome administrative agreement that Bonie [Sodnik, senior vice president of <i>Boeing</i> 's Office of Internal Governance]'s organization is in charge of implementing. Sears/Druyun: On October 17, 2002. Mike Sears [then chief fanancial officer of <i>Boeing</i>] met Darleen Druyun [then chief acquisitions officer for the Air Force] and offered her a job. The next day, Mike sent an e-mail that said 1 had a 'non-meeting' with Darleen Druyun.' So, the cultural questions: How come nobody said is Noold we really be hiring the relatives of our chief procurement officer for the largest customer we have on the defense side.' It also raises the question, Do we have a culture of silence - don't ask the tough questions. We have been trying to resolve these things. We have not been successful yet. But there are some within the prosecutors' offices that believe that <i>Boefing</i> is rotten to the core. They talk to us about prevasive misconduct and they describe it in geographic terms of spanning Cape Canaveral to Huntington Beach, to Orlando, to St. Louis to Chicago. They talk about it in terms of levels within the company that go from non-management engineers to the chief financial officer. The State Department's view of <i>Boeing</i> is that we just don't get it. There are to many violations.			
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2006 ce W America BA , Sy "Conver s,	lison Investo food, r 4E estem	tolerate their conduct for this long?" β "Where do you see the values in your businesses; would you agree these are no longer in producing pieces of aircraft but in integration and net-centric solutions? 'For	On the mental
with St Alison ic Wood" D (Phillip pr	roup rateg evelo nent irect	 BAE Systems, we see four value strings The fourth value level is Airbus, where we have a 20% investment. We have the tremendous success of Airbus in the marketplace, with the A380 coming on line and the A350 developments.' Would you agree that in the future it's going to be harder to maintain the transatlantic balance that BAE has been able to achieve, especially when you look at issues such as China— which is both a threat and an opportunity? Which do you think it is? 'One thing to be clear about upfront is that, with the U.S. business having the role it does in the portfolio, we will not be doing defense business in China. Our U.S. business is important to us, and we would not destabilize that. It is very clear that within the U.S., China is seen as a military threat. But the question is valid because China is as much an economic as a military threat and opportunity. For Airbus, China is a tremendous opportunity. But for BAE Systems—with a U.S. portfolio— there is natural question: At what expense do you ignore China?' Are you under any pressure to sell your 20% share in Airbus companies? 'I am sure this is going to be the hot topic for the next 18 months, especially among bankers. Airbus constitutes a very successful business and contributes to our earnings, therefore the group always looks at that as a successful contribution to the portfolio. But probably long term we don't see ourselves as owners of the business. We haven't said we want to be out by any particular date, and it's not an issue of derisking the business; it's a question of choice about where we put the money. The fundamental competitiveness of the wing work in the U.K. is based on competency and capability, and that goes back to earlier points about the competitive environment in the U.K. If the U.K. ceases to be competitive and trails its other European colleagues in areas such as R&D grants and launch aid, then the Airbus management team, putting politics aside, will make a decision about where is best to put	models of a modular owner of an integral enterpri se architec ture.

					Airbus work? 'We don't do it. We have transferred	
					that work to Airbus U.K., to stop that becoming an issue. The only return BAE Systems takes out of Airbus is the dividend we take from the Airbus businesses. By having a return from the Airbus business as a whole you do empower the Airbus management team to run that business in the same way as Boeing. As a U.K. citizen I want to see [the Airbus U.K.] Filton plant remain at its current level of competitiveness. But as an Airbus shareholder I want to see Airbus be competitive, and that means if work has to move out of Munich, filton, or Toulouse, because that's what makes sense in the marketplace, that's the right decision."	
13 Mar. 2006	Busines sWeek, "Cleani ng Up Boeing" (Stanley Holmes)	James McNer ney, Chair man & CEO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm	α	"McNerney said that 'management had gotten carried away with itself,' that too many executives had become used to 'hiding in the bureaucracy,' that the company had failed to 'develop the best leadership.' 'I think the culture had morphed in dysfunctional ways in some places,' the polished, soft-spoken McNerney said in a recent conversation with BusinessWeek, his first extensive interview since taking the job. 'There are elements of our culture that I think we all would like to change.' McNerney believes that internal rivalry is at the root of the company's ethical scandals. His prescription includes encouraging managers to talk more openly about Boeing's severe ethical lapses. 'I want to try to make it O.K. to have that dialogue,' says McNerney. 'If we can get the values lined up with performance, then this is an absolutely unbeatable company,' says McNerney. Insiders say that McNerney is trying to lead by example. He wins praise from co-workers for not embarrassing underlings in public. 'Jim is more interested in the human side. He is interested in how to create a culture where people speak up and take the risk and stop a production line because something is wrong. McNerney is reform[ing] Boeing's culture, [by] promoting integrity and avoiding abusive behavior." "McNerney introduced General Council, Douglas G. Bain, who really lowered the boom, railing against Boeing's pervasive 'culture of silence.' Bain warned the audience that many prosecutors 'believe that Boeing is	On an architec t re- integrati ng the low- trust environ ment of a modular enterpri se architec ture
26 April 2006	Thomso n Reuters Researc h, excerpt from "The Boeing Compan y, Q1 2006 Earning	James Bell, CFO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm- Investo r	α	 rotten to the core." James Bell (<i>The Boeing Company</i>): "Thank you, Dave, and good morning. As Dave said, I will briefly review our first quarter results and discuss our outlook, then we'll take your questions. Now, beginning this year we have moved to a split of duties between our CEO, Jim McNerney, and myself on our earnings call. Jim will participate in the calls at mid-year and at year-end and other calls on a selected basis. Of course, I will continue to be on all of <i>Boeing</i>'s quarterly earnings calls. Let's begin by turning to the first slide. <i>Boeing</i> is off to a very good start this year. During the first quarter, we grew revenues, net income, earnings per share, and cash flow at strong double-digit rates. Productivity 	On a modular Enterpri se Archite cture's defense of its finanaic al perform ance

s Call	improvements we continue to make across the company	
Transcri	and the significant increase in commercial airplane	
pť"	deliveries generated the strong performance this quarter.	
	Our balanced cash deployment strategy continues to	
	deliver value to customers and shareholders by investing	
	in our growth and returning capital to investors. Boeing's	
	businesses continue to be well positioned in their markets.	
	We expect the Commercial Airplane business will drive	
	strong enterprise growth over the guidance period. Our	
	total backlog grew to a record level of \$213 billion, largely	
	driven by the strong demand for our market-leading commercial airplane products, especially the 787	
	commercial amplante products, especially	
	Dreamliner. Coincidentally, today is the two-year anniversary of the 787 launch. The 787 has been the	
	most successful commercial airplane launch in <i>Boeing</i> 's	
	history. Today, we have 26 customers from around the	
	globe that have placed firm orders for 350	
	Dreamliners. We also continue to make good progress	
	on the development of the 787. As on all new airplane	
	programs at this stage of development, we are working	
	weight and schedule challenges, and we're making steady	
	progress in these areas. We remain confident that we'll	
	meet our customer commitments. We are on track to	
	begin flight testing next year, followed by entry into	
	service in 2008. Last quarter we highlighted the four	
	growth and productivity initiatives we are deploying	
	company wide to help drive us to financial performance	
	that matches the quality of our people and our technology.	
	While we're still early in this process, the implementation	
	of those initiatives is going well. The initiatives are the	
	tools we will use to drive growth and productivity to new	
	levels. They are long term. Combined with our focus on leadership development, they are important keys to	
	Boeing's future performance. Now let's take a look at	
	the numbers. Our operations are running well and	
	gaining momentum. Now let's review the performance of	
	our businesses. Next slide. Our Commercial Airplane	
	business is benefiting from a product strategy that's	
	keenly focused on our customers, and on our	
	commitment to continuous productivity improvement.	
	Clearly Boeing Commercial Airplanes is performing	
	very well in a strong demand environment. Next slide.	
	Connexion by Boeing continues to demonstrate the	
	potential of its satellite-based broadband service.	
	Connexion service is now available on more than 180	
	daily flights. In addition to 500 orders and options	
	from airline customers, we recently completed the first installations of Connexion service in the commercial	
	shipping industry. Also during the quarter, we	
	repurchased 5.5 million <i>Boeing</i> shares, paid a 20%	
	higher dividend, and continue to invest in our growth	
	program, all consistent with our balanced cash deployment	
	strategy."	
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	Heidi Wood (<i>Morgan Stanley</i>):	
	"All right. You weren't that active on the share	

repurchase front this quarter. Can you talk a little bit about your cash deployment strategies for the rest of the year? Do you plan on being more aggressive through the balance of the year?"
James Bell: "Well, we plan on continuing to implement our balanced strategy. We will continue to buy back shares. Clearly we have about 18 million or 19 million shares to go under our current authorization. The plan will be to go back to the Board and ask for an additional authorization. We will buy accordingly, as long as the stock is undervalued as it is, we will continue to have a pretty active buyback program."
Steve Binder (Bear Stearns): "All right. Then with respect to pricing in the commercial aircraft market today, and you look at 787, 777, especially the 300ER and the 737 NextGen, if you're looking at deals that you've been doing here in the last three or four months, for the '08 - '09 time period depending on the model type, maybe 787's further out if you isolate the escalator factor, how would you characterize the pricing environment, what you've seen in the last three or four months?"
James Bell: "Well, clearly it's a competitive environment, but we're really pleased with the kinds of deals we're signing. We believe we have embedded in those deals a real opportunity to create real value going forward, Steve, so we're not having fire sales."
Steve Binder (<i>Bear Stearns</i>): "No, I'm actually wondering, are you starting to see better pricing than your normal escalators would show?"
James Bell: "Well, we're seeing good pricing. I think it's stabilizing, and one of the reasons is that we have differentiated products, and we think we're getting good pricing, good value in the market space. That, coupled with what we're doing from a productivity perspective, we think we're going to be able to deliver good value on this order book."
Steve Binder (<i>Bear Stearns</i>): "Lastly, with respect to potential replacements for the 737 NextGen, I know there's been a lot of ideas. Is there any firm sense of whether BCAG down the road would go with a single aisle configuration or a twin aisle configuration to potentially that overall narrow body market?"
James Bell: "Well, no, we're clearly not there yet. We will continually be working with our customers, because that's where a

	product development decision is going to start and end, trying to make sure that we're going to provide to them a product, and invest in that product based on what they believe their needs will be going forward. Right now, Steve, we're just enjoying the success of the 737. As I mentioned earlier, we've delivered the 5,000th aircraft. That model is doing extremely well. It's the most popular airplane in the world. We've got over 6,000 of them on order. We'd just like to deliver on that order book, but obviously we will continue to work closely with our customers so we make the right product development decisions and we make investments according to what we think our customers want, as we've done on the 787. You've seen the benefit of that."	
	Ron Epstein (Merrill Lynch): "Good morning. Just following up on Steve's question about product development. As you guys walk through more of the 787 program , what milestones should we keep an eye out for, so as outsiders looking in, we have a good idea that things are indeed on track ?"	
	James Bell: "Well, I think that clearly the fact that we've gotten through firm configuration, which we did complete, we've been able to manufacture and successfully join some of the composite barrels. We powered up the auxiliary power unit. We've had the engine runs at both GE and Rolls. Now we've started, and our supply chain has started, building their plants, their factories where they can start the fabrication of the other component parts. I think there's been a number of milestones that you can look at now and get a good sense that this development program is on track, and then those others, particularly as our supply chain starts to stand up their factories and start to work on their detail parts, I think that would be something I would watch. Obviously, we're preparing to go into flight testing at the end of next year, or the second quarter of next year excuse me, in the second half, not quarter the second half of next year so that we'll be prepared to have this thing introduced in 2008. We do believe we're on track to make that happen."	
	David Strauss (UBS) "Good morning. James, could you talk about what impact a potential <i>Alcoa</i> strike could have on the business, and what precautions you have taken, as well as maybe what you're seeing out of some of your suppliers?"	
	James Bell: "Well, I think we have tried to be sure that we have multiple sources, and we'll work pretty closely with our supply chain and see what we need to do in order to deal with it, but obviously it's a challenge. We always have contingencies, so I think we'd be able to see our way	

through it."
Joe Nadol (JP Morgan): "Thanks, good morning, James. I was wondering, you've already given us a little bit of color on the supply chain and how things went well in the quarter. Now that you're up to your sort of 100 aircraft per quarter delivery rate, it would seem that you have a pretty good handle on things. I was wondering if you could give a little bit more color on, I guess if there are any necks of the toothpaste tube, where are they, and how you feel about it, relative to maybe three months ago or six months ago?"
James Bell: "Well, clearly that remains a watch item for us and we work it hard every day. We have our teams both from BCA and IDS really working very, very closely with the supply chain to make sure that we're able to get what we need when we need it. So that's why, as we talk about raising production rates, why it's a long-term, well thought through, disciplined process that we have to integrate with our supply chain. So clearly, we're feeling I think relatively more comfortable as we see progress, particularly on the 787, with our supply chain. Clearly that has not been without it's challenges, and we've been able to work closely with our suppliers to offset any of the issues we've seen to date. We will continue doing that going forward. Overall, we're feeling pretty comfortable about it. That's not to say that the supply chain isn't a watch item for us. It's not to say that there are no risks in it, but I think the way we're working together in an integrated fashion is allowing us to have a high degree of confidence that it's not going to cause us an issue as we work our way and harvest this up-cycle."
Robert Toomey (GT Reilly Advisors): "Hi, good morning. Thanks very much. I'm just wondering, James, with respect to the progress you've made on improving your productivity , clearly it's really starting to show through in your margins. Do you believe that based on what you know now, the potential for margins on the 787 could be higher than your other products? In addition to that, there has been some talk about the duration of this cycle being longer. You said earlier this is a different sort of a cycle . Can you just comment on how long you see this commercial cycle extending? Could it go out beyond '08 or '09? Thank you." James Bell: "Well, clearly the way we're building the 787 is different than the way we built the other product, and so we're pretty comfortable with the business case on that product that we're going to deliver good margins. As to whether it will ultimately be higher than the margins on other airplanes, that's yet to be seen. I think the thing that is clear is we're expecting to deliver

	a tremendous amount of value to our shareholders as it	
	relates to the 787 program. What was the second part of	
	that question?"	
	Robert Toomey (GT Reilly Advisors):	
	"Just the duration of the cycle."	
	n in the second s	
	James Bell:	
	"Well, clearly what typically you'd see in the cycle is a	
	peak order year, and then that order for the next	
	several years would drop off pretty dramatically.	
	Although we've seen a moderation of orders this year,	
	particularly given the 176 orders we got in the first	
	quarter, it does look like they will level off and stabilize, is	
	what we're thinking over the next couple of years, at least.	
	So that's somewhat of a different experience than we've	
	had in the past. Then when you couple with that the	
	traditional domestic customers, or domestic carriers, and	
	the European carriers are not back in the market at a	
	significant level yet, gives us some early indication that	
	this cycle really may go longer, and may be a little	
	more protracted and be a little different. Maybe the	
	peak is not as high as it would've been. We peaked at	
	over 1,000 orders last year. We don't anticipate that this	
	year, but we do anticipate getting more orders than	
	deliveries, and we anticipate that over the guidance period,	
	and perhaps it will be a little longer. We'll have to see	
	when the domestic carriers and the European, the	
	traditional carriers there, get back into the marketplace."	
	, , , , , , , , , , , , , , , , , , ,	
	Lynn Lunsford (Wall St. Journal):	
	"Good morning, James. This is just a housekeeping kind	
	of question, but when was the last time commercial	
	airplanes had a 10% profit margin?"	
	James Bell:	
	"You know, we were just trying to figure that out	
	ourselves, and I'm really not sure. I'm not sure that they	
	have, but maybe way back in the early '90's. I don't	
	know, but I'm sure glad they got it now."	
	Stanley Holmes (BusinessWeek):	
	"Good morning, James. Could you be more specific on	
	some of the challenges you see with the 787 in terms of	
	production and putting the plane together? Where do	
	you see the biggest challenges to date? You can just start	
	with that."	
	James Bell:	
	"Well, Stanley, I don't see that we have a whole lot of	
	major issues on this program yet to date, but obviously	
	where the challenges will be is in our supply chain as	
	some of our global partners are trying to do this for the	
	first time. So that's what we're monitoring very, very	
	closely, and making sure we're there. We're having them in	
4	our shop to make sure they know how to do the processes	

	that are necessary to make the material, and to actually perform the operations to develop the major components that they're responsible for. So our team, our technical team in BCA, is working very, very closely with the supply chain to make sure that they can get that done. So I wouldn't necessarily call those challenges, as I would say that we've gone through and looked at this development program. We've identified where the risks would be relative to the way we're building the aircraft, and we are making sure we have the right process in place to work through those and mitigate them so they don't materialize."	
	Stanley Holmes (Business Week): "Okay, what about on the cost side? There seems to be some issues and concerns about costs from suppliers. Where would you assess your suppliers' and Boeing's ability to maintain the entire cost of building a 787 within the parameters that you set out early in the program?"	
	James Bell: "Well, I've got to tell you, as I go through and look at the program, and I've been through a lot of development programs, because I grew up on the government side of the house, so you always are worried about the unexpected things happening that would drive you to over- run your budget. We are well downstream on this development program. We're well within the budget, well within the business case, and it really does look good. Stanley, all I can tell you is that right now, this looks like the best-run development program I've ever seen, but it is a development program. So clearly, we are mindful of that and making sure that we have the right resources embedded in our business case to help if something should happen. So right now, that something hasn't happened, and we'll just have to wait and see."	
	Peter Pae (<i>LA Times</i>): "Good morning. If I was an airline and I ordered a 787 today, when can I expect a delivery?" James Bell: "I think we're sold out in the first few years, so it would be in the 2010, 2011."	
	Peter Pae (<i>LA Times</i>): "A follow-up to that, considering that this is a new way of developing or making the aircraft, how difficult would it be to ramp up production, or what kind of challenges would you have?"	
	James Bell: "Well, a ramp up is complex and difficult, whether it's a new model or an old model, but we're always studying that. We have a global supply chain that has to be taken	

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25	P				into consideration. They're not sitting around just waiting for us to up production. They do have other work and other requirements. So we'd have to work our way through in an integrated fashion. It is a very complex, detailed study that has to take place, and generally, once you get through that, the implementation of it is in the future. It's not something that you can turn on immediately."	On the
27 April 2006	Boeing Confere nce Board, as reported in Uhl- Bien & Carsten, (2007)	James McNer ney, Chair man & CEO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm	α	 "We thought we'd done all the right things; we had an ethics leader, ethics advisors assigned around the company, and an anonymous ethics-line to report suspected violations. It wasn't enough. So then we had to ask ourselves some really tongh questions: Were these lapses symptomatic of a larger issue with our corporate culture? Were our leaders modeling ethical behavior? Did our people feel confident enough to speak up about ethical concerns without fear of retaliation? Were our people hiding in the bureaucracy; were they 'winking' at wrongdoing or looking the other way? The studies concluded that, certain cultural weaknesses had permitted the people (including leadership) who suspected a problem to, in effect (although they didn't regard it this way) look the other way. In other words: Too many people who thought something 'didn't feel right' failed to raise a red flag for a variety of reasons: They wanted to win a contract, they feared retaliation, they just didn't want to rock the boat, or they lacked the courage to speak up in a command-and-control culture. We also found that just about every part of our organization responsible for guiding, investigating and enforcing ethics and compliance worked prety much in isolation – they didn't necessarily share information with each other. Once we had the facts, Boeing faced a whole new set of challenges: Do we hunker down, fall back on 'process' and make everybody dot every 'i' and cross every 't'? Or do we go for the gold and drive a real shift in how we operate and the culture we operate in? Boeing chose to take the big step. We concluded that we had to make three major changes: 1. Get committed, and get aligned 2. Open up the culture 3. Drive ethics and compliance through our core leadership model, not off to the side of other things we're doing every day. To open up the culture, we are creating an environment that encourages our people to speak up about their concerns and feel safe in doing so. We d	On the chief architec t of a modular enterprise architec ture, exhibiti ng integral behavio r with regards to leadersh ip

					 why, at Boeing, we stress that there can be no tradeoff between values and performance. They go together, and we can't stray from our values or principles as we strive for better performance. Something done unethically will only undermine our ability to perform. I know and you know that one of the absolute prerequisites for success in ethics and compliance is the belief that it is OK for people to question what happens around them. You have to be absolutely honest and candid in talking about those things. Openness and candor have to start at the top. People mustn't be allowed to think that they can hide in the corporate bureaucracy or wink at the misconduct of fellow workers, or even their leaders – especially their leaders. We also realize it all starts with leadership. If an organization's leaders don't model, encourage, expect and reward the right behaviors, why should anyone else in that organization exhibit those behaviors? This must be and must be seen to be a central part of the whole system or training and developing leaders and of the whole process of evaluating and promoting people. This is the key. At the end of the day, the ethos or character of an organization its culture comes down to the behavior of its leaders; leaders get the behavior they exhibit and tolerate. What really makes the difference between one company and another? More than anything else, it's people and how they view themselves and their jobs. Do they feel they can speak their mind freely or do they have to be wheedled and cajoled into giving an opinion? One of the most important aspects of my job is leadership development. This is where I can have the most 	
Мау	Boeing	Alan	Firm	α		On
2006	Frontier s	Mulall y, CEO, Boeing Comm ercial Airpla nes			ever been in." "Our stock price shows that investors really value our plan."	<i>Boeing'</i> s record high share price, in spite of its record

May 23, 2006 May 29, 2006	Cincinn ati Enquire r Chicago Tribune	Scott Don- nelly, CEO, <i>GE</i> <i>Aviatio</i> <i>n</i> Richar d Aboula fia, Consul tant, <i>Teal</i> <i>Group</i>	Suppli er	α & β	"Its partnership with Airbus was key for GE becoming a military contractor and becoming a commercial aviation giant." "Airbus is instrumental in our position as the world's leading jet engine supplier." "Airbus is looking at permanent marginalization in the industry if they don't come back this year."	low market share. On <i>GE's</i> success via serving <i>Airbus</i> . On the under- estimati on of system inertia.
May 29, 2006	Seattle Post- Intellige ncer	Charle s Boffer ding, Execut ive Direct or, SPEE A	Labor	α	"With Harry Stonecipher, it was all about power-based interactions and intimidation. McNerney is not a flamboyant, force-it-to-happen kind of guy. He's the efficient, help-it-to-happen-in-the-right-way sort."	On Boeing' s past and present CEO, from the perspect ive of labor unions. Signalin g a potentia l effort towards reintegr ation of enterpri se architec ture?
May 29, 2006	Seattle Post- Intellige ncer	John Leahy, VP of Sales, <i>Airbus</i>	Firm	β	"Unfortunately, he's [McNerney] more impressive now [that he left <i>GE</i>]. It's a shame he's running our major competition."	On Boeing' s CEO, from the perspect ive of the competi tor. Signalin g a potentia l effort towards reintegr ation of

	I					enterpri
						se
						architec
						ture?
May 30, 2006	Wichita Busines s Journal	Jim Melvin , VP & GM	Suppli er	α	"It's a good opportunity for a United States company to get some business in China on 787, so it's great."	On supply chain "arbitra ge": US work sent to China for offsets, and ultimate ly returnin g to the US for capabili ty &
				0		cost/qua lity reasons.
14 June	New York		Investo rs	β	" <i>EADS</i> stock closed down 26%, the lowest since the stock debuted in July 2000 and on par with some of the biggest	On the market'
2006	Times		15		one-day plunges in corporate history. <i>Enron</i> shares, for	s short-
					example, fell by 23% on Nov. 20, 2001, after the company	term
					restated earnings a second time."	reaction
						to
						Airbus' second
						delivery
						delay
						announc
						ement
						on the
	DI I			-		A380.
14 June	Bloomb erg.com		Investo	α &	"The problem isn't a delay of a few months, its that we no longer have confidence in what EADS says," said	On the fluidity
2006	erg.com		rs	β	Xavier Debeugny, a fund manager at Paris-based	of
2000				E.	brokerage Oddo & Cie. 's private banking unit, which	capital
					oversees some of France's wealthiest individuals. He said	among
					he sold most of his EADS shares three months ago in favor	competi
					of rival Boeing's stock."	tors.
15	The	Jim	Firm	α	"WSJ: You said you want ethical behavior to become a	Ona
June 2006	Wall Street	McNer			competitive advantage for <i>Boeing</i> . What does that mean? McNerney: 'Every company of our size has a bad apple	modular enterpri
2000	Street Journal,	ney, Chair			or two in it. The question is, are they caught before it	se
	Asia	man &			becomes a problem.'	architec
	"Boss	CEO,				ture's
	Talk:	The			WSJ: How is running Boeing different from your previous	view
	Jim	Boeing			stints at General Electric or 3M? McNerney: They are all	towards
	McNern	Compa			proud, high-performing companies that have attracted very	leadersh
	ey:	ny			good people over the years where, each at different	ip.

	Piloting Boeing' s New Course. " (J. Lynn Lunsfor d)			points in their history, grew a little inward and parts of the culture got a little stale. In all cases, there was a big leadership challenge to retap into the capability of the company and the people and the leadership.""	
5 July 2006	MSN Money, "Boeing Shares Could Fail From The Sky: Optimis tic Investor s are Treating Orders like Revenu es. Given the Comple xities of Produci ng the New Dreamli ner, <i>Boeing</i> May be in for a Hard Landing ." (Jon Markma n)	F	irm α	"Investors admired the ambition, complexity, profitability and market dominance of industry leaders <i>Fannie Mae</i> and <i>Intel</i> all the way up to the point when their earnings forecasts were proven wildly over-optimistic and blew up. Could the same now happen at <i>Boeing</i> ? The parallels are eerie, if not at all perfect. <i>Boeing</i> — the third-best gainer in the <i>Dow Jones industrials</i> over the past year — is priced for perfection, much as the techs and banks were in 2000. And perfection, as we know all too well by now, is rarely attained. Investors in the European consortium behind <i>Airbus</i> found that out all too well last month when executives had to backtrack from laughable assurances that production of their new super-sized A380 commercial aircraft was on track. The bad news sent the consortium's shares down 25% in a week. <i>Boeing</i> investors celebrated the Europeans' bad news, figuring it meant new business from frustrated <i>Airbus</i> customers. But really, they should have taken it as a warning, for it is very hard to believe that the U.S. aircraft maker will manage to escape a similar fate with the construction of its own new plane, the 787 'Dreamliner.' Sky-high optimism <i>Boeing</i> rarely built a new aircraft on time when the planes were built start to finish in the greater Seattle area. But somehow it has managed to persuade investors that this time — when much of the plane is being built overseas from hard-to-get materials and organized with a glitchy new software system — <i>Boeing</i> can not only keep production on schedule but actually build planes at a record clip. A couple of analysts have been sounding the alarm, but have not made much of a dent yet with <i>Boeing</i> bulls. One bearish analyst, David E. Strauss at Swiss-based brokerage UBS, has told clients that the Dreamliner is even more likely to blow deadline than the <i>Airbus</i> A380. 'Risk to the 787 production schedule will continue to increase from here as the program heads toward first flight in late summer 2007,' he wrote. If shares of <i>Boeing</i> do go into a n	On a systemi c understa nding of modular enterpri se architec ture.

a premium for an industrial company's shares when they believe it is halfway through a business up-cycle and recent earnings growth will extend at least three years into the future. They pay absolute top dollar when they think a company whose growth has been cyclical in the past has found a way to smooth out its ups and downs and bring in steadier cash flows through diversification efforts. So what are investors thinking? Forgetting the risk of production delays and the loss of face that would entail, steady cash flows could hardly describe Boeing, which is now, and will forever be, tied to the ups and downs of the worldwide demand for commercial and, to a lesser extent, military airplanes. With energy costs persistently high, global stock markets reeling, worldwide economic growth flattening and the threat of pandemic hanging over travel, the airline business does not look like an ideal place for investment capital at this time -- and that goes double for companies that provide capital equipment, like Boeing. The case for Boeing shares over the past three years has rested on its brilliant campaign to best its only major rival, Airbus, in obtaining orders for nextgeneration commercial aircraft. Airbus made a big bet on offering a gigantic new double-decker, wide-body jet that would transport up to 800 people at a time; Boeing made its own big bet on the 787, a more fuel-efficient aircraft that proposes to save airlines money. So far, Boeing has won the race for new orders by a handsome margin.

A source of concern

But orders are one thing, and producing the darn thing is quite another. And this is where we get deeper into the intersection of ambition, complexity and risk. For if the plane misses its 2008 delivery deadline and fails to perform as Boeing's salesmen-engineers promise, then dreamy investors can kiss many of those orders goodbye before the first plane ever takes off. In its marketing material, the Dreamliner has been sold as a plane that achieves its fuel efficiency and streamlined manufacturing costs through an unprecedented reliance on large quantities of titanium, aluminum and carbon-fiber composites, and on a global supply chain held together by a new software system. Boeing has said that its suppliers and software are performing up to par and that it has not encountered any difficulty in securing enough specialty metals. Yet persistent rumors have surfaced over the past six months, denied by the company, that the 787 schedule has been plagued with technical, production and supply hitches. Fear of the loss of a ready source of titanium was in large part behind the company's stunning pledge to spend \$27 billion over the next three decades on engineering and raw materials in Russia, an economically and politically unstable **country** that happens to house most of the world's supply of the key metal. Two weeks ago, BusinessWeek

reported that the passenger seating section of the 787 fuselage has failed in testing. The company blamed the problem on faulty quality controls, but denied that construction problems at Asian or European airframe contractors would force it to bring more of the work back to the United States.
Cancellations coming? <i>Citigroup</i> aviation analyst George Shapiro notes that historically, <i>Boeing</i> shares have not performed well during development cycles and adds that their recent success 'reflect(s) a lack of concern about problems developing' with the 787 and its outsourced research and development efforts. Shapiro also warns that the 787 production cycle may be shorter than normal as airline profitability has not recovered enough to support the order surge. He expects a wave of order cancellations, even if delivery schedules are met. Why so glum? Shapiro says new planes containing significant technological innovations inevitably encounter manufacturing problems. Already, <i>Boeing</i> has acknowledged that the 787 is overweight, and with a big advance in electronic complexity, my guess is that some variation of the wiring snafus that have tripped <i>Airbus</i> are virtually a lock to appear. It's precisely due to manufacturing crises that <i>Boeing</i> shares have typically underperformed during development cycles and outperformed once planes are finally delivered. The company ultimately fixes the problems, of course, but the solution comes at the price of higher research costs that depress profit margins. Meanwhile, investors are treating orders as if they were booked revenue, even though past cycles have seen up to a third of orders canceled. Although some 787 orders are still coming in, many were made in an environment of much lower oil prices and interest rates, and stronger economic growth.
Tech echoes You may recall that, in early 2000, tech companies boasted that tremendous order backlogs would lead to fantastic earnings growth, only to learn later that buyers had speculatively double and triple ordered. Jets also are ordered by companies that speculate on traffic boosts that never materialize. <i>Citigroup</i> notes that the Indian market is seeing air traffic grow by 20%, while capacity is expected to grow by 30% an imbalance that increases the likelihood that price wars will sap profits and lead to cancelled orders. If cracks appear in <i>Boeing</i> shares' uptrend, the stock could come in for a hard landing. So what are the shares really worth, considering the risk? <i>Boeing</i> has historically traded at anywhere from a 50% discount to a 50% premium to the <i>S&P</i> <i>500</i> aggregate price-earnings multiple. Since the index multiple is around 16 and <i>Boeing's</i> multiple is at 25, it's now trading at a 55% premium. Were the multiple to

24 July 2006	Aviation Week & Space Tech., (Robert Wall)	Thoma s Enders Co- CEO, EADS	Firm- Investo r	β	contract to parity with the broad market and earnings were to come in at consensus 2006 estimates, shares would be worth \$56, or 35% less than the current quote. And if the schedule slips and the company disappoints on earnings, well, sky-high is not the word that would be used for either the multiple or the price. Personally, I'll take an aisle seat in coach." "EADS especially would like to end the recent large fluctuations in its share prices. 'We need more stability,' Enders says, which smoother operations should provide."	On producti on stability causing share price stability
26 July 2006	Thomso n Reuters Researc h, excerpt from "The Boeing Compan y, Q2 2006 Earning s Call Transcri pt"	Jim McNer ney, Chari man and CEO; James Bell, CFO, <i>The Boeing</i> <i>Compa</i> <i>ny</i>	Firm- Investo r	α	W. James McNerney (<i>The Boeing Company</i>): "Boeing has made good progress across most areas of our business during the quarter. We used our cash to invest in our organic growth programs and add capabilities to our services businesses. We also improved our liquidity position, reduced debt and returned capital to our shareholders through our dividend and share-repurchase programs. Our strong cash generation was driven in part by the outstanding sales success we continue to achieve in our commercial airplanes unit, which has expanded our total company backlog to another record level of \$220 billion. Overall, we continue to be well- positioned in healthy markets. Our commercial airplanes business remains our growth catalyst, thanks to an expanding market and airline customers who increasingly prefer Boeing's value-creating products. Business execution is of paramount importance to us. It is our main focus. Before I turn it over to James to provide more detail on our financial results and our updated outlook, I would like to say a few more words about the global settlement we reached with the U.S. government during the quarter and our decision not to seek tax deductibility for any of the charge associated with it. A few years ago, certain Boeing employees did some things that were wrong. We accepted responsibility for their actions and, through the settlement, we sought to put the past behind us and move toward a new era where ethics and compliance would become a competitive advantage for Boeing. We have made substantial changes in our ethics and compliance in everything we do, at all levels in the organization. We have been advised that the bulk of the settlement is in fact tax-deductible and that similar deductions have been allowed in the past. Without question, the short-term financial impact of the taxability issue is significant. However, the long-term value of Boeing's reputation is even more significant. Accordingly, I feel strongly that the right thing for Boeing to do is not to seek tax deductibility for th	On a modular Enterpri se Archite cture's defense of its finanaic al perform ance

settlement charges. This should be a signal to our	
employees, customers, suppliers and our shareholders	
of our willingness to acknowledge responsibility, accept	
accountability and to move forward in a manner	
reflective of the great legacy of our company and its	
employees. Simply speaking, my intent is to focus on	
the future and put this unfortunate part of our past	
behind us. As we move forward, operating with	
integrity will differentiate <i>Boeing</i> just as much as our	
technology, our talented people, and our attention to	
customers."	
customers.	
James A. Bell (The Boeing Company):	
"Commercial airplanes is benefiting from a product	
strategy that is keenly focused on our customers and our	
commitment to continuous productivity improvement.	
Revenues for the quarter rose 10%, and BCA's operating	
margins expanded to 10.1%, driven by a 14% increase in	
deliveries. We are on track to deliver 395 airplanes this	
year, a 36% increase over last year's total. These numbers	
reflect our success in working with our global partner	
network to efficiently increase production rates across	
the entire supply chain, while at the same time manage	
for profitability. We are increasing our R&D	
investment in BCA primarily to reduce risks on 787	
program goals related to weight and schedule. The	
program remains on track to meet its performance	
commitments and entry into service. We captured 311	
airplane orders during the quarter with our industry-	
leading product line. Our success has enabled us to grow	
our very large commercial airplane backlog, which has	
now reached a record \$142 billion. The strong order	
environment and the market demand for Boeing products	
drove our order total for the first six months of 2006 to	
487 airplanes. As of today, we have won net orders for	
510 airplanes. We continue to make progress on the 787.	
We began manufacturing and major assembly during the	
quarter. We also added to the large backlog of 787 orders	
in the period. Since program launch, we have captured 364	
firm orders from 25 customers from around the world. We	
expanded our large service businesses during the quarter	
by completing the <i>Carmen Systems</i> purchase and	
announcing an agreement to acquire Aviall. These focused	
acquisitions, combined with double-digit organic growth	
in our service businesses at both BCA and IDS, will help	
us deliver enhanced capability to our customers and	
additional value to our shareholders. We also achieved	
key milestones during the quarter, including the roll-out of	
our first 737-900 extended range aircraft. Clearly Boeing	
Commercial Airplanes is performing very well in a	
strong market, and we are raising our guidance for BCA	
revenue and earnings in both 2006 and 2007. Next slide,	
please. Turning to our balance sheet on slide 7, we	
continue enjoying outstanding balance sheet strength and	
liquidity. We ended the second quarter with \$10.6 billion	
in cash and liquid investments. Our total debt levels	

decreased about \$500 million in the quarter, as BCC paid down maturing debt consistent with its reduced portfolio size. Financial strength and solid credit quality remains priorities for us, and we are pleased to have the highest credit rating in the industry. Also during the quarter, we repurchased 6.3 million shares, paid a dividend, purchased <i>Carmen Systems</i> with cash, and continued to invest in our growth program such as the 787 and the new 747-8 all of which is consistent with our balanced deployment strategy."
W. James McNerney: "Thank you, James. As James said, our outlook continues to strengthen. Our businesses are strong. Our products are valued. They are building upon our customer relationships and we are focused simultaneously on growth and productivity. Throughout the organization, we are committed to consistent execution, avoiding past mistakes and delivering on our commitments. We are keenly aware that our success depends on providing better value to our customers and on operating our businesses with the highest levels and standards of integrity."
Heidi Wood (Morgan Stanley Dean Witter): "Good morning. Jim, I have a question for you. Now that you have been CEO at Boeing for a year and you said in your comments that business execution is a main focus, can you give us some specifics about how you are addressing the risk mitigation efforts through the company, so the issues come to you earlier and the charges are smaller?"
W. James McNerney: "I think, Heidi, part of the increased focus on risk management and program execution has been to service some issues over the last year. I think that is part of the result of this focus. Having said that, we have had more things to deal with than I would have liked. That is not a perfect answer for you, but maybe by way of explanation that helps a bit."
Douglas Harned (Sanford C. Bernstein & Company, Inc.): "Good morning. I would like to get your reaction to Airbus' wide-body approach coming out of Farnborough. First, there are a lot more details that need to come out on the A350, but the focus of the initial airplane is at the large-end of the 787 and the low-end of the 777. Not surprisingly, they are claiming better performance. In addition, we are seeing Airbus pricing very aggressively to get more A330's in the market at the same time. When you look at all of this, how do you see Airbus' A350 launch and approach to the A330 impacting BCA's performance and product strategy?"

		W. James McNerney:	
		"First of all, we did not expect them to do nothing. They	
		have introduced a product that, on the face of it, and since	
		we really do not have a clear definition of what the	
		product is beyond the concept that has been discussed, it is	
		hard to react to the specifics with regard to performance	
		versus our airplanes. I will say that it seems they are	
		trying to cover two of our airplane families with one	
		airplane, which is a tough putt. You are right, it has some	
		elements of competitiveness with the low-end of the 777	
		line, if they can execute along the lines of the concept they	
		put out. We do not see it as a plane that can compete	
		very well with our 787 line. It is a little big and a little	
		heavy to do the mission the 787 can do. In summary,	
		you have a single airplane trying to cover two of the	
		most successful families of airplanes we have ever had.	
		Knowing a little bit about engine technology associated with these kinds of planes, which is part of the value	
		package as well as the plane itself, it is an ambitious	
		program. Now, will it be a good airplane? Yes. Will it fit	
		some missions well? Yes. Will they try to, while they	
		gear up production which will take them two to three	
		years longer than us getting the 787, we have already	
		had the 777 out for 10-plus years will they aggressively	
		price old technology to bridge some customers? I	
		would be tempted to do that, and that is the A330	
		story. What they are doing makes sense, but will it be	
		enough is the question."	
		Douglas Harned (Sanford C. Bernstein & Company,	
		<u>Inc.):</u>	
		"You are not seeing any real change in the way you are	
		looking at them, at the market based on this?"	
		W. James McNerney:	
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upward pressure on our current production plans. Alan Mulally and his team are sifting through alternatives, which range from increased productivity in their current facilities, or currently being developed facilities, as well as potentially some additional facilitation. We have not made a call there, but you are right the demand for this airplane, the unprecedented demand for this airplane is forcing us to ask the question. There are worse questions to ask and answer, and over the next year or so, we will come up with a final answer there."
Robert Stallard (<i>Banc of America Securities</i>): "So this plane is essentially sold out until 2010? Is that the current situation?"
W. James McNerney: "Beyond that pretty much through it eats into '11 pretty far too."
Byron Callan (<i>Prudential Equity Group, LLC.</i>): "This is really just a follow-up on Heidi's question how satisfied are you that the focus on execution is such that <i>Boeing</i> has gotten to the bottom of the barrel on some of the issues of that have vexed earnings lately? Are you satisfied that you have the risk reduction disciplines, and even the culture in place that we are not going to see some of these surprises in the future?"
W. James McNerney: "No, I am not totally satisfied none of us are. As I answered Heidi's question, I try to portray a situation where the increased focus itself is surfacing some things. But I think what this company does are things that no other company does and as a result, we can push the envelope a little bit. We have to be more careful, not only in execution, but on things we choose to do. We are spending a lot of time focused on it. We have a lot of our initiatives focused on it. I would see every quarter, every year, an improvement. But I am not satisfied with where we are and I probably never will be totally satisfied, because that is a little bit of the nature of the business, but we are going to improve."
Steve Binder (Bear, Stearns & Co.): "How should we look at the margin guidance for BCAG for '06 and '07? You did not change margin guidance, but you did increase the R&D expense. Should we look at it as just block extensions? Is it lower expected costs on programs? Is it rate changes in the outlook? What are the factors offsetting the R&D build?"
James A. Bell: "Actually, we did have a block extension for the 777 it was off 50 this quarter, and that is why you will see that the deferred production costs went up slightly. But no, it is a combination of things. We are working our

productivity initiatives. We are harvesting the benefit
of that. That is being somewhat offset by raw material
costs, so we are dealing with that. Clearly the R&D that
we have, that we guided you to that is going up, is really
there to make sure that we can get through some of the
issues you normally would encounter at this phase of a
development program, while raising the level of insurance
that we will be able to meet our customers commitment
and our in-service date schedule. That is why you are
seeing the balance in terms of margin guidance, both this year and next at BCA.
year and next at BCA.
<u>Cai von Rumohr (SG Cowen & Co.):</u>
"Thank you. For the second quarter, BCA has done 10%
margin. Could you comment first on some of the color on
that? For example, the difference between program and
unit cost narrowed. What did the impact of the 777 block
extension do? Secondly, while you have increased R&D,
essentially it looks it is going to be relatively flat next
year, and the volume at BCA now is going up. Explain to
us again why those margins do not go up, or in fact, if
there is a chance they could go up, what should we look
for to tell whether they might?"
James A. Belli
James A. Bell: "In '06, as you look at where we are this first part of the
year, in the second-half of the year, we are going to have
less contributions by our supply chain to our R&D. That is
some of the impact. We are having higher R&D costs this
half of the year, and then we have timing on some of our
expenses, primarily our selling expense. That is what you
are looking at and how it would moderate. In fact, if you
took the contribution out of the second quarter, we would
be closer to what the run-rate is that we guided you to. So
we think we are pretty comfortable this year that that is
about the right number. Going to next year, again Cai, it is
clearly we are going to increase the R&D spend rate.
We are also going to be careful with what is going to
happen with raw material costs and our productivity
initiatives. We are doing very, very well on the single [L]. Clearly we are still challenged on how to get that
out of the wide bodies. There are more special features
associated with the 777 and the 4-7 as a custom-built
airplane, but we are optimistic we are going to get it.
Nonetheless, you could say we are being what I would
consider conservative at the right level."
Ronald Epstein (Merrill Lynch):
"Good morning. A question for Jim in the release and
the on the call, you guys mentioned how you are
increasing R&D spend to mitigate risks I guess in
weight on the 787 program. Can you give us any further
color on that? Sort of as outsiders looking in, so we can
feel more comfortable with the development of this new
airplane?"

W. James McNerney: "The weight issues on a program like this are not unusual.	
As a matter of fact, I cannot remember an aircraft program	
that did not have a weight issue of one form or another at	
this stage in the program. I would characterize the	
weight issue we have here as more normal than	
abnormal. Having said that, we have aggressive	
commitments from certification and for entry into service,	
and we want to mitigate any risk associated with not	
meeting those commitments. I think we are attacking the	
weight issues aggressively and the associated schedule	
issues, we still, as we project where we are going to be, we	
still see the plane delivered on time, within the	
performance commitments we have made to our	
customers. These programs are never easy. As you design	
and build the 4 million parts that go into these aircraft,	
there are always going to be issues. We are paranoid	
every day about them and trying to attack them and	
leave no stone unturned at this stage. I would rather be	
paranoid now than deeply disappointed later."	
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Ronald Epstein (<i>Merrill Lynch</i>):	
"So we are still looking at first flight at the end of next	
year?"	
W. James McNerney	
"Yes, first flight '07 and next year. It is third quarter	
and then similar timing '08 for EIS, entry into service."	
David Strauss (UBS):	
"Good morning, thank you. Jim, could you just give us	
your current view on the status of the overall supply	
chain? Incrementally, have you seen any improvement or	
has your confidence increased over the course of the last	
three to six months? If any problem areas, if you could just	
give us some examples."	
W. James McNerney:	
"We knew at the beginning that there would be issues that	
cropped up in the supply chain, particularly as we relied	
on people for higher level components, and we tried to	
anticipate this by our use of IT, common engineering	
tools, real-time visibility across the globe in our labs	
and their labs simultaneously. We try to anticipate it by	
the way we manned and worked together our site and their	
site all toward the end of seeing problems early, dealing	
with them aggressively. We have had a couple of	
instances where we have moved work, but that was all part	
of the contingency plan, where we had built extra	
engineering capacity in the event that someone ran into an	
issue on completing work and we had engineering	
capability and facilities ready, and that has happened once	
or twice. Again, anticipated, planned for, and we are	
dealing with it, but I would not characterize any of it as	
unanticipated or earth-shaking. We are right at the stage	
now where the transition from engineering to development	

is happening and we are monitoring it every day."	
Joseph Nadol (JPMorgan Chase & Co.): "Thank you, good morning. I have one more on the 787 R&D. Over the two years, your R&D guidance has gone up \$0.5 billion. It sounds like it is more than that for Commercial, and I guess specifically for the 787. I am just wondering if you could be a little more specific as to where that money is going. Are you hiring more engineers? Are you paying overtime? Any more color on that, and then, as an adjunct to that, are your suppliers	
also seeing increased costs across the board or anywhere particularly?"	
W. James McNerney: "I think the backdrop to my answer, and the quick answer is more engineers and more overtime to execute these risk mitigation programs. But the perspective you have to have here is that this will be the most efficiently developed airplane that we have ever done. The strategy of working together with our partners and our suppliers where they are shouldering some of the development work in concert with us is producing a cash model for this airplane, even with some risk mitigation activities, that promises to be superior to anything we have ever done. Having said that, yes, more engineers and overtime, and not all unanticipated."	
Joseph Nadol (JPMorgan Chase & Co.): "Are your suppliers participating in the higher costs, or are you picking up most of the slack?"	
W. James McNerney: "They have skin in this game to, so the extent to which we [achieve] together, that they are falling behind in some area or where the weight is an issue in another, yes, it is their resources that they are applying. That is part of our agreement with them."	
Myles Walton (<i>CIBC World Markets</i>): "Thank you. A question on pension. For '06, you have lowered that number by \$200 million, left '07 intact. Given current year adjustments tend to be a little stickier, can you just give us background on how that '06 number changed? Also, given the rising interest rates, it looks like maybe 75 basis points higher next year, why you left your '07 \$1 billion intact? Then, as an adjunct, is most of that pension expense still flowing through BCAG?"	
James A. Bell "Well, that was about six questions, Myles, but let me see if I can remember them all and answer them. First of all, the overall pension cost for the year is the same. It is about \$1 billion. What you are seeing is what actually flows through earnings for this year, and that is the differential between what goes to inventory and what	

actually flows to expense. In our model, we had to modify the method for making that determination, and it turned out that it gave us [inaudible] for this year, because the way the thing works is that which is inventoried last year gets expensed this year, and then a portion of this year's cost gets expensed this year. That is what you are seeing in '06. In '07, the pension cost as you know is determined well in advance of what you would see in changes in interest rates. The change in this year does not have a significant effect on '07. Nonetheless, that method, what you see, what we think will happen in '07 stays about the same based on what we have just done. It is a one-time adjustment in '06."

Myles Walton (CIBC World Markets)

"Most of that is flowing through BCAG?"

James A. Bell:

"The pension cost is allocated -- the cash piece is probably going through, **most of it is going through BCA**, but then what you are looking at a lot of too is the adjustment that flows from it stays on the corporate books, the fast-cash adjustment."

Joseph San Pietro (Wachovia Securities):

"Good morning. Circling back to the Connexion issue, the company has stated in the past it has justified its investment in the program not necessarily from the revenues that can be derived from the back of the plan but more importantly from what is going on up-front. My understanding is that part of the lower operating cost of future programs, specifically the 787, are tied to the efficiencies that can be gained from using the Connexion system. If you guys keep it or sell it to someone, I get that, but if you decide to shut it down, exactly how does that affect the operating costs for the outlook for new aircraft programs?"

W. James McNerney:

"Not significantly is the quick answer, but you are right. The program is largely justified by the back of the plane -so I differ with you a little bit there -- but also in part justified by facilitating operations of the airplane and some service elements. The facts are that our business model is not being met. We are taking a good swing at this business and we are falling short of where we want to be, which is why we are asking a series of fundamental questions now on a going-forward basis -- restructure, terminate, affiliate being the obvious options, but continuing to operate as we are now is not an option. We are taking the fundamental look. All elements of the business model are falling short of the projections and impact on a major restructure or terminate would not significantly impact the economics. There are other ways to do what you are describing."

 Joseph San Pietro (<i>Wachoid Securities</i>): "What has been the response from your customers, specifically? The system seems to be working. I mean, <i>Lufthanuss</i> acress to be relatively pleased. It is a drag that you gays had the U.S. carriers back out due to your financial situation, but at some point they come back. You gays were not the only ones that invested in this, so what are your partners saying?" W. James McNerney:		
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the IDS people mentioned that they wanted the ITAR out of the tanker proposal, they wanted to insert that back in there. Will <i>Boeing</i> pursue these and what is your reaction to the <i>Northrop Grumman</i> statement?"
W. James McNerney: "As I pointed out, Dominic, we are just seeking a level playing field here, equally applied regulatory environment for both. This issue was raised as we discussed in Farnborough really by the legislature in terms of discussions they have had and resolutions that have been put forward to ensure this level playing field. I think our customer and the legislature behind it are probably the ones that should push for this rather than us. We are a self- interested party. We are a competitor here. We just want to make sure it is a level playing field. I saw your interview with Mr. Crosby. You know, for all I know, they are taking steps to respond to these things that I am unaware of. That is where we stand."
<u>Molly McMillen (<i>The Wichita Eagle</i>):</u> "Good morning. My question is for Mr. McNerney. I saw comments from Alan Mulally out of Farnborough about a plan for the 737 replacement, that that plane would be more composite. My question is, what kind of impact do you anticipate that could have on <i>Spirit</i> <i>AeroSystems</i> here, which certainly has a huge portion of the current 737? What do they need to be doing in the meantime?"
W. James McNerney: "Listen, first of all, I do not think Alan meant to say, and I do not think he did say that there was a clearly defined next-next generation 737. You probably did not imply that in your question. We are studying where to go and obviously composites are one of the technologies that could flow from the 787 down into the narrow body. The value of the composites, obviously strength, maintainability and weight. I think Spirit is doing a good job on the composite side. They are a very valued partner, so I think whatever plane we define for the future aero body which will not be for a number of years, keep in mind we would hope that Spirit would remain a very important partner for The Boeing Company going forward. Based on the capabilities I see there, I think that is going to happen."
Molly McMillen (<i>The Wichita Eagle</i>): "So you would anticipate them getting a bigger chunk than they have of the current 787?"
W. James McNerney: "No, that is not what I said. That is not what I said. What I said is that they will remain a very important partner. It is hard to have a work statement until you have an airplane defined. I see the capabilities that have

		9	Pierre		developed there, the quality of the people developed there, I see them holding on to a big chunk of it, and we want them to hold on to a big chunk of it, consistent with competing for the business. I think they are going to be very competitive." <u>Amik Sacheet (Chicago Tribune):</u> "Good morning. I wanted to ask you, with Airbus likely to seek new launch aid for the A350, how that might affect any potential settlement of the trade disputes?" <u>W. James McNerney:</u> "Well, I do not think it would be helpful. I think if they seek launch aid on the same terms that they have had it historically, I think our government would view that as a step backwards, a significant step backwards in the negotiating process. As I said before, I hope we can find a way to negotiate something, our government and the European governments, but that specific step, would not be helpful, in my opinion."	On a
Sept. <i>H</i> 2006 (<i>y</i>	The Boeing Compan website	Scott Carson , Preside nt, <i>Boeing</i> <i>Comm</i> <i>ercial</i> <i>Airpla</i> <i>nes</i>	Firm	α	"Boeing Chairman, President and CEO Jim McNerney today announced the appointment of Scott E. Carson as president and CEO, Boeing Commercial Airplanes. Carson, 60, a 34-year Boeing veteran, moves to the leadership position from vice president, Sales, for Commercial Airplanes. He replaces Alan Mulally, who has been named chief executive of Ford Motor Company. 'Scott Carson is a seasoned and well-respected leader who knows our customers, our business strategies, and our products and services inside and out,' said McNerney. 'He is uniquely qualified to step in and lead our commercial airplanes team and continue to advance our performance and growth plans.' Boeing also named James M. Jamieson, 58, to the new position of chief operating officer, Boeing Commercial Airplanes. Jamieson currently serves as senior vice president, Engineering, Operations & Technology, at Boeing's corporate offices in Chicago. Jamieson will report to Carson and oversee airplane operations and product development. 'Adding the strength of Jim's background and experience in engineering, operations and product development will make our already strong Commercial Airplanes team even stronger,' said McNerney. Carson has a long record of accomplishment across Boeing. In his most recent position he reinvigorated sales of Boeing commercial airplanes and related services to airline customers and leasing companies around the world. He has also served as executive vice president and chief financial officer of Boeing Commercial Airplanes, where he led the finance and business strategy organizations, as well as information systems and services. He also held leadership positions in the company's defense business and was the first president of Connexion by Boeing. 'I am excited and energized by the prospect of leading the people of this great business,' Carson said. 'We will remain steadfast and focused on executing our growth and	On a modular enterpri se architec ture's creation of a COO position to shore up its new CEO (having little operatin g experie nces in light of the coming 787 challeng es).

Oct. 7-13, 2006 Oct. 12, 2006	The Econom ist Financi al Times (Paul Betts)		Firm	β	strengthen engineering and operations functions across the company, and provided leadership to the <i>Boeing</i> technology and information technology organizations. He served previously as senior vice president of airplane programs for Commercial Airplanes, where he was responsible for the design and production of all <i>Boeing</i> commercial airplanes. Other roles he has held include head of <i>Boeing's</i> single-aisle commercial airplane programs, chief project engineer for the 757, and chief of customer engineering for the 747 and 767 programs." "The fate of <i>Airbus</i> now depends as much on political courage as on managerial expertise."	On the importa nce of political stakehol ders on <i>Airbus</i> . On the success of <i>Airbus</i> '
					model to work, you need a skilful architect who has all the plans in his head, knows what needs to be done, and can keep politics and meddling shareholders out of the factory."	model, and the type of leadersh ip required to perpetut e it.
13 Oct. 2006	The New York Times (Mark Landler)	Richar d Aboula fia, VP, <i>Teal</i> <i>Group</i>	Consul tant	α	"The political balancing act has hampered the company's efficiency. There are a lot of needless inefficiencies built into the management structure and production processes that are there to satisfy political goals."	A critique on Airbus' explicit political constitu ency, focusin g on the costs and not the benefits.
13 Oct. 2006	The New York Times	George W. Hamli n,	Consul tant	α	"Is Airbus designed to generate a return for shareholders, or is it designed to generate industrial jobs in Europe?"	On the implied zero- sum

	(Mark Landler)	Consul tant, <i>Morten</i> , <i>Beyer</i> & <i>Agnew</i>				mutual exclusiv ity of goals in the firm objectiv e function
13 Oct. 2006	The New York Times (Mark Landler)	Manfre dBisch off, Co- Chair man, <i>EADS</i>	Shareh olders	β	"There is no reason to assume that <i>DaimlerChrysler</i> or <i>Lagardère Group</i> want to make sacrifices on the altar of national feelings."	On the implied zero- sum mutual exclusiv ity of goals in the firm objectiv e function
13 Oct. 2006	The New York Times (Mark Landler)	Manfre dBisch off, Co- Chair man, <i>EADS</i>	Shareh olders	β	"If it's only changing hands for the sake of ownership, it's not worthwhile."	On EADS' willingn ess to sell plants, only if the buyers can operate them more cheaply than Airbus.
16 Oct. 2006	Fortune , "How one CEO Learned to Fly" (Geoffr ey Colvin)	Jim McNer ney, Chair man & CEO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm	α	<i>"Fortune:</i> What have you observed about those who grow and those who don't? Can you tell in advance who they'll be? McNerney: 'No, you can't always tell in advance. It generally gets down to a very personal level – openness to change, courage to change, hard work, teamwork. What I do is figure out how to unlock that in people, because most people have that inside them. But they often get trapped in a bureaucratic environment where they've been beaten about the head and the shoulders. That makes their job narrower and narrower, so they're no longer connected to the company's mission – they're a cog in some manager's machine.' <i>Fortune:</i> People often draw parallels between sports and other fields. You were enthusiastic about sports – do you see those parallels? McNerney: 'The whole team dynamic is similar in business. Leadership is earned – the captain earns that role; it's not because he's the	On a modular enterpri se architec ture's view of evolvin g toward integral enterpri se architec tural leadersh ip.

Image: Some some some some some some some some s						another son. When companies loss their way they loss	
25 Thomso Jim Kerner (1) Jim McNerred Strong results in the third quarter with modular revenues and core earnings per share growing at double-digit rates. In August, our Board approved a new index of the strength of the strengt							
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changed since last july (changed since last July?"	

Jim McNerney: "I think I would characterize what we're doing here as pretty aggressive contingency planning. We are at that point in the development program where weight remains a dogged issue. We know what we have to do. Suppliers occasionally need help, and what I am trying to do along with the BCA team is put a contingency plan in place. Just to give you some context, we have got eight contingency plans that we're looking at. We've funded one right now. We're trying to get out ahead of it just in case. This program has been characterized from the very beginning as a program that cuts across all boundaries within our company and across our company and to other companies that are our partners. We have one database, common tools and processes. We see everything, and what we're trying to do is as we go through this, just be as conservative as we can be; and there is a fair amount of conservatism built into this. We know how to build this airplane. This plane will be done on time and will be done within contractual commitments."Heidi Wood (Morgan Stanley): "Good morning, gentlemen. I am wondering if you can provide us a bandwidth of kind of the high, low range where as you see now R&D's possible variance could go versus the '07 guidance you're giving us of the 3.2 to 3.4? I mean, obviously, that's a single-figure number, but how	
 much risk do you see to that being up over the next couple of quarters? I mean \$100 million to \$200 million a quarter through '07?" Jim McNerney: "As we see it now, that's a pretty conservative number, Heidi, as was consistent with the answer I gave Byron. We are trying to witch-hunt the issues in this program right now, and we do have some weight issues as I have said. We do have some supplier implementation issues. We are addressing all of them with aggressive recovery plans, and we've planned on more, should additional issues crop up. So I would characterize this from where we sit today against the delivery commitments and the contractual commitments we've made, a pretty conservative number." James Bell: "And let me add to that. What you're seeing as the spending profile is still well within the business case, well, actually well under the business case for the current spending that had us to launch this program. As you can see by the number of orders today, it is obviously a lot more successful than we ever envisioned at this point in the program." 	*
Heidi Wood (Morgan Stanley): "This is sort of a question for both of you, because it's both	

a strategic as well as a financial question. But your current market outlook pegs the 787 market niche size at around 3,600 aircraft and assuming a 50% share, that's 1,800 planes. But at the 432 bookings, you're at 25% there before the first delivery. So the business case you guys talked about presumed an <i>Airbus</i> response, but now it's looking like the A350 XWB isn't going to deliver until the 2014 or 2015 timeframe, which gives you sole positioning in the mid-size wide-body niche for a good seven or eight years. Does the A350 looks like it's more positioning itself to more than fully take on the 787? I am wondering if you guys can talk to us about how you think about the trade-off in production rates and pricing, given that it appears either your market share or the size of your market assumptions have been conservative?"
Jim McNerney: "No. I'd say the 50% looks pretty good, and there is upward pressure in our planning on production rates." <u>Heidi Wood (Morgan Stanley):</u> "Would you need to spend additional capital, Jim, to get there, though?"
there, though?" <u>Jim McNerney:</u> "Not anywhere near the size of the opportunity" <u>Cai van Rumohr (Cowen):</u> "Thank you, gentlemen. Could you give us more color on
the supply issue and the weight issues on the 787 and perhaps answer the more important question: you have increased the R&D here in '06 and '07, but do you still feel as comfortable about the potential for this program to be solidly profitable as we get out to the 2008 and 2010 timeframe?"
Jim McNerney: "Cai, this program's projected economics are significantly better than any airplane program I have been involved with and that's because of the structure of the supply chain, both in its participation and recurring and nonrecurring costs. I think you know the business model. So the structure of it combined with unprecedented market acceptance leads you to a pretty good conclusion about the concept and the strategy. As James pointed out a few minutes ago, even notwithstanding some upward pressure on research and development here in the short and medium term, we are well within the business case. Our internal targets are significantly within the business. This
pressure hasn't really changed that outlook, so I don't see a fundamental change in an outstanding business case because of what we're talking about here today, at all."

Column Deverator (Counce)
<u>Cai van Rumohr (Cowen):</u>
"And to the issue of supplier issues and weight issues?"
Jim McNerney:
"Just more color you mentioned. Yes, I would say that we
have a significant amount of engineering resources. Now
that we've largely completed the engineering release
process, there are some places we're going back to get
weight out. So the good news is that we completed the
majority of the engineering releases within the timeframe
we hoped to and we have time to go back with a team. We
have a weight reduction team that is going back both on
parts that we designed and parts that others have designed.
Remember, we're all on the same system. So we
understand the design parameters and design specifics
on a real-time basis as well with our partners as we do
in our own engineering shops. So we are very agile and
very quick in terms of being able to go back and put
resources on some of that. Other things we're doing, there
has been some production process help we've given a
couple of suppliers as they're setting up new facilities and
needed some boundary-less kind of collaboration
between our production people and theirs to move it along
a little faster. It's all the kinds of thing we anticipated. It's
all the kinds of things that you do when you share a
supply chain with people who have a lot of skin in the
game with you. But the good news about a lot of skin
in the game is we are both incented to get it done. It is
not us pointing at them and them pointing at us. It's us
getting together and so it's a mix of weight reduction and
production process facilitation, I would say."
Joe Campbell (Lehman Brothers):
"Hi, guys. Good morning, all. I would like to go back to
the second part of Heidi's question, which is when looking
at the stock, it is a bit upset because it looks like people
are assuming over runs in R&D are for sure, and
estimates that it will do better in the future on the
operating performance are maybe. I am wondering
whether or not implicit in the numbers that are the 2007
guidance, or if that will do even better? It looks to me like
what you've got is a forecast of the second half of 2006
performance forecast into 2007. And if it is true that the
R&D is really only contingency, it would seem that we
might not be so heavy on the R&D, but we could be better
on the operating side while the market seems to be
worried that the R&D is for sure, and we might not
make the operating profit gains they're going to offset
the R&D. So I wondered if you could talk with what
you've assumed, in terms of getting better versus I know
your hopes are that you will do better.
Jim McNerney:
"We feel good about the underlying operating plan.
You know the ramp up, which will continue next year
in a number of our airplane programs, has gone well. I

think we have confidence that the underlying operating marging for R&D will be delivered. The R&D I would
margins for R&D will be delivered. The R&D I would characterize as a conservative number, one that
anticipates contingency actions that could happen.
We'll be ready for them if they happen. Could there be
an upside? Perhaps, but I think planning on an upside
is not the way to run a business. James, do you have any
other comments here?"
James Bell:
Yes. And I think the other thing, Joe, if you look at what
we're projecting and normalize our earnings this year that
we're projecting to potential charges, I think we're still
going to have 30% earnings growth year-over-year.
Although we have the ability to see the way the program is
being managed, see the risk early and make a decision to
make available resources to have contingency plans to offset those risks, should the risks hit the beach; I don't
want us to lose sight that we've had a significant
number of recent accomplishments on this program
that are hitting right on schedule. For instance, we have
begun major assembly of the center wing section. We
started fabrication of the landing gear, the APU integration
facility is up and running, we completed the first test of the
engine pylon. We've unveiled the wing test box. We're
opening the new production propulsion integration center.
We've had the first major partner-to-partner delivery, and
that was the keel assembly and the pressure deck. We
completed the 787 integration test vehicle, and we're now
testing the large cargo freighter. I mean those things
have been hitting right on point. The fact of the matter
is, Jim and I are going to run this business from a
conservative perspective, and we're going to make sure that we have in place plans early enough that we can
implement, so that we can hold to schedule and meet
our customer obligations, and I think that's what
you're seeing in this increase in R&D."
V
Doug Harned (Sanford Bernstein):
"Good morning. Over the last two quarters as you've
taken up your estimates for R&D, you've kept your
guidance the same in commercial. I am interested in
understanding, I mean that's better than a 1.5 points in
margin. I am interested in understanding where that
benefit is coming from? I know you have had a number of initiatives on the operations side also on the
of initiatives on the operations side, also on the corporate side. Could you talk about what you see that
you've captured, where it has come from and how you
get comfortable about those savings?"
Jim McNerney:
"Well, I think the two places we've had pressure are R&D
and some sourcing pricing inflation on some key raw
materials. I think that's well known in the industry and
well known as discussed by us. Where we are offsetting
that is in conversion productivity. There is a lot of

innovative work going on in the PCA factories, whether it is moving lines in Renton, the beginning of moving lines in Everett which is a revolution in the way airplanes are converted; whether it is volume-related leverage as we take up our rates a bit; whether it is labor productivity. There is a lot of great work being done on conversion productivity, which is by in large, along with volume, offsetting these pressures. That's the business model we run under. I mean when we talk about growth in productivity simultaneously, we mean it. The reason we drive productivity so hard in the Company is to make sure we have resources available to properly fund these huge opportunities we've got. When you look a t the 787 which we've talked a fair amount about here this morning. This is one of the most competitive airplanes when both measured against the planes it is replacing and against the planes that the marketplace is offering as an alternative as you will ever see. We don't want to you lose sight of that as we have these candid discussions about how we're managing R&D and managing risk as we develop the airplanes. We want to be up front with you. We want to be up front with ourselves as we march through this program." Doug Harned (Sanford Bernstein): "That's good. I am trying to understand, though, on the cost side, what's allowing you to get the better margin? If you put R&D aside, is it also the overhead type initiatives that you have let out of corporate?" Jim McNerney: "There is some of that. The answer is yes. I mean, we have reduced some of what you would call corporate and SG&A costs as a percentage of sales. But I think the hard work has been on conversion productivity in our factories and with the way we're working with our suppliers. I think that is leaving aside price inflation on some commodities as a separate issue, as a pressure. I think that is a bigger part of it, and there is more to go on both by the way. There is more to go on conversion productivity, and there is more to go on G&A and corporate costs. We do have, as you point out initiatives in place to address both. A lean plus initiative, our corporate services reduction initiatives as well as our development process excellence initiative which gets at some costs. So we are going to be relentlessly focused on these things." Steve Binder (Bear Stearns): "And the same question was about pricing. You know, we have no clue what you're assuming not just for escalators, but for pricing on your model types, especially since you have a compromised competitor. That's why I was wondering have you seen any revision in those estimates, variables." **James Bell:**

	"Well, our pricing has stabilized, we think. Clearly, we are expecting more growth going out, we will give you more guidance on that obviously in the fourth quarter as it relates to '08. But we are assuming we're going to get the productivity as we go forward And in fact we've demonstrated it. We've demonstrated we've been able to move up in rate in all the current models and do that effectively and do that profitably. We anticipate to do that going forward, and also to get additional leverage."	
	Robert Spingarn (Credit Suisse): "Good morning. You know, Jim, as a follow-up to what Steve just mentioned on the 747-8I , could you give us a little bit more color on where you are on that program? Clearly, you have the R&D ramp. It looks like from macro perspective, you may have more opportunity here lately to capture some share just based on some instability perhaps in the marketplace right now, vis-à-vis a competitor. If you could give us more color there."	
	Jim McNerney: "Yeah. I mean I think you have to back off a little bit and get some altitude on it. First of all, this is a derivative program, and the amount of money we're spending on this reflects that. I mean this is taking an airplane we know how to make, we've made for years, one of the world's most successful airplanes and we're modifying it. So as we adjust and tweak to meet specific market requirements, we have to keep the context that it is not a huge development program for us. Now, having said that, I think the requirements have settled down on that airplane now. We've had a lot of dialogue with not only the legacy carriers in Europe that Steve referred to, but a lot of other people. We've made some modifications. We know what we have to do. We understand the engineering of the airplane, and we know how to do it and we have time to do it. So I think we're in pretty good shape, with the requirements having settled down."	
	George Shapiro (Citigroup): "I wanted to pursue the R&D a little bit more. I mean effectively, you've raised R&D pretty substantially now two quarters in a row. When do you think the period of greatest risk in this program is? Or you can't say until we get to say the initial flight test program?"	
	James Bell: "Well, I think we're in it. We're in a period of considerable risk, and I think we've identified them early. Obviously, we want to get the contingency plan in place in time and have them resourced in case we need to call on them, George. Obviously, you'll have a different set of risks once you get into the flight test. But I guess the real point I want to make on this is that we think we understand how to build this airplane. I mean we think	

	we've gone through it. We understand the systems we need to go deal with and how to do them. We don't have the complexity on our airplane that the A380 is, we have a fifth of the electrical wiring in it. So I think if some of the concern is being driven by what you see out there in other places, then I think you have to	
	understand there's some distinct differences in what we're doing here. What you're seeing here is early risk mitigation. I think we're there in terms of our ability to go look forward and see where those risks might hit the beach and where we can put contingency plans in place and hopefully mitigate it."	
	George Shapiro (<i>Citigroup</i>): "But if something incrementally worse didn't happen in the third quarter, why wouldn't you have raised the R&D by a bigger amount in the second quarter? I guess I am looking for what did you incrementally see in the third quarter that you didn't in the second quarter?"	
	James Bell: "Well, again, if you remember in the third quarter half of this increase is associated with the 747-A. The other piece that's associated with the 787 is to look at those other contingency plans that we had on the table and we understood in the second quarter, but we now have another quarter of history or time has passed and so we wanted to make sure we had the resources available. So, quite frankly if we were going to focus on something big happening, it would be something that would be totally unexpected like somebody dropping a big piece of hardware or a big piece of tooling or something having a major failure. But right now in terms of the technical things that need to be done, we think we understand them pretty well and we just want to get the weight out of it and then make sure we hold the schedule."	
	"There has been no dramatic or qualitative change in the risks we're managing one quarter to the next. I think it's a matter of as James said, being at that point in the program where, as the risks exist, you want to get out ahead of them and more than get out ahead of them. I think that's what you're seeing here."	
	Ronald Epstein: And then a product placement or product development question for you. Lately I think the BCA guys have been out talking in industry conferences and have been a little bit more vocal about <i>Boeing</i> being involved with a small plane, something maybe around 100 seats . Jim, I was wondering if you can speak to that, how seriously <i>Boeing</i> is considering that and any color you can add on a smaller narrow bodied jet."	

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		Jim McNerney: "I don't think, Ron, that we have a crystal clear view yet of what the narrow body market of the future is	
		going to look like . Certainly there is a lot of discussion around the 100 packs, and there is a lot of discussion	
		around a bigger version of a narrow body, you know, the	
		200-plus size as well as the core of the market, the 150 to	
		180. A lot of discussion, a lot of debate, different camps	
		within our company. Meanwhile, we're just focused on	
		maturing the technologies that we know will fit into	
		any of those versions as that clarifies. But I hesitate to tell you I know exactly what that market is going to	
		look like eight, nine years from now. Over the next year	
		it's going to get a lot clearer."	
		Joe Nadol (JP Morgan):	
		"Thanks. Good morning. I was wondering if you could	
		comment just a little bit more on your current production	
		at BCA. You've been running the past couple quarters with unit costs accounting, profits higher than program	
		and this quarter that slipped around. So I was	
		wondering what caused that."	
		James Bell:	
		"Joe on the unit margins it's just we've had the impact of	
		the increased material costs they had a more dramatic impact on unit margins early, and it doesn't have the	
		ability to have the production improvement that we have	
		over time in programs. So again, with the problem with	
		unit margins, I know you all like them, but they're	
		volatile, because they can be affected by near-term things and doesn't take a program picture into effect.	
		But it's a data point."	
		Joe Nadol (JP Morgan):	
		"So you characterize the issues you're facing more as just	
		raw material inflation rather than getting the stuff in the door."	
		James Bell:	
		"Exactly. And for the quarter there was a big difference in	
		terms of delivered units which have a pricing impact."	
		Peter Jacobs (Wells Fargo):	
		"Good morning, gentlemen. James, could you just highlight again specifically where you're seeing some of	
		the weight issues on the 787-A program and any kind of	
		additional color you can give there?"	
		Jim McNerney:	
		"No, I don't want to name names. But in general what we	
		have is the airplane is pretty much designed and as you start laying out the components, there are weight	
		opportunities, and obviously the bigger the component,	•
		the more generally the opportunity is. So we're trying to	
		attack those that have the highest payback and that we	

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could do within the timeframe necessary to meet our delivery dates and still meet all of our contractual obligations, and so that's the focus."
Gary Liebowitz (Wachovia Securities): "I am going to kick the R&D dead horse one more time. Jim, in the beginning of the conference call you were speaking that there were eight contingency plans, one of which you had funded. Are you saying that there is potentially seven more contingency plans to be funded?"
Jim McNerney: "What I meant by that was that we have around eight, last time I reviewed it, contingency plans in place if we need them. The R&D level that we are talking to you about assumes we fund all of them and more. We've only triggered funding, we've only needed to trigger funding on one of them. I was trying to point out a specific with regard to the conservative posture we have with our R&D. So is that clear? In other words, if we fund them all, we still won't be pressuring the number I gave you."
Lynn Lunsford (<i>The Wall Street Journal</i>): "Good morning. Just one little question and I think it's more looking at nuance than anything else. Up until now you have pretty well said that you expected entry into service for the 787 to be mid-2008. I noticed in your press release that in the graph where you talk about that you just say during 2008. Does that mean you're slipping that or is that just a word?"
Jim McNerney: "Not at all. I mean that's wording. I believe it's August '08. It has always been late August, early September has always been the timing and still is the timing. That was advertent, Lynn."
James Wallace (Seattle Newspaper): "Yeah. Good morning, Jim. I had a question and in previous interviews that Mike Bair has done with me and others, he has mentioned 2% has been the overweight issue, plus or minus something. Has the weight increased recently or are you just trying to tackle the same weight that he's been talking about?"
Jim McNerney: "I think it's within the range of what he is talking about. I don't know when you last talked to him, but I would say the weight pressures have increased slightly, but also the opportunities to reduce them have increased. So we're working it, but it's within that range sort of low single- digits."
Dominic Gates (The Seattle Times):

1 Jan. 2007	Aviation Week & Space Technol ogy (Michae I Mecha m & Anthon y Velocci)	Alan Mulall y, Former Pres. & CEO of <i>Boeing</i> <i>Comm</i> <i>ercial</i> <i>Airpla</i> <i>nes</i> . Curren t Pres. & CEO of	Firm	α	 "Good morning a couple of things. I wondered, Jim, if you could give us any idea of what the one contingency plan that you have had to fund, what that was exactly?" Jim McNerney: "There will be some work that is going to be brought to Seattle. That was going to be done by a couple of our suppliers that is more efficiently done in Seattle, and so we've made an adjustment there, and that's the one we have triggered." Dominic Gates (<i>The Seattle Times</i>): "Is it major work?" Jim McNerney: "Well, I don't know what you would categorize as major work. I mean it is systems installation work, that is systems that are going to be installed in the airplane." Dominic Gates (<i>The Seattle Times</i>): "Thanks for letting me back in. I just wanted to go back to one answer that Jim McNerney gave earlier. I was a little surprised when you told Lynn Lunsford that the first deliveries of the 87 would be in late August of '08, because I certainly understood it was going to be earlier that summer. One of the reasons for that was ordered the 87 wanted it for the Olympics. Isn't that going to be too late if you're delivering it in late August? The first one goes to Japan, not China. Jim McNerney: "Dominic, you're right. I may be confusing when we're shipping an airplane to somebody versus when they are implementing it. Our date for delivery to the Japanese and Chinese airlines have changed. If I have confused the date, I apologize. We'll reaffirm that with you. I am not trying to signal any change at all." "I don't think one bit about whether it can be done or not, I'm focusing on how to do it, to turn it around, to find a way to do it. And if it can't be done, then the assets will go to somebody else. And they should, it's business."	On a modular enterpri se architec t's views of competi tion and capital.
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about of the sector of the 50 the 707 is Frankt during	SL
quarter; final assembly of the 787 in Everett during	
second quarter; 787 rollout in July and first flight the 787 which is targeted for the end of August. Th	
areas represent the bulk of our R&D spending at this po	
and we're making progress on all fronts. On weight	
have identified a number of areas where we are tak	
weight out of the airplane. We've redesigned numero	
parts and changed some materials. And we f	
confident we'll get where we need to be. To mitig	
schedule risk, we've continued to provide engineering a	d
manufacturing support to our partners, many of whor	
have personally visited over the last twelve months.	
continue to make good strides there as well. We contin	
our process of robust contingency planning wh	
keeps us looking forward at risks we may encoun	
and mitigation actions we may need to implement.	
have committed resources for these plans as we not	
to, and retired plans no longer required. To help	bu
track our progress on the 787, we plan to update you	at
least twice a quarter, once during our earnings call	nd
once by Mike Bair, our 787 program head during	
quarterly call with media and investors. So, while mino	
of the inherent challenges and risks that lie ahead o	
program like this, we are pleased nonetheless with	
progress we are making on the 787 and with	1e
airplane's performance, which we expect will exc	
the overall performance levels we committed	
customers when we launched. We continued to inves	
developmental programs like 787 and the 747-8, both	
which will be major growth programs for the	15
Company for a long time to come. While we impr	
the value and performance of our business, we further the value and performance of our business.	
enhance the value we provide to shareholders	
increasing our dividend 17% and authorizing a new	
billion share repurchase program. We see more poten	a1

	to return capital to owners through share repurchase and dividends as our financial performance improves. You have heard me say that we are committed to delivering financial results that match the quality of our people and our technology with our momentum and continued focus on growth and productivity we have a great opportunity to do just that."	
	James Bell (<i>The Boeing Company</i>): "Now turning to our segment guidance. BCA airplane deliveries are forecast to grow to between 440 and 445 airplanes in 2007. Deliveries in 2008 are expected to be approximately 515 to 520 airplanes, driven by higher production rates and the introduction of the 787 Dreamliners. Looking further out, we expect airplane deliveries in 2009 to be higher than those in 2008. Commercial Airplane revenue guidance for 2007 is between \$32.5 and \$33 billion. And it's expected to grow to between \$39 and \$40 billion in 2008. We expect 2007 operating margins for Commercial Airplanes to be above 10%, reflecting higher deliveries and continued productivity. For 2008 we expect BCA margins will continue to expand to approximately 11%. Now, in terms of airplane orders, we expect the strong demand for our products will keep our book-to-bill ratio above 1 for 2007, resulting in a further increase in our backlog."	
	Jim McNerney: "Thank you, James. Well, this is the second time I have addressed you to discuss our year-end performance and the road ahead. Last year I told you we had embarked on a new course based on a new management model, dedicated to the simultaneous pursuit, growth and productivity and founded on the principles of leadership development. Our results show we are making very good progress on this new course. I also told you last year we moved to put some of the ethics and business problems from our past, put them behind us, and we have succeeded there as well. I personally believe that we will look back on 2006 and see it as a pivotal year in the history of <i>the Boeing Company</i> . We will heighten our focus on growth in productivity. We will expand our leadership development, and we will redouble our efforts to meet commitments while living the <i>Boeing</i> values. We want to remain the world's strongest, best integrated aerospace company, and we want to make sure our stakeholders see us that way, too."	
	Doug Harned (Sanford Bernstein): "On the 787, there have obviously have been a lot of rumors out there particularly related to suppliers, and when we were back in the last quarter you talked about the eight contingency plans , and that you were working on one of them at that time. Could you describe where you are today? Are you exercising more of those contingency	

plans, and are you still on track for the 112 deliveries that you have described for '08 and '09?"	
Jim McNerney:	
"This is Jim. I will answer the question, Doug. The answer	
is the specific answer on the contingency plans is we had	
outlined eight, I think we had said that we had activated	
one, and we were prepared to activate the rest as we	
needed them. The facts are, we sort of activated a	
couple other ones, and they had to do with work generally	
being done in different places or preparing for the	
contingency of that happening, I guess is a better way of	
saying it, and hiring some people and having them hot	
ready to go in the event that that happens. It doesn't	
involve much money, it doesn't involve that many people,	
but it does anticipate worst case kind of scenarios for some	
traveled work. We retired one of the contingency plans,	
the interface control data, because we made better progress	
on getting that systems level work done, and so we're about where we thought we'd be. We sort of activated	
half of them, and ready to go, and I think your second	
question on the deliveries in '08 and '09 as we look at it	
today, we feel comfortable with that anticipation."	
today, we teel comfortable with that anticipation.	
Doug Harned -(Sanford Bernstein):	
"And when you talk about the contingency plans and some	
of the challenges here, do you see them more in the	
structures area, the systems or are they more general	
weight reduction type issues?"	
Jim McNerney:	
"The weight reduction program is a major program that we	
kicked off in the second half of last year. We're making	
very good progress on that. That is a core engineering	
activity, and that we turned the gain up on as the plane,	
like all planes, started to come in a little heavy. I am	
feeling pretty comfortable about the progress on that	
weight reduction program and getting the plane down to	
where we need to be to meet the commitments to our	
customers, so I feel good there. I think the kinds of things	
I am talking about with contingency plans are having	
stand-by capability to make some tubes, clips and brackets	
in the state of Washington in case they don't show up in	
some of the components that have been stuffed before they	
get there. I mean, it is things like that that I am talking	
about. The weight reduction thing is a major effort, and I	
am feeling good about the progress there."	
Cai von Rumohr (Cowen and Company):	
"Thank you. Like to follow up on Heidi's question. Even	
if the 787 were at 0 profit given you're going to be down	
150 to 200 bips in R&D, and also you're going to get a	
positive swing in pension, it looks like your margin	
before R&D is down, is that pricing? Is it	
conservatism? What is it, because basically the	
numbers don't add up."	

James Bell: "We're conservative, Cai." Cai von Rumohr (Cowen and Company): "Okay. Thank you." James Bell: "You got me." Howard Rubel (Jefferies & Company): "The dilemma that you sort of talked about, Jim, is that things are so good, how do you make them better, might very well be characterized with one of your challenges, and one of them is that your backlog stretches so far that, how do you keep your sales force motivated to continue to sell airplanes? And are have we if we look at what we see in the way of rate schedules, there have to be at least one or maybe two more rate increases planned beyond what you've announced. Is that fair?" Jim McNerney: "I think we have to get a little more visibility longer term before we consider we just raised we are just getting	
before we consider we just raised we are just getting there now, and listen. I don't want to argue with you, because your big point is right which is that with this kind of demand we are always looking at rate increases, but we always want to do them prudently, so because as you know, companies like ours get in trouble when they chase rate without the proper supply chain management. And so you're going to see us raise rates prudently, and I think the I think our sales force, by the way, they have a lot to do out there as they work with airlines and work with other customers and the infrastructure that supports them to make sure we get the current technology that's moving out installed properly and supported properly, and they're not taking Wednesdays off."	
Joseph Campbell (Lehman Brothers): "Good morning. I wanted to ask again about production rates. You were careful in 2006 to make sure that you raised the production rates. I can't remember your exact phrase, but it had to do with profitably ramping up rather than just ramping up, and you had a strike and gave us rather conservative numbers about the time it would take to you get whole, and you've now raised the production rates in '03 for the existing products. You've given us a range, something like 3 a month '08 over '07, and I wondered whether we should look at the '08 rates which you've talked about as being limited still by your ability to ramp up as they were in '06, and I presume in '07 as well, or whether you now have got your production rates as what you think are prudent given the level of demand that you see out there. Thanks very much."	

	Jim McNerney: "Yes. I think the short answer to your question is that we see a good fit between demand and our rates in '08. Could we sell another airplane or two if we scrambled to ramp up another few airplanes in the year? Maybe. Is it worth the risk? Absolutely not. I think we've got clear visibility on how to raise the rates to the level that we're talking about in '08. By the way, to do that we had to start working with many of our suppliers a year ago. I mean this is a long- cycle activity, and as a result, to chase speculative demand with rate is not the way to run this business. We got a good match in '08. We're in good shape."	
	Lynn Lunsford (<i>Wall Street Journal</i>): "I am trying to this is sort of a larger philosophical kind of question, but over the last several weeks the <i>Boeing</i> stock has been pretty volatile, and it seems like several days ago whenever one of the analysts came out and declared the top of the order peak that is started going down. I guess the question is, is by focusing on book-to-bill and the order peak, are people keeping their eye on the wrong ball? Is there something else that investors should look at when watching how <i>Boeing</i> performs?"	
	Jim McNerney: "Well, I think, obviously, book-to-bill is a factor to consider when you're looking at any company, but I think when you're looking at a backlog the size and the diversity and the balance that we've got across the Company, the backlog is many, many multiples of the yearly revenue of our Company. I think looking at the backlog and our progress on executing against it, when it is as big as it is, is probably a better measure of in terms of visibility that you want to project, particularly when you've got a the biggest part of the backlog, Commercial Airplanes, with a cycle that doesn't look like it is slowing down right now. We talked about the legacy carriers in '07 and '08 getting back into the game, and so I think you add it all up, and I think I would pay a little more attention to the backlog right now than book-to-bill. If the backlog were a lot smaller, I think book-to-bill would be a more relevant something you would worry about a little bit more."	
	Lynn Lunsford (<i>Wall Street Journal</i>): "You said also that one of the key things with this ramp-up is, can you raise your rates and maintain increasing profitability. Are you pleased with where that's going so far?" <u>Jim McNerney:</u> "Yes. The short answer is yes, I am pleased with where that's going so far. We have had a number of rate increases, and there is some here in the planning period	
		 see a good fit between demand and our rates in '08. Could we sell another airplane or two if we scrambled to ramp up another few airplanes in the year? Maybe. Is it worth the risk? Absolutely not. I think we've got clear visibility on how to raise the rates to the level that we're talking about in '08. By the way, to do that we had to start working with many of our suppliers a year ago. I mean this is a long-cycle activity, and as a result, to chase speculative demand with rate is not the way to run this business. We got a good match in '08. We're in good shape." Lynn Lansford (<i>Wall Street Journal</i>): "I am trying to - this is sort of a larger philosophical kind of question, but over the last several weeks the <i>Boeing</i> stock has been pretty volatile, and it seems likeseveral days ago whenever one of the analysts came out and declared the top of the order peak, that is started going down. I guess the question is, is by focusing on book-to-bill and the order peak, are people keeping their eye on the wrong ball? Is there something else that investors should look at when watching how <i>Boeing</i> performs?" Jim McNerney:

Jamison and the team there are bound and determined to do this in a disciplined way, and I am certainly philosophically aligned with that. And so the steady increase in margin expansion that you're seeing combined with the on-time delivery of our planned rate increases with suppliers who are committed to working with us, is working so far, and we're just going to keep	
doing it that way."Dominic Gates (Seattle Weekly): "I would like to go back to the 787 supply chain and the various glitches there. Two parts. You said three or four partners are having some difficulties. Are those all structures people or are the systems partners working and are you having to help any of them out as well. And then second part, with regard to the structures work that traveled from Japan to South Carolina, could you talk about how that, the new business model for the 787 may, perhaps, be creating a much more complicated situation than in the past. Where if work had traveled Boeing would just have done it in Everett. Now you've got global aeronatica having to cope with work traveling to them, and so are they asking for more money as a result, and are you in effect having to renegotiate contracts with the Japanese and global aeronatica as a result of work traveling that way?"Jim McNerney: "Your first question, Dominique, the three or four partners we've been working with over the last few months have 	
it has centered on the structures side of the business as we're trying to share learning across all of them and us to make sure we get it right, and there has been a lot of cooperation going there. As to the traveled work question, I see it a little differently. I think because the fundamental work is spread out a little bit, because there is an interim step in South Carolina on the way to Seattle, there is a little more flex in the system to	
where everything showed up in Washington and there was a huge geographically centered "Oh my God" that where the number of people and the amount of work all came together at one time, and there is a little more opportunity the way we're doing it now to handle it within a more flexible environment. As to the last part of your question, as you know, many of the contracts	
most of the contracts with our supplier partners do leave room for accommodation when more or less work happens than was anticipated, and there are often times robust discussions with our and this has happened in every airplane program we've ever had, robust discussions with these partners as to price and the amount of the end result of the financial accommodation, and, yes, we're having those discussions, and occasionally they last more than a	
minute." 19 Busines Suppli α "For union workers, a new corporate owner usually means"	On a

Feb.	s Week,	er	&	one thing: mass layoffs. So it comes as quite a surprise	spun-of
2007	"Soarin		β	that, after buying Boeing Co.'s Wichita aircraft plant, the	"integra
	g Where			Toronto private investment firm Onex Corp. kept on most	l"
	Boeing			of the 4,000 employees. Of course, the Machinists union	division
	Struggle			wasn't happy that more than 800 people lost their jobs. But	ofa
	d: How			the new owners helped ease the pain by giving the	modular
3	Spin-off			remaining workers \$246 million in cash and stock options.	enterpri
	Spirit			The money was a reward for helping the company, now	se
	Aerosys			named Spirit AeroSystems, cut costs and pull off a	architec
	tems			successful initial public offering. 'I can't tell you what a	ture,
	Built a			thrill it is to give our organized workforce nearly \$250	becomi
				million,' says Seth M. Mersky, an Onex managing	ng mor
6	new			director. The comity between Spirit management and	integral
	Model				integra
	for			the International Association of Machinist &	
	Worker-			Aerospace Workers is partly a sign of the times. The	
	Manage			commercial plane business is booming, which is why	
	ment			Spirit expects to post a 2007 profit of \$260 million on	
	Coopera			projected revenues of \$4.1 billion, up from about \$3.2	
	tion"			billion in 2006. That won't last forever. But for now the	
	(Stanley			unusual deal is being widely praised as a promising	
	Holmes			new labor model. No one is more bullish than the man	
)			who helped put it all together, former Democratic	
	,			House Minority Leader Richard A. Gephardt of	
				Missouri. 'It is what we are going to have to do in a lot	
				of our industries to be globally competitive,' says	
				Gephardt, who is a consultant with Goldman, Sachs & Co.	
				'It aligns [workers] with the company and gives them a	
				fair reward for their contribution.' This improbable	
				story began several years ago, when Boeing, in a bid to	
				shed weak assets and outsource more of its	
				manufacturing work, decided to sell its uncompetitive	
				Wichita plant. Although it was Boeing's biggest internal	
				supplier, cranking out fuselages and nose cones, it suffered	
				from inflexible work rules, high wages, and testy labor	
				relations. Enter Mersky and fellow Onex Managing	
			2	Director Nigel S. Wright. Where Boeing executives saw	
				lemons, the two turnaround specialists saw lemonade.	
				They reasoned that if they could cut costs, make the plant	
				more productive, and start working for Airbus, defense	
				contractors, and regional jetmakers, the Wichita plant	
				could become profitable. But first Onex had to get costs	
				under control. The firm saved \$40 million annually by	
				slashing corporate overhead costs inherited from	
				Boeing. It negotiated price reductions from Spirit's	
				suppliers and simplified the procurement process. It	
				managed to reduce the complexity of work rules,	
				reducing 160 job classifications to 13. Finally, it asked	
				the unions for a 10% wage cut to better reflect the	
				prevailing wages in the area and told them it would reduce	
				the workforce by 15%.	
				SHARING THE PAIN	
				Onex, which sought the union's support, lost the first vote	
				with the Machinists. Many workers came from third- and	
				fourth-generation Boeing families and wanted to stay with	
		I	1	the giant. 'It was tough on people,' said Ron Eldridge, the	1

Feb. 21, 2007	Bloomb erg.com (Andrea s Cremer)	Manfre dBisch off, Co- Chair man, <i>EADS</i>	Shareh olders	β	Machinists' aerospace coordinator for Wichita. 'It was like an ugly divorce.' The managing directors approached R. Thomas Buffenbarger, international president of the union. 'They asked: 'What's it going to take?'' Buffenbarger recalls. 'I said, 'If you want to share some of the pain, then give us a stake in the enterprise.' They warmed to it quickly.' A new deal was negotiated: For the wage and job cuts, <i>Onex</i> offered union members a 10% equity stake in an eventual IPO. The new owners sketched out a scenario where workers could earn some \$30,000 in stock and cash over five years as long as the IPO was successful. Now, 18 months later, the bargain has exceeded everyone's wildest dreams. An IPO on Nov. 21 raised \$1.4 billion. Each Machinist is about to receive \$61,440 in cash and stock. Given <i>Boeing's</i> backlog of orders, plus a surge of defense-related spending, analysts figure <i>Spirit's</i> stock will do well in the next few years. That should buy the company goodwill for when the industry hits the skids.'' "The board members of <i>EADS</i> nominated by <i>DaimlerChrysler</i> are solely geared to the success of <i>EADS</i> and <i>Airbus</i> . Thus, the allegation that they might act in national or political intent is absolutely wrong. At the same time, the inevitable impacts in the countries involved must be made acceptable and enforceable by means of a fair distribution of future opportunities.''	On the accusati on that the sharehol der <i>Daimler</i> <i>Chrysle</i> <i>r</i> is pushing to keep A350 jobs in German y for political and not financia 1 reasons. Demons trates the comple xity of how <i>Airbus</i> emphasi
						how

						1
Feb. 21, 2007	Bloomb erg.com (Andrea s Cremer)	Christi an Wulff, Prime Minist er of the state of Lower Saxon y	Gover nment	β	"This crisis can be overcome if all players stand together ."	. Are capital and labor really uncoupl ed factors of producti on? On German y's offer to fund <i>Airbus</i> R&D in return for keeping jobs in German
Mar. 14, 2007	Forbes. com (Parmy Olson)	Arnaul d Lagard ère, Co- chair of EADS	Shareh olders	β	"Lagardere recently reported a 57% drop in 2006 profit, due largely to the poor performance of its 7.5% stake in EADS. Chief executive Arnauld Lagardère, who also co- chairs EADS, also ruled out the sale of the company's stake in EADS when announcing his annual results. 'I will play my role and I want to carry on being part o EADS's growth,' he told Le Monde. He added that he saw no need for a capital increase at EADS, presumably in lieu of politicians who wish to take a bigger role in Airbus. So concerned was Lagardère about EADS' future that he vowed to return any upcoming dividend back to the company. 'The Airbus situation has affected everyone, the employees above all, but also the shareholders and notably the small investors who have suffered from the dron in shares ' he said."	y. On "patient capital" in an integrat ed enterpri se architec ture.
30 Mar. 2007 222	Flightgl obal.co m (Helen Massy- Beresfo rd)	David Mickle wright, VP Procur ement	Firm Firm-	β	drop in shares,' he said. " "It is not exactly <i>Boeing</i> but it is radically different. It's about halfway to <i>Boeing</i> and that is pretty radical for <i>Airbus</i> ." Jim McNerney (<i>Boeing</i>):	On Airbus' plans to outsour ce risk to the supply chain on the A350, compar ed to Boeing' s similar efforts on the 787. On a

A		McNer	Investo	"In summary, we are off to a good start in 2007, we	modular
Apr. 2007	n Reuters	ney,	r	delivered solid top-line performance during the first	Enterpri
2007	Researc	Chari	·	quarter with strong double-digit growth in operating	se
	h,	man		income, net income and earnings per share. These results	Archite
	excerpt	and		are inline with our expectations for the quarter and	cture's
	from	CEO;		represent good progress towards the challenging goals we	defense
	"The	James		have [set] for ourselves both this year and beyond that.	of its
	Boeing	Bell,			finanaic
	Compan	CFO,		While we make progress on our financial goals and grow	al
	<i>y</i> , Q1	The		our record backlog, we also continue making progress on	perform
	2007	Boeing		our major development programs, including the 787	ance
	Earning	Compa		Dreamliner. Scott Carson and Mike Bair gave you a	
	s Call	ny		detailed 787 update last month, and as you've seen as soon	
	Transcri	ŕ		as yesterday with the Virgin and Air Canada	
	pť"			announcements, demand for the Dreamliner continues	
				unabated. We are also making progress toward our	
				development milestones for this year and next. Let's	
				review just a few of those. During the first quarter, we	
1				surpassed 500 orders for the Dreamliner, which is an	
				unprecedented achievement by the BCA team. We now	
1				have 544 firm orders from 44 customers, which is the	
				highest tally ever achieved by a commercial jet program	
				within three years of its launch. We are now in the process	
				of bringing the 787 to life. Major structural elements of the	
				first airplane are being assembled, and in some areas we	
				are already working parts and assemblies for airplane	
				#5. Fuselage sections from Japan, Italy, South	
				Carolina, and Wichita, are coming along well, as is the	
				wing box from NHI. Second special 747 Freighter or	
				Dreamlifter has taken its first flight and delivered its first components. And we have a third Dreamlifter at the Mod	
				Center and a fourth one heading there. Our engine	
				partners are making good progress on their flying test	
				beds. And work on the systems side is moving ahead as we	
				enter integration testing of these major elements. In	
				Everett, the upgrade of the final assembly day is going	
				well and we have started receiving components there. The	
				horizontal stabilizer arrived just very recently and other	
				major components will be arriving in the next few weeks.	
				We will rollout the first 787 out of our Everett factory	
				on July 8th, an event we will webcast so all of you can	
1				see the airplane. As you know, we are targeting a first	
1				flight in late August, which will kick off our flight test	
1				program. We will remain on-track for first delivery to	
1				ANA in May of 2008. As we have said before, we are	
1				working late, scheduled, and supplier challenges, as we	
1				strive to meet our milestones. These areas represent the	
1				bulk of our R&D spending at this point and we are making	
1				strides in each area. We are moving into the very critical	
1				final assembly and systems integration phases of our	
1				program, and as you can imagine the entire 787 team is	
1				working very hard to achieve our milestones. So, mindful	
1				of the inherent challenges and risks that lie ahead, particularly in the latter stages of major airplane	
				development programs, we are nonetheless pleased with	
1				the progress we are making on the 787. We are also	
			1	the progress we are making on the 787. we are also	

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		pleased with the airplane's performance, which we expect will exceed the overall performance levels we committed to customers when we launched this program. We will continue to update you on the 787 as we move through our key milestones.	
		So, let me wrap up my opening comments by saying that we have reaffirmed our financial guidance for 2007 and 2008. Our record backlog, increasing productivity and the progress of our development programs have us on track to achieve our growth and productivity objectives."	
		James Bell (Boeing): "R&D spending for the quarter was on track at \$788 million. We expect BCA's R&D to begin declining in the second half of this year which along with productivity improvements will drive margin expansion consistent with our guidance. Program margins exceeded unit margins this quarter due to new customer introduction costs and pricing mix that reflects airplanes sold two to three years ago in a tougher pricing environment. We captured 109 gross orders in the first quarter which lifted BCA's backlog to another record of \$188 billion which is 6 times current BCA revenues. Now Jim has already talked about the tremendous success of the 787 as enjoyed in the market and the progress we are making in its development.	
		We continued our balance cash deployment strategy as we invested in organic growth programs, repurchased 4 million shares for \$360 million, and contribute to our pension plans, as well as, paying a 17% higher dividend to shareholders."	
		Jim McNerney: Thank you, James. You can see from the outlook James just discussed, that we have some ambitious goals for this year and next. We are confident we can meet those goals. Our businesses are executing well, and all of us are focused on executing even better. We are in healthy markets pursuing prudent growth strategies and seeking to boost productivity in each of our factories and our offices. Meeting the financial commitments we make to you is as important as meeting the performance commitments we make to our customers. We are determined to deliver on both. We want to remain the world's strongest, best integrated aerospace company."	
		Byron Callan (<i>Prudential Equity Group</i>): "Jim, you have been at the helm for almost two years. I am just curious where do you think you have made the most progress with things you want to change at <i>Boeing</i> . What are you most keenly focused on today? And are there areas you are <i>disappointed with or frustrated with</i> that you think the company can do better at? Thanks."	

		Jim McNerney: "Yeah, sure. Listen this was certainly not a broken company when I took the helm a couple of years ago. It was a company that was doing a lot of things right and had some good strategies in both its businesses. I think though we are emerging from era of management turmoil, some uncertainty with regard to priorities and I thought, just to use a term, some of the software the company needed addressing in terms of leadership development, management needed to be infused with a little more accountability in some cases. So, it was more around the leadership. A refocus helped the company regain its confidence in itself, because the strategies were good and the products were by and large good, also focused a lot more on international I would say and some of that effort is beginning to bear fruit."	
		Byron Callan (<i>Prudential Equity Group</i>): "Okay. And areas that you think you could still do better out here?"	
		Jim McNerney: "Well, I don't want to give the bullish answer which is there is nothing we can do better, because there is a lot of things we can do better. But I think with \$260 billion plus backlog, the issue is obviously around execution, because the markets and our customers are accepting our technology, and the backlog represents to all of us at <i>Boeing</i> , both a huge opportunity and a big burden to get it done properly. And so we are focused on a lot of things that you don't see, which have to do with new ounces of making sure priorities are right, making sure people are aligned and accountable, making sure that we have balanced work across the enterprise and make sure that people feel like they are growing and are excited about what they are doing. Those are the kinds of things we are focused on now."	
		<u>Howard Rubel (Jefferies & Company):</u> "Thank you very much. I want to kind of go from the broad to a little bit more narrow, two things are sort of notable, one is that if you exclude the Research and Development spending from your operating profits, it looks like you are about 19.8% versus 17.5% year ago Jim. And that would sort of indicate to me that there is some real change in the way you are addressing productivity and profitability, where do you take up from here, and as we look out this could imply maybe as much as 15% operating margins in commercial, is that a fair way to think about it?"	
		James Bell: "Well, first of all Howard your math is impeccable. Yes, it's not bad at all. And I think you are seeing the fact that we really are starting to harvest a lot of benefit not only from lean but our other productivity initiatives	

that we implemented a year ago, and we would expect there is more opportunity as we get the volume from our higher production rates and the lower order traffic. And as Jim mentioned earlier, as we have the opportunity to convert this record level backlog and convert that to value. So, we will continue to be working that to see how we get these pre-R&D margins up."	
Jim McNerney: "And I think you said it James, I think we are going to continue to face into a competitive environment though, every dollar of improvement that we get may not flow to the bottom line because we have customers that need to be productive, and we have competitors that aren't going to sit still and let us take easily as much of the market forever as we are taking now. So, how that exactly gets expressed in terms of progress towards a 15% operating margin or whatever target will sort of unfold, but we are determined to be ready to make any necessary competitive responses, any kinds of investments we need to making customers and grow our margins as we move along."	
Steve Binder (Bear Stearns): "Just wanted to follow-up on Howard's question, because James you touched on a difference between unit and program in your introductory comments and you did touch on pricing on the unit costs so I bet it's reflecting deliveries at a less favorable pricing and you changing your program method. So, I am just wondering the reason for that increase in the pre-R&D margin to 19.8 from the low 18% range in the fourth quarter of '06. is that really just cost system or visions or is it also reflecting a better pricing environment that's built in to your blocks?"	
James Bell: "It's both I would tell you its productivity and better pricing going forward. The planes which you are seeing in the unit margins and the impact of that is two or three years ago we really were faced with a much more competitive pricing environment and also a phase we are trying to have pricing that bridge us to new market particularly for the 747-8 and then also we saw a more robust market in this time period for the 777 two or three years ago and we needed to make sure we got there along with the single arm. So, I think you are seeing a combination of both the better pricing as it stabilizes today and then also our productivity efforts."	
Heidi Wood (Morgan Stanley): "James and Jim, I want to also hark on the margin outlook for commercial and make sure I have got through the right puzzle pieces as we think this is true. If you look at our guidance in '07 versus '08, you are talking about 20% uptick in volume and over 13% decline in overall R&D, which means that commercial R&D is going down more, and yet only a 10% increase in BCA margins year-over-	

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	year. So, again just what are some of the key assumptions that would help offset that mix of productivity and mix in R&D tailwind?"	
	James Bell: "Are you talking going forward, Heidi?"	
	<u>Heidi Wood (Morgan Stanley):</u> "Yeah, I am just trying to think what keeps us from thinking about 15% margins by 2010."	
	James Bell: "Well, principally, what's going to keep us from that by 2010 is the fact that we are going to have dilution from the 787 margins. Obviously, it's the beginning of a new program, and although it will start out more probable than any new program, any new product introduced at least in our history. It will still dilute the margins that we experienced on our mature programs. And so clearly to the 2010 timeframe that's going to have an impact particularly since we expect to deliver over 100 airplanes in the first two years and then that will grow in the third year."	
	Heidi Wood (Morgan Stanley): "And that more than overpowers the increase in volume and decrease in R&D?"	
	James Bell: "I won't say that it more than overpower. I am just saying to you that we are going to have that dilutive impact and we will have to wait and see as we get closer if we are able to get more productivity as we ramp up on the 87 because that dilution is real. And remember just what we have been talking about 18% or 19% in these years for our pre-R&D margins on our mature program. Obviously, it's going to take us some time to get to that same level on the 787."	
	<u>Cai von Rumohr (Cowen & Company):</u> "Yes, thanks a lot. If I go back to the commercial margin issue, your R&D commercial was 10.4% of sales. Even if you come in at the absolute tippy-top of your R&D estimate \$3.4 billion, I mean it's got to be down at least \$200 million to \$250 million and unless a program accounting margin pre-R&D go down from that 19.8%, it's kind of hard for me to see how the margins for the year won't be above 11%?"	
	Jim McNerney: "Well, I think I got your question there Cai. Look, I think is there opportunity to expand our margins? Yes. Are there other things we are wrestling with to make sure they are put in the box before we revise anything? Yes. But the opportunity to continue to improve our margins in BCA certainly lies in front of us and the head set of Scott	

 -		
	Carson and his team supported by me and James is to do just that."	
	James Bell: "And Cai we do feel comfortable. We will hit our	
	guidance at greater than 10."	
	Robert Stallard (Banc of America Securities): "But these are very distance dates, is that leaving to airlines encouraging you to raise rates how aggressively than you would like?"	
	Jim McNerney: "Yes. We have been encouraged to raise rates. But I have a fundamental belief, which is that the best customer service is to deliver on your promises. And so to raise rates and then later not be able to deliver because the supply chain was not with you and the planning was not done properly is a lesson that this industry teaches itself every decade or so, and I am bound and determined not to learn that lesson that way while in this job. So, we want to raise rates because our	
	customers do need the airplane, and we as you noticed were raising rates and we are doing it prudently and we are going to keep looking at raising rates because we do want to satisfy these customers. But it will be done when we can do them."	
	Robert Toomey (E.K. Riley Investments): "There has been a lot of news lately about China entering the commercial jet market, and I am wondering if you could make some comment on your observations on what China maybe doing here in the near-term, I guess, in your industry in the next five years? And then also if you could make a comment on your assessment of the airline, on behalf of your major customer, the airline industry? Thank you."	
	Jim McNerney: "Yes, I think there is no doubt that the Chinese will be someday in the commercial airplane business. There is lots of speculation on how long it will take them. It will probably take them a considerable period of time to get there, but they have a large internal market. They have technical capability, and they have the resources to do it. So, I think whether its 10-years or 20-years, I think, we will see somebody probably in the narrow-body segment from China competing there. Listen, it is a huge market for us, we have many partnerships over there. I am one of	
	us, we have many partnerships over there. I am one of these people who believes that partnering with people who are potentially competitors is not necessarily a bad thing. So I think we will have a headset of both competing with them and partnering locally because we benefit from it as a company, it strengthens our company. And they will find us the top competitors and they would expect to. It's close to what's probably a 10% to 12% of our sales	

over the last few years had been in China that will moderate a bit as other parts of the world get back in the game, but they will continue to be major customers, and they have shown preference for our products, and we continue to think they will, for a pretty long period of time."	
Stanley Homes (Business Week): "Hey, I wanted to just ask you, or actually follow-up on the contingency funds that you set aside for the 787? Could you just wanted you to let us know how many again you have triggered and have you triggered anymore since the last time you talked about those funds and using them, setting aside those funds for some of the production issue?"	
Jim McNerney: "I think we are at roughly the same place we were the last time we chatted with you. I mean we have got contingency efforts in place for wiring, for tubes, for traveled work, other forms of traveled work. These break down into three teams, that we hope won't have a lot of work to do. But if they need to, they are ready to go. And we are training them and standing them up, and as we re-planned some work as pieces come into Charleston and then to Seattle and these guys will be ready to go. And I am always asking the question, so as Scott, are these teams ready? Are there enough of them in our worst case scenario? And we feel very comfortable with where we are. So, the specific answer to your question is, there is three teams ready to go. We have retired one team actually, that was whether we got in place to make sure we had any extra composite work that needed to move around. But it turn out, we didn't need that. All the partners did their composite work that they promised they could do. So, that team is sort of gone mute."	
<u>Stanley Homes (Business Week):</u> "Okay. So, you have retired a composite team and then you have three teams that are for wiring, tubes and traveled work. Those are the ones that are still sort of setup, ready to go if you need them?"	
Jim McNerney: "Yeah, wiring and then the tubes, clips, brackets, those kinds of thing."	
Stanley Homes (BusinessWeek): "Alright, okay, yeah."	
Jim McNerney: "And then some other traveled work that we would have to plan and that, as you know, when these kinds of things, Stanley, those teams would need to be in place for their first, usually 20 airplanes or so, just as it winds down	

				and all the work settles in and where it's going to be."	
				Stanley Homes (Business Week): "And then finally how are the Italians doing? And why were they little slower than some of the others? What were their issues? And I am assuming that they're pretty much on track, is that correct?"	
				Jim McNerney: "Yeah, I think in a word they're doing better. I think the transition from prototype to production was not easy for any of our partners, and it may have taken them a little longer, but they are now flowing with the work, and so we are feeling better about it. Still challenges in front of us, still <i>Boeing</i> people working with them, but I would say we are feeling incrementally better there."	
				Lynn Lunsford (Wall Street Journal): "This is kind of a follow-up on that, is looking at the 787 program clearly there is a whole bunch of folks who are sitting on the sideline and waiting for Boeing to stand up and say oops! and so far you keep reiterating that you are on track and on schedule. What is probably the single biggest challenge that you still have to meet? Is it making sure that all of the systems come together, and where if you just have to kind of handicap your biggest hurdle yet, what would it be?"	
				Jim McNerney: "Well, I think, obviously the system's integration at this stage in a program becomes very important and things can happen that require re-work, re-looping work, and that represents in our norm. So far that's going well, but it represents a risk. I think when you add it all up Lynn, whether the airplane flies at or around the time that our milestone says it should, will be the time when everything comes together. And if we hit that milestone on or within a reasonable time around our target there and EIS is now threatened, then I think you could look at that and say we are in good shape. Now, the next risk is what you would find out in flight test, and there could be some unknowns there as well. But as we sit here today we think it's going to come together, and we think we will be flying."	
Busines s Week "The New Heat on Ford" (David Kiley)	Alan Mulall y, CEO, <i>Ford</i>	Firm	α	"We have been going out of business for 40 years." "Mulally, who is moving to lengthen job tenures, finds [Ford's] system appalling. 'I had the same job at Boeing for seven years,' he says. 'You can't hold somebody accountable for a job they've done for nine months."" "You can't manage a secret."	On the CEO as Chief Archite ct. Note that as CEO of <i>Boeing</i> , Mulally was a modular architec
	s Week "The New Heat on Ford" (David	s WeekMulall"They,NewCEO,Heat onFordFord"(David	s WeekMulall"They,NewCEO,Heat onFordFord"(David	s WeekMulall"They,NewCEO,Heat onFordFord"(David	Busines S WeekAlan S WeekFirm GαBusines S Week ToruAlan S WeekFirm GαBusines S Week ToruAlan S WeekFirm GαWeek ToruAlan S WeekFirm GαWeek ToruAlan S WeekFirm S WeekαWeek ToruAlan S WeekFirm S WeekαWeek ToruAlan S WeekFirm S WeekαMulally Week ToruAlan S WeekFirm S WeekαMulally WowKalan S System appailing. '1 had the same job table of a job they're doing for sum appailing. '1 had the same job table of a job they're doing for sum appailing. '1 had the same job table of a job they're doing for sum appailing. '1 had the same job table of a job they're doing for sum appailing. '1 had the same job table of a job they're doing for sum appailing. '1 had the same job table of a job they're doing for sum appailing. '1 had the same job table of a job they're doing for sum appailing. '1 had the same job at Booing to sum appailing. '1 had the same job at Booing to sum appailing. '1 had the same job at Booing to sum appailing. '1 had the same job at Booing to sum appailing. '1 had the same job at Booing to sum appailing. '1 had the same job at Booing to sum appailing. '1 had the same job at Booing to sum appailing. '1 had the same job at Booing to sum appailing. '1 had the same job at Booing to sum appailing. '1 had the same job at Booing to sum appailing. '1 had the same job at Booing to sum appailing. '1 had the same job at Booing to sum appailing. '1 had the same job at Booing to sum appailing. '1 had the same job at Booing to sum appailing. '1 had the same job at Booing to sum appailing. '1 had the same job at Booing to sum appai

						relative
						to
						Airbus,
						while at
						the
						more
						modular
						Ford,
						Mullaly
						appears
						relativel
						У
						integral.
27	Flightbl	Mike	Firm	α	<u>Update 3 - June 25, 2007 - 10:25pm</u>	Ona
June	ogger	Bair,			"Mike Bair said today, 'The aircraft will be structurally	modular
2007	(Jon	VP			complete at rollout but will still have systems, ducting,	enterpri
	Ostrowe	787			wiring and similar work to be done before first flight.	se
	r)	Progra			When those tasks are completed, it will be powered up	architec
		m, Roging			and proceed to ground test before it flies.""	ture's
		Boeing Comm				overpro mise
		ercial				and
		Airpla				under-
		nes				delivery
						uchivery
July	Airways	Gordo	Firm-	α	"I already hear labor leaders crying out, 'Let's go back to	On a
2007		n	Labor		the old ways and let's get that again.' Do you know that a	modular
		Bethun			walrus isn't born fat and ugly - they become that way?	enterpri
		е,			So, if you want a date, you gotta kinda slim down and	se
		former			keep yourself in shape. So if you get fat and ugly again,	architec
		CEO,			someone's just going to take it away from you. Who are	t's view
		Contin			the big losers? The employees lost the most with pensions	on labor
		ental			and incomes. Well, don't let that happen again! The guy	relation
		Airline			that overeats is the one that dies. Where there's a	s
		S			management that says, 'Fine. We have to sign this	
					contract, that we know that if we do will put us at a very	
					non-competitive situation and will ultimately kill us'. Don't sign it! 'If we don't sing it they're going to strike	
					and take the company out.' Well, take it! Shit, you're	
					going broke anyway! It might as well be them that	
					cause it and not you. How do you pull a band-aid off? If	
					you do it fast, do it quick. On hair at a time or get that	
					goddamn thing off $-$ it's got to come off. Get it over with.	
					United, Delta; Northwest, and others were a victim of	
					compromise - another layer of fat, another deal they	
					shouldn't have signed, another concession."	
25	Thomso	Jim	Firm-	α	Joe Campbell (Lehman Brothers):	On a
July	n	McNer	Investo		Will you say something about what you are going to do	modular
2007	Reuters	ney,	r		with the 87? I thought that might have been part of the	Enterpri
	Researc	Chari			answer about what it is that you are going to book. I think	se
	h,	man			a lot of people are thinking with a big block size you	Archite
	excerpt	and			are going to have more normal profits than you would	cture's
	from "The	CEO;			usually have here, but so we are pretty much in the	defense
		James			dark about how to think about the 787 in '08.	of its
	Boeing Compan	Bell, CFO,			James A. Bell (Boeing):	finanaic al
					TATTES A ISEN (KOPING)	

	y, Q2 2007 Earning s Call Transcri pt"	The Boeing Compa ny			Think about it in two ways it will be profitable from the first airplane, which is something that is different than what we have experienced in the past, but on the same token, it will not be as <u>Joe Campbell:</u> You are saying it will be profitable on a unit cost basis from the beginning? <u>James A. Bell:</u> I think it will be profitable on a program accounting basis and it may also be slightly profitable on a unit basis. We'll have to take a look at that but clearly it will be dilutive to the mature margins we experienced on the 777 and the 737 today. So I think the way you think about it is it is going to contribute but it is going to contribute at a much lower margin rate than our other airplanes."	perform ance
Sept. 24, 2007	CNN Money.c om	Tom Enders , CEO, <i>Airbus</i>	Firm	β	"We will decide when we are ready. Announcements will only be made when Airbus has arrived – together with the potential partners – at concrete terms and conditions for a promising long-term partnership ."	On Airbus' picking investor compan ies to buy some of its internal manufa cturing facilitie s. (Contra sted with Boeing' s process of selling off its internal Wichita division .)
5 Oct., 2007	Reuters	French state bank, CDC	Investo r	β	"The CDC said in a statement that when it bought the shares it was acting as a 'long-term investor, alongside other financial institutions."	On accusati ons that underva lued EADS shares were bought by a French state

						1 1
						bank
						after the A380
						problem
						s.
24	Thomso	Jim	Firm-	α	"David E. Strauss (UBS Securities):	On a
Oct.	n	McNer	Investo	~	Could you just address profitability on an initial batch of	modular
2007	Reuters	ney,	r		787, I think in the past you talked about from a	Enterpri
2007	Researc	Chari			program accounting standpoint you expected it to be	se
	h,	man			possible. I think from a unit accounting standpoint you	Archite
	excerpt	and			also said it would be profitable. With the delay	cture's
	from	CEO;			obviously we are seeing the schedule with some of the	defense
	"The	James			penalty payments and I am note sure if you are	of its
	Boeing	Bell,			capitalizing any other cost, could you just address what	finanaic
	Compan	CFO,			you are looking as far or thinking about in terms of	al
	<i>y</i> , Q3	The			profitability on the initial batch?	perform
	2007	Boeing				ance
	Earning	Compa			James A. Bell (Boeing):	
	s Call	ny			We still think the initial units will be profitable. We	
	Transcri				haven't gone through and completed our analysis yet on	
	pť"				what the accounting quantity side will be and are they	
					still working all the cost estimates and then obviously we	
					have a pretty good feel on pricing because we have sold so many of the airplanes but we haven't concluded	
					those that analysis yet we are working through our	
					auditors and we will meet quite frankly, but we do know	
					and still feel that those initial units will be profitable,	
					but they will be diluted from a margin standpoint to our	
					marked mature material programs.	
					1.0	
					Benjamin Fidler (Deutsche Bank):	
					Question if I could, just to clarify a bit more on the 787.	
					Just in terms of how far through the supply	
					renegotiations and the discussions with your airline	
					customers you now are on the 787 and when you expect	
					to fully complete those?	
					James A. Bell (Boeing):	
					Well obviously we're on the supply chain as Jim	
					mentioned, the discussions around any changes associated with the slide, any changes in statement of work	
					associated with the development program are pretty	
					mature and we believe we have the what the ultimate	
					settlement position on that already taking care of both	
					in our R&D guidance, where would be the R&D	
					related and then our assumptions for booking rate on	
					the program of accounting the assumptions. So that	
					when we start to delivering in the next year, that is	
					already included."	
29	Reuters,		Firm-	α	"Boeing Co. said on Monday it would buy up to \$7 billion	On a
Oct.	"Boeing		Investo		of its own stock, one of the planemaker's largest	modular
2007	Sets \$7		rs		repurchase plans on record, but kept its cash dividend	EA's
	billion				unchanged. The announcement comes amid a three-	investm
	Share				month slide in Boeing shares, which have lost about 10	ent
	Buybac				percent of their value after hitting an all-time high in July,	strategy
	k" (Bill				as production problems have delayed the company's new	

	Rigby)	T T	787 Dreamliner.	T	
1 Nov. , 2007	Rigby)Rigby)SelectionThe BoeingBoeing CompanMcNer companyChair website:"2007Speeche sSpeeche sSpeeche sSpeeche sSpeeche sSpeeche 	Firm	 787 Dreamliner. <i>Boeing's</i> shares added to ga announcement, and closed up afternoon trading on the New You. The plan allows the repurchase <i>Boeing's</i> outstanding shares at a biggest plan on record authorized 15% of outstanding shares in 19 over rival <i>McDonnell Douglas</i> of stock buybacks after the attack resumed only in 2004. Since the billion of its own stock. Its last which is nearing completion, was stock, set in August 2006. The specified time limit. 'Our strong financial performation value to our shareholders while growth and becoming more product Executive Jim McNerney, in executing a balanced cash depserving <i>Boeing</i> and its shareholders. <i>It's a whole lot tougher to be a lefather would tell his students, be do the impossible – or what other But then he would go on to say: opposition. If you have the will will gain a lot of support along the low the point that Jack didn't just chart the course, when that made him of hated figure.</i> To 'set high expectations' throw or retaliatory behavior without others' is to fall fatally shated figure. To 'set high expectations' throw or retaliatory behavior without others' is to fall fatally shated figure. Part of living the Boeing values a is being absolutely honest and evaluating their work and proceeding t	97 cents at \$96.99 in ck Stock Exchange. e of about 9 percent of current prices. <i>Boeing's</i> ed the repurchase of about 98, the year after it took <i>Corp. Boeing</i> suspended as of September 11 and en, it has bought about \$8 repurchase authorization, as for \$3 billion worth of new authorization has no ance allows us to return e continuing to invest in functive,' said <i>Boeing</i> Chief a statement. "We are bloyment strategy that's ers well."" <i>hip in MBA-level classes.</i> <i>cause the leader aims to</i> <i>ers regard as impossible.</i> t 'don't overestimate the and courage to lead, you the way.' <i>solution of the strates here is</i> <i>course; he stayed the</i> <i>t want to stress here is</i> <i>course; he stayed the</i> <i>t want to stress here is</i> <i>course; he stayed the</i> <i>t want to stress here is</i> <i>t course; he stayed the</i> <i>t an unpopular and even</i> <i>t wile compromising your</i> <i>ugh close-to-the-line or</i> <i>on the well from which</i> <i>drinks. It is the exact</i> <i>my kind of positive - or</i> <i>and doing the right thing</i> <i>l candid with others in</i> <i>oviding feedback on a</i> <i>done. For many people,</i>	On the chief architec t of a modular enterpri se architec ture, using integral rhetoric with regards to leadersh ip

					- part of the job of being a leader. If you rate the majority of employees as 'above average,' you under-	
					value the work of those who ought to be recognized for	
1					truly superior performance.	
					An open culture cannot work without reality-based	
					communication - honest and respectful conversation.	
					That is why the candid, constructive, one-on-one	
					discussion between a manager and his or her direct	
					reports is an essential element in developing people and achieving strong performance within an open culture.	
					Done well, it is that interaction, more than anything else	
					that engages people's hearts and minds, that excites them	
					and moves them forward.	
1						
					As we're thinking of it here, leadership might seem to	
-					consist of a series of paradoxes. To be a leader, you have	
					to be:	
1					• Both tough and inspirational	
					 Far-seeing and results-oriented 	
					• Unsparingly honest and strongly supportive	
					Well, that's a little daunting, isn't it? Just how do you do	
					it all? You don't want to go to work every morning,	
					desperately thinking to yourself 'What do I need to do	
					today to be seen to be both tough and inspirational?' In	
					my view, that is the wrong mindset. You will wind up being both tough and inspirational if you give yourself a	
					chance to grow into leadership thinking of it less as a	
					form of play-acting during dramatic, life-and-death	
					moments, and more as an organic, continuing part of	
					what must be done to help an organization or team	
					proceed toward a shared goal. As we all intuitively know,	
					it is when you are working for the larger good of others	
					that the courage to lead decisively can be found within	
					yourself. Nonetheless, pushing someone hard, even in	
					their own eventual self-interest, is not easy.	
					That brings me back to leadership development, which I	
					regard as the single most important part of my job. We	
					have metrics for assessing every one of our managers and	
					executives on how well they perform against the six	
					leadership attributes. It is well understood within Boeing	
					that a leader's job consists – in large part – in helping	
					others to discover their own capacity for improvement.	
					As my own father – and mentor – would have said: Aim	
					high. And don't overestimate the competition. If you	
					have the will and courage to lead, you will gain valuable	
					support along the way. I wish you well in your future	
1	General	Miles	Dime	~	endeavors."	0
1 Nov.	Seattle Post-	Mike Bair,	Firm- Suppli	α	"Mike Bair, former 787 boss, gave a pretty blunt talk about 787 suppliers on Wednesday to a group in Everett.	On a modular
2007	Intellige	VPMar	er		I was unable to attend, but check out my report, though	enterpri
2007	ncer,	keting			late, on what he had to say. Some of the highlights:	se
	,		L	L	the state of the state of the state state inglinghts.	20

(() 51	0	(Come of these more work and the prime's state	architec
"Mike	& Strateg	"Some of these guys we won't use again," Bair said. He	architec ture's
Bair's	Strateg	did not name names. Did Bair mean to include <i>Boeing's</i> top-tier partners in the U.S., Italy and Japan that are	relation
'Remar	y, Regime	and an entropy arrangement of the second states of the second states and the second states are second as a second state of the second states are second states and the second states are second	ship
kable'	Boeing	responsible for manufacturing the composite wings and	with its
Speech"	Comm	fuselage sections of the new jet? I put that question to	
(James	ercial	Boeing on Thursday. 'The suppliers you name and some	supplier
Wallace	Airpla	of their subtiers,' a <i>Boeing</i> spokewoman said when asked	S
)	nes	to clarify Bair's comments. Was Bair's speech reviewed	
		and approved ahead of time by his immediate boss, Scott	
		Carson, or by anyone else at <i>Boeing</i> ? Bair did not have a	
		prepared speech, the spokeswoman told me. One industry	
		analyst called Bair's speech 'remarkable.' 'It's	
		remarkable that <i>Boeing</i> is saying publicly that some of	
		their world partners are falling down on the job and	
		that Boeing made a mistake and that they will do it	
		differently the next time,' said Scott Hamilton of	
		Leeham.net. For Boeing's next all-new jet program	
		after the 787, Bair said, it would be better to have a	
		central manufacturing site rather than the global	
		assembly method that is being used for the 787. He said	
		Boeing would put pressure on its suppliers the next	
		time to locate in the same area. On the 787 program,	
		Boeing gave some of the design work to suppliers, in	
		addition to manufacturing responsibilities. Bair said some	
		of that design work had to be done by Boeing when	
		suppliers could not. 'Some of them proved incapable of	
		doing it,' he said"	
		Posted by unregistered user at 11/2/07 3:29 a.m.	
		"Hmm, Mike Bair and rest of the top management at	
		Boeing must have felt, that after the Sonic Cruiser	
		boondoggle, the 7E7 would have to constitute a	
		technological leap forward, if they were to remain an	
		equal contender at the forefront in the civilian airliner	
		business. I would guess that the mandrel molding	
		production method must have looked like a simple and	
		elegant method to them, and not the least; a 'hi-tech'	
		way in which to leapfrog <i>Airbus</i> ; however rushed their	
		design might be. Currently, <i>Boeing</i> does carry a lot of	
		weight as an Original Equipment Manufacturer, and based	
		on its past performance credentials, the company	
		obviously has a lot of clout with their customers.	
		However, past performance is not necessarily indicative on	
		how a future program will perform; and especially not	
		when the OEM does not follow industrial best-practice	
		recommendations that suggest new products should use	
		existing processes and tools, the existing organization and	
		demonstrated technologies. Well, guess what, Boeing	
		didn't follow any of the industrial best-practice	
		recommendations. It appears that they threw a Hail	
		Mary pass to try to "win" the fierce fight for market	
		share in the LCA business in the second decade of the	
		millenium."	
		Posted by unregistered user at 11/2/07 12:26 p.m.	
		"Ok, talking Barrel Mismatch From the 'unofficial	

photos' One barrel was clearly overflush by approx 0.25" at one point, at no other point on the diameter was it underflush, therefore the diameter of one barrel was approx 0.25" greater than the other. The real problem is that the circumference is therefore 0.75" longeron one barrel when it should be much closer, so when you start bolting up you either need a lot of spacers to distribute the gap around the fuselage (prohibitively expensive and work intensive), you make 'proper' matching barrels, or you do what <i>Boeing</i> have done, make up some special joining pieces down one side and whack in a load of filler. There is no easy fix to this problem! Commentators such as Leelaw were correct pillory the rollout, it was a complete joke! This was a <i>Boeing</i> interface slip up!"
Posted by unregistered user at 11/2/07 2:20 p.m. "It is important that these companies do take risks. That is the point, if they played it safe they would have an updated 767, what good would that have done. Risk and failure is how companies grow provided two things - The failure is not so immense it takes them down, and two they learn from it. If the 787 turns into a 2 year delay boondoggle then it may approach that immense failure. If Boeing actually manages their way out the maze and actually deliver 100+ planes by 2009 then all will be well and the risk and failure will permanently move the bar to a higher level. If they deliver 6 airplanes by April of 2009 then they will be in serious serious trouble. So it is to early to call the risk an abject failure. We will now get to see how well Boeing Executives can really manage. It will be interesting to see how they do compared to EADS when they ran into trouble."
Posted by unregistered user at 11/2/07 8:58 p.m. "Bair used to say we 'hired them for their ability to the job'. What an incredible screening process. Bair said, it would be better to have a central manufacturing site rather than the global assembly method that is being used for the 787. No kiddin, I don't believe it. That is radical. Real engineers can look at the 787 and see that it is an aluminum plane made out of graphite. Revolutionary? he, he. Boeing Senior Managers, take a good look in the mirror and you'll see who's at fault."
Posted by unregistered user at 11/3/07 10:29 a.m. "When are <i>Bloeing</i> due to give the next 787 program update? I'm looking forward to hearing about misaligned barrels, phantom fasteners, software code issues, overweight aircraft, underperforming <i>GE</i> engines, etc"
Posted by unregistered user at 11/4/07 1:06 a.m. "When the photos of the mismatch were leaked <i>Boeing</i> were livid. For such photos to get out showed serious breaches in security not to mention confidentiality

issues from employees. Boeing have now clamped
dowm as they were mortally embarrassed by both the
photos and by the leak itself. You will not see a 0.25"
gap from 120 feet. The mismatch problem still exists. I
reckon they will now have spacer panels moulded up that
go 360 degrees around the joint. What this will do for
fatigue on the bolts is anyones guess, and it will have
added much weight and cost. This is one relatively minor
issue, I'd love to see what else is going on. The program
is an utter mess."
Posted by unregistered user at 11/4/07 6:16 a.m.
787-8 Specifications 2006:
OEW 240k
MZFW 340k
Payload 100k
MTOW 480k
WITCH TOOK
2007:
OEW 252.5k
MZFW 345k
Payload 100k
MTOW 484k
It has a commonship which to the 1220 200
It has a comparable weight to the A330-200 now. A
slightly lower max payload and a lower MTOW."
Dested by upperistened user at 11/5/07 0.55 a m
Posted by unregistered user at 11/5/07 9:55 a.m.
"What is it with this guy Bair?????? I don't
understand ,usually when you get kicked out of a job
for not doing your job properly you don't go and
publically admit it too!!!!!!"
Posted by upredistand user at 11/5/07 11-47 a m
Posted by unregistered user at 11/5/07 11:47 a.m.
"Hey 1/4" gap guy, and <i>Boeing</i> is a stupid job outsourcing
guy, answer a question for me. If <i>Boeing</i> has screwed the
pooch so bad how come their stock is still up above \$90
and <i>EADS</i> is below 25 and headed down?"
Posted by TriplePac at 11/5/07 12:34 p.m.
"Seriously though, as one who grew up in the culture of
one of the suppliers AND customers, he should should be
shot for such a public flogging of them regardless of the
problems. Maybe that's a little insight into his day to
day management style. Counterproductive American
arrogance in a global economy; period. For Boeing's
case, they need to get rid of him. Boeing seems to be
exhibiting an alarming level of leadership. Keep it up
& they'll be worrying about Mitsubishi instead of
Airbus."
Posted by unregistered user at 11/5/07 1:14 p.m.
"Counterproductive American arrogance: Apparently
creating the greatest economic engine the world has ever
known is counter productive. 'The transformation of
EADS requires substantial efforts across the group.
Dirbo requires substantial choits across the group.

	7					
					Airbus in particular, requires an overhaul of the	
					original industrial set-up, a behavioural evolution and	
					more modesty ' This little gem came from <i>EADS</i> own	
					website, so who is the arrogant ones?"	
					Posted by Leelaw at 11/5/07 10:33 p.m.	
					"However, I find the 'Great Satan' Aboulafia's assessment	
					of Mr. Bair's recents remarks in his November Newsletter	
					far more interesting:	
					Boeing has done extremely well with global sourcing so	
					far. The 767 and 777 were hugely successful with exactly	
					this kind of global supply chain. The top-tier 787	
					suppliers that Bair criticized, by the way, are valued	
					partners or suppliers on these aircraft. And the 787 looks	
					set to be the successful culmination of these global	
					trends. Geography has never been a problem for Boeing.	
					Outsourcing (in the US and abroad) works great for the	
					company. The real problem is that this time they trusted,	
					but didn't verify. In their zeal to maximize profit and	
					spread much of the financial risk, they offloaded most of	
					the airframe responsibilities without the due diligence	
					needed to ensure that their partners could do the design	
					and integration work. Boeing's unrealistic 787 program	
					schedule didn't help either. Even if it was the partners	
					that screwed up, it was ultimately Boeing's mistake-the	
					buck stops at the prime contractor. The supersite idea,	
					by contrast, sounds completely dysfunctional. Imagine the	
					labor consequences. In good times, you'd see hellish wage	
					inflation for engineers and manufacturing workers, with	
					Boeing and its contractors all poaching employees from	
					each other. In bad times, you'd have a regional	
					employment slowdown that would create armies of	
					workers scrambling to Mexico for maquiladora jobs. A	
					jetliner "bust" cycle would cripple an entire region.	
					Requiring foreign partners to relocate work and jobs to	
					the US would eliminate Japanese, Italian or other	
					government financial support for new programs (to his	
					credit, Bair made this last point in his speech). You'd see	
					fewer bidders vying to work with Boeing on the next plane.	
					Of course, the prospect of a supersite does serve as a ploy	
					to attract the mother of all incentive packages from state	
					and local governments"	
					Posted by unregistered user at 11/6/07 9:35 a.m.	
					"Bair should just shut up and be thankful he still has a job.	
					Stop threatning the State of Washington to provide more	
					tax incentive for <i>Boeing</i> to stay. How is this difference	
					from <i>Airbus</i> subsidy. <i>Boeing</i> executives have known for	
					a very long time that there be delay. No one was honest	
					enough to share that so innocent shareholders	
					purchased <i>Boeing</i> stocks thinking of rosie future is now suffering. Could a class action law suit be far away?"	
8	Forbes.	Moody	Firm-	β	"Moody's cites strong government support as a reason	On
Nov.	com	's	Gover	()	for a stable outlook for EADS' rating."	EADS
2007	(AFX	Investo	nment		na n	rating
2007						0

	News Ltd.)	rs Servic e				being unaffect ed by <i>Airbus'</i> A400M delivery delays.
16 Nov. 2007	Seattle Post- Intellige ncer, "Boeing Bosses Spy on Worker s" (Andrea James)		Firm- Emplo yee	α	"Within its bowels, <i>The Boeing Company</i> holds volumes of proprietary information deemed so valuable that the company has entire teams dedicated to making sure that private information stay private. One such team, dubbed "enterprise" investigators, has permission to read the private e-mails of employees, follow them and collect video footage or photos of them. Investigators can also secretly watch employee computer screens in real time and reproduce every keystroke a worker makes. One company source said some employees have raised internal inquiries about whether their rights were violated. Sometimes, instead of going to court over a grievance on an investigation, <i>Boeing</i> and the employee reach a financial settlement. The settlement almost always requires people involved to sign non-disclosure agreements, the source said. <i>Boeing</i> desires to keep investigation details under wraps. Recently, a <i>Boeing</i> investigator told a Puget Sound-area employee that he was followed off company property to a lunch spot, that investigators had footage of min 'coming and going' and that investigators had accessed his personal Gmail account. The primary reason for the 2007 investigation, the employee said, was <i>Boeing's</i> suspicion that he had spoken with a member of the media. He has since been fired. 'I wasn't surprised, but more just disappointed in them, that instead of looking at the problems, instead of investigating that, they investigated the people that were complaining and got rid of them,' said the employee, who had been an auditor in the company's Office of Internal Governance and asked that he no be named. The problem, Ed Mierzwinski [consumer program director at the federation of Public Interest Research Groups] said, is when companies use the surveillance tactics available to them to root out whistle-blowers.	On a modular enterpri se architec ture's low- trust environ ment.
26 Nov. 2007	Financi al Week "Boeing , Boeing Gone ?	Jim McNer ney, Chair man & CEO, <i>The</i>	Firm- Investo r	α	"After <i>Boeing</i> publically assured investors in September that production glitches wouldn't delay delivery of the first plane, Mr. McNerney revealed a few weeks later that it would be six months late. 'I think the reason we will be able to meet the new timetable is the detailed bottom- up planning we've done to assure that we can make it.'	On a Modula r Enterpri se Archite cture's
	Stumble Could Cost CEO" (John	Boeing Compa ny			'McNerney has to deliver. This is strike two and you're out," said Noel Tichy, a professor of management and organizations at the University of Michigan who worked with Mr. McNerney at <i>GE</i> and in a forthcoming book, lauds his handling of the ethics scandals.	relation ship with its investor s.

	Pletz & Paul Merrion)				Slowing down production for several months may be 'the next shoe to drop,' J.P. Morgan Chase analyst Joseph Nadol predicted in a report earlier this month, 'which may be perceived as negative by the market but in fact could be the first step on the road to recovery.' Mr. Nadol, one fo the first analysts to predict serious 787 production delays, remains neutral on the stock, which is off 7.3% since the delivery delay was announced Oct. 10, after rising 56.8% in the preceding 27 months of Mr. McNerney needs to exercise more hands-on control so he's got the straight poop,' said Scott Hamiltion, an airline consultant at Leeham Co. 'People simply don't buy their spin.' 'The last thing they want to do is what Airbus did: announce a six-month delay, then come back and delay it even further,' said Paul Nisbet, an analyst at JSA	
5 Dec. 2007	The Seattle Times, "Airbus Producti on May Move to U.S." (Domini c Gates)	Ralph Crosby , North Ameri can executi ve of <i>Airbus</i> parent compa ny <i>EADS</i>	Firm	β	Research. "If Airbus were to go ahead, 'its tantamount to Toyota entering the U.S. auto market' with U.S. factories. 'Its Toyota all over again,' he [a person close Airbus] said. 'We become Americans.'"	On an integral enterpri se architec ture's organic geograp hic growth strategy
7 Dec. 2007	Wall Street Journal, "Jet Blues: Boeing Scrambl es to Repair Problem s with New Plane," (J. Lynn Lunsfor d)	Scott Carson , Preside nt & CEO, <i>Boeing</i> <i>Comm</i> <i>ercial</i> <i>Airpla</i> <i>nes</i>	Firm	α	"Rejecting the idea that <i>Boeing</i> might be better off increasing production more slowly, Mr. Carson says, 'I couldn't stand the pain of telling a customer it's going to be worse off for them, just to make my life easier.""	On a modular enterpri se architec ture's view of courage and stability
12 Dec. 2007	Aviation Week's Things with Wings, "Falling Out of	Heidi Wood, analyst , <i>Morga</i> n Stanley	Firm- Investo rs	α	"One of the biggest <i>Boeing</i> bulls on Wall Street is having second thoughts. <i>Morgan Stanley</i> research analyst Heidi Wood lowered her rating on the company's stock to 'equal-weight' the equivalent of neutral following a yearend briefing on the 787's status by the program's new general manager, Pat Shanahan. Shanahan maintained the program's recovery plan is	On the valuatio n of a modular enterpri se architec

	Love with Boeing" (Joe Anselm o)				on track to deliver the first 787 by the end of next year. But Wood, in a research note issued Wednesday morning (Dec. 12), says the hurdles ahead are just too risky to tell her clients to keep buying <i>Boeing</i> stock. 'We have a new level of concern the 787 risks are likely to linger over the stock and not be retired as we had earlier believed,' she writes. 'For the time being the risk/reward trade-off is no longer sufficient to warrant a [buy] rating.' Wood's downgrade is a sharp departure from her tone in October, when she said investors had over- reacted by selling off <i>Boeing</i> stock after the 787's first delivery was delayed at least six months because of problems with suppliers. At that time, she predicted <i>Boeing</i> shares 'could soar in the 50% vicinity' over the long run. <i>Boeing's</i> stock is down about 12% since the 787 delivery slip was disclosed in October. Wood believes another six-month delay in the 787 could send Boeing shares tumbling an additional 18- 20%. The stock 'is apt to trade on event risk versus valuation until the 787 risk perception meaningfully clears,' she writes. Conversely, if <i>Boeing</i> is able to hold	ture.
- 20	The	1-65	Guardi		the 787 to its new schedule without any major problems, the stock could rise 35% to \$120 a share, Wood predicts. She also remains bullish that the commercial aerospace upcycle won't peak until 2011 or 2012."	0.7
20 Dec. 2007	The Wichita Eagle	Jeff Turner , CEO, Spirit Aerosy stems	Suppli er	α & β	"In the end, we just couldn't close a business case that met both our customer requirements and our shareholder requirements."	On Spirit Aerosys tem's losing bid for Airbus plants.
20 Dec. 2007	The Wichita Eagle	Stefan Schaffr ath, <i>Airbus</i> spokes man	Firm	β	"The three partners had better offers commercially and technically, were more aggressive than <i>Spirit</i> in the last round of negotiations. Politics had no influence."	On Spirit Aerosys tem's losing bid for Airbus plants to Europea n partners , GKN in the UK, OHB Technol ogy MT Aerospa ce in German y, and

.

						Latecoe
						re in
				_		France.
Dec. 20, 2007	The Wichita Eagle	Robert Spinga rn, Analys t, <i>Credit</i> Suisse	Investo r	α	"[<i>Credit Suisse</i>] praised <i>Spirit</i> management for not overpaying for the plants, particularly given the difficult long-term governmental and labor climate in Europe."	On Spirit Aerosys tem's losing bid for Airbus
		in characteristics and				plants.
Dec. 20, 2007	Seattle Post- Intellige ncer	Group Scott Carson , CEO, Boeing Comm ercial Airpla nes		α	"Boeing picked world-class partners, but then failed to provide adequate insight about what was happening with those partners. 'We looked into them, but it was more from the outside in,' Carson said. 'When I talk about insight , its about having enough knowledge, enough sense of what's going on in their factory on a daily basis to identify issues that may bite them so you can help clarify and resolve those kinds of challenges. I think we came too late to realizing we needed that insight . When I look back at this thing, the lesson I carry away is you have to manage the production process as viorously when it is distributed as you do when it is centralized . And	On Boeing' s "Large- scale Systems Integrati on" strategy on the 787.
Jan. 26, 2008	The Econom ist	Christi an Streiff, Former CEO of <i>Airbus</i>		β	frankly, shame on me for not recognizing that sooner."" "What has characterized most of Mr. Streiff's career is boldness and a bullish impatience to get things done. Mr. Streiff should have known that running <i>Airbus</i> would require political skills of a high order. Describing his first few days as 'vertical take-off' at 'full thrust', he threw himself into the job of saving <i>Airbus</i> , as he saw it, from itself. The <i>EADS</i> board told him that his behaviour was not acceptable. He claimed that his plan had been undermined by the dysfunctional corporate governance at <i>Airbus</i> . But the more emollient Louis Gallois who succeeded him showed what could be done even in less than ideal circumstances, and Mr. Steiff now admits he could have been more diplomatic. There is certainly no doubting Mr. Streiff's effectiveness when it comes to managing down."	On the manage ment qualities of a failed modular leader in an integral enterpri se.
Jan. 29, 2008	<i>Reuters,</i> James Regan	Louis Gallois , CEO of <i>EADS</i>	Firm	β	"[Gallois] sees no sign of a downturn in the aviation industry, despite global financial turbulence and does not expect more major swings in demand after a record year for orders in 2007. While in the past, planemakers had suffered from a 'very brutal cycle with peaks and canyons', the emergence of an autonomous second market in the Middle East and Asia made the industry less susceptible to the current credit crisis and threat of a U.S. recession. 'We do not see that the second market is suffering from the downturn for the time being. It's two different markets, two different cycles. We could expect not to have peaks and canyons, but more hills and valleys."	On characte rizing the dampen ing of the business cycle.
30 Jan. 2008	Thomso n Reuters Researc	Jim McNer ney, Chari	Firm- Investo r	α	" <u>Steve Binder (<i>Bear Stearns</i>):</u> Can you maybe just touch on the 08 BCA guidance as far as margins obviously is not, productivity is one of the drivers of the margin improvement , is it coming at all	On a modular Enterpri se

	1		 from block shanger on is that armine simply from	Archite
	h,	man	from block changes or is that coming simply from productivity improvement and maybe you can address	cture's
	excerpt	and	which lines it pertains to.	defense
	from "The	CEO;	which lines it pertains to.	of its
	Boeing	James Bell,	James Bell (Boeing):	finanaic
	Compan	CFO,	It really is coming from productivity improvement	al
	<i>y</i> , Q4	The	across the in-production airplane programs. We clearly are	perform
	2007	Boeing	continuing to focus on driving our productivity initiatives	ance
	Earning	Compa	in the BCA and we are starting to bear those fruit and it is	
	s Call	ny	primarily what we are seeing of the 777 moving line as we	
	Transcri		get into its implementation and we continue to harvest the	
	pť"		kind of productivity we have seen in the past going	
			forward on the 737.	
			Steve Binder:	
			And if I can just follow up, you addressed the cycle to	
			some degree that growth and demand across the globe,	
			maybe if you can address, how do you believe the so-	
			called credit crunch we are seeing today both in rate	
			increases and availability of credit in the aviation industry	
			granted that is mainly tied to the US carriers, but certainly	
			it is affecting the ability of some leasing companies and	
			some lower grade airlines around the world to get	
			financing, how does that affect your decision on what the	
			rates, the 373 rates further number one, and two, how does	
			that affect you achieving your rates that you plan to get to	
			by the 2010 timeframe.	
			<u>Jim McNerney:</u> I do not think the credit situation, while it has had an	
			impact in parts of the capital markets, I do not think it	
			has changed our thinking on the near-term, medium-	
			term opportunity in front of us. Most of our planes are	
			financed by non-capital market institutions that have	
			remained in pretty good shape throughout all of this	
			whether it is sovereign credits. The leasing companies	
			themselves have been doing reasonably well. I think the	
			capital markets, you have seen a risk premium built-in in	
			some of the faultier deals are not getting done, but we are	
			actually seeing a little bit of loosening up there as some paper that was not being sold, maybe four or five months	
			ago is now being sold again in the capital markets albeit at	
			a higher premium, but I would characterize that as	
			marginal and not yet impacting nor do we see it	
			impacting, quite frankly our prospects for growth.	
			Doug Harned (Sanford Bernstein):	
			On the 787, now, we are looking at a delay of at least	
			nine months in delivery off of the original schedule and I	
			am just wondering if you could give a perspective on when	
			you look at the areas that we might see higher cost and	
			financial impact and I classify those as customer	
			penalties, supplier costs, for your own operational costs	
			as time stretches out, where do you see the greatest risk	
			financially?	

				Jim McNerney (Boeing):	
				The business case remains sound. Obviously, we are	
				very disappointed with the delay in terms of its impact on	
				our customers, but the backlog remains in place. The	
				profitability of the airplane could be marginally	
				impacted and will be marginally impacted by the delay	
,				in terms of some increased cost in the supply chain and	
				some possible penalties on the customer side, but we do	
				not see those kinds of cost having a significant impact	
				over the huge volume base that we are fortunate to	
				have on this airplane, so this is a case where I think the	
				value of the plane to our customers as borne out by the	
				record order book is helping mitigate what are bound	
				to be some cost. In the meantime, James, do you have any	
				further comments there.	
				James Bell:	
				I think the other side of that equation is that the schedule	
				stretch out that we have experienced is going to allow us	
				to work harder on finding opportunities for productivity	
				that would also offset some of the cost we would	
				experience as a result of the delay, so we have not gotten	
				through the assessment yet to really know where things are	
				going to fall out, but I think, along with the risk, there will	
				be other opportunities that we have not foresaw	
				previously.	
				proviously.	
				Doug Harned:	
				So I would assume particularly from your guidance at least	
				in the near term and even as you go out a couple of years,	
				I am looking at margin, it sounds like you are not	
	1 ×			seeing anything that really changes your economic case	
				for the airplane even over the next couple of years	
				other than a push back.	
				Jim McNerney:	
				Absolutely not.	
				Howard Rubel (Jefferies & Co.):	
				I want to talk for a second on DFA certification process	
				that you are going through on the 78, I know you cannot	
				fly the airplane, but there is a whole bunch of things that	
				you can do in the process to get there. Could you sort of	
				touch on that and then again, Jim maybe talk about how	
				this delay has been able to have been insulated from	
				the core business which really showed terrific results.	
				lim McNomey (Peaing)	
				Jim McNerney (<i>Boeing</i>): Wall you are right about your observation on the part	
				Well, you are right about your observation on the cert	
				process. About 70% of the certification effort	
				documentation does not have to come from the flight test	
				program. It can come from things we are doing today and	
				we have got about half of that done, and we have got a	
				clear plan with the FAA so we are feeling pretty good	
				about that. Obviously, the flight test program has its own	
		1	ı	set of risks, but we are feeling pretty good about it and we	

	are certainly working as well with the FAA on this program as we have on any that I can remember.
	Now, one of my jobs, I think is to work with Scott Carson to make sure that when you have a program that is struggling and in terms of schedule that you get as much focused effort on that program as you can. You get the best leadership and we have done a lot of that over the last months and we have got our best of Boeing team working on that program now on the 87 and a lot of folks from BCA obviously and with some help from IDS depending on the task at hand, and at the same time, we have got to make sure that that effort does not impinge on the fundamental running of the business. I mean, the 87 while a critically important program for us is one of 300 programs we manage here at <i>Boeing</i> and we have got to make sure that the leadership understands that struggles are one part of our company do not mean distraction, rather it means, intense focus to make sure that we keep delivering the results that the total corporation is aiming for. So that is a leadership challenge and it is all about how we work together and help lead and manage each other and that is
	one of my tasks and I am very sensitive to it. <u>Robert Spingarn (Credit Suisse):</u> Just to follow up on your answer to that last question on leadership and particularly on communication within <i>Boeing</i> between Seattle and Chicago, between suppliers in Seattle. How has your oversight and your involvement in 787, recognizing it is one of many programs, how has that evolved over the past six months or so?
	Jim McNerney (Boeing): As is typical in big corporations like what we are part of here, there are days when Scott and his team probably feel I am too involved and then there are days I wake up and say to myself, 'why are you not more involved?' But the fact is I think, we have a pretty good balance. I mean there is a very good team out there. I am probably more involved now, as you can imagine. I mean I think part of my job is to get involved when help is needed. And that has been the case on the 87 over the last few months as we have all tried to understand together the issues. I try to understand the right way forward and I think it is done in the spirit of less of oversight and administration, more in the spirit of all getting in the boat together, trying to figure it out. So, yes, I am a little more deeply involved now than I was, but that could be said about some other programs that we are trying to manage to the success we know they can have.
	<u>Robert Spingarn:</u> Would you say that you are involved to the point that you are very comfortable that your R&D guidance of 3.2 to

3.4 in '08 will not go up?	
Jim McNerney: Well look, I am comfortable with that guidance and that is why we are giving it. But, are there some risks inherent in research and development? The answer is yes, but I feel comfortable with that guidance and we have been through it pretty thoroughly and Scott and his team are committed and I am in the boat with them.	
Ronald Epstein (Merrill Lynch): Just kind of going back to the 787 for a minute, when we think about the compressed flight test schedule , Jim, how do we get comfortable with that ? You know, if you compare it to previous aircraft, all the new stuff on this airplane, it seems like getting the airplane out on this new schedule is really contingent upon that Flight Test schedule. You mentioned in the past, we are going to run it like an airline. It is not so much as flying the plane but it is crunching the data in dealing with the issues when they arise.	
Jim McNernev (Boeing): Yes well I think, it is a non-aggressive Flight Test program. It is a little less aggressive than the Flight Test program schedule we had earlier, but still aggressive and I think one of the silver linings of the delay is we have had more time to test systems, which are critical elements to the Flight Test program, ensure software compatibility and have a little more time with static and fatigue, which I think all are giving us reassurance that some of the more mundane things that can happen during a Flight Test program would not happen, which still leaves us some of the fundamental risks. But we think the program is eminently doable, the head start we have got with the FAA is helping us here and so, I think it is one airplane type, it is not multiple airplane types, one-engine type, or engine configuration I should say. So, I think there is less complexity in this Flight Test program than there is in our usual set of Flight Test programs. So, we are confident we can do it.	
Ronald Epstein:And then one follow up, if I may, you have got roughly\$12 billion of cash on the balance sheet and you are deploying it for share buybacks. What else are you thinking about?James Bell: Well clearly, what you see is our fundamental basic deployment strategy and obviously other things that we are looking at, we could not talk about in any detail, but we are always looking at better ways to provide value to our share holders with that cash and that can include some things like you have seen in the past, particularly with the	

in our support business and how we could look at our strategy in terms of being horizontally versus vertically integrated. We look at that as we always do and see if there is opportunity there to create better value than current cash deployment strategy will provide, but we are looking at a lot of things.
Joe Campbell (Lehman Brothers): Good morning, our aircrafts seems like firmly on the weight of 40 narrow-body a month and with somewhere between 250 and 300 on the FWB [XWB?] pushing forward on that aircraft, targeted against the 777, I guess with delivery in 2013 but <i>Boeing</i> thus far has narrow-body only to 31 a month, apparently constrained by factory production issues, your judgment for that, what would be prudent in the ramp up and perhaps some apprehension about the cycle and the sustainability . But it seems to me that most of these concerns on the narrow-body have been delayed but thus far, we have not seen any comments from you on plans to at least put in place the option of going higher with the 737 nor anything about the response to the A-350. So I was just wondering, whether that difference above, almost a hundred airplanes a year on the narrow-body and the stretch from the 787 were seen as serious and we will be seeing response in 08.
Jim McNerney (Boeing): I will take that one. First the A-350, I think that the model that will compete for the long-range 777's if the plane has the performance that <i>Airbus</i> thinks it can have is the 1000 and I think that that is not a 2013 airplane, I think it is more 2015 or 2016, I am not sure. It is certainly later, it could be seven or eight years from now. So, I think we have time to assess that plane and we have time to assess what we might need to do if anything with the long-range 777s. So that is one.
Joe Campbell: Nothing in '08?
Jim McNerney: In terms of what our R&D on the 777?
<u>Joe Campbell:</u> With this response from you, in order to get ready for whenever they are going to have their plane ready.
Jim McNerney: Well I think my point is that we do not have to do anything in 08, if I am getting the sense of your question.
<u>Joe Campbell:</u> Yes that is right, I was thinking, so you are going to wait until 09 or 10 to do something.
Jim McNerney:

Well yes. I think we need to see what the performance of the A-350 might be. We are not just sure. I know they have designed goals, but I think they have, just like anybody would, us included, seven or eight years ahead of an introduction. There are a lot of unanswered questions about the performance of the airplane and I do not think we want to put too many wheels in motion although we are obviously thinking through some contingencies and we are doing some preliminary work in the normal course of events, but I would not see a major program emerging until after this year. Heidi Wood (Morgan Stanley): I am curious about your comment about another good order year for BCA, can you define that for us a little bit better. Kind of talk about where you are seeing incremental demand coming from geographically and perhaps where you are seeing demand may be exhausting	
perhaps where you are seeing demand may be exhausting and what you are thinking also about 09 and 2010 in terms of units and book to bill. James Bell (Boeing): Well, we think the traffic that we have seen in prior years remain and so we think that is where we will continue to get it. We also believe that it is going to pick up domestically as Jim has mentioned and we have talked about before that although the US carriers really have it engaged heavily in the cycle that with the higher oil prices and their needs at least we understand them. They will have to get engaged soon. That is kind of where we would expect to see the order traffic come from this years and then going forward. I mean there is a lot of aging	
year and then going forward. I mean, there is a lot of aging aircraft in the US that cannot be operated economically and clearly can be competitive and allow them to create value for their shareholders if they continue to operate them in this current environment. And then that coupled with all that is going on with green and the environment, I just think that there is going to be a lot of pressure to replace old airplanes and that is what we see. <u>Heidi Wood:</u> But do you see demand exhausting in the Middle East and Asia Pacific where it has been inordinately robust in the last couple of years. I mean, does that slow down?	
James Bell: At some point, I think it will. We have not seen it yet, but obviously at some point we are not sure exactly all that drives their needs, we know a lot of it. An issue had been the infrastructure, but we will see. <u>Troy Lahr (<i>Stifel Nicolaus & Company, Inc.</i>):</u> James, I thought you talked about aircraft service work and how it increased this year at a double digit rate, can you maybe talk a little bit about what was driving that	

		and do you expect that growth rate to continue at a double digit pace next year end of 2008?	
		Jim McNerney (Boeing):	
		We do have good momentum. The base business there is	
		obviously sparse and some routine work, but more and	
		more we are getting our technology into play. The	
		drivers are convergence. There is a lot of passenger to	
		freighter convergence. That business is continuing to grow	
		and also some modification kind of work and then, supply	
		chain work where increasingly, our customers are looking	
		for folks like us to manage their supply chain for them more productively on an outsourced basis, so those tend to	
		be drivers and we see it going and I would say on the	
		productivity side, we are beginning to share infrastructure	
		across the two sides of our services businesses, the defense	
		and commercial side that can give us a little more	
		productivity and best practices and things like that. We are	
		beginning to leverage all of <i>Boeing</i> to improve that overall	
		business.	
		Troy Lahr:	
		But the double digit growth rate, that should continue?	
		Jim McNerney:	
		Yes, low double digits is the plan.	
		Joseph Nadol (J.P. Morgan):	
		My question is on the 747-8 passenger variant. Just wondering what your outlook is perhaps for this year for	
		demand. You have the one order from Lufthansa so far	
		and also the development program. How do you	
		characterize that as progressing and then stepping back	
		after that, what is your commitment to the aircraft if	
		your order outlook does not meet expectations?	
		Jim McNerney (<i>Boeing</i>):	
		I do not have the numbers right here in front of me,	
		somewhere between a hundred and hundred fifteen orders	
		for the two airplanes. We have got about 27 or 28 on the	
		PAX side. DLH with 20 as you pointed out and then we	
		have some other small orders, so the majority remains	
		freighters which are an extremely well received in the	
		marketplace. We have got about ten discussions going on	
		right now with folks for the PAX version. So we anticipate	
		success here. We do not anticipate failure. And so none	
		of our plans include an offer up here. All of our plans	
		include making this a success and it would not surprise me	
		in 08 if you saw a few of those customers shake loose and	
		we all felt a little differently about it a year from now.	
		Joseph Nadol:	
		Can you characterize the difference or the incremental and	
		definite requirement to do, the passenger in addition to the	
		freighter very qualitatively and maybe the commonality	
		between the two aircraft.	

Jim McNerney: As you can imagine, there is a lot of commonality in the structure in the systems, without divulging the details of it, I mean, there is enough unique investment on both sides of the model so that you pay attention, but I think the overall characterization would be tremendous energy that affords you the opportunity to do both. David Strauss (UBS): Looking at your BCAG revenue forecast for 08, you are forecasting about 40 additional deliveries, yet you are only forecasting about a billion, a billion and a half additional revenues. You have already talked about double digit growth in services, so it just seems that that revenue forecast would be a little bit light given what I assume is better pricing coming through in 08.
James Bell (Boeing): I think it is about right the way we have done it and you are going to see the bulk of the better pricing come through at 09 and then there are some product mix in there that would differentiate what we did relative to revenue.
David Strauss: And then, on 777 [787/?] can you just comment on the status where you are with supplier negotiations, I guess, where you were before the announcement of the latest delay and are we back to square one here. How progress is going there?
Jim McNerney: Well, we are going through a process right now of adjusting the schedule and as we mentioned at the end of the first quarter, we will talk about the new schedule. It obviously needs the cooperation and commitment of our supply base who are cooperating and who are committed given the tremendous market success of this airplane, but there are discussions going on because there is a new schedule and there are shifts in cash flows and pain that has to be borne, but I would characterize those discussions as constructive and heading toward a conclusion which we will report on at the end of the quarter.
Myles Walton (Oppenheimer and Company): I guess this is kind of a follow up to that last question, what kind of guidance are you giving in the interim three months to the supply chain such that you will hopefully dissuade them from making some independent decisions that could potentially exacerbate the delay as far as their procurement of raw material goes? Jim McNerney (Boeing): Which guidance are you talking about there?

<u>Myles Walton:</u> Production on the 787, obviously with the next three months, you are establishing a new production plan. They are making their own production decisions. How are you communicating with them in an effort to make sure that the line of communication is open.
Jim McNerney: In all of our supplier partners, we have got between 50 and 130 Boeing employees working hand in hand, minute by minute, hour by hour 24/7, so transparency on each other's issues is not our problem here. It is getting resolution. We are working very closely with our suppliers and they have their people in our facilities and so, it is a pretty seamless operation right now as we all work hard to resolve the issues.
James Gonzales (<i>Bloomberg News</i>): You mentioned that the amount of <i>Boeing</i> employees are out in the facilities and working overtime , I was wondering if you guys have got any feedback from STIA or the machine expedient, I am inquiring further on what the status of the program is and any kind of feedback from them on the working conditions and what the overtime hours that they are having to put in ?
Jim McNerney (Boeing): Our union partnerships have been extremely supportive here. We are all trying to focus on the success of this airplane and the success with the company. So I would characterize it as, overall, very supportive in general.
<u>James Gonzales:</u> And just one other question for you, with the deliveries being revised for this year, this is for James because I remember that you taught that 08 would be the year to surpass <i>Airbus</i> on deliveries. Do you think that is still the case?
James Bell: I do not think I ever said that. That it would be the year we would and I would know that until we get through the year and deliver them. We are giving you our guidance and I am not sure what their delivery guidance is for 08.
Jim McNerney: I think there had been some analyst projections that said that 08 would be the crossover year but quite frankly, I do not think we ever characterize it one way or the other.
<u>Julie Johnson (Chicago Tribune):</u> Okay on the 787 supply chain, could you just give us a little bit of color on how you plan to drive greater efficiency through the production process and could

	
	that potentially mean dropping under performing
	partners?
	Jim McNerney:
	Well, I think obviously the whole concept here, when
	we get through the startup is to have an extremely
	efficient production process where multiple
	organizations are each focusing on their piece and
	through the repetition become very good at a drive
	down their own learning curves and when you add
	them all up, it is better that we were all doing it, that is
	the concept. What was the second part of your question
	there?
	Julie Johnson:
	I was just wondering if potentially you—
	i was just wondering it potentially you
	Jim McNerney:
	By enlarge, we have absolutely no plans to drop any
	suppliers. When we qualified our partners early on, we
	did it with our eyes wide open and they did it with their
	eyes wide open. We have each put a lot of investment
	into it, now I think from time to time, we shift work
	around. We restructure relationships the way the work flows in order to capitalize on things that emerge as
	strengths, or things that emerge as weaknesses, but I
	would characterize it more as fit and finish and that way
	than ever thinking about dropping the supplier except
	in some extreme circumstance, but we do not see that
	here.
	Sebastian Svanki (Book Review):
	I would like to ask another question on the 787 production partners, please. Has <i>Boeing</i> any intention to maybe
	invest financially or organizationally in your
	production partners in order to strengthen them and
	maybe help them through the dire times when they do
	not get the money back in time, and if you would today
	have to decide about like a 737 follow on, would you do
	the very same production set up or would there be
	something different given the experience you have made
	until today?
	Jim McNerney (<i>Boeing</i>):
	Two very good questions. I mean, I think the form of
	financial support that we might contemplate in
	extreme circumstances would be more jointly carrying
	inventory or material together if we put an undue
	hardship on somebody, rather than investing in their
	own facilities, but we have a good feeling about the way
	we are approaching this airplane despite the startup
	difficulties, would we do it exactly the same? We might do it a little bit differently, but the overall strategy
	would be the same. I think we now have learning about
	the relative strengths between ourselves and our
	partners and I think we might draw some lines in

				different places but we would not change the concent	
				different places, but we would not change the concept. Lyn Munsford (Wall Street Journal): This is kind of just a high level question here, but in the last several months, it seems that your issues with having to push off the schedule on the 787 have been kind of the result of this voyage of discovery you have been on, how do you feel right now, are you at a point now where you can see to the bottom of the barrel to know that you do not have any more surprises coming up or when do you expect to be at that point? Jim McNerney (Boeing): I think it is true that the projections we made earlier when we did not have much experience with all the work that traveled to our facilities unanticipated where we did not have robust enough contingency plans when you look backwards. It is true that we missed some projections. Now, we are a lot closer today to completing the first airplane now that we have properly staffed the effort, we now more fully understand the requirements as they came in from our partners and work that we thought they were going to do. And just by virtue of being closer to the end than to the beginning and having had experience with working with the engineering drawings of our partners, having now rounded up the supply chain, a lot of the original supply chain issues have gone away as we have gotten our arms around inventory that was going to travel to other places and things like that, so I think just by virtue of having the experience of getting deep into the	
				complicated than that. Lyn Munsford: Okay, thanks and just one other thing is, do you anticipate as a result of some of the things you are seeing here that you might ramp up a little more slowly than you initially expected so that, when you do actually start getting into the production of airplanes, it would not be at a super aggressive rate and it will be more gradual?	
				Jim McNerney: Well, that question has to be answered over the next couple of months Lyn. We are very mindful of committing to a ramp that we can execute. We are also very mindful that we have already disappointed some of our customers in terms of when we are getting them the technology that they have faith in us to deliver. So, that tension, I think will produce a realistic but aggressive ramp."	
2008 Tin	e Ray attle Goff mes, h & omini Cyn	ort	α	"The white collar engineering union at <i>Boeing</i> doesn't begin formal contract talks with management until later this year, but its leaders are already talking war with the company. Senior officials with the Society of	On pending strike negotiat

2008			Custo		boom year for the industry.' Aboulafia believes that the	tempora
Mar.			Firm-	α	"'All the signs suggest that 2008 will prove another	On
					candor and I appreciated it.'	
					Goforth. 'I didn't like what he was saying, but I liked his	
					'I came away from that meeting liking the guy,' said	
					stance.' Still, his assessment of Carson was not negative.	
					They are somewhat bewildered by the provocative	
					union take pride in working for the Boeing Company.	
					said. 'It doesn't have to be that way. Members of the	
					rhetoric and the tenor already in a bad place,' Goforth	
					the job. 'It was somewhat disconcerting to see the	
					Cole said. That meeting came on Goforth's first day on	
					Kight, expressed a 'desire to dismantle our pension plan and our health-benefit plan. Things got a little heated,'	
					was also present, said <i>Boeing's</i> top labor negoriator, Doug	
					efforts to get rid of the unions at Boeing.' Cole, who	
					statements that 'the company will continue to support	
					Carson was very frank. Goforth said Carson made 'overt'	
					officials, an initial meeting Feb. 4 between Goforth and	
					with some of its major suppliers.' According to union	
					supporting that, too. 'Boeing is still coordinating things	
					decertification drive at the former <i>Boeing</i> parts plant, now <i>Spirit AeroSystems</i> . Goforth believes that <i>Boeing</i> is	
					Utah. SPEEA officials in Wichita also face a	
					SPEEA bargaining units at plants in California, Kansas and	
					contrast, Boeing has supported efforts to decertify smaller	
					concessions giving back pay to rehired workers. In	
					Mulally. In the past year, Machinists negotiated	
					relations with Boeing since Carson succeded Alan	
					President Tom Wroblewski has talked up the improved	
					typically more strident than SPEEA. Machinsts district	
					between <i>Boeing</i> and the Machinists union, which is	
					has contributed to an unusually amicable atmosphere	
					issues on its new 787 Dreamliner programThat situation	
					considered a landmark victory. <i>Boeing</i> can ill afford a strike this time. It is grappling with serious technical	
					day strike that crippled <i>Boeing</i> and won what was	
					before. Eight years ago this month, the union began a 40-	firm).
				8	Boeing engineers have had an extended strike only once	and the
					beore we even begin the formal negotiation process.'	labor
					concerned 'that these kind of statements are being made	between
					'committed to continuing dialog with SPEEA,' but is	not
					said. Boeing spokesman Tim Healy said the company is	ate" -
					of coming paychecks. 'I'm starting my strike fund,' she	"Corpor
					the company began to pay Wednesday, as well as a portion	i.e.
	6				members to set aside part of their 2007 incentive bonuses	capital -
					SPEEA President Cynthia Cole said she's advising	and
		in a start s			Scott Carson that they consider aggressively anti-union.	labor
		nt			private meeting this month by commercial-airplanes chief	between
		Preside			angry over several matters: comments made to them in a	S
		ive Dir. &			'a very realistic possibility.' SPEEA's leadership is	relation
		Execut			to be leading us down toward a crisis,' said SPEEA's new executive director, Ray Goforth. He sadid a strike is	adverse
		A			for the possibility of a strike. 'The company does seem to be leading us down toward a crisis' said SPEFA's	arly on the
		SPEE			(SPEEA) told members to start saving money to prepare	(particul
	c Gates	a Cole,			Professional Engineering Employees in Aerospace	ions

2 Mar. 2008	Seattle Post- Intellige ncer	mer Custo mer	α	current upturn, which began in 2004 shows little sign of running out of impetus and could carry on until at least 2011." "There has been a gulf between <i>Boeing</i> and its <i>Air Force</i> customer ever since the procurement scandal,' said Loren Thompson, a defense analyst with the Virginia-based <i>Lexington Institute</i> . 'That has made it hard for <i>Boeing</i> to understand its customer the way it once did.' 'This is such a stunning upset,' he said. 'It shows something fundamental has gone wrong (in the relationship) with their biggest military customer."	inconsis tencies in analysts of modular enterpri se architec tures. (Compa re with same analyst' s stateme nts in 17 Dec. 2008 and 2001.) On losing the bid to provide the US Air Force with a tanker replace ment to <i>Northro</i>
3 Mar. 2008	Reuters	Custo mer	α	"'This was not a close outcome in any sense of the term,' the analyst, Loren Thompson of the Lexington Institute, told Reuters. 'Northrop won decisively and completely, and Boeing simply was not competitive in the major measures.' Air Force reviewers pressed Boeing to stretch out its aggressive development schedule for a new version of its 767 jet, which in turn added cost. In fact, the Boeing proposal was initially rated as 'high-risk' because the reviewers were concerned that Boeing's proposal to build a new version of the 767, using parts from other versions, would cost more than expected. "Although some observers expected that the Northrop team would offer a better price, nobody expected that they would be better in every significant regard,' Thompson told Reuters. Buying the Boeing tanker would have resulted in a much slower tanker replacement rate. 'The reviewers concluded that if they funded the Northrop Grumman proposal, they could have 49 superior tankers	p/EADS On losing the bid to provide the US Air Force with a tanker replace ment to Northro p/EADS

11	The	Louis	Investo	β	operating by 2013, whereas if they funded the <i>Boeing</i> proposal, they would have only 19 considerably less capable planes in the year,' Thompson said. Air Force reviewers also had less confidence in <i>Boeing's</i> past performance due to 'poor execution' in three relevant programs, including long-delayed tanker deliveries to Japan and Italy, Thompson said. <i>Northrop</i> got higher ratings due to 'satisfactory' execution on six programs deemed relevant to the tanker competition. <i>Boeing</i> had expected to face tough competition from <i>Northrop</i> on cost, but it compounded its problems by failing to adequately explain its assumptions in calculating the cost of developing a tanker, Thompson said. 'The resulting low confidence in <i>Boeing</i> cost projections undercut its claims of lower life-cycle costs,' he said."	On
Mar. 2008	Press Associat ion	Gallois , CEO of <i>EADS</i>	r		Louis Gallois said. 'We are cautious by nature , but I feel <i>EADS</i> is establishing a firm footing on a higher ground.'"	<i>EADS</i> ' nature in setting market expectat ions.
12 Mar. 2008	The Seattle Times	Senior Execut ive, Leasin g Compa ny	Custo mer	α	"It would have been preferable for <i>Boeing</i> to have announced one 18-month delay back in October, the executive said. <i>Boeing</i> management would have 'looked liked heroes' if they had then delivered sooner . He said customers have lost faith in <i>Boeing</i> because of the cascade of delays preceded by promises that everything is fine. <i>'Boeing</i> didn't learn anything from the A380.""	On over- promisi ng and under- deliveri ng.
17 Mar. 2008	The Tacoma News Tribune	Ray Gofort h, SPEEA Execut ive Direct or	Labor Union	α	"Before I took this job, I'd been told that relations with SPEEA and Boeing were pretty darned strained, and I had hoped that could be fixed, but I learned that isn't going to happen easily. Mr. Carson explained that he wanted to get rid of all unions at Boeing and that he intended to continue to support the efforts to bust the bargaining units where they could. It was disappointing. I appreciated the candor. It did supply some clarity on these problems. I went into this hoping that we could partner to solve these problems, but the answer was 'no'. They shared their plans to eliminate the pension plan for all new hires and to make negative changes to the medical plan that will drastically shift costs onto the employees. They seemed to be setting us up for what could be a cataclysmic conflict this fall. Their stance on the pension plan came after the news that Boeing's pension plan is overfunded by \$5 billion, and they are enjoying healthy profits so this is not like the auto industry where they're facing some tough problems that call for some creative solutions. These aren't things they need to keep the business healthy. These are things that they simply want. If I wanted to synthesize it, I'd have to say it is bewilderment that the people who run the company are intent on running it into a ditch and won't listen to the people that really do the work. My members are telling me we're going to have even more delays. Within Boeing	On pending strike negotiat ions (particul arly on the adverse relation s between labor and capital - i.e. "Corpor ate" - not between labor and the firm).

19 Mar. 2008	The Financi al Times	Steven Udvar- Hazy, Chair man, Interna tional Lease Financ e Corpor ation	Custo mer	α	management there's an almost religious belief right now that this offshoring is good, and when you point out the problems, it's seen almost as a challenge to the fundamental belief tenant rather than a discrete problem to be fixed. Hopefully we will find solutions to these problems that are peaceful and quiet and professional. Thus far, <i>Boeing</i> corporate has found no interest in finding solutions, so we've begun to prepare our membership for very tough negotiations and possible adverse labor actions." "Boeing admitted on Wednesday that it would have to redesign parts of its troubled 787 Dreamliner, raising the prospect of a third delay in recent months to delivery of the new aircraft. Mr. Hazy told a <i>JPMorgan Chase</i> conference that the state of the Dreamliner programme was 'not pretty'. He said first deliveries would be delayed for at least another six months because its centre wing box – which holds the wings in place – needed to be redesigned. <i>Boeing</i> refused to comment on the specifics of the redesign work but said Mr. Hazy was not painting an accurate picture of the overall programme. 'We are doing some redesign work but things are more complex than what we said,' said Yvonne Leach, for <i>Boeing</i> . Mr. Hazy said he expected delivery of the jet to be delayed until the end of the third quarter of next year. <i>Boeing</i> 's most recent guidance was that the Dreamliner would be ready in 'early' 2009. <i>Boeing</i> said it was sticking to its most recent guidelines. A further delay would be hugely embarrassing for the company. Last month <i>ILFC</i> said it would seek compensation 'on a large scale' from <i>Boeing</i> for the 787 delays. The 787 is <i>Boeing</i> 's most successful new aircraft, with 857 orders in place, worth about \$140 billion. But analysts are asking difficult questions about how profitable the whole programme could be if penalty payents are added to other cost concerns. 'The large number of 787s sold at low prices, combined with rising recurring costs, are steadily eating away at programme margins and long-term progr	On a modular enterpri se architec ture's overpro msing and underde livering.
26 Mar. 2008	BBC News	Alan Mulall y, CEO & Pres., <i>Ford</i> Motor	Firm	α		On a modular EA's particul ar growth objectiv
31 Mar. 2008	Seattle Post- Intellige ncer "Boeing Leaks 'For the	Motor Co. Mike Bair, VP, The Boeing Compa ny	Firm- Emplo yee; Firm- Custo mer	α	"Senior deputy prosecuter Scott Peterson on Monday called his big gun witness: Former 787 program chief Mike Bair. Boeing Commercial Airplanes' senior leadership team is so cautious about information leaks that it meets in a room without exterior windows, Bair said. The room is	es On Firm- Employ ee and Firm- Custom er

						40 0
	Greater				also swept for recording devices, and wireless	"Trust"
1 1	Good,'				technology is not allowed. 'We were nervous that	in a
	Eastma				somebody could intercept it in the parking lot,' Bair	Modula
	n said				said.	r
1	(Andrea					Enterpri
	James)				Bair said the leaks to The Seattle Times were so	se
	,				disturbing that Boeing considered polygraph test of its	Archite
					leadership team. 'Initially, we thought the source of	cture.
					the leaks had to be one of the 10 or 12 people on the	
					leadership team, or two or three support people in	
					meetings during conversations,' Bair said. But	
					management scrapped the polygraph idea when it	
					'decided that would look bad when that leaked out,'	
					Comparison of the second of the second	
					Bair said.	
					Boeing investigators questioned those privy to the	
					information, and checked phone and e-mail records.	
					Among the files confiscated from Eastman's home	
					computer, the biggest 'heart-stopper' concerned	
					airplane concessions, Bair said.	
					n en	
					Concessions are the closely guarded difference between	
					the list price of an airplane and what <i>Boeing</i> actually	
					charges customers. 'This is as close to the jewels you	
					can get in terms of sensitive information,' Bair told the	
					jury. If an airline buys a jet and then finds out that its	
					competitor paid millions less for the same plane, 'We'd	
					have a social problem with that customer,' Bair said.	
					On cross-examination, Bair admitted that the concession	
					data never appeared in any media reports.	
					'Everyone knows we live in a duopoly with a	
					competitor that is heavily subsidized by the French,	
					German and U.K. governments,' Bair told the jury.	
					'And every day is intensely competitive with Airbus.'	
					One of the jurors upon seein Bair remembered that he used	
					to work for him. Bair still works at Boeing, but is no	
					longer 787 program chief. The juror works on the 787	
					program, and has worked as a finance estimator who	
					helped prepare the type of long-range business	
					planning documents that Eastman is accused of	
					leaking. Judge Monica Benton excused the juror and sent	
					him home, leaving 13 jurors including one alternate.	
					han nome, fouring to jaroro monuting one unernate.	
					Jurors were let out early Monday because one juror had a	
					self-inflicted injury involving scissors."	
4	Busines	"Ben"	Investo	α	"Boeing is in the same dream state that the US car	On
		Dell	325	~	companies were for the last few decades. They have had a	sharehol
April	s Week		r		string of failures and clearly they have not learnt one bit.	der in-
2008	(online					
	blog)				As a <i>Boeing</i> shareholder I would like to see the whole	activism
					leadership team changed. Unfortunately the institutional	
					shareholders (like the pension funds) are not proactive	
					and will allow the current leadership team to run the	
					company into the ground. It is sad to see yet one more	
-						

					American icon go down the tube."	
7 April 2008	Flightgl obal.co m	Ross Bogue, Boeing Comm ercial Airpla nes VP & GM of 747- 8	Firm	α	"Boeing now acknowledges that sticking to the 747-8 Freighter programme's original schedule could mean that the aircraft is delivered slightly above nominal weight targets. Part of the weight problem is caused by <i>Boeing's</i> decision to keep deliveries for the 747-8 on schedule, Bogue says. If deliveries were delayed, <i>Boeing's</i> engineers would gain more time to optimize the design of the aircraft to reduce weight. The 747-8 has faced schedule pressure [due to a delay on] the 787 programme , [which] meant that engineers from that programme could not be transferred to work on the next- generation 747. <i>Boeing</i> solved the problem by outsourcing engineering work to a variety of aerospace firms abroad. The engineering workforce at <i>Boeing</i> IDS also were loanded to the programme. Although this strategy has helped to overcome the workforce shortfall for the 747-8F, <i>Boeing</i> has also learned that the work was distributed too broadly , Bogue says. "I would tell you we spread the work too far on the Freighter,' he says.	On how to make architec tural tradeoff s between time and product perform ance, modular izing an integral product.
8 April 2008	Seattle Post- Intellige ncer "Mistria I for ex- Boeing Inspecto r" (Andrea James)	Mike Bair, VP, <i>The</i> Boeing Compa ny	Firm- Emplo yee; Firm- Custo mer	α	"Boeing's investigations team searched for three years to find the source of the leaks, and even checked the emails and phone records of senior leadership."	On Firm- Employ ee "Trust" in a Modula r Enterpri se Archite cture.
8 April 2008	Bloomb erg.com	Jon Kutler, Head of Admir alty Partne rs Inc.	Investo r	α	"The more they miss, the more I get the impression they don't even know what the problems are. It's going to take a whole lot to repair their credibility."	On how informa tion is shared between the firm and its investor s (after the announc ement of a third delay to its 787 program
8 April 2008	Bloomb erg.com	Myles Walton , Analys t, <i>Oppen</i>	Investo r	α	"'I don't think anyone will believe them.' The stock is 'kind of treading water.'"	On how informa tion is shared between the firm

		heimer & Co				and its investor s (after the announc ement of a third delay to its 787 program
8 April 2008	Bloomb erg.com	Cai von Rumoh r, Analys t, <i>Cowen</i> & <i>Co.</i>	Investo r	α	"These guys had two preditions before and they've blown both of them. This time they'll want to reset the schedule once so that they can hit it."	On how informa tion is shared between the firm and its investor s (after the announc ement of a third delay to its 787 program
8 April 2008	Bloomb erg.com	Joseph Nadol, Analys t, J.P. Morga n	Investo r	α	"The enormous sales success of the program may have been more a curse than a blessing, as it locked <i>Boeing</i> into the schedule that ultimately could not be executed."	On how informa tion is shared between the firm and its investor s (after the announc ement of a third delay to its 787 program
9 April 2008	The Times (UK)	Doug McViti e, Manag ing Direct or, <i>Arran</i>	Industr y analyst	α	"This is a massive blow to <i>Boeing's</i> credibility because it is drip feeding bad news , which gives the impression it does not have a handle on the problems ."	On how informa tion is shared between the firm and its investor

		Aerosp ace				s (after the announc ement of a third delay to its 787 program
10 April 2008	Speigel Online	Handel sblatt (Germ an busine ss daily newsp aper)	Media analyst s	α	"The untried model of getting suppliers from across the world to take part in the financial risk has shown itself to be a flop , and <i>Boeing</i> has lost control of the project the company's credibility is tarnished."	On critiquin g the 787 "risk- sharing" partners hip model.
13 April 2008	<i>Emirate</i> s Busines s 24/7, "Boeing Failed to Learn from <i>Airbus</i> " (David Roberts on)	Jim McNer ney, Chair man & CEO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm	α	 "A couple of years ago Jim McNerney, the chief executive of <i>Boeing</i>, was in London to persuade the world's airlines that they should purchase the 787 Dreamliner. Over lunch at a Mayfair restaurant I asked McNerney whether he and <i>Boeing</i> had learned anything from the chaos that was unfolding at <i>Airbus</i>. The European aircraft manufacturer was at that time doing a swallow dive from the high board into concrete. Chief executives were departing on a monthly basis Without pausing for thought, McNerney said no. He felt there was nothing to learn from <i>Airbus</i>. I thought at the time that such arrogance was hubris and events since have proved the foolishness of McNerney's words. <i>Boeing</i> announced last week that the 787 Dreamliner, one of the world's most important industrial projects, is now running 18 months late." 	On modular EA's inability to learn
17 April 2008	Busines s Week, "What Airbus learned from the Dreamli ner"	Greg Albert, <i>Honey</i> <i>well</i> Vice- Preside nt	Suppli er	β	"To avoid production glitches, <i>Airbus</i> is giving contractors an unprecedented role in designing the A350. For months, engineers from aerospace companies such as <i>Honeywell</i> <i>International</i> and <i>Thales Group</i> have been working alongside <i>Airbus</i> staff, poring over the design and suggesting changes to simplify manufacturing. <i>Boeing</i> held similar consultations, 'but <i>Airbus</i> is taking it a step further,' says Greg Albert, a <i>Honeywell</i> vice-president who oversees its work with <i>Airbus</i> ."	On Airbus' differen t approac h in treating supplier s on the A350 than Boeing did on the 787.
18 April 2008	The Seattle Times, "Boeing	Ray Gofort h and Tom	Union	α	"Relations with the white-collar engineering union already are so strained that the union's new executive director, Ray Goforth, talks openly about the potential for a strike. "We can absolutely do it,' Goforth said. 'I have every	On Boeing' s discussi

Labor	Wroble	confidence members will stand up for themselves if	ons with
Negoti		necessary. The union is pretty darn unified.'	its
tior	SPEEA		unions
Wants	Execut	'This is unbelievable,' said Wroblewski, district president	about
Pension	CONCEPTS.	for the International Association of Machinists (IAM) Local 751, on hearing of the idea from a reporter.	changin g its
-lan Change	Direct or, and	Although Kight had previously informed engineering	pension
for nev		union leaders of the proposal, he hadn't mentioned it to	plan for
Hires"	district	Wroblewski. Wroblewski said that in 2005, when Boeing	new
	Preside	proposed daking away retiree medical benefits for new	hires.
	nt	hires, 'it ended in a strikeThis is unacceptable. I'm	
		sure our members will walk again.'	
		"We're going to have disagreements," Kight said. "The	
		key, as leaders, is how you respond.' The Machinists'	
		2008 negotiations slogan is 'It's our time this time!' Said	
		Kight, 'I wish we were half as good as the IAM at	
		crafting great slogans.'	
		'Past, present, future, it doesn't matter. We fight for	
		all our members. You're fighting for the unborn,'	
		Wroblewski said. 'Our members didn't fall for it in	
		2005. They won't fall for it this time.' The Machinists	
		have struck Boeing six times since 1948, including a 69-	
		day walkout in 1995 and a one-month strike in 2005.	
		That fighting stance followed an initial meeting with Kight	
		and Boeing Commercial Airplanes Chief Executive Scott	
		Carson. Goforth and the two other union officials present	
		insist that Carson told them candidly he'd prefer 'to get	
		rid of all the unions at <i>Boeing</i> ' and intended to continue	
		to support efforts to do so. Kight, who was also at the meeting, flatly denied that. 'He didn't say that,' Kight	
		said. 'He knows it would be a fool's errand to make a	
		statement like that.' Late last month, Carson himself	
		defended his remarks in the February meeting in a letter to	
		an employee. His version of what he said was: 'I wish	
		Boeing didn't have to work through a third party to	
		have discussions with employees. To say these comments indicate that Boeing is anti-union is, in my	
		opinion, a mischaracterization.'	
		'I'm responding to a campaign of aggression against the union. The company is assentially trying to put us	
		the union. The company is essentially trying to put us out of business,' Goforth said. 'If they attack us in one	
		place, they attack us all.' Kight said the efforts to unseat	
		the union in each place were employee-driven, and the	
		outcomes were determined by employee wishes. 'It's up	
		to the employees,' Kight said. 'We respect the choice.'	
		Clearly, well-paid white-collar workers do not strike	
		lightly. SPEEA has only had one strike that lasted more than a day in 2000.	
		more than a day in 2000.	
		Goforth cited a survey of his members, the results of which	
		are still coming in. Of the almost 4,000 people who have	
		responded so far, three-quarters registered 'low	

18 April 2008	Seattle Post- Intellige ncer, "Boeing to ask Unions to Drop Pension Plans for New Hires."	Ray Gofort h and Tom Wroble wski, SPEEA Execut ive Direct or, and IAM district Preside nt	Union	α	 confidence' or 'no confidence' in Boeing corporate management. 'This is setting us up for some pretty tough negotiations,' Goforth said. 'My fear is that we might find ourselves stumbling into a strike.' At this point in the 787 program, that could be disastrous for Boeing. 'All of us must continue to keep focused on what we've got to do to meet customer commitments,' Kight said. 'The last thing we can afford to do is slip up on our promises to customers." "The change is 'about attracting a new generation of employees that may not have the same appreciation for the value of the traditional pension,' [Boeing spokesman Tim] Healy said. 'The new generation may not be willing or have a desire to stay at the same company for 30 years,' and would instead favor a more portable retirement plan. While Boeing said it has broached the subject with both unions, comments made by top labor negotiator Doug Kight and published in Seattle-area newspapers Friday seem to have taken both by surprise. 'They have never come out and said, it is our goal,' Tom Wroblewski, president of Machinists Union Local 751, in an interview. 'I'm pretty upset about it.' Wrobleswski said the company's plans would shrink new employees' retirement savings and leave them more vulnerable to market swings. 'If the employer wanted to restructure the retirement package in a way that didn't take money away from the employees and put it in their pockets,' Goforth said." 	On Boeing' s discussi ons with its unions about changin g its pension plan for new hires.
21 April 2008	Reuters, "Boeing , Northro p CEOs met with Air Force on Tanker" (Andrea Shalal- Esa)	Anony mous official , U.S. Air Force	Custo mer	α	"Boeing has also run a series of full-page advertisements in U.S. newspapers condemning the Air Force's handling of the deal as 'flawed by countless irregularities.' 'It's really gotten ugly,' said one Air Force official who spoke on condition he note be identified. Defense analyst Loren Thompson, of the Virginia-based <i>Lexington Institute</i> , said the meeting was clearly prompted by Air Force concerns about the tanker debate. 'The tone of the tanker debate has turned so negative the Air Force leaders are concerned that it could damage their long-term relationship with Boeing,' he said.	On Boeing' s deterior ating relation ship with its long- time custome r.
22 April 2008	Reuters, "Boeing CEO Admits 787 Dreamli ner Errors" (Bill Rigby)	Jim McNer ney, Chair man & CEO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm	α	<i>"Boeing Co.s</i> chief executive has admitted that the company's ambitious plan to outsource most of the producion of its new 787 Dreamliner jet has not been completely successful and could lead to a re-evaluation for future programs. 'The global partnership model of the 787 remains a fundamentally sound strategy,' said <i>Boeing</i> CEO Jim McNerney in a memo circulated to employees on Monday, 'but we may have gone a little too far too fast in a couple of areas.' The plan, which offloads some of the financial risk of developing the plane to its main partners, was hailed as the	On a modular Enterpri se Archite cture's emphasi s on executio n and not strategy.

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5			company in the first quarter. The difference between the program accounting and the unit accounting was some \$330 million, which is the largest number we have ever seen I think in a single quarter and 71 million of it, which is pretty much consistent with what we have been seeing is related to the 777-300ER. I wondered if you could sort of tell us what was going on because the actual is so different from the assumed program performance?	
			James Bell (Boeing): Yeah, some of it was again we are still experiencing the impact of the more aggressively priced airplanes several years ago that we are delivering, which has a more profound impact on unit margins than program. Then coupling that with the mix that was delivered in the quarter had the increase the gap a bit based on what's in the accounting quantity relative to that mix and the pricing associated with it, Joe.	
			Joe Campbell: James, what was the mix difference. I didn't notice anything especially different?	
			James Bell: Well, there were more 777 in it today in the	
			Joe Campbell: 777 wasn't the issue, it was only 71 million of the 330? So the big number	
2			James Bell: You are only talking about the difference in pricing on 777, there is a mix difference also that would be associated with better priced airplanes out in the outyears, Joe.	
			Joe Campbell: But, I mean, you are showing us the difference between actual and program assumptions on the 777 to be only \$71 million. So is it not correct to assume that 330 minus 71 is related to some airplanes other than the 777 ?	
			James Bell: Well, there is. Yes, there is.	
			Joe Campbell: So, I am asking what that 200 million is, which is	
			James Bell: It's mostly the 777, but there would be some mix relative to the 777s as well that's in the cost base that's beyond which you are seeing in deferred production and it would be quite frankly the mix between freighter and passenger.	
			Heidi Wood (Morgan Stanley): Jim when you, James I guess, when you go through and	

analyze the range of possible additional costs on these customer penalties and supplier support. In totality what's the highest negative cost outcome that's realistic. I mean does that number ever exceed 4 billion. We are really struggling on the outside to conceptualize this. I mean if we can't think of it is 2 to 4 billion is that a reasonable bandwidth? James Bell (Bocing): Well Heidi, you know, the fact of the matter is we go through and struggle with that same thing ourselves and with the information we have to date, its hard to set a number. And that's why we obviously have taken the position that we are going to start off booking the program at a zero margin to make sure we have adequate reserve in order to deal with that. I can't predict what the number will be. I just know that our past history would suggest that we do a pretty good job of mitigating that and not having and roll through to be a significant impact to your financial performance. Heidi Wood: A tright. You gave us color on when you are going to make the decision on the program block, but maybe can you give us more transparency on the process of how will you make the determination for the accounting block size for earnings recequition. And when you look at all of this backlog that you have, obviously the implications of these higher non-recurring is very different if you use a 400 block. Can you walk us through the process of that? James Bell: I can Heidi. Let me start with history. Typically when we got to a point of delivering the first airphane we sell it about a 100, this in raw numbers on our new aliphane models. And as you mentioned typically the block turned out to be - the initial block is on the marker potential is for the airphane range. So what that is beyond the long orders you look at a time period over which you can estimate your cost and estimate you reveal and then may to puscle with the accounting quantity is and then what's your booking margin ought to be on these airphane as yo			
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wha our ver to o do bas sig <u>He</u> We init	ng to have on the initial opening quantity here. But at we see today and what we understand based on what contracts have in them, based on N-SAR, our very y preliminary discussion with our customers, it is hard estimate what the customer settlements will be but we believe that whatever the opening quantity will be ed on the price theory I just described, there will be nificant profitability in the program today to cover . idi Wood: It that's interesting so basically in the scenarios on this tial program block, you're saying that in every nario the costs are still less than the revenues?	
	mes Bell: at's correct.	
Ok aga had 289 the Yo sta des und kno cos this get	idi Wood: ay, thank you. And then one last one, if you don't mind, in a bit of a doubles [divagate] question for you. You d one 747 order in Q1 and a great booking quarter of P planes. You had 25 747s in '07, yet you are raising e R&D and raising the non-recurring on the 747. u've gone from some 280 changes on the wings that rted of mildly to what looks like to a whole new wing sign which is kind of \$3 billion to \$4 billion. Help us derstand why is that the right answer? I mean, we ew there is backing out the door to buy 787s and your its are rising on the plane, we can understand it but in s situation your costs are rising and we're not ting confirmation for higher customer demand. Can a walk us through your rationale there?	
We the tall tha yea res int tall	a McNerney: ell hi this is Jim. I think we've about 110 orders for both freighter and the passenger. And I think James just keed historically about models we've introduced at about t rate and so we're already aware and we're still over a ar late from introduction. Now having said that, I will be t in Canada, if I didn't tell you I wish we had more ercontinental orders which is I think what you were king about, the passenger version.	
Ye	ah. mes Bell:	
We	idi Wood:	
An	d only one major customer	
Ye	n McNerney: ah and one major customer, although the minor stomer would not appreciate your characterization there the way, but we're in discussions with about 8 to 10,	

serious discussions with 8 to 10 major carriers. It is impossible for me to predict how many of those will order but typically when we're at this stage, a large number of them would. So, I think we are still basing our spending on what we perceive to be the market and by the way we are up to a pretty good start with a 110 orders worth over a year to go before we have to set accounting quantities and the like. But I also wish we had another couple major intercontinental orders right now and the guys are really working hard at it and I think there is a good chance we'll have some soon.
Howard Rubel (Jefferies): Thank you very much. I want to go back to the R&D. You kind of I mean we all live in glass houses in form or another and you've sort of had to go through this a couple time and raise that. Is there any change in process that Jim that you need to look at in terms of helping you think about estimates for programs?
Jim McNerney (Boeing): Well, we can be better. I think if you're looking for a root cause, it would probably center on the 87 development. As we've struggled with getting the supply chain in place and the costs associated with recovering from that. We've been forced to keep an experienced set of engineers on that program that had been planned to go on off to other programs. The 47-8 that increased costs as we scrambled to find the engineering capacity we need the trading, we need outside help supplementation from time to time, little more costly, so. I think part of what you are seeing is the scramble but having said that I'm not happy and Scott Carson is not happy with our inability to get our arms around predicting the development cost. The business case for both airplanes remains good but we need to do a better job there and we are working hard to do that. And we do not a have shortage of business reviews around the subject.
Ron Epstein (Merrill Lynch): A boarder strategic question for you Jim. If the tanker stays with <i>EADS</i> and <i>Airbus</i> ends up setting up a wide- body production in North America. I mean how will that change the strategic outlook for the industry. I mean how do you have to consider them now if you get your competitor here in a dollar cost structure putting together wide-bodies?
Jim McNerney (Boeing): Yeah, I mean I think it wouldn't change the nature of their business and it wouldn't introduce another competitor. But would change where they produce or have the capacity to produce some things. So it ultimately gets down to a dollar based production site. If they end up wining this thing believe me that site will be pre- occupied with modifying freighters made in France for

a long time. So I'm not sure they'd immediately convert hat into something else. So it's more of a geographic deployment. They've announced similar things in China, US. They've got lots of dispersed production in Europe. It will not be an in complicated supply chain for them to manage by the way as you look at from managing manufacturing operations it will tough.	
Ron Epstein: Okay and then just one follow on if I may, I think everybody else did. When you look at your suppliers everything from raw material down to your Tier-I's, Tier- II's, on the legacy programs . I mean how's the supply chain doing?	
James Bell: On through legacy programs, its doing fine. Not that it doesn't labor from time to time. I think the team quite frankly is doing an excellent job on the legacy programs. We've go through periods where certain raw materials are scarce, other periods where quality funds are found. But I would categorize them as being well managed and less difficult than you probably imagine. Most of our supply chain issues have been centered over and found the 787 development and those are well chronicled. So I am trying to paint a picture, when I managing at everyday we are but we have had no major disruptions in our production and with our fingers crossed we think we can keep that record going.	
Robert Spingarn (Credit Suisse): Jim you've already noted earlier in the call the prevailing weakness in broad economy and <i>Boeing's</i> very impressive backlog here, and you said many times and you alluded to this earlier that you resist the temptation to over ramp at BCA . So with that said, what kind of backlog erosion could Boeing tolerate before 2009 and lets say 2010 production plans would be impacted?	
Jim McNerney (Boeing): Let me answer your question by a array of siding another stressful time and that would be the recession 2000 and then closely followed by 9/11. I think when you looked what happened there roughly 6 or 7% of our orders ended up being cancelled and that was a very tough situation. There where a number of reschedules, a push outs, and number that the majority didn't change. But we managed to work through with our customers we are facing difficult headwinds to say the least of that time. And a lot of those orders were US based carriers then. And as you heard me earlier describe that's in contrast where we are today, we are the vast majority of orders 80% plus are with international carriers backed by Ex-Im financing. So we	
are in a stronger backlog position, today all you can use is data here, because you can't predict future. So if you had exactly the same situation happened to you as happened to	

	you in 2001 same kind of pressures although differently constructed you can end up with something like that. And I think that given that we have constraints on most of our product lines right now, we can get people airplanes right now. And as you say we are sort of a biased to be cautious on the rate increases even though we are increasing, but you add that all up, the strong ability to managing the past when we got lacked. We are in pretty conservative position to go again and return we have more order than we have production. And so could there be some impact? Yes. Would it be a major thing? Probable not.
	Robert Spingarn: Let me also understand because I think you just said that if you had a 6 to 7% cancellation to fuel environment which is the similar trend that we saw following 9/11 is that what you said?
	Jim McNerney: No I am just saying no. Because there were other factors that impacted our financial performance. I was only dealing with the question of volume and I was simply pointing out that at that time we had more than 6% deferrals okay 6% cancellations is what I said.
	Robert Spingarn: Okay.
	Jim McNerney: We tend to assume that kind of cancellation rate as we put together our business plans and our financial promises.
	<u>Robert Spingarn:</u> Okay. Because people are going to look to the ramp down from the '01 production rate of over 500 to 240 or so two years later and I want to clarify that's that not what you are talking about?
	Jim McNerney: No, you are right. I mean that's not what I am trying to portray and I can see, why I confused you. What I am trying to say is that 6% orders loss were in much more and a lot of that ramp down was a result to push outs. But we are in a much stronger position today in that or insulated from economic conditions with most of our orders outside the United States Ex-Im Bank financing. So you would see a lot less deferrals in my opinion this time around.
	Lynn Lunsford (<i>Wall Street Journal</i>): This has to do a little bit more with the deliveries on 787 kind of in the out years; some of your customers that have airplanes that are way at the end of the delivery line here, are kind of expressing a little bit of concern that the delays will cascade down through the chain. Do you

have any sense of how far down the airplanes maybe delayed by the slower ramp up? Is there a scenario that all 900 of them could be delivered later than people had thought?	
Jim McNerney (Boeing): Lynn, this is Jim. We don't believe that the slide will impact all 900. Having said that we're still working through exactly what the impact will be. As you know, I think we've told you what's going to happen in '09 that the ramp-up will be slower after that and full rate production in 2012. We're seeing if that could be pulled in. We don't know and we're seeing what we can do to ramp-up beyond that, after that, that both of those could significantly improve the situation and when we've thought through that, we'll be able to be more precise with everybody. But we don't see a scenario where all 900 would be delivered late.	
Hal Weitzman (Financial Times): You said earlier Jim that EADS, if they were to end up wining the tanker contract would face a complicated supply chain and I just wanted, given your own experiences with the 787, what have you learned in terms of supply-chain issues?	
Jim McNerney (Boeing): Well, we have learned a lot and have the scars to prove it; I guess would be my summary on the 87. I think having real time visibility of your partner's inventory as well as their rep as they as they are assembling things so a global understanding of how things are coming together all the way down to Tier 3 and 4 would have helped us a lot. So, IT visibility, like we had on the engineering side and so there is some learning there for us. We are already doing it differently. And whether Airbus chooses to learn from that or not is something that, then at last they will be confronted with similar challenges and I think they know it will not be easy.	
Hal Weitzman: The next time around, you're going to do things differently?	
Jim McNerney: No, our strategy will be the same. We believe that global leverage is important both from a cost and risk mitigation standpoint. We might draw some lines at different places, now that we understand our own capabilities; better understand the capabilities of our partners. I think we all learned and I think it will be more of an adjustment to the strategy than a change in strategy.	
Dominic Gates (Seattle Times): I just wanted to clarify if something Heidi Wood has asked about. She characterized a change to the 747-8 program.	

	The wing the change to the wing was effectively a new wing and put a price tag on it, total price tag I think of 747-8 development of somewhere between 3 and \$4 billion. So, is the characterization of more or less the whole new wing accurate and what about that price tag?	
	Jim McNerney (Boeing): The wing was an issue we had to wrestle through. There was some redesign that had to happen there, it took us longer than we thought, but I think we are largely through it. We feel comfortable with it and it did explain a lot of the non-recurring pressure that we had particularly last year.	
	Dominic Gates: And is that increasing the cost to about the levels Heidi cited of 3 to \$4 billion?	
	Jim McNerney: Yeah, I don't think we talk about that publicly. It obviously cost more than we thought it was going in, but we remain very comfortable that this will be a profitable program and the business case remains strong.	
	Mike Mecham (Aviation Week): Hi. A couple of weeks ago, Steve talked about some weight issues in the 787 continue to had in the -10 as you know isn't a particular program yet, but those implications there as to how you might set the company up to compete with the A350, the larger A350s that would creep into your 777 programs as competitors? Is there any thinking about a development effort on 777 to position against the A350 or are you confident that what you have got definitive 300-ER?	
	Jim McNerney (Boeing): That's a good question. Obviously, the A350-1000 as it comes together, it comes together as Airbus has characterized it will in terms of its performance would put some pressure on our longer range 777 fleet and we would have to answer the question what we would do about it. So it's very much of a wide issue. I think the driver is what were the real performance of the A350-1000 be and since that probably won't be introduced until 16ish, I am guessing here, but I think that's right, it's introduced after the 800 and 900, we have plenty of time to make the decision on what kind of modification might be needed if the performance does threaten the bottom of our long range part of our 777 fleet. But given the order rates that we continue to have on 777s, I don't think the marketplace is all really worried about it yet, but it will be an issue we have to address.	
	Suzanne O'Halloran (<i>Bloomberg</i>):	

23 April 2008	The Wall Street Journal, "Ford Eyes More Cuts As Recover y Advanc es"	Alan Mulall y, CEO, Ford Motor Compa ny	Firm	α	You mentioned company-wide part gains in your release and I am just wondering if you could give some examples. And then also since your plane deliveries, I guess they will be flat next year if you strip out the 787, does that means you have already achieved all the productivity gains that helps you with this deliveries last quarter? Jim McNerney (Boeing): The productivity gains are pretty much across the board in our productions programs. If you looked at both on IDS and on commercial airplanes, you look at the 737 the 777 and you look at F-18, F-15, C-17 you would see good year-over-year productivity on all of our major product lines. It is an article to face [*of faith?"] each year that we will make progress there. So I think its in across the board story. And your other question I couldn't quite hear you. Suzanne O'Halloran: I just was wondering it looks like your commercial plane deliveries will be flat next year, if you strip out the 787, and so I am wondering that that means you have already achieved all the productivity gains with this delivery last quarter? Jim McNerney: Absolutely, not. And I think the example I would cite there is our largest facility, our Edward [Everett?] facility, James mentioned it earlier, there are productivity efforts that are just gaining maturity up there on the 777 in particular and on the 747 that will produce significant productivity for us even at rate. And there is still productivity approvals year-over-year planned for renting [Renton?] as well. So like I said it's an article of fake [faith?], we never get there." "The firm isn't done cost-cutting. According to people close to Mr. Mulally, he is looking at selling Volvo. Similarly, he hopes to shutter the ailing Mercury brand. More job cuts may be coming. In Ford's most recent buyout offer, only about 4,000 workers signed on, about half the desired total. Mr. Mulally will likely offer one more round, then could resort to layoffs. 'Clearly, we have lots of mechanisms to keep taking the fixed costs out,' Mr. Mulally says.	On a modular Enterpri se Archite ct's approac h.
	1 Sec. 19				'This is a classic example of how one can shrink to grow,' says Peter Nesvold, an analyst at <i>Bear Stearns</i> . Mr. Mulally 'is making many difficult decisions during a down cycle, which should benefit the company as they enter the next upturn.' Mr. Mulally came to <i>Ford</i> from <i>Boeing</i> , the aircraft maker, where he had spent his entire career. <i>Boeing</i> twice passed him up for the CEO's job despite his work rehabilitating <i>Boeing's</i> once struggling commercial airplane division	

					by borrowing efficiency ideas from Toyota.	
					by borrowing efficiency ideas from <i>Toyota</i> .	
					Mr. Mulally wanted Ford's market share to reach its 'natural level' – the volume where cars sell without big discounts. 'I don't care what market-share level you are,' Mr. Mulally says, the goal is to 'get back to profitability.'"	
24 April 2008	Reuters, "Four- hour strike hits Airbus France Producti on." (Nicolas Fichot, Jessica Mead)	Jacque s Rocca, Direct or of Comm unicati on, <i>Airbus</i> France	Firm	β	"Striking workers disrupted production at <i>Airbus</i> factories in France for four hours on Thursday in a dispute over restructuring. The strike was called afer <i>Airbus</i> dropped plans to sell some of its factories in Germany to an outside investor but pressed ahead with plans to sell two of its three factories in France. French Unions say French and German plants should be treated equally . <i>Airbus</i> declined to comment. 'We will let the strike speak for itself,' said Jacques Rocca, director of communication at <i>Airbus</i> France."	On the quality and quantity of labor strikes in an Integral Enterpri se Archite cture
25 April 2008	Bloomb erg, "Ford Chief Mulally May Do for Automa ker What He Did at Boeing" (Bill Koenig)	Alan Mulall y, CEO, Ford Motor Compa ny	Firm	α	 "The confidence in our plan is really increasing,' said Mulally, 62 in a <i>Bloomberg Television</i> interview yesterday. 'We said we had to aggressively restructure to meet real demand.' At <i>Boeing</i>, Mulally slashed employment as head of the commercial airplane division by more than half, to about 50,000 in eight years. He sped production of a more fuel-efficient jetliner, the 787, and helped lay the groundwork for record orders. In his current post, Mulally has eliminated 46,300 jobs in North America over the past two years as <i>Ford</i> has closed or scheduled to close nine plants to match its shrinking manufacturing footprint. The system is patterned after <i>Toyota</i>, the automaker Media. 	On a modular Enterpri se Archite ct's approac h.
28 April 2008	Seattle Post- Intellige ncer, "Boeing Won't back Down, but Civility is Key In Tanker Dispute " (James Wallace)	Jim McNer ney, Chair man & CEO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm	α	Mulally studied when he was at <i>Boeing</i> ." "Boeing Chairman and Chief Executive Jim McNerney knows a thing to two about rough play 'Our view is the (tanker selection) process chose the wrong tanker ,' McNerney said. 'Which is why we are protesting. And everything we learn as we move thorough the protest makes us feel better about having protested that process.' In a report issued Monday, Loren Thompson, a noted defense expert at the <i>Lexington Institute</i> , wrote, 'If you want to understand hower former allies end up going to war – or former lovers end up getting divorced – take a look at how <i>Boeing</i> and the <i>Air Force</i> are treating each other in their angry confrontation over the award of a next generation tanker program to <i>Northrop Grumman</i> .' Thompson said that <i>Air Force</i> leaders believe <i>Boeing</i> 'is willfully misstating the facts in a bid to obscure the	On how a modular enterpri se architec t solves disputes with its custome r

					the state of the s	
29 April 2008	The Seattle Times "Boeing Won't Throw 'Elbows ' in Dispute " (Susann a Ray)	Jim McNer ney, Chair man & CEO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm	α	inferion performance of the plane it proposed. A marathon session of <i>Air Force</i> acquisition experts two weeks ago concluded that none of the 200 issues raised by <i>Boeing</i> in its complaint to the GAO was likely to be upheld, and that whatever minor problems the accountability office might uncover would be far from sufficient to overturn a competitive outcome that service says was not close.' Beyond the merits of <i>Boeing's</i> case, Thompson wrote, ' <i>Air Force</i> officials are insulted by the tone of the company's public statements,' which have used phrases such as 'deeply flawed' and 'severely prejudiced' to describe the tanker selection process. 'There is nothing I'd like better than to get that work back into our company,' McNerney told shareholders at the company's annual meeting. " <i>Boeing</i> , chided by the <i>Air Force</i> along with <i>Northorp</i> <i>Grumman</i> for the tone of its military-contract dispute, will avoid throwing 'sharp elbows' without backing down from the protest, Chief Ecceutive Officer Jim McNerney said Monday. <i>Boeing</i> lost its first chance at the contract in 2003 after an ethical scandal sent a company executive and a former <i>Air</i> <i>Force</i> official to jail. 'There is a certain amount of shamelessness about <i>Boeing's</i> current campaign to overturn the awarding of the tanker contract to a different company,' shareholder Peter Flaherty, president of the <i>National Legal and Policy Center</i> , said at Monday's meeting.	On how a modular enterpri se architec t solves disputes with its custome r, (and the respons e of one of its investor s.)
29 April 2008	Reuters "Airbus in 'Major Review' of A380 Deliveri es" (James Cordahi)	Tom Enders , CEO, <i>Airbus</i>	Firm	β	"'I am currently conducting a major review of the ramp up plan,' Chief Executive Tom Enders told reporters in the United Arab Emirates. 'This is a very steep ramp up and this is something one always needs to be concerned about,' he said, calling it a 'difficult subject.' Enders said the company had a limited ability to save money by cutting jobs because it needs staff to meet its delivery obligations. Airbus has already announced plans to slash 10,000 jobs and sell plants to restore its competitiveness. 'At a time of ramp up, cutting jobs has its limits so we are thinking seriously about structural measures,' he said. Enders said it might consider offshoring 'major parts of the work in manufacturing as well as engineering because the cost is a very serious problem for us with the dollar at \$1.50 to \$1.60 (against the euro).' But the challenge to offshoring, he said, was in finding 'high quality and trained personnel' to ensure standards are maintained. Enders also noted that meeting its targets also required suppliers to come through. 'The industry has multiple supplier problems and stuff like that obviouisly has been taken into consideration as well,' he added. 'There will be no miracles.'"	On an Integral Enterpri se Archite ct's manage ment of 'wicked messes' (i.e. high dynami c and behavio ral comple xity)

29 April 2008	Forbes / Thomps om Financi al News. "Airbus France Worker s Stop Work to Protest Sale of Plants in France, German y" (Greg Keller)	Tom Enders , CEO, <i>Airbus</i>	Firm	β	"Unions at the <i>EADS</i> unit had called on employees to stop work for two hours Tuesday between 9:30 a.m. and 11:30 a.m., at all of <i>Airbus'</i> French plants. The work stoppage, which follows a four-hour stoppage last Thursday, coincided with an extraordinary meeting of <i>Airbus</i> <i>France's</i> works council, to be followed by a meeting between unions and the head of <i>Airbus France</i> , Fabrice Bergier. While unions claimed a higher mobilization Tuesday than last Thursday, <i>Airbus</i> management said 30 percent of all employees of the Toulouse plants had taken part in the work stoppage. Last Thursday, French union <i>Force</i> <i>Ouvriere</i> , the largest union in <i>Airbus</i> , said that the strike was followed by 80 percent of Toulouse employees compared to management's estimate of 60 percent ."	On the quantity and quality of an Integral Enterpri se Archite cture's labor strikes
8 May 2008	Seattle Post- Intellige ncer, "Some Buyers Will Get 787s 2- 1/2 Years Late" (James Wallace)	Boeing	Firm	α	 "Although <i>The Boeing Co.'s</i> 787 Dreamliner may be only 15 months or so behind schedule, delivery delays will be as much as twice as long for some customers 24 to 30 months late. Some industry analysts are forecasting that the 787 delays could end up costing <i>Boeing</i> as much as \$4 billion or more in penalty payments. <i>Boeing</i> is drastically cutting 787 production ramping up production much more slowly than first planned. 'We are still working through what the impact will be,' McNerney said. 'But we don't see a scenario where all 900 would be delivered late.''' 	On a modular enterpri se architec ture's backtrac king from modular instabili ty torward integral stability
8 May 2008	Bloomb erg, "Boeing Unions May Use 787 Delay for Contrac t Leverag e" (Susann a Ray)	Tom Wrobl ewski, <i>IAM</i> Preside nt; Ray Gofort h, <i>SPEEA</i> executi ve directo r; James Bell, <i>Boeing</i> CFO	Firm- Labor	α	"Boeing Co.s' delayed 787 Dreamliner may give its two main unions extra leverage in contract talks. 'Unions have the upper hand now,' said Richard Aboulafia, an analyst with Teal Group, an aviation consulting firm. 'They're determined to get their share of the good times.' 'The last two negotiations, we were at the mercy of the company,' said Thomas Wroblewski, president of the International Association of Machinists' Seattle-based District 751. Boeing's Puget Sound-area machinists have gone on strike six times since the union was founded in 1935. With profit and demand rising, the union is in 'the best position we've been in a long time,' Wroblewski said. 'Its our time this time.' The Society of Professional Engineering Employees in Aerospace has staged work stoppages twice, most recently for 40 days in 2000. 'We seem to be on a repeat pattern this year with the same kinds of issues that provoked our members the last time,' said Ray Goforth, who took over as executive director. 'There could be some serious conflict this fall. I'm hoping not, but it's looking	On a modular enterpri se architec ture's increasi ngly short- term relation ship with labor,

—					pretty bad.'	
	5	Prov	Pinn		'Outsourcing is obviously a concern for us,' Goforth said in his Seattle office, where a poster with a picture of the 787 says, 'Bring back the work so it's done right.' <i>Boeing</i> Chief Financial Officer James Bell said that the company may do more production itself and have back-up capacity at its own facory if a supplier gets into trouble. 'In some cases we drew the line too far and we ought to pull back a bit and retain some of the work,' Bell said. 'But it wold only be a moderate bit.' 'We absolutely believe in this model,' Bell said. 'It is the model you will see us using going forward.'"	On a
8 May 2008	Seattle Post- Intellige ncer, "Boeing , Machini sts Union Open Contrac t Negotia tions" (Jessica Mintz)	Doug Kight, VP HR, <i>Boeing</i> <i>Comm</i> <i>ercial</i> <i>Airpla</i> <i>nes</i>	Firm- Labor	α	"Doug Kight, head of human resources and labor relations for <i>Boeing's</i> commercial airplanes unit, outlined some of the company's thinking. One of <i>Boeing's</i> key worries is that its growing obligation to fund its employee pension plan could undercut its ability to maintain booming orders and a massive backlog. 'In a long-term business like <i>Boeing</i> , where you have long-term capital investment requirements to invest in your new products and the design of your next generation of airplanes, a market downturn that all of a sudden obligates you to spend billions and billions to fund your pension is a real challenge,' Kight said. 'We've got to have more stability and predictability so that we can have some assurance that we've got the resources there to invest in the product line.' The proposal, which the union opposes, is also designed to make <i>Boeing</i> more attractive with a younger generation of workers who may not stay at the plane maker for five years and want a retirement plan that's portable and vests immediately, Kight said. Citing a 7 percent annual increase in health care costs, Kight said <i>Boeing</i> is asking the <i>Machinists</i> to accept a modest increase in what workers pay for coverage and elimination of early retiree medical benefits for new hires who retire before age 65. The union has threatened to strike ove the company's pension demands. 'They're posturing to take away benefits that we've fought hard for,' said Tom Wroblewski, president of Machinists Union Local 751 in Seattle, adding a jab about <i>Boeing's</i> much-delayed new jetliner: 'That strategy is as flawed as their 787 production system.' Wroblewski said <i>Boeing's</i> blockbuster earnings, most recently a 38 percent jump in profit to \$1.2 billion in the first three months of 2008, should support more benefits for workers, not the cuts and higher costs <i>Boeing</i> proposes. The union struck for 30 days over company demands to cut retiree medical benefits, Wroblewski noted. 'I can't believe they would come back again and want to talk about that again,' he s	On a modular enterpri se architec ture's increasi ngly short- term relation ship with labor, (as well as its slightly inconsis tent logic and focus on exogeno us events)

					The Machinists will also try to regain control over jobs lost to outsourcing , Wroblewski said. He would not give any details about the union's proposals in that area. <i>Boeing</i> spokesman Tim Healy said <i>Boeing's</i> outsourcing of jobs and deals with suppliers around the world is in response to customer demands and rapid growth .	
19 May 2008	Aviation Week (Guy Norris & Robert Wall)	Airbus	Firm	β	"Moreover, <i>Airbus</i> is spending \$155 a year on continued A320 development engineering upgrades , and is planning to invest another \$420 million over the next two years in additional improvements as part of a production ramp-up in Europe and China."	On an integral enterpri se architec ture's increme ntal and sustaine d approac h to develop ing growth.
19 May 2008	Seattle Post- Intellige ncer, "Boeing Touts 787 Progres s" (James Wallace)	Boeing	Firm	α	"The first Dreamliner was essentially an empty shell, without wiring or systems, when it was unveiled to the world July 8."	On a modular enterpri se architec ture's over- promisi ng and under- deliveri ng
20 May 2008	Forbes, "EADS" Gallois Says 'No Urgenc y' to Find Investor s for Airbus Site Units"	Louis Gallois , <i>EADS</i> CEO	Firm	β	 <i>"EADS NV</i> CEO Louis Gallois said there is 'no urgency' in finding investors for the subsidiaries it is creating to group together certain sites in Germany and in France. The priority is 'maintining the development rythym of the A350 XWB', the company's forthcoming wide-body aircraft programme, due to enter service in 2013, Gallois said at a press briefing. Gallois said the company's cash position means finding investors to take stakes in the subsidiaries is not urgent, but we do not want the discussions 'prolonged for ever.' 	On an integral enterpri se architec ture's time horizon s.
20 May 2008	Forbes, "EADS" Gallois Says 'No Urgenc y' to Find Investor	Louis Gallois , <i>EADS</i> CEO	Firm	β	The CEO also said <i>EADS</i> has got rid of its system of stock options as remuneration for management. Instead the company has put in place a system of 'virtual stock options' under which the person holding the option does not decide when to convert it, but instead this takes place automatically, removing any grounds for suspicion, Gallois said.	On an integral enterpri se architec ture's incentiv es for leaders.

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21 May Sweek Busines (Netrophic) Jim Mother ney, From Coop (Catar) Firm ney, man an Eye on Coop (Catar) G (Catar) Benefit man and From (Cudit) Firm my G (Catar) G (Catar) G (Catar) Firm man and man an Eye on (Ceo) G (Catar) Firm man and an Eye on (Ceo) Firm (Catar) G (Catar) Firm man and man an Eye on (Ceo) Firm man and (Ceo) G (Catar) Firm man and modular G (Catar) Firm man and modular G (Catar) McNerney said any purchase would have to fit into Boeing's strategy of long-term profitability and productivity improvement for the group." On a modular 21 Forbes (Ceo) Jim McNerney said any purchase would have to fit into (Ceo) On a modular On a modular 2008 Says (Ceo) The Ney, Says (Canpar) Firm- (Ceo, (Ceo), (David Firm- man and (Ceo), (David G (Ceo), (Campar) Firm- (Ceo), (Campar) G (Ceo), (Campar) G (Ceo), (Campar) Chicege (Ceo), (David (The Boeing (S) Says (Ceo), (Campar) Firm- (Ceo), (Campar) G (Ceo), (Campar) G (Ceo), (Campar) Chicege (Ceo), (Campar) G (Ceo), (Campar) Firm- (Ceo), (Campar) G (Ceo), (Campar) G (Ceo), (Campar) Firm- (Ceo), (Campar) G (Ceo), (Campar) G (Campar) G (Campar) G (Campar) <td></td> <td>Airbus Site</td> <td></td> <td></td> <td></td> <td></td> <td></td>		Airbus Site					
21 May 2008 Forbes "Boeing CED Jim McNer Says Firm Chair May Chair Keeping an Eye on CEO, Possible Acquisit Joseing ons" Firm CEO, CED, The Acquisit Acquisit Acquisit Acquisit Acquisit Possible Acquisit Acquite Acquisit Acquisit Acquisit Acquisit Acquisit Acquis	May	Busines sWeek "Can Boeing Benefit from High Oil Prices? " (Judith	McNer ney, Chair man and CEO, <i>The</i> <i>Boeing</i> <i>Compa</i>	Firm	α	crumple under the weight of soaring fuel prices. But Boeing is counting on the energy crisis to boost demand for its new generation of fuel-efficient jets, CEO James	modular enterpri se architec ture's exogeno us view of the
May 2008Tribune, "Boeing PositiveMcNer ney, erSuppli erremains committed to its strategy of relying on major partners around the world to share the cost, risk and potential profits of new airplanes, but it will change the se architec torward " CEO, (David g)man remains ceo, Compa nyremains committed to its strategy of relying on major partners around the world to share the cost, risk and potential profits of new airplanes, but it will change the se architec tormapy lost its line of sight deep into its global supply thain and was surprised by some of the shortcomings that caused delays, McNerney said. 'We should be managing to integrat and people in place 'to see and manage as well as we could have,' he added. "We still believe that the global- supply-chain model is the way to do this thing. We just didn't get it right the first time. We're on the bleeding edge of taking a big, big step that was just a quarter step too far.'On a modular enterpri se architec ture's22 22 22 22 2008 30 30 30 30Pat 30 30Firm 30 40"In some aspects it will be a photo finish, but I'm highly confident we will get power on in June,' Shanihan said.On a modular enterpri se architec ture's over- promise and modular g)	May	<i>"Boeing</i> CEO Says Keeping an Eye on Possible Acquisit	McNer ney, Chair man and CEO, <i>The</i> <i>Boeing</i> <i>Compa</i>	Firm	α	Boeing's strategy of long-term profitability and	modular enterpri se architec ture's attempt to transitio n towards
May 2008Tribune, "Boeing Positive Head Heading of 787 Forward g)Shanih an, head progra m, The Compa g)confident we will get power on in June,' Shanihan said.modular enterpri se architec ture's over- promise and under- delivery	May	Tribune, "Boeing Positive Heading Forward " (David Griesin	McNer ney, Chair man and CEO, <i>The</i> <i>Boeing</i> <i>Compa</i>	Suppli	α	remains committed to its strategy of relying on major partners around the world to share the cost, risk and potential profits of new airplanes, but it will change the way it manages the system with any new airplanes. The company lost its line of sight deep into its global supply chain and was surprised by some of the shortcomings that caused delays, McNerney said. 'We should be managing the supply chain as if corporate borders do not exist,' McNerney said. Boeing did not have adequate systems and people in place 'to see and manage as well as we could have,' he added. "We still believe that the global- supply-chain model is the way to do this thing. We just didn't get it right the first time. We're on the bleeding edge of taking a big, big step that was just a quarter step too far.'	On a modular enterpri se architec ture's learning to integrat e its supplier relation
	May	Tribune, "Boeing Positive Heading Forward " (David Griesin	Shanih an, head of 787 progra m, <i>The</i> <i>Boeing</i> <i>Compa</i>	Firm	α	"In some aspects it will be a photo finish, but I'm highly	modular enterpri se architec ture's over- promise and under-
	22	Flight	Didier	Firm	β	"The A350 fuselage's structural design comprises	

May 2008	Internat ional, "Airbus Set to Roll Out Carbonf ibre A350 Fuselag e Demons trator," (Max Kingsle y-Jones)	Evrard , <i>Airbus</i> A350 progra mme chief		8	carbonfibre panels and frames, together with metallic cross-beams – a departure for <i>Airbus</i> which has traditionally used aluminum for the bulk of the fuselage structure. 'We need to have a very mature technology both from the technical and the manufacturing point of view ,' says A350 programme chief Didier Evrard.	integral enterpri se architec ture's technol ogy strategy
23 May 2008	Bloomb erg, "Airbus at 'Less Than Zero' Value Still Loses Altitude " (Andrea Rothma n)	Louis Gallois , <i>EADS</i> CEO	Firm- Investo r	β	 "Airbus SAS, the world's largest commercial aircraft maker, is valued at 'less than zero' after this year's 32% drip in the shares of parent EADS according to Lehman Brothers Holdings Inc. analyst Joe Campbell. 'The market is viewing Airbus as a liability, rather than an asset,' said Campbell, 62, who is based in New York and has ranked among the top five aerospace analysts for six consecutive years in an Institutional Investor magazine poll. EADS, on May 13 reported an additional three-month delay in deliveries of the A380 superjumbo jetliner, which was already two years behind schedule. Airbus is also six months to a year late on the A400M military transport. The planemaker sought in part to shift investment for new planes to subcontractors who would buy Airbus plants. It chose local companies in France and Germany that lacked the capital to shoulder the risk and the plan fell apart. Investors' low valuation of Airbus is 'a bizarre outcome for a large company,' Campbell, whose firm is an investment bank for EADS, said in an interview. 'It reflects both the industrial challenges of engineering and making big airplane programs, and particularly and primarily, the euro trading at \$1.50 or \$1.60.' He rates the shares 'equal weight.' EADS's non-Airbus assets are worth 15 or 16 euros a share, or about where the stock is trading, estimates Campbell. Non-Airbus businesses contribute a third of the company's sales, which totaled 39.1 billion euros in 2007. Scott Babka and Rupinder Vig at Morgan Stanley in London say EADS without Airbus is worth 13.5 euros a share. Getting an aircraft maker for free might provide a floor for the stock, according to Vig. In an interview, [EADS CEO] Gallois agreed with Lehman's Campbell about EADS's valuation. 'He's right,' Gallois 	On an integral enterpri se architec ture's overinv estment (as a mixed uopolist) and subsequ ent valuatio n

					said. 'Either you're getting Airbus free or the other activities are free. In any case, the shares don't represent the company's value. Our shares are very linked to the dollar – I'd say too much [linked to the dollar].'" When EADS was founded in 2000, management promised 10 percent margins on earnings before interest and taxes by 2003. The best so far was 7.3 percent in 2005. CEO Louis Gallois in March 2008 forecast margins on earnings before interest and tax at Airbus 'in the mid-single digits' through about 2011. 'As long as Gallois and Enders and people at the top of the company can't give guidance that EBIT margins will go above 5 percent, there's not a lot of incentive to buy the shares,' said Klaus Breil of Cominvest Asset Management in Frankfurt.	
28 May 2008	Internat ional Herald Tribune, "WTO Ruling on Subsidi es for Airbus Jets May Ripple to Other Countri es" (Mark Landler)	Richar d Aboula fia, <i>Teal</i> <i>Group</i>	Industr y Analys t	α & β	"Aboulafia said he figured that the heaviest expenditures at <i>Airbus</i> for the A350 – around 2013 , when the plane is scheduled to be introduced – would coincide with the low ebb in its production cycle . By then, he predicted, <i>Boeing</i> will turn out 447 planes a year, compared with 296 for <i>Airbus</i> .	On a modular industry analysts , systema tic inability to predict long- term operatio ns (i.e. assumpt ion of instabili ty of integral enterpri se architec tures)
28 May 2008	Busines sWeek, "Faceti me with Boeing' s Jim McNern ey" (Maria Bartiro mo)	Jim McNer ney, Chair man & CEO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm	α	"Boeing Chairman and CEO Jim McNerney has taken his share of hits lately. The ambitious 787 Dreamliner is about 15 months behind schedule, and in late March, Boeing lost out on a multi-billion dontract to build a fleet of refueling tankers for the U.S. Air Force. Boeing's stumbles have caught many by surprise, primarily because McNerney, a disciple of former GE CEO Jack Welch, is held in such high regard. Boeing stock went from 100 to 75 because of delays with the Dreamliner, How did you allow that to happen? 'Well I would characterize the 787 as bleeding-edge innovation, all right? The good news is we have market acceptance for this airplane that has been better than any airplane ever marketed.'	On a modular enterpri se architec t'sment al models of over- promise and under- deliver

1 June 2008	Seattel Post- Intellige ncer, "Boeing Says It can Handle Airline Fuel Crisis – For Now" (James Wallace	Scott Carson , Preside nt & CEO, <i>Boeing</i> <i>Comm</i> <i>ercial</i> <i>Airpla</i> <i>nes</i>	Firm	α	Do you have any regrets about the way you handled it? Some people say: 'Look, he's a high-profile manager and highly regarded. How come he was so low-profile during such an important time for the company?' 'I don't think the guys in Seattle would characterize me as low-profile regarding my involvement with the 787. Having said that, you can always look back on these situations and say if I'd moved two months earlier here or a month and a half earlier there we probably could be in slightly better shape I can learn from that.' What kind of confidence do you have that the targets you've got for the 787 will be met? 'We have a high level of confidence. It's still the most successful introduction in aviation history.' I was talking with a money manager who has a position in <i>Boeing</i> stock, and he said: 'The dollar has put enormous pressure on <i>Airbus</i> , and yet they're outselling <i>Boeing</i> in the smaller end of the market.' How is that possible? Why haven't you been more successful there? 'The fact is our sales levels are about the same in the narrow-body segment so I wouldn't characterie us as losing out in the narrow-body side. But our competitor has been doing a good job there.' You've got roughly \$12 billion in cash right now. A lot of people might say: 'That's about \$16 a share. We would like a high dividend or more acquisitions.' Are there any plans to use that case differently? 'We are mindful of the employees first – in terms of pension plans and health-care plans – and our investors. But you have to remember, aerospace is a lumpy industry. I'm a pretty conservative manager who likes to keep probably more than enough cash around.''' "Although sky-high aviation fuel prices have thown a scare into the airline industry not since the horrendous 9/11 downturn that resulted in massive layoffs at <i>The Boeing</i> <i>Company</i> , the leader of the compnay's jetliner business said that the aerospace giant will be able to manage its way through the current crisis without much impact at least for now. 'In terms of the im	On a modular enterpri se architec ture's ability to see and understa nd exogeno us events.
4 June 2008) Spirit Aerosys tems Investor	Rick Schmi dt, CFO,	Suppli er	α & β	 "Potential Headwinds for Margin Expansion: Lower margins on 787 first 500-unit block Cyclical downturn in large commercial deliveries." 	On the cost of instabili ty in a

	's	Spirit				modular
	Confere	Aerosy				enterpri
	nce	stems				se
						architec
						ture.
5	Seattle	John	Firm	β	"You don't bite off more than you can chew,' Leahy	On an
June	Post-	Leahy,			said in an interview. 'I think we learned that on the A380,'	integral
2008	Intellige	Airbus			he added. 'It was a very painful tuition. We needed to	enterpri
	ncer,	C00			have a slower ramp-up, better program management	se
	"Airbus				and better coordination of the supply chain. Boeing	architec
	says It				didn't learn those lessons from us, and so it's repeating	ture's
	Won't				the mistakes with the 787. We have been watching very	approac
	Repeat				carefully.'	h to
	Errors,				carefully.	stability
					Airbus plans a much less ambitious production ramp-	, and the
	Delays"				up on the A350 than <i>Boeing</i> initially proposed for the	modular
	(James				• • • • •	enterpri
	Wallace				787, Leahy said. Boeing recently revised [its original]	
)				target and will ramp up 787 production at a slower and	se
					more traditional pace. Leahy said he and others at	architec
					Airbus had believed for some time that Boeing would	ture's
					never be able to meet its initial 787 production targets.	predisp
					'We thought their ramp-up was way too ambitious,' he	osition
					said. 'Our people said they would not be able to match	to
					thant five years later on the A350, and it turned out	'over-
					that maybe we were right.' He said Airbus has built	promise
					'cushions' into the A350 schedule to allow for the kinds	and
					of development and production issues that always crop up	under-
					on new airplane programs. 'It is always more difficult in	deliver'.
					reality than sitting around in meetings and deciding	
					how fast things can get done.' 'We will have a much	
					slower ramp-up than Boeing had with the 787, with	
					extra padding built in for our program based on our	
					experience with the A380 and what we learned from	
					(Boeing) on the 787,' Leahy said. 'I think we will be	
					right on time. I'm hoping even a bit early.' Leahy said	
					Boeing's delays on the 787 mean the competing A350-900	
					will be getting to market at almost the same time as the	
					787-9, and that's where the real battle between the	
					planes will be fought. Because of the delays, Boeing	
					recently said delivery of the bigger 787-9 has been pushed	
					back until 2012, or just one year before the A350 arrives.	
					The A350-900 will be the first version that Airbus	
					delivers, in 2013. The smaller A350-800 will come next,	
					followed by the biggest A350-1000 in 2015. Leahy long	
					maintained that <i>Boeing</i> made the 787-8 too small. 'The	
					787-8 is too small for a widebody plane,' Leahy said.	
					'I'm even discovering that my A350-800 might be a bit	
					small. Most airlines are pushing for bigger capacity.'	
					Adultus has an A250 1000 that sheelintake bills the 777	
					<i>Airbus</i> has an A350-1000 that absolutely kills the 777-200EB <i>i</i> he said fand they know it '''	
		2.01			300ER,' he said, 'and they know it.'"	0
9	Reuters,	Mike	Firm	α	"Boeing Co. said on Monday its 787 Dreamliner would	On a
June	"Boeing	Bair,			make its first flight in the fourth quarter of 2008, repeating	modular
2008	's 787	VP,			the revised schedule for the new airplane's launch	enterpri
	1 march 1 marc					
	Dreamli ner First	Busine ss			announced in April. The company clarified its schedule after Mike Bair, vice-president of business strategy and	se architec

	Flight On Schedul e," (Robin Paxton)	Strateg y & Market ing, Boeing Comm ercial Airpla nes			marketing at <i>Boeing Commercial Airplanes</i> , said on Sunday the plane would fly 'by the end of the summer .' He did not say that the schedule had changed."	ture's tendenc y to overpro mise and underde liver.
11 June 2008	The Seattle Times "Vough t Chief Elmer Doty Explain s Why Compan y Pulled Out of Part of <i>Boeing</i> ' s 787 Progra m," (Domini c Gates)	Airpla nes Elmer Doty, CEO, Vought	Suppli er	α	 "Vought Chief Executive Elmer Doty said today that his company pulled out of one part of Boeing's 787 Dreamliner program because it didn't have direct management control over other suppliers. Doty compared the complicated supply chain that must deliver parts for a new jet to a relay race where each member of the team must run in sequence. 'A year ago ago, definitely we were at the back of the pack,' Doty said. 'We've moved to the middle of the pack, and we're moving up. The thing about this race is, it only counts when everyone gets across the finish line.' Boeing did not disclose what it paid Vought for the ownership stake, which leaves Boeing and Alenia of Italy as 50-50 partners in the joint venture. Tuesday in Charleston, Bob Noble, vice president in charge of Boeing's 787 supply chain, insisted to skeptical journalists that Boeing hadn't bought Vought out Global Aeronautica (GA) wasn't working well. 'It was not performance-related,' said Noble. Enzo Caiazzo, GA's chairman and also chief operating officer of Alenia North America, went further and insisted that Vought's four-year participation in GA could not be considered a failure because it had created a state-of-the-art airplane manufacturing plant on a previously empty site. Speaking in a phone interview vrom Vought headquarters in Dallas, Texas, Doty gave his take on why it happened. Doty said Vought's role in the GA venture became problematic when the supply chain broke down and work supposed to have been completed at other major suppliers traveled to Charleston for GA to finish. GA takes large sections from Alenia as well as from Fuji and Kawasaki in Japan and integrates them with a lot of Boeing-furnished parts. The problem was that Vought had no control over the procurement of those large pieces, Doty said. Boeing, as the prime contractor, was responsible for managing those major partners. To manage the traveled work efficiently, you need that 	Iver. On a modular enterpri se architec ture's dis- integrati on.
					accounted for less than 10 percent of <i>Vought's</i> 787 program revenue, he said, 'It was a huge distraction and difficult to execute' because <i>GA</i> lacked that partner oversight role. 'That is best done by the prime,' Doty said. After discussions with the 787 leadership team,	

				Boeing agreed.	
12TheJuneSeattle2008Times, "Boeing 'sDilemma: IfCompany LosesTankerAppeal,Appeal,ShoulditThrowTowel? ""(Domini		Firm	α	 Boeing agreed. Initial customer payments won't begin to flow until at least 14 months later than originally planned and after that more slowly than anticipated as <i>Boeing</i> holds down the new jet's delivery rate. <i>Boeing</i> paid <i>Vought</i> a cash advance of \$122 million in March as partial restitution for that loss of cash flow. Further payments are being discussed. A person familiar with the negotiations said Doty played hardball with <i>Boeing</i>, insisting that the company wouldn't continue to build parts – grindin the whole 787 supply chain relay race to a halt – unless <i>Vought</i> got paid. In the interview today, Doty would say only: 'It's a negotiation. <i>Boeing</i> is my biggest customer.' With sales of the Dreamliner sky high, the program will likely deliver big profits in time. But with revenue flow pushed out, for now all the suppliers are hurting as they continue to spend big. Struggling financially, <i>Vought</i> secured \$200 million in loans in the first quarter. 'Of course, it's a good idea to be on the program,' Doty said. 'You're talking to someone who just arranged to take out additional debt and worked hard to find ways to finance this program.' The money from the <i>GA</i> sale will help, too. Longer term, private equity firm the <i>Carlyle Group</i>, which owns <i>Vought</i>, is looking to sell the company. Possible buyers include <i>Spirit Aerosystems</i> of Wichita, Kan., or conceivably <i>Boeing</i> itself. Doty said he couldn't comment on prospective buyers. 'We were for sale the day 1 walked in,' said Doty, who became CEO in February 2006. 'My job is to continue to build.'''' ''''''''''''''''''''''''''''''''	On a modular enterpri se architec ture's inconsis tent logic, when facing an integral enterpri se architec ture.
c Gates) 13 The June Seattle	Terry George	Suppli er	α	"Terry George, <i>Spirit's</i> 787 director of operations, attributed the success here to the company's <i>Boeing</i>	On an integral
2008 Times, "	,787			heritage, its familiarity with <i>Boeings</i> ' tools and	relation

	Boeing Dreamli ner's From Ent Gets Finishin g Touches at Spirit Aerosyt ems" (Domini	Direct or of Operat ions, Spirit Aerosy stems			processes, and the experience that managers here, including himself, gained in past stints in Everett. 'We had a lot of <i>Boeing</i> DNA,' said George."	ship as success within a modular enterpri se architec ture.
13 June 2008	c Gates) The Seattle Times, " Boeing Dreamli ner's From Ent Gets Finishin g Touches at Spirit Aerosyt ems" (Domini c Gates)		Suppli er	α	"Spirit is erecting a plant in Kinston, N.C., to build the A350 fuselage-panels, but will assemble them in Europe. Ron Brunton, executive vice president and chief operating officer, said it isn't clear if Spirit will own that assembly plant. Given that guarded response, it seems possible Spirit workers may end up doing assembly at an Airbus location."	On a modular enterpri se architec ture, learning to work within an integral enterpri se architec ture.
18 June 2008	CNN, "EADS CEO – New Airbus Cost Saving Plan Not Ready Yet", (David Pearson)	Louis Gallois , <i>EADS</i> Chief Execut ive	Firm- Investo r	β	"European Aeronautic Defence & Space Co. Wednesday said it is still working on a package of additional cost- cutting measures for its commercial aircraft subsidiary Airbus, and hinted it might miss its deadline of rolling out the plan by the summer. The raft of additional measures to supplement the Power8 cost-saving and restructuring progam announced in early last year and aimed at achieving cost savings of EUR 2.1 billion by 2010 'will be ready when it's ready,' EADS Chief Executive Louis Gallois told a press luncheon. He added, 'I'm not going to let my calendar be influenced by pressure from outside the company.'"	On the patience of capital in an integral enterpri se architec ture.
18 June 2008	CNN, "EADS CEO – New Airbus Cost Saving Plan Not Ready Yet",	Louis Gallois , <i>EADS</i> Chief Execut ive	Firm- Investo r	β	"Gallois said that once it has carved out two industrial facilities in France into a separate subsidiary, <i>Airbus</i> will have four tier-one suppliers of aerostructures in France: <i>EADS</i> ' subsidiary <i>Socata</i> , <i>Sogerma</i> , <i>Latecorere SA</i> and the <i>Airbus</i> entity that will initially be 100% owned by <i>EADS</i> . 'Maybe in the future we will look for a solution involving a certain consolidation of theses tier-one suppliers. I think it's desirable,' the CEO said."	On the way an integral enterpri se architec ture restruct ures its supply base.

	(David Pearson					
18 June 2008	Chicago Tribune, "Boeing , airbus Jet Orders Tailing Off", (Julie Johnsso n)	George Shapir o, analyst , <i>Citi</i> <i>Invest</i> <i>ment</i> <i>Resear</i> <i>ch;</i> Randy Tinset h, VP Market ing, <i>Boeing</i> <i>Comm</i> <i>ercial</i> <i>Airpla</i> <i>nes;</i> John Leahy, COO, <i>Airbus</i>	Firm- Custo mer	α & β	"Orders are starting to slow for planemakers <i>Boeing Co.</i> and <i>Airbus SAS</i> after three straight years of record- shattering sales. What's unclear is whether airlines are taking a breather after splurging on more than 7,300 new aircraft, or whether they are headed for a global shakeout that will force them to cancel or defer plane orders on a large scale. Analyst George Shapiro of <i>Citi Investment Research</i> sees early signs that a sharp downturn looms for the planemakers and the companies that supply them. The aerospace sector to date has been largely unaffected by the twin forces squeezing airlines: an oil shock and slowing economy. Shapiro predicted in a research note Tuesday that 'over the next several months, orders will fall off sharply, cancellations and deferrals will increase.' He thinks the next downturn could be the steepest since the 1989 market correction, when about one-third of Chicago-based <i>Boeing</i> 's order backlog was canceled. <i>Boeing</i> and <i>Airbus</i> say they are closely monitoring oil's impact on global travel but believe they are protected by a record backlog of orders that will keep production lines at both companies humming for the next seven years. 'This is going to create great strain on the airlines,' Randy Tinseth, vice president for marketing with <i>Boeing's</i> commercial airplane division, told the <i>Tribune</i> last week. 'We're watching it very closely.' Other analysts downplay the risk to <i>Airbus</i> and <i>Boeing</i> . 'With such deep backlogs, whether a particular customer receives delivery of an aircraft next year or in three years is of little consequence to the [manufacturers],' said Brian Studioso, aerospace analyst with <i>CreditSights Inc.</i> , in a report Tuesday. Shapiro believes fore ign carriers will widely adopt the survival tactics that have taken hold in the U.S.: price hikes, parked aircraft and cash preserved at all costs. 'Usually, airline profitability takes two years to go from peak to a loss, but it will likely be only one year this time, increasing the tisk of a sharp downturn,' Shap	On the modular nature of the global airline industry in creating the boom and bust order and delivery cycle; as well as the modular nature of <i>Boeing</i> .

					Dut Design ion't taking the surrent situation lightly. Its	
					But Boeing isn't taking the current situation lightly. Its managers meet weekly to match current and future sales with production schedules, a practice it started during the airline collapse following the Sept. 11 attacks. 'The important thing is that we actively manage our production system,' Tinseth said. Airbus, too actively manages its order book, Chief Operating Officer John Leahy told the Tribune last week via e-mail. 'So far, [Airbus] is handling the airline crisis well, but if the fuel price bubble were to soar to \$200 per barrel, then all bets would be off,' he wrote.	
19 June 2008	Busines s Week, "How Big is Boeing' s Big Win?" (Keith Epstein)		Gover nment	α	"We're going to the mat,' vows Representative Norm Dicks (D-Wash.). Their quest: Round up enough congressional votes to stymie funding for the tankers unless <i>Boeing</i> gets the deal."	On a modular enterpri se architec ture's relation ship with govern ment
19 June 2008	Forbes, "EADS Shares Shrug Off Boeing Victory " (Lionel Laurent)	Zafar Khan, Analys t, Societe Gener ale	Investo rs	β	"It was business as usual for European Aeronautic Defense and Space share on Thursday, closing down – but in line with the sector – after Boeing clawed back a victory over a disputed fuel-tanker congract with the United States Air Force. Shares in European Aeronautic Defense and Space fell 2.5%, or 34 euro cents (53 cents), to 13.21 euros (\$20.48), in Paris on Thursday. But this was not an isolated plummet: BAE Systems closed down 2.8%, in London, while component-supplier Meggitt lost 2.1%. The European aerospace sector is squeezed on all sides by eye-wateringly high oil prices, a weak dollar and the imminent prospect of a recession in the aviation sector. So it was not surprising th see EADS's stock perform in line with its peers, despite fresh coubts over a U.S. Air Force contract awareded to EADS partner Northrop Grumman that could now end up going to Boeing. 'In our view, this is not the big issue in people's minds at the moment,' said Zafar Khan, analyst with Societe Generale. 'Its more a sentiment issue than hard numbers.' Boeing's shares closed up 3.1%, to \$76.95 in New York on Thursday. Northrop Grumman, its chief competitor for the fuel-tanker, was not far behind: its shares closed up 1.9%, to \$71.35."	On the market' s relative valuatio n of a modular and an integral enterpri se under a commo n event.
19 June 2008	Bloomb erg News, "Airbus Speedin g, Not Slowing , Producti	Louis Gallois , CEO, <i>EADS</i>	Firm	β	"Airbus, the world's largest maker of commercial planes, said it will continue increasing production even as airlines under pressure from high oil prices may defer or cancel aircraft orders. Airbus is ramping up production rates until it can turn out 40 single-aisle planes and as many as 11 widebody airliners a month by the end of 2010, Louis Gallois, chief executive of Airbus, said Wednesday. 'For now, we don't see any movement in that sense, but we're following the market	On an integral enterpri se architec ture's need / ability to

8	on" (Andrea Rothma n)				very closely,' Gallois said. 'At the last shareholder committee meeting of <i>Airbus</i> , we looked at the airlines, one by one. And right now there's nothing that leads us to panic for airlines.' <i>Airbus</i> has a backlog of 3,655 planes, or more than six years of work. It delivered a record 453 planes to airline customers last year and is planning to deliver about 470 this year. At least 24 airlines have quit operating or filed for bankruptcy protection this year as record fuel prices eat into earnings and a global tightening or credit slows economies. Airlines may report combined losses of \$6.1 billion this year, the worst since 2003, the International Air Transport Association said earlier this month. Gallois also said that the <i>European</i> <i>Aeronautic Defence and Space Co., Airbus'</i> parent, is still grappling with the challenges of meeting production schedules on the A380 superjumbo and the A400 military transport. The company should get those issues under control in 2008, he said."	continu ally expand.
19 June 2008	Bloomb erg News, "Airbus Speedin g, Not Slowing , Producti on" (Andrea Rothma n)	Louis Gallois , CEO, <i>EADS</i>	Firm	β	"Gallois said <i>Airbus</i> job cuts in Germany have been slower in coming than in France, Spain and the U.K. because labor laws make the process of letting people go more cumbersome."	On an integral enterpri se architec ture's internal heterog eniety.
20 June 2008	Aviation Week "Boeing Reconsi ders Plan for 787-10" (Robert Wall)	Scott Carson , Preside nt & CEO, Boeing Comm ercial Airpla nes	Firm	α	"The 787-10, although not formally launched, would be a double-stretch of the basic 787-8 and the top end of that aircraft family, But <i>Boeing Commercial Airplanes</i> President Scott Carson says the paramount consideration now is whether the double-stretch concept makes sense . Carson, however, says the company is 'not threatened' by <i>Airbus</i> activities. One of the challenges for the Seattle manufacturer will be finding the industrial resources to birth the twin- widebody in the same timeframe as the 737 replacement."	On a modular enterpri se architec ture's inability to perform long- term product strategy.
20 June 2008	Aviation Week "Analys t: 25% of Aircraft Ordersa t Risk" (Joseph C. Anselm o)	Robert Stallar d, directo r, <i>Macqu</i> <i>arie</i> <i>Capita</i> <i>l</i>	Investo rs	α	"A new analysis finds that a quarter or more of the commercial aircraft backlog at <i>Boeing Co.</i> and <i>Airbus</i> could be at risk as high oil prices continue to batter airlines. The two aircraft builders have taken comfort that the hardest-hit segment of the industry – U.S. airlines – accounts for just 12% of their backlogs. But Robert Stallard, a director at <i>Macquarie Capital</i> , warns that orders from undercapitalized startups in Asia and Europe and carriers with overly aggressive growth plans also are at risk. He believes 25-30% of the backlog of commercial aircraft orders could be deferred or canceled. 'The question that has yet to be	On a modular enterpri se architec ture's inability to see long- term trends due to

					answered is not whether there will be a downturn, but how bad it will be,' says Stallard.	its myopia.
					There are two schools of thought on how to answer. Optimists believe that with backlogs equal to seven years worth of production, <i>Boeing</i> and <i>Airbus</i> can afford to lose orders and still make it to the industry's next up-cycle with minimal pain. They argue that demand for air travel should continue to grow in places like China and India, making up for declines in other regions. Indeed, <i>Boeing</i> refuses to lower its 20-year demand outlook, even though the forecase is based on oil selling at a fairy tale price of \$70-80 per barrel when in reality it's closed ro \$140. The second, more negative answer is that a step change in global energy demand has created a permanent era of high prices and sent the airline industry into unchartered territory. While many of the challenges of the last downturn - overcapacity, inefficiency, labor costs – were within management's span of control, this time there is no obvious remedy. As cash reserves rapidly dwindle, all choices will have to be draconian."	
20 June	Boeing website	Pat Shanah	Firm	α	"In completing the Power On sequence, we have verified both that the electrical power distribution system is	On a modular
2008		an, VP 787			installed as designed and that it functions as intended."	enterpri se
		Proga				architec
		m,				ture's
		Boeing				achieve ment of
		Comm ercial				a a
		Airpla				milesto
		nes				ne, 5
						months later
						than
						originall
						y planned.
23	ATW,	Renee	Firm	α	"Both [Airbus'] Martin-Nagle and Boeing MD-	On the
June	"Airbus	Martin		&	Environmental Strategy Billy Glover see a bright future for	contrast
2008	, <i>Boeing</i> Commit	- Nagle,		β	biofuels, although they differed somewhat on a timeline. 'It's a long process,' Martin-Nagle said. 'We have to	ing rates of
	ted to	Airbus			move through a testing phase and then it has to be	technol
	Biofuels	North			proved. I'd say 8-10 years.'	ogical
	but Differ	Americ a VD:			Clover by contrast told attendees (Um quite a bit more	innovati
	Differ on	a VP; Billy			Glover, by contrast, told attendees, 'I'm quite a bit more optimistic.'"	on which
	Target	Glover			- F	underly
	Date"	, MD				modular
	(Sandra Arnoult	Enviro nmenta				and integral
)	1				enterpri
		Strateg				se
		y, Pasiwa				architec
		Boeing				turs

23 June 2008	Busines s Week "A Granco- German Civil War at Airbus? " (Carol Matlack)	Tom Enders , CEO, <i>Airbus</i>	Firm	β	"The French also say they are bearing the brunt of the so- called Power 8 restructuring plan to slash \$7.5 billion in operating costs bu 2010. As of March 31, <i>Airbus's</i> German operations have achieved only 23% of the cost reduction target, while the French operations had achieved 39%. 'The social climate is not good,' <i>Airbus</i> boss Tom Enders acknowledged in an interview published June 23 in the French business newspaper <i>La Tribune</i> . 'It's impossible to change everything at the same time and at the same speed. To have a total, permanent equilibrium, as some of our unions want, is absolutely unrealistic,' Enders said. Enders told <i>La Tribune</i> that he understood the concerns in Toulouse about the large number of Germans working in the factory. 'I asked the same thing when I arrived last year,' he said. 'But the sad reality is, the lack of integration in <i>Airbus</i> , caused by an organization of work along national lines as well as different kinds of training and language problems, forced us to bring a large number of Germans' to complete the work that had been started in Germany. As for moving some aircraft cabin work to Toulouse, Enders said, 'It was a decision that went against the traditional division of labor, and it proves that the management is reacy to make pragmatic decisions if necessary.'"	On the difficult y of maintai ning integrali ty.
24 June 2008	<i>Boeing</i> website	Rick Stephe ns, Senior VP, Human Resour ces and Admin istratio n, <i>The</i> <i>Boeing</i> <i>Compa</i>	Firm - Emplo yee	α	"The Boeing Company is introducing a new retirement benefit program for nonunion employees hired or rehired on or after Jan. 1, 2009. 'We are changing our retirement program for nonunion new hires for several reasons,' said Rick Stephens, senior vice president, <i>Boeing</i> Human Resources and Administration. 'This new approach addresses new employee preferences for retirement programs that offer flexibility and portability and responds to market trends and practices of peer companies. At the same time, it allows us to better manage our retirement plan expenses and reduce financial risk.'"	On a modular enterpri se architec ture's continu ed disinteg ration of the firm- labor link.
25 June 2008	Reuters, "Boeing Shares Plumme t After Goldma n Cut" (Esha Dey)	ny Richar d Safran, analyst , <i>Goldm</i> <i>an</i> <i>Sachs</i>	Investo r- Firm	α	"Boeing Co. shares fell to a two-year low on Wednesday after Goldman Sachs cut its rating on the airplane maker and defense company to 'sell' from 'neutral', reflecting falling orders, problems facing airlines and high fuel prices. The stock fell 5.5 percent – its biggest one-day drop in more than five years – to \$70.68 on the New York Stock Exchange, its lowest point since February 2006. The stock is down 34 percent from its all-time high of \$107.80 last July, hurt by the delays on its 787 Dreamliner program and general concern about high oil prices. 'We expect the weak macroeconomic backdrop and record fuel prices to hurt airlines and translate to a significant slowing in the order book,' said Goldman analyst, Richard Safran in a research note published on Wednesday. He put a \$60 price target on the stock for the next 12 months, but said there was substantial risk the stock could go lower. Safran, who downgraded the	On a modular enterpri se architec ture's non- systemi c, short- term view on valuatio n

25 June 2008	Wall Street Journal, "Boeing, Gone" (David Gaffen)	Richar d Safran, analyst , <i>Goldm</i> <i>an</i> <i>Sachs</i>	Investo r- Firm	α	whole commercial aerospace sector to 'cautious' from 'neutral,' expects orders for the sector to drop 50 percent in 2008 and another 50 percent in 2009 as airlines focus on restoring profitability through aggressive capacity cuts and price increases. 'Aerospace stocks are off nearly 30 percent from October highs, but history indicates the stocks could fall another 20 percent or more as we think the market is not factoring in that the combined effect of accelerated crude prices, a weak economy and rapidly deteriorating airline fundamentals could pose a worse problem for the aerospace group than 9/11 and SARS,' wrote Safran. He said there is more risk to the 787 program than is priced in as the program has yet to even enter flight test, where historically most issues on development aircraft are found. Other aerospace suppliers also fell sharply on Wednesday, including <i>Spirit Aerosystems Holdings Inc.</i> " "Shares of aerospace giant <i>Boeing Co</i> . have been weak in the last few months, and they're getting weaker in early trading Wednesday, down 5% after <i>Goldman Sachs</i> put the company on its 'conviction sell' list, a move that's hard to misconstrue. The stock is down 34% since a 52-week high of \$107.83 and <i>Goldman</i> says the economic environment is none-too-friendly for a maker of large aircraft. 'We expect the weak macroeconomic backdrop and record fuel prices to hurt airlines and translate to a significant slowing in the order book, driving further multiple compression,' writes analyst Richard Safran. He adds that delivery rates and margin expansion will suffer, and added that the Dreamliner 787 program contains more risk than 'is currently priced in as the program	On a modular enterpri se architec ture's non- systemi c, short- term view on valuatio n
25 June 2008	Wall Street Journal, "Boeing, Gone" (David Gaffen)	Market beat@ wsj.co m (blog)	Investo rs- Firm- Emplo yees	α	 has yet to even enter flight test."" "I am highly suspect of the motives of Goldman Sachs report by Richard Safran." [Comment by John Hannahs]. "this is bs, just 3-days before boeing employies will get there share value, they analyst and boeing ceo give the ok to trash this stock. Ther is a big payoff going on ! but again not for co employies" [Comment by dave]. "I would like to thank Mr. Safran @ Goldman Sachs for his most timely downgrading of Boeing. Now my Boeing Shared Value Trust award will be less. We had a June 30 stock price that would set the amount of the award. Perhaps a little boeing birdy told him hummmmm??????" [Comment by satman]. "Watch for another BA stock buy-back announcement around the time 2nd quarter earnings are released. BA seems to drop in value before Share Value Trust payout and then the company announces a major buyback." [Comment by Former BA Analyst]. "Boeing had a record last quarter, record boeing sales/backlog, dreamliner on track/power on, and GAO vindication. Goldman Sachs downgrade is pathetic like 	On a modular enterpri se architec ture's potentia l zero- sum game, due to allegati ons from unconfir med employ ees.

June S 2008 7 "" S P S D B M B D (() C C S S S S S S S S S S S S S S S S S	he Geattle Fimes, Boeing Stock Price Slumps Days Before Magic Bonus Day" Domini Gates) CNN, Gates)	Tom Libby, analyst with Power Inform ation	Investo rs- Firm- Emplo yees	α	30-month low – and even employees who don't buy company stock may have lost some money as a result. After a <i>Goldman Sachs</i> analyst reduced his rating on the stock from 'neutral' to 'sell,' <i>Boeing</i> shares closed down \$5.15, or 6.9 percent, to \$69.64. The downgrade came as 80,000 <i>Boeing</i> current and former workers in Washington state await word on a company incentive program that hinges on what the average share price will be on Monday. This time around, the trigger price is \$54 . If the average share price on Monday is \$70, the average payout would be about \$1,493 in company stock , a <i>Boeing</i> spokesman said. <i>Boeing's</i> Share Value Trust pays nonexecutive employees once every two years , assuming the stock prices is above a predetermined threshold. Employees wha worked the entire four years beginning July 1, 2004, qualify for the full amount. Those who worked less receive a pro-rated amount. Companywide, about 196,000 people are eligible for incentive payments under the Share Value Trust. Collectively they would receive about \$309 million in Boeing stock , based on a \$70-a-share price. The trust payout in 2006 yielded <i>Boeing</i> workers an average \$5,231 before taxes. That was the result of a much larger spread between the threshold share price of \$47 and the stock price on the final day of the period , \$82.29 ." <i>"General Motors</i> stock price fell almost 11% Thursday, to the lowest level in more than 33 years , as analysts reacted to a <i>Goldman Sachs</i> downgrade and continued concerns about the automaker's competitiveness . That was the lowest price for <i>GM</i> shares since Dec. 24, 1974, when shares traded at \$11.16. The price has been adjusted for splits and other price-affecting distributions. The selloff followed a report issued Thursday by <i>Goldman</i>	On a modular enterpri se architec ture's potentia l zero- sum game, due to allegati ons from unconfir med employ ees.
26 7			Investo	α	 the way they look after their own finances." [Comment by Richard]. "Wall Street Gerbils and Goldman Sucks just put their hands on the scales they must want to load up at \$65 and sell at \$100 this fall." [Comment by Richard]. "Two years ago our last Share Value award was tanked by a huge write down by <i>Boeing</i> the day before the award. Now this? Maybe Mulder and Scully should come to investigate this conspiracy theory." [Comment by I Believe]. "Look out Ba at the next contrack." [Comment by nu know]. "Boeing shares slumped nearly 7 percent Wednesday to a 	On a

		ny; David Cole, chairm an of the <i>Center</i> for Autom otive Resear ch			 next is likely to lead it to look to raise capital, which we believe could lead to significant shareholder dilution and/or a cut to the company's dividend.' Tom Libby, an analyst with Power Information Network, an automotive research company said the automaker faced increasing material and high labor costs, representing an additional hurdle when competing with Asian manufacturers on price. "Their market share is under pressure now, and it will be for the rest of the year,' Libby added. It will take over a year for GM to realize the cost savings of the recently negotiated contract with the United Auto Workers Union, said David Cole, chairman of the Center for Automotive Research. 'The big question sis whether they have enough cash to make it from here to there,' Cole said. 'It is going to be tough, and it depends on the economy. Once they start to realize the we 	ent, non- conserv ative balance sheet), as well as potentia l zero- sum game between factors of producti on.
8 July 2008	Flight Internat ional, As Airbus A350 Takes Shape, Can it Avoid the A380's Trouble s?" (Max Kingsle y-Jones)	Gordo n McCo nnell, <i>Airbus</i> A350 chief engine er	Firm	β	have never seen from GM."" "After a turbulent couple of years for the A350 XWB programme, Airbus finally finds itself in a relatively calm state. There are now more than 4,000 engineers working on the A350, which McConnell [A350 chief engineer] says is a lot more than on previous aircraft for this stage of the programme. 'We've front-loaded the programme deliberately because we want to have a very mature aircraft when we go to flight test so we don't have many changes,' he says. This should reduce the number of changes required after certification to enable a faster ramp-up during the flight-test programme when production of customer aircraft will be under way. 'We've also selected our suppliers earlier than on previous programmes.' The earlier supplier selection is part of Airbus's strategy to follow the industry trend to involve companies in the design process sooner. 'Once we've selected the supplers, we immediately put in place a joint development phase and there are currently 21 JDPs running with system suppliers,' says Francois Caudron, vice-president A350 customer and business development. Significantly, all contracts for the outsourced aerostructures work are dollar rather than euro-based, despite much of it staying in Europe. Much of the fuselage work has in fact been allocated to existing Airbus plants in France and Germany that will eventually be divested, which are dubbed French and German 'newcos' for the time being. 'The two 'newcos' will be created in France and Germany and owned by EADS,' says Caudron. 'The next step will be to open the capital of the shareholding to the public to meet the divestment target of Power8.'"	On an integral Enterpri se Archite cture's de- risked approac h to new product develop ment.
14 July 2008	Aviation Week & Space Technol	Jim McNer ney, Chair	Firm	α	"There's been a lot of speculation about how the 787 program got off track. What's your take? "I think it's a case of the bleeding edge of innovation. We did not do a good job of exeution, and that's the bleeding edge part	On lessons learned from the

	ogy,	man			of the innovation. The last time we talked [in June 2006]	architec
	"Lesson	and			you identified supply chain as the big issue. It was a	t of a
	S	CEO,			prescient question, because that's the place where we	modular enterpri
	Learned	The			did not execute as well as we had planned and where we have spent a lot of time fixing and refocusing. I don't	se
	(A with a w	Boeing			think we had a joint industrial plan among all partners	architec
	(Anthon	Compa			that was as effective as it could have been. Companies	ture.
	y L. Velocci	ny			like ours have to work as effectively with factories that	(Note
	and				we don't own as those that we do. That's where we	that the
	Joseph				stumbled.'	modular
	C.				stumbled.	architec
	Anselm				Do you think those lessons have been assimilated? 'When	t
	o)				you're in scramble mode like we've been, there's a lot of	appears
	0)				learning and kluging together of things. It will be done	to think
					a lot better on the next program. I do believe in the	that the
					global model that leverages engineering and	problem
					manufacturing capability. But we drew the line too	s are
					aggressively on the 787, we bit off a little more than we	fixed
					could chew, and we've had to learn from that. So we	going
					have to figure out where to draw the line, who the	forward,
					strong partners are, the systems we need to have in	and are
					place, the right rhythm of work.'	therefor
						e non-
					It's pretty clear that the date for a next-generation 737 has	systemi
					slipped. When can we expect to see it? '[Probably] closer	c – e.g.
					to the end of the next decade. We're just finding it harder	going
					to reach the goal that the airlines have given us. That is a	from
					big challenge on the 737, an airplane that essentially is	787 to
					continually refreshed.'	747-8).
					It seems that large, complex programs in this industry almost invariably have execution problems. 'There's always going to be bleeding edge kinds of issues. Having said that, I think the industry has a tendency to overpromise. Half the answer is more discipline at the beginning about what you can and can't do, and what risk is and isn't. You have to have the courage to lose a program as well as the desire to win one. I think we are more prepared today than we were 7-8 years ago to say 'I don't see how we can't do that.' I think that is	
1					a better answer for both our customers and for us than the	
					answer that starts us down a cliff, into the ocean, to the	
					bottom of the ocean."	
16 Indu	The	Tom	Labor	α	"Girding for a fierce battle this fall, members of the	On a
July 2008	Seattle Times,	Wrobl ewski,			Machinists union who work at <i>Boeing</i> voted today to authorize a strike if negotiations with the company break	modular enterpri
2008	"Machi	Preside			down. The margin of victory is not yet known but is	se
	nists	nt of			expected to be in the 90 percent range. Chants of 'strike'	architec
1	Vote to	IAM			swept the fired-up crowd of an estimated 14,000 in	ture's
	Authori	(Intern			KeyArena. Union members and leaders said they would	adversar
	ze	ational			make big demands of <i>Boeing</i> and, unlike in recent	ial
	Strike at	Associ			negotiations, had the leverage to secure them. 'The fact	relation
	Boeing"	ation			is, it's no secret, we are in the strongest bargaining	ship
	(Iasac	of			position we have been in years, and we intend to	with
1	Arnsdor	Machi			leverage that position,' said Tom Wroblewski, president	labor.
	7 milouoi	macm			isterage that position, said roll wroblewski, president	14001.

	f)	nists)			of the union's Washington district. In his 20-minute speech, he repeated the event's catchphrase, 'It's our time this time,' at least 21 times. <i>Boeing</i> is being pressured by an order backlog of more than \$340 billion and an already delayed 787 delivery. The 787 Dreamliner's first fight is scheduled before year-end. Union leaders are hoping that on this tight production schedule, <i>Boeing</i> won't be able to abide a strike, but, with soaring profits, could stand to make some concessions to workers. 'Hopefully, <i>Boeing</i> can't afford a strike,' said material handler David Raines, who has weathered two layoffs in his 20-year stint at <i>Boeing</i> . 'Not that I want to strike,' he added, 'that's for sure.' 'We're the ones out there building the planes, and we need to share more of	
					members were on layoff. Since then, the union has added 6,000 members. Employees said they wanted a	
					larger slice of <i>Boeing's</i> soaring profit - \$1.2 billion last quarter. Topping their wish list are cost-of-living- adjusted retirement benefits, expanded medical	
					coverage and a general wage increase."	
17 July 2008	Seattle Post- Intellige ncer, "Machi nists 99% in Favor of Strike" (James Wallace)	Associ ation of Machi nists); Mark Blondi n, IAM nationa 1	Labor- Firm	α	 "It's payback time,' one union leader, Mark Blondin, said to thunderous applause. He was president of Local 751 of the International Association of Machinists during contract talks in 2005 and 2002 and is now the national union's aerospace coordinator. 'We understand the historical practice of holding this vote and understand that it is largely procedural,' a <i>Boeing</i> spokesman said. 'But we are disappointed that the union is holding it during the week and promoting other activities that keep employees away from work. We have production schedules to meet and delivery commitments to meet.' 'Our members came despite management e-mails and intimidation in crew meetings to stay at work,' IAM District 751 President, tom Wroblewski said in a statement after the vote. 'Our members shut down airplane 	On a modular enterpri se architec ture's adversar ial relation ship with labor
17	Forbes,	aerosp ace coordi nator.	Labor-	α	manufacturing at the biggest aerospace company in the world because without our members there are no <i>Boeing</i> airplanes.' 'It's our time this time for workers to get their fair share,' Wroblewski added. In an interview, Blondin said the union will hold firm on pensions and medical benefits and a good wage increase for each year of the contract. 'We have the leverage now that the company had in 2002 and 2005,' he said. 'And we are going to use it. They are going to have to pay up to get an agreement from this membership A lot of our members have it in their gut that it's payback time.'"	On a

July	"Boeing	Wrobl	Firm		years, and we intend to leverage that utility,' Districty	modular
2008	Machini	ewski,			751 President Tom Wroblewski told the crowd. 'The fact	enterpri
	sts	Preside			is, by the time you've had your second coffee break on	se
	Approb	nt of			your first day, <i>Boeing</i> CEO Jim McNerney has already made more than you will all year,' he said. District 751	architec ture's
	e Strike	IAM			members haven't had a general wage increase since	adversar
	Authori zation"	(Intern ational			2004, but have had lump sum bonuses and cost of living	ial
	(Dan	Associ			adjustments, according to <i>Boeing</i> spokesman Tim Healy.	relation
	Catchpo	ation			Union members are still resentful over the past two	ship
	le)	of			contracts, in 2002 and 2005, Wroblewski said. In 2002,	with
	,	Machi			the union accepted concessions due to the economic	labor
		nists);			downturn after the Sept. 11, 2001, terrorist attacks. By	
		Mark			2005, machinists complained that the company had	
		Blondi			brought them a bad contract when it was doing well.	
		n, IAM			'It's payback time!' union official Mark Blondin told the	
		nationa			crowd. Blondin was District 751 president in 2005 and	
		1			now oversees all IAM contract with Boeing.	
		aerosp			We need a contract that remarks ampleuros but allows	
		ace			'We need a contract that rewards employees but allows us to continue having that success,' Healy added. The	
		coordi nator.			average <i>Boeing</i> machinist has 17 years of experience and	
		nator.			makes \$27 an hour or about \$56,000 a year. The pay	
					scale ranges from \$8.72 an hour to \$35.13 an hour.	
					Robert Fowler, a seven-year Boeing veteran, wants better	
					health benefits, stronger job security and a general wage	
					increase. 'Typically if you look at the top 40 people at	
					the Boeing Co. they make 1,000 times what the	
					machinists make, and we're the backbone of the	
					company,' he said. Fowler doesn't want to strike, but	
					will if he thinks it is necessary. 'This meeting is a	
					sanction to use the baseball bat, and hopefully we won't have to but we need the ability to use it if is necessary,'	
					he said.	
17	Financi	Scott	Firm	α	"Tom Enders, Airbus chief executive, said that in spite of	On the
July	al	Carson	1 mm	&	concerns that the aircraft maker might face more	differen
2008	Times,	, CEO,		β	airlines seeking to defer or cancel deliveries the group	ces in
	"Airbus	Boeing			saw no reason to change its plan to increase production	growth
	Presses	Comm			rates. 'At this point we have no reason to question that.	rate
	Ahead	ercial			Of course we are watching the market and we will see	between
	with	Airpla			again after the peak summer season is over. Airbus's	modular
	Producti	nes;			determination to continue to raise production is in	and
	on D	Tom			sharp contrast to the much more cautious stance	integral
	Boost"	Enders			adopted by <i>Boeing</i> . Scott Carson, chief executive of <i>Boeing's</i> commercial aircraft division said this week that	enterpri se
	(Kevin	, CEO, Airbus			Boeing's commercial aircraft division, said this week that the group has no plan to increase output rate of its 737	se architec
	Done)	Airous			family of short-haul jets, its main volume product. <i>Airbus</i>	tures
					is increasing output of its A320 family of short-haul jets	<i>u</i> 105
					from 34 now to 40 a month by 2010."	
17	Forbes,	John	Firm	β	"We are quite comfortable with the fact that we are	On an
July	"Airbus	Leahy,			going to have 50 percent of the world market,' [Airbus	integral
2008	Orders	Airbus			COO, John Leahy] added, when asked if the company was	enterpri
	Тор	COO			disappointed that Ethiad had split its order between the	se
	Boeing'				two major plane makers. 'We have never had a goal to	architec
	s at				do what they have done in the past years and dominate	ture's
	Farnbor				the market with 80 percent or 90 percent.""	apparen

	ough"(J ane Wardell)					t growth ambitio ns.
17 July 2008	The Econom ist, "Marath on Man: Can Tom Enders, the Chief Executi ve of Airbus, Turn the Planem aker into a 'Normal, Compan y?"	Tom Enders , <i>Airbus</i> CEO	Firm	β	"'I knew this was not going to be a sprint, but a marathon,' says Thomas Enders as he looks back on his first years as chief executive of Airbus - the firm that, with Boeing, holds a duopoly in the market for large civil aircraft. The emphasis Mr. Enders puts on the long haul is calculated. This week, at the biennial Farnborough Air Show, the aviation industry had the chance to judge whether Mr. Enders has the right stuff to give the planemaker the stability and strategic clarity it desperately needs. But Mr. Enders admits that much more must be done if he is to turn the technologically brilliant but politically dysfunctional firm into what he calls a 'normal company'. Plagued by power struggles within the core group of <i>EADS</i> shareholders as well as it s bizarre governance, <i>Airbus</i> suffered when it admitted that deliveries of its new superjumbo, the A380, would be seriously delayed. Shares in <i>EADS</i> tanked. The immediate cause was problems wiring up the huge aircraft, brought on by the use of incompatible software in the firm's French and German factories. But the underlying reason for the mess was a hopeless lack of integration within the company. A month later, at the 2006 Famborough Air Show, a new chief executive, Christian Streiff lasted a hundred days, quitting after he concluded that the politicized <i>EADS</i> board would interfere with his own radical cost-cutting programme, known as Power8. After Mr. Streiff's stormy exit, the sophisticated and emollient Mr. Gallois held the fort for several months before Mr. Enders was finally appointed. The Power 8 restructuring plan, which included selling some factories in Europe to suppliers, was proceeding slowly, but with less union resistance than had been feared. Mr. Enders and and as fast as possible in the direction of being a normal company. Aerospace is a political and strategic industry, but we need to make as much room as possible for business thinking and entrepreneurial decisions.' In practice, he says, that means both fixing the integration woes that be	On the leadersh ip qualities of an integral enterpri se architec ture.

17 July 2008	The Econom ist, "Crisis, What Crisis? The Airlines are Sufferin g, but the Order Books of Boeing and Airbus are Bulging "	Philipp e Jarry, <i>Airbus</i> Head of Market Develo pment	Firm	β	"Philippe Jarry, Head of Market Development at Airbus, claims that airlines 'could get 15% efficiency gain tomorrow' if they ended their 'frequency frenzy' by operating fewer flights. 'We refuse to carry on our shoulders the misery of the industry,' he says."	On the leadersh ip qualities of an integral enterpri se architec ture. Custom ers are but one of many stakehol ders.
18 July 2008	The Times UK, "Boeing Tests Pentago n over Tanker Protest" (David Roberts on)	Jim McNer ney, Chair man and CEO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm- Custo mer	α	"Jim McNerney, the chief executive of <i>Boeing</i> , said this week that a bruising transatlantic battle with <i>Airbus</i> over a \$35 billion Pentagon contract risked damaging his company's relationship with the Federal Government . <i>Boeing's</i> decision to protest the contract, which is likely to become the largest ever Pentagon procurement project, is understood to have angered the United States Air Force (USAF). The USAF has repeatedly said that it believes the <i>Airbus</i> aircraft is the best suited to its needs and the recompetition will postpone a decision on the already much-delayed tanker contract by at least six months. Service personnel have privately expressed anger that <i>Boeing</i> has questioned their judgement in selecting the <i>Airbus</i> plane and delayed the tanker still further. Mr McNerney, who was attending the Farnborough Air Show, said: "I realise that we took some risk with our relationship when we protested. We were very uncomfortable with that. We are very sensitive to our relationship with our customer and only after a lot of thought did we protest. We did take a risk.'"	On a modular enterpri se architec ture's adversar ial relation ship with its key custome r.
23 July 2008	Thomso n Reuters Researc h excerpt from, "The Boeing Compan y, Q2 2008 Earning s Call Transcri	Jim McNer ney, Chari man and CEO; James Bell, CFO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm- Investo r	α	"Ron Epstein (Merrill Lynch): Yes, good morning. I just want to just talk a little bit about the commercial revenue. I think I was a bit surprised, and probably some other investors, with the weakness in the quarter in those revenues. When you kind of look at the aircraft that you delivered and the customers that you delivered to, I think you delivered ten 737s to Continental, nine to ILFC, nine to Southwest. I mean the weakness we saw in the quarter, I mean is that an indication of a trend or was it truly just a weak customer mix in terms of pricing in the quarter?	On a modular Enterpri se Archite cture's defense of its finanaic al perform ance

pt"	we expect to see in the second half, Ron, where we think the pricing will be a little better on those delivered airplanes. And then also we had a difference in the mix in terms of we had more single aisle and fewer wide-body delivered for this quarter, which also impacted the revenue. Again, that's timing.
	Ron Epstein: Okay. Great and then one follow-up if I may, <i>Continental</i> changed their outlook with regard to refunds in pre-delivery deposits . They were expecting 8 million this year. Now they're expecting 71 million, that would be 66 million additional dollars they're getting back from you guys in pre-delivery deposits. Are we going to see that from other airlines that have ordered the 787?
	Jim McNerney: I don't think you're going to see it from us, so I don't know what you'll see from a, you know, I—that's news to me.
	James Bell: Yes, we're going to be refunding any deposits to Continental.
	Howard Rubel (Jefferies): Mr. McNerney, you talk about, you know sustained focus on productivity and an improvement and execution and yet these results fall short of that. Could you reconcile kind of the two? And then just related to that, a lot of the, you know, initiatives that you talk about or at least you hint at that you can do in the short term to help you make the numbers seem hard to understand, given the long-term nature of the business and just the way in which the accounting system works and recognizes a lot of your costs?
	Jim McNerney: Let me try it this way. The two, actually three major headwinds we faced this quarter, two of which were development programs, 87 push out and the AW&C, I think the way we're trying to run the company is to have an ongoing productivity program that assumes that when we have stumbles in innovation, which those two represent, that we can largely cover it with a strong productivity program, which we do have here—and were it not for a strong productivity program we would not be able to reaffirm guidance this year. So I think that is the philosophy behind it. Both IBS and BCA have got well- funded, well-resourced programs, for example the productivity program and Everett, the moving line, a number of similar programs in St. Louis and Southern California and Philadelphia—so when we have these disappointments on the development side, we are ready to
	cover them. Now, obviously we are very disappointed with the development program issues that we are facing, and we are working very hard to minimize

those. And I would say we are closer to the end than to the beginning of working through a number of those legacy development programs that have caused us some pain.
Howard Rubel: I mean, Jim, just to follow up, it is a 200 basis point slip in commercial and some of that should have been recognized at the time you moved the 787 schedule. And so I'm struggling a little bit to understand how we are going to get such strong performance in the back-half of the year. Can you be a little bit more specific either in terms of quantifying it, or lay out some of the initiatives?
Jim McNerney: Yes, well let me just say one thing, and then James you can talk about the booking. I mean, roughly half of the running-rate issue that I think you are alluding to here is timing, maybe a little more than half is related to timing of revenues and costs, but there are significant productivity program efforts that are underway now—that we are not just dreaming up now, that are underway now that we are counting on as we have counted on before. So James, you want to talk about the booking?
James A. Bell: Yes, Howard, I just wanted to also say that you are talking about approximately \$200 million short in earnings overall. About half of that is related to the timing and some of the product mix we experience, so we'll pick that up when we deliver those airplanes during the second half. The other part, though, partially is also timing of expenses. We'd expect the expenses and cash to be lower in the second half than they were in the first in terms of those expenses incurred to provide infrastructure to support their future growth requirement, and then we will start seeing—as we gain more experience—more benefit out of some of the productivity initiatives that have been in place like the 777 moving line as we get more clarity around the benefit of that and it continues to smooth out, we expect to see more benefit there. And we have asked the BCA team and they have accepted the challenge and they're committed to going out to see what we can do to reduce some of the other cost in the infrastructure to moderate those as the base has diminished somewhat with the flying of the 787. So we believe it's doable.
David Strauss (UBS): Jim and James, can you give us some color with where you are with 787 supplier and customer negotiations, how much progress you made in the quarter, and on the customer side, are you seeing airline customers opt for cash, in terms of the damages, or are they looking for additional lift to make up the GAAP [gap]? Jim McNerney (Boeing):

Well first of all, every customer is different in terms of both the contractual obligations we may have with them or they may have with us, and every customer situation is different relative to the things that can be brought to bear to resolve the discussion. So it is very hard to generalize. We have gone through customer-by-customer. We do have a view of the cost in cash that it will take to resolve it. It is in our guidance. The majority of it is resolved within the 87 program, but there are some resolutions that impact current numbers, and that's all taken into account in our guidance.	
Also, with the suppliers , our supplier partners, as I said, I went out and visited all of them last month and I have a great deal of confidence in their business progress and while every financial discussion is not yet complete, most are well along. And again—they're the typical issues around scope, timing, execution that we have on every program, and we're getting those resolved. And the supplier discussions are probably ahead of the customer discussions in terms of resolutions, but again, we tried to capture all of the projected resolutions which we can quantify in total, roughly, in a conservative way.	
David Strauss: Okay, and as a follow-up on the 787: What's left until the plane is completely assembled at this point, and when do you actually expect the plane to be completely assembled?	
Jim McNerney: Well, the plane will be flying in the fourth quarter, as you know. We are on or slightly ahead of both the assembly and the testing. The structural assembly of the plane is largely complete. There are some systems installations that have yet to be done, but the electronic infrastructure and backbone, the structures itself, as evidenced by the Power On test going very well and the hydraulics and control surfaces tests going very well. You need a largely assembled airplane to accomplish all those things. So it's a matter of getting the final systems in and then doing some ground testing and then flight testing, and we're on schedule.	
Joseph Nadol (J.P. Morgan): James, just on the program accounting versus unit accounting margins in the quarter, I guess big picture, trying to understand if there are any changes to your either pricing or volume assumptions in the out-years that might have impacted what you recognize this quarter? Because program accounting earnings came down sequentially a lot more than unit accounting did.	
James A. Bell (<i>Boeing</i>): There is, there was only an addition of 200 to the 737 accounting quantity and 25 to the 747. That was what impacted it. I think what you are seeing is the GAAP	

		[gap?] is closing. The impact is really what we talked about earlier, and that again is the mix of customer and product that were delivered in the quarter that would affect that difference. That's all it is .	
		Joseph Nadol:	
		At what point would we expect to see the lines cross?	
		Because program, in theory, is a smoothed version of	
		earnings and it should be more volatile. In good times	
		earnings should be higher than program, but how do we	
		think about –	
		James A. Bell:	
		I got you, but what you will see over the course of this	
		year is that GAAP [gap] is going to narrow and, we	
		think, narrow pretty significantly. It's hard to say	
		when it will really cross, because if we get new customer	
		introductions and we get new things that add to the cost that we would inventory because the subsequent delivered	
		units would benefit from it. That could extend it, Joe, but	
		what I would say to look for is that, as we go through the	
		course of this year, the GAAP [gap] will definitely narrow.	
		Joseph Nadalı	
		Joseph Nadol: And there are no changes in terms of your narrow-body	
		pricing assumptions?	
		James A. Bell:	
		No.	
		Robert Spingarn (Credit Suisse):	
		James, your guidance implies that BCA margins in the	
		back-end of the year, the second half has to be in the	
		low 12s, maybe 12.5% in order to hit that 11.5 for the full	
		year. And you talked a bit about reimbursed R&D et cetera, but you're guiding to 11.5% for next year. So do	
		we have a decline in margin from the back-end of '08 into	
		'09? Is that attributable to some 787 next year? How	
		should we think about that, and the carry of this	
		infrastructure absorption for the next several quarters until	
		those aircraft are actually delivered?	
		James A. Bell (<i>Boeing</i>):	
		Well, you're right. We are expecting that they are going to	
		deliver higher margins in second quarter-and it's in the	
		range of the second half, in the range that you	
		mentioned—and that is going to be driven by the lower R&D cost, including subcontractor contributions. But it's	
		also going to be the timing of some of the expenses will be	
		down again. The annual what we thought from a cost	
		standpoint will hold for the year. Now as we go into '09,	
		we will be better prepared and we would expect to see	
		good performance, but that good performance will be	
		impacted by the dilution of delivering the 787 that we	
		will start delivering in 789 [ph 00:43:10], in 2009. So that	
		will dilute the margin picture, and that's why we are	

saying we're going to hold 11.5 year-over-year.		
Robert Spingarn: Okay, and then James or Jim, how do you think about that R&D profile as we get into the out-years, when we have to consider potentially a 777 refresh or the next-gen platform , obviously at Farnborough Gene [ph 00:43:35] talked about a new engine ready for 2016, and that sort of thing. And you're spending, on the commercial, around 2.9 billion. We expect that to trend down over time. Where do you think you'll trough on R&D and when?		
Jim McNerney: Well, this is Jim. Obviously we are projecting some of the R&D coming down off the current program of spends on the 87 and the Dash 8 that's going to begin to come down significantly in the second half of this year. We see it continuing into next year although we are going to sustain some level of investment in R&D against the two things you mentioned. And the 777—either a refresh or a renovation, based on what we see with our customers and what we see that the A350-1000 is or isn't, and we'll have plenty of time to look at that. I think its delivery is in the 15, 16 timeframe. And then obviously, stay positioned to mature the technologies associated with the narrow-body. And those are the two things that we have to do, so when the actual program ramp-up of those happens is to be determined. but we don't see the big ramp-up happening within our guidance right now.		
<u>Robert Spingarn:</u> It sounds like it might not even be by 2010, and so what is the 9% R&D against commercial revenues can have by then?		
Jim McNerney: Well, listen, the marketplace has changed. Competitive environment's changed. Customer requirement's changed. And when we get the 10 guidance, we'll discuss that the best way we know how.		
Doug Harned (Sanford Bernstein): I wanted to go back to the BCA margins and just understand. You talked about, in Q2 you had some period expenses and then you had overhead absorption. Can you mention how much is each, give an idea where the real impact was? And then when you look at going forward the next two quarters, there's the overhead absorption issue. This added cost, does that stay with you at the same levels it did in Q2?		
James A. Bell (<i>Boeing</i>): So, it's about half-and-half if you look at the timing versus the increased spending. And some of the increased spending, remember, is also timing-based in that we expect lower spending particularly in cash in next guarter.		

Now the infrastructure absorption issue, the BCA team is committed to go and look at what they can do to reduce that during the second half of the year without doing something that would reduce capability needed again in 2009 as we get this 787 program on track from a production-support perspective. That's how I would look at it. It's about half-and-half and we absolutely believe we have great plans in place with opportunities to correct the cost growth that we experienced in the first half, in the second half.
Doug Harned: If I went back to Q1 and your guidance at that time— and as you looked ahead at that point in time, did you expect to have this level of overhead absorption to deal with?
James A. Bell: No, we did not. We did have an estimate in there, which we obviously underestimated the disruption that would be caused relative to these costs being allocated to programs, and so we trued it up in second quarter.
Doug Harned: So you're saying that the productivity-improvement effort that you are doing now has to step up a little more than you had expected back then to get to the same margin level?
James A. Bell: Well I think—we think—we have to continue to drive good productivity and if it stepped up a little more than the current levels, I wouldn't be disappointed, let's put it that way.
<u>Myles Walton (Oppenheimer):</u> Just a quick question for you on R&D into '09. Your guidance reflecting a \$500 to 600 million tech decline, James is that entirely within commercial , or is there also some anticipated decline on defense as maybe the international tanker winds down?
James A. Bell (<i>Boeing</i>): It's primarily in commercial and it's primarily representing, as we complete and finalize the design effort on the747-8 freighter. The R&D is already starting to come down on the 787 from prior year levels.
Myles Walton: Yes, I guess I was referring to when you raised the guidance from 2.8 to 3.2 to 3.4, you said 50% of the change was—
James A. Bell: Yes, there was a little piece in there associated with international tankers, and that's behind us. But the bulk of

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	it was driven by 747 and increased spending on the A7 [87?].	
	Joe Campbell (Lehman Brothers):	
	Let me go back to our favorite margin target on DPA	
	[BCA?]. I'm still struggling a little bit to understand—	
	I'm trying to understand what was going on still, I know	
	you've told us three or four times on BCA, what these	
	margins were. So I'm trying to understand why the	
	disruptions of the 787 aren't just allocated to the 787,	
	and why they're spilling over to the production	
	programs. Or is it simply a difference that you assumed	
	you would be able to charge stuff to 87, because you	
	thought that you would deliver the planes that are not now	
	happening? And I wondered if you could also say	
	something about the after-market? Many of the suppliers	
	are saying that the after-market is weak, and I	
	wondered whether you could say something about how	
	Aviall and the rest of the affiliated BCA companies'	
	outlook has changed, or not—	
	James A. Bell (Boeing):	
	Okay, Joe, I'll take your first question and Jim will take	
	your second.	
	But essentially on the 787 issue, we planned on the old	
	schedule to have more 787 work in-house this year than	
	now the actuality, with the slide of the schedule, is actually	
	showing up. And so the cost that we're talking about here,	
	the heart of the very infrastructure costs are constant. And it only can be allocated for the work that's in-house, and	
	so that's why we're seeing a shift of the 787 program onto	
	the other production programs because that's the work	
	that's currently in-house. Is that clear?	
	Joe Campbell:	
	Yes, so I guess it means that the overhead went up and	
	you were expecting it to be covered by 787. So why's	
	the overhead up?	
	James A. Balli	
	James A. Bell: The infrastructure cost remained constant. What we	
	assumed is we'd have more 787 work in-house than we	
	did after the schedule slide, so less of that constant cost	
	was allocated to 787 and more of it was allocated to the	
	production program-at 787's program was then allocated	
	to 787 program accounting and inventory. The remaining,	
	since the 787 work did not show up, that differential went	
	to the production programs and flowed through the	
	earnings.	
	Joe Campbell:	
	Okay, got it.	
	Jim McNerney:	

And then on the services, you know it is true Joe, we are seeing a moderation in the spares rates and that makes sense. As people are taking out older inefficient aircraft, which tend to have slightly higher maintenance rates, and some of the mod work is slowing a bit too as planes are staying in service, not being modified to freighter configuration—for example, because of A380, 87 delays. Having said that, the other parts of our business are doing well and the guys are achieving their business plan although they're breathing a little harder than they were a quarter ago.

Joe Campbell:

So but then you're still expecting to make their business plans that you have in the '08 and '09 guidance? A lot of other people are moderating their '09 business plans and you haven't changed anything.

Jim McNerney:

Listen, we're not changing our overall guidance which obviously has puts and takes in it, Joe, okay? And obviously the services, the BCA business is a watch-item for us and despite some softening, they're doing well. But I think as we put together the specific plan for that specific piece of the business, we'll have to see what the environment and the competitive situation looks like. So there are other places where we have less pressure and other places we have upside, and that's what gives us the confidence to give you the guidance. But to your earlier point, we have seen a softening in spares and conversions. We're dealing with it and we'll just have to monitor the situation.

Cai von Rumohr (Cowen And Company):

Yes, to maybe understand a little bit better the [inaudible 00:54:31] costs, if infrastructure costs were shifted from the 87 to other programs, does that mean that the other programs profit-accrual rates have gone down and if not, why not? And secondly, you mentioned period costs in the second quarter, those presumably costs are expense as incurred. How big were they in the second quarter and how big are they likely to be for the entire year?

James A. Bell (Boeing):

On your first question on the infrastructure costs: The infrastructure costs, as I said earlier, were constant and then they're just allocated on the basis in-house, and what was the second half of that question? [Interposing] What it is is that the profit rates on the production program, before allocation of those costs, would remain constant. Then it would have taken up a bigger absorption of those costs through the allocation process, if the work was there.

Cai von Rumohr:

True, but if that happens, their accrual-rate goes down and the profit margin stays the same, how come?

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			James A. Bell: Exactly, their accrual rate was impacted this quarter as a result of the allocation of those costs.	
			<u>Cai von Rumohr:</u> Right, but I mean, presumably program is through the end of the program, so if you have lower program accrual-rates in this quarter, presumably you're looking forward and that continues. And if so, given the guidance hasn't really gone down that much, why not?	
			James A. Bell: Because we plan on dealing with the increased cost we experienced in the second quarter in the second half of the year.	
			<u>Cai von Rumohr:</u> Okay, and then the period cost that you mentioned that are expensed as incurred, how big approximately were they in the second quarter and how big would they be for the year?	
			James A. Bell: So if you're just talking to <i>Delta</i> , it would be about half of the \$200 million difference we saw, in what we anticipated the earning rates to be versus what they were.	
			George Shapiro (<i>Citigroup</i>): Good morning. James, is part of the issue with the allocation happening this quarter because this was the quarter that the 787 was supposed to be initially delivered?	
			James A. Bell (Boeing): It's because, George, we expected to have more 787 work in our shop this quarter than it turns out we did because of the schedule slide. It wasn't just because of deliveries. It's more about the amount of work on the 787 program that we originally anticipated having in the shop.	
			George Shapiro: Okay, and then if you could go forward, James, why wouldn't I assume that you'll probably wind up being short of your margin in commercial aircraft but you'll be better on unallocated, because you only have 130 million through six months and you're saying it will be \$1 billion for the year?	
			James A. Bell: Well, we think we're going to make our plan in commercial airplanes, but if we don't, we'll still make our earnings per share expectations and the guidance we provided you.	
			Troy Lahr (Stifel Nicolaus): When you guys talk about 2010 deliveries up due to 787,	

27 July 2008	The Wichita Eagle "Boeing Wichita Head Prepare s for Change " (Molly McMilli n)	Scott Strode, former ly in charge of develo pment and produc tion of <i>Boeing</i> 's 787 Dream liner progra	Firm	α	does that mean legacy programs are going to be flat and all the growth is coming from 787? And really, how are you thinking about the supply-and-demand balance and what your supply chain can keep up with versus airline demand for new aircraft, specifically 737 line? Jim McNerney (Boeing): Yes, I mean I think since we don't offer specific guidance on rates, it depends until the beginning of '09, we were just isolating the 87 as a known factor that will for sure be an upper based on our current schedule, and isolating that as something that would drive it higher. And I guess the assumption behind it is that everything else would stay the same, but that's something we'll work through before we give our final guidance. Troy Lahr: And then how are you balancing supply chain with what the supply chain can kind of keep up with versus demand? Like if you look at the 737, how many do you have in backlog? Where do you stand on that? Are you more concerned with the supply chain or more concerned with the supply chain or more concerned with the supply chain or more concerned with the supply chain do no the 37, and we also have got a well-established supply chain through a program that has been in place for many, many years. So while there are certainly challenges day- to-day on the supply chain." "Before coming to Wichita, Strode was in charge of development and production of Boeing's 787 Dreamliner program. The issues Boeing has run into on the 787 are not unusual, he said. In hindsight, the right plan was in place. 'it's just a matter of executing it,' he said. So what could have been done differently? 'Some of the issues we could have recognized earlier,' he said. But 'we were busy inventing an airplane, too.'"	On a modular enterpri se architec ture's non- systemi c view of separati on of design from executio n.
30 July 2008	The Seattle Times, "Machi nists Say Contrac	m Mark Blondi n, lead negotia tor for the Interna	Firm- Labor	α	"The lead negotiator for the Machinists union said Tuesday that contract talks with <i>Boeing</i> are 'in deep trouble' and implied a strike in September is likely if the company's offer doesn't improve. The tough talk from Mark Blondin, lead negotiator for the International Association of Machinists (IAM), came during a joint teleconference with representatives of the white-collar	On a modular enterpri se architec ture's adversar

	t Talks with Boeing "In Deep Trouble" (Domini c Gates)	tional Associ ation of Machi nists (IAM); Doug Kight, <i>Boeing</i> <i>Comm</i> <i>ercial</i> <i>Airpla</i> <i>nes</i> , VP HR			engineering union at <i>Boeing</i> . The two unions also delivered a scathing critique of the state of the 787 Dreamliner program and of the company's strategy of global outsourcing. The outsourcing of 787 work and the prospect of <i>Boeing</i> sending out more work on future jets add tension to this year's labor negotiations, which climax next month ahead of the new plane's expected first flight in October. 'So far, all they are talking about is take- aways,' Blondin said. 'If that continues over the next couple of weeks, they are in deep trouble.' Blondin said <i>Boeing</i> is 'acting right now like it is ni bankruptcy court, rather than where they are with a record backlog of orders and record profits.' 'There's enough orders right now to sustain two or three bargaining cycles, and we know it,' he said. 'We're going to get our share of those profits.' <i>Boeing</i> 's top labor negotiator, Doug Kight told employees this month that the company will release full details of its final offer by Labor Day weekend. Kight's message gave no hint of an impasse in the talks. 'We're about three weeks away from moving to the hotel for the final phase of negotiations,' Kight wrote. 'I am pleased with our progress.' "I am very surprised <i>Boeing</i> has come out with the same tactics in 2008,' said Blondin, who headed the District 751 Machinists when they went on strike three years ago. 'Our members didn't stand for those divisie tactics last time. I don't see it happening this time.'" Stan Sorscher, director of research for SPEEA, said the union has argued for a long time that outsourcing airplane design cannot work as it may for simpler products, say sneakers. Building something as complex as a plane requires a tight community of experienced engineers and mechanics working together to overcome the inevitable challenges, he said. 'We thought the 787 would be a test case for this,' Sorscher said. 'The results are in.' One rank-and-file member who requested anonymity said only a strike will demonstrate to workers that they got the very best deal. '	ial relation ship with labor
					best bargain they could, so a strike is almost a given,' he said. 'The real debate is on its duration.'"	
30 July 2008	The Herald, "Machi nists and Enginee rs Questio n Boeing'	Ray Gofort h, SPEE A Execut ive Direct or; Mark	Firm- Labor	α	"Boeing cannot afford a disruption by its skilled work force,' david White, assistant director of strategic resources for the Inaternational Association of Machinists, said in a conference call. 'We're a force to be reckoned with and to be respected,' said Mark Blondin, aerospace coordinator for the Machinists. 'We sacrificed during the lean times,' he said. 'Now it's time for <i>Boeing</i> to pay up.' The aerospace giant is adopting the 'exact wrong'	On a modular enterpri se architec ture's adversar ial relation ship

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	s 787	Blondi			strategy by relying more on foreign suppliers and	with
	Busines	n,			focusing less on retaining its skilled work force in this	labor
	s Strategy	aerosp ace			country, said Ray Goforth, executive director of the Society of Professional Engineering Employees in	
	"	coordi			Aerospace. However, <i>Boeing</i> Chief Executive Jim	
	(Michel	nator			McNerney hasn't budged much on the company's	
	le	for the			global business model. 'We've learned a lot and have	
	Dunlop)	Interna			the scars to prive it,' McNerney said of the 787 in April.	
	Duniop)	tional			'I think it will be more of an adjustment in strategy	
		Associ			rather than a change in strategy,' he added. 'We're	
		ation			heading into these negotiations in a negative context,'	
		of			Goforth said."	
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		(IAM);				
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31	The		Firm-	α	"Boeing received a major boost from a House of	On a
July	Seattle		Gover		Representatives subcommittee Wednesday, which	modular
2008	Times,		nment		proposed tight restrictions on the Pentagon as the	enterpri
1	"Boeing				Defense Department seeks new bids on a \$40 billion	se
1	Tanker				contract for Air Force aerial-refuelling tankers. The	architec
1	Bid Gets				language in the bill would require the Pentagon to seek	ture's
1	Big				a medium-sized tanker like the one <i>Boeing</i> offered and it would prohibit extra gradit for a larger tanker like	intermit
1	Big Boost"				it would prohibit extra credit for a larger tanker like the one offered by <i>Northrop-EADS</i> ."	tent relation
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31	Seattle	Rep.	Firm-	α	"Rep. Norm Dicks, D-Wash., who has called on the	On a
July	Post-	Norm	Gover		Pentagon to rerun the competition 'farily and	modular
2008	Intellige	Dicks,	nment		competitively ,' said the tanker provision in the defense	enterpri
1	ncer, "Bill	D- Wash			bill 'just tries to create a level playing field.""	se
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1	Chicago		Firm-	α	"The stock has 'certainly had a rough time' in recent	On a
Aug.	Busines		Investo	20000	months, mostly because of delays related to the long-	modular
2008	<i>S</i> ,		rs-		awaited 787 jetliner and fears over high oil prices, JSA	enterpri
	"Boeing		Emplo		Research analyst Paul Nisbet said in an interview.	se
	Recover		yees		In a note to investors, Banc of America Securities analyst	architec
	ing		10000 C		Harry Nourse wrote of a 'looming' strike by union	ture's
	After				machinists working for Boeing's commercial airplane	valuatio
	Hitting				business. 'Following a recent conference call with	n due to
	a Three-				union officials, we believe that there is a high chance	overpro
	year				(greater than 70 percent) of a work stoppage at Boeing	mising and
	Low"				in the near future,' he wrote. A <i>Boeing</i> spokesman, Tim Healy, said the company had adopted a new approach that	underde
	<i>¥</i>				entailed meeting early with union representatives and	livering
					discussing critical issues, such as wages and benefits. 'We	as well
					think it's going well and we're driving toward an	as its
					agreement,' he said."	adversar
					agreement, no suid.	ial
						relation
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						labor.
28	Busines		Firm	β	"EADS would be able to assemble freighters at a plant it	On an
Aug.	s Week,				intends to build in Mobile, Ala., thus shifting production	integral
2008	"Boeing				out of Europe and taking advantage of favorable	enterpri
	's				exchange rates and lower labor costs. It could sell its	se
	Tanker				commercial planes for less. By combining production	architec ture's
	Challen				of a commercial tanker based on the freighter, 'they	ability
	ges				would achieve economies of scale that would make a commercial operation in Mobile even more attractive,'	to make
	Mount" (Keith				says Lexington Institute defense analyst Loren Thompson.	more
	Epstien)				'The workforce, the overhead, and the supply	comple
	Lpstien)				challenge is diminished if you build planes for both	x cross-
					military and commercial customers off the same	platfor
					airframe design.' Adds Thompson: 'Boeing is at least as	m trade-
					worried about their key commercial customers in the	offs.
					U.S. market as they are about the tanker franchise.	
					Once EADS sets up a commercial operation in the U.S.	
					market, Boeing loses a lot of its national advantage in	
					terms of competing for congressional support, protests	
					from the [U.S. trade Representative], and so on.' 'They	
					don't want to have a domestic competitor' for commercial aircraft, says Jacques Gansler, a former top	
					U.S. military acquisition official.	
					0.5. mintary acquisition orneral.	
					'Yes, we've been making some changes,' an EADS	
					source tells BusinessWeek. 'We're looking at potential	
					business opportunities and therefore examining our	
					business structures. It's part of our strategy. We're	
					looking down the road."	
29	USA	Toyota	Firm	β	"Now, about 2,000 permanent employees draw a	On an
Aug.	Today,	Motors			paycheck from a plant that doesn't produce anything.	integral
2008	"Toyota	Corpor			They perform maintenance, talk about ways to improve	enterpri
	's	ation			quality, and relearn tasks as basic as the best way to drive	se
	Plunge				a bolt. They're luckier than the plant's 200 temporary	architec
	Into Big				workers who work as needed and an army of	ture's

Pickups	employees at its parts suppliers, who have been	ability
Veers	furloughed. Opened with great fanfare only a couple of	to
Into A	years ago, the plant halted poduction on Aug. 8 after	absorb
Texas-	demand collapsed for its Tundra full-size pickups, amid	econom
size	sky-high fuel prices and free-falling home values.	ic
Ravine"	Production won't restart until at least November. It's a	downtur
(Chris	blow to San Antonio residents, who nevertheless are	ns.
Woodya	grateful the company has kept so many workers on the	
rd)	payroll. The San Antonio plant's month-long closure is	
	testing how Toyota, one of the world's most respected and	
	savvy companies, handles a miscalculation.	
	The decision to jump into making full-size pickups now	
	is eating into the Japanese automaker's bottom line and raising questions about why it, too, was suckered by the	
	same siren call of profitable big trucks that's now	
	sapping Detroit's Big Three. It's humbling for an	
	automaker noted in the past for being able to grab	
	market share when its American counterparts	
	stumbled. Toyota got into full-size trucks with 'a little	
	bit of hubris and pride, thinking, 'We conquered all	
	these other segments, and here is an opportunity to put	
	the Marlboro Man out of a Ford and into a Toyota,'	
	says James Womack, chairman of the Lean Entreprise	
	Institute, and educational group that fosters steamlined	
	productions systems such as <i>Toyota's</i> . The lesson:	
	'Toyota's crystal ball doesn't work any better than	
	anyone else's.' 'The lure was money,' Womack says.	
	'It would have taken a lot of discipline to stay out of	
	this thing.'	
	"We're a full-line manufacturer,' Bob Carter, U.S. sales	
	chief for <i>Toyota's</i> cars and trucks, said in a recent	
	conference call. 'Certainly the market has been	
	surprised in the truck area, but we have full confidence	
	it's going to return in the future.'	
	Truck first with each Gran have shown have	
	Toyota, flush with cash, 'is a long-term player,' says	
	Michael Robinet, vice president of auto market forecaster CSM Worldwide. 'The Asian culture thinks in years	
	CSM Worldwide. 'The Asian culture thinks in years and decades, not months and quarters.'	
	and decades, not months and quarters.	
	Toyota archival Honda, by contrast resisted the	
	temptation of full-size trucks and has been rewareded.	
	'They were smart,' Robinet says of Honda. 'This is a	
	company that said, 'We're not going into the truck	
	market. We're going to stick to out knitting.'	
	Mostly non-union Toyota is continuing the Japanese	
	tradition of lifetime employment policies for	
	permanent hires. Breaking with that practice could	
	lead to consequences at other global <i>Toyota</i> facilities.	
	'If they laid off San Antonio workers for three months,	
	that would be the shot heard 'round the world,' says	
	Jeffrey Liker, a University of Michigan professor whose	
	The Toyota Way and other books on Toyota's production	

					system hasve become business best sellers.	
					system hasve become business best seriers.	
					If the training program for the San Antonio plant stoppage works, the result could be workers with higher skills and more loyalty, lowering the plant's costs in the future. It is also building a reservoir of local good will. 'If I were in Texas, I think any sane person would say, 'the market is awful, and this crazy company is actually keeping people employed,' Liker says.	
					Texans express gratitude toward Toyota for continuing paychecks, and say they believe Toyota will continue to invest in the plant. 'Toyota is still the top,' says Judge Nelson Wolff, the Bexar County executive who took a leading role in trying to lure Toyota here. 'They are there for the long term.' Former Texas state legislator John Longoria said the Japanese 'plan 10, 30, 40 years ahead of time, and they didn't forsee this.' As Wolff, the city's former mayor, points out in his book Transforming San Antonio, if Toyota hadn't taken extra steps to protect workers during the shutdown, 'It could force closer scrutiny of Toyota's agreement that led to creation of the plant.'	
					Stephen Carter, a physician in the <i>Toyota Family Health</i> <i>Center</i> outside the complex's south perimeter, says workers are confident they'll get through this rough	
29	The		Firm-	α	patch." "'I'm as against it as I possibly can be,' said Joe	On a
29 Aug. 2009	The Seattle Times,		Labor	u	Albanese, a parts expediter on the 777 program in Everett who's concerned the pact would permit <i>Boeing</i> to	modular enterpri
	"Some				continue outsourcing of parts delivery. 'I don't care	se architec
	Machini sts Jeer				about the money,' he said. "If they don't give me job security, it doesn't matter.' A colleague, Ron Seelye,	ture's
	Boeing'				said he, too, is ready to strike. 'I've done it so many	views of
	s 'Final' Contrac				times before, I can do it again,' he said. 'They've got to share their profits.' One Everett Machinst, a relatively	compro mise.
	t Offer"				new hire, said 'I have home improvement projects to	mise.
	(Domini c Gates)				last through September, and money enough to stay out for six months.'	
					One affirmitavie voice was a Machinist who works at the spares distribution center in SeaTac, who said he and a dozen workmates were inclined to accept the deal. He added, however, he had heard the mood was different in side the bigger plants in Evertt and Renton. 'We're afraid that our leaders will drag this out for an unnecessary strike,' said the worker, who asked for anonymity. 'It seams no reasonable offer will be good enough.'	
29	Forbes,	Richar	Firm-	α	"Richard Aboulafia, an industry analyst with the Teal	On the
Aug. 2009	" <i>Boeing</i> Machini	d Aboula	Labor		Group, said Boeing had used a 'smart tactic' by making its latest offer 'sweet enough to stop the most strident	prevaili ng
2007	sts to	fia, an			union elements' from persuing a strike. 'The question	views of
	Respon d to	industr			is, 'Are there enough people who really believe in the idea of job security?' he said. 'No employer in America	how a modular
		V			The same of the same same the same same and the same of the same o	

	Propose d Contrac t" (Daniel Loverin g)	analyst with the <i>Teal</i> <i>Group</i>			is willing to talk about job security. That just doesn't happen in today's economy.'"	enterpri se architec ture operates within a Liberal Market Econom y.
29 Aug. 2008	Bloomb erg, "Boeing Union Urges Worker s to Reject Offer and Strike" (Susann a Ray)	Richar d Aboula fia, an industr y analyst with the <i>Teal</i> <i>Group</i>	Firm- Labor	α	"The IAM also filed unfair-labor practice charges against Boeing with the National Labor Relationsh Board for 'direct dealing with our members,' spokeswoman Connie Kelliher said today near Seattle, the company's manufacturing hub. Managers met one-on-one with workers 'to enhance their own bargaining position, undermine the union and intimidate our members.' The union's members in Washington state, Oregon and Kansas have followed leaders' voting recommendation in three of the last four negotiations, stopping work over two of them to gain contract improvements. The plan would preserve the way Boeing uses contractors, rejecting changes the IAM sought and had warned it would be willing to strike over. 'Boeing is gambling that their concessions are appealing to enough of the workforce to keep a strike from happening, but job security is a sticking point for a lot of them,' Richard Aboulafia, an analyst with Teal Group in Fairfax, Virginia, said today. 'There is no question that union management feels as though the company is working around them.' Lead company negotiator, Doug Kight said, 'As leaders it is not only our right but our obligation to talk to	On a modular enterpri se architec ture's zero- sum competi tion between labor and the firm.
29 Aug. 2008	Busines sWeek, "The Dreamli ner's Cost to Boeing" (Joseph Weber)		Firm- Labor	α	employees, owners of the company, about our business." "By the time <i>Boeing</i> puts its first new 787 into the air this fall, after delaying the so-called Dreamliner for more than a year, the company will have racked up extra costs that may top \$2 billion. That hit comes with deferred sales worth at least \$3.5 billion, and a roughly 40% slide in its stock market value. Such dismal numbers—and the possibility of even further delay—pressured <i>Boeing</i> at the contract bargaining table since it can ill afford a work disruption. Fears of rising costs spurred by additional Dreamliner delays make <i>Boeing</i> executives especially wary of a strike. The \$2 billion-plus estimate, toted up by <i>American Technology Research</i> analyst Peter Arment, is twice the figure analysts broached last fall when <i>Boeing</i> announced its first six-month delay. The company followed that delay in January with a three- month holdup and another six-month delay last April. 'It's been a strain financially and from a credibility standpoint,' says Arment. The tab includes penalties <i>Boeing</i> owes customers for delayed orders and	On a modular enterpri se architec ture's non- systemi c labor policies impacti ng producti on schedul es and product launche s.

					1.122 and the shares are the state of the st	
					additional research charges, as well as payments to suppliers. 'This is an enormously complex program and that comes with a lot of risks,' says Arment. 'They've spent more than four years modeling and testing and developing the systems for this aircraft, but this is still an all-new composite frame and all-new electronic system architecture. There are many different systems.'"	
30 Aug. 2008	Market Watch, "Boeing Risks 787 by Refusin g to Deal with Outsour cing Problem s, Says SPEEA "	Ray Gofort h, executi ve directo r of SPEEA	Firm- Labor	α	"The Boeing Company's public acknowledgement that outsourcing is causing problems with the 787 program is lip service until action is taken to correct problems created by a global network of suppliers and inexperienced workers, according to the Society of Professional Engineering Employees in Aerospace (SPEEA), IFPTE Local 2001. Officials at SPEEA and other unions, including the Internationtal Aerospace Machinists (IAM), repeatedly warned the aerospace giant that it was a mistake to part out highly complex aerospace products to inexperienced workers around the world. More than one year after a ceremonial 'roll out' of a 787 shell, the same aircraft remains in the factory incomplete and missing parts from suppliers. 'Continued statements that everything is fine with the 787 global supply network just doesn't fly,' said Ray Goforth, executive director of SPEEA. Last week, the company announced plans to place full-time Boeing inspectors at key suppliers to reduce flaws and maintain quality. The announcement, reported by the Puget Sound Business Journal, said Boeing will first target about one dozen problem companies. SPEEA's Goforth said more inspectors at suppliers to scatates cost and avoid the real problem – Boeing's great experiment to outsource large parts of the engineering and manufacturing of the next major leap in air travel failed. 'It's time for Boeing to stop the lip service and take real action,' Goforth said. 'Face the fact that the global network is a failure and bring back the critical work back so the experienced employees can get the 787 back on track.' Boeing needs more than paid advertising and internal campaigns to regain the trust of customers and employees. The most recent Ritenhouse Ranking Survey of corporate candor ranked Boeing 98 th , six spots below Excon Mobil. The annual survey evaluated 100 Fortune 500 companies and CEOs for fair, open and sincere communications. 'Instead of thanking and rewarding employees for correcting the errors of suppliers and management, Boeing is banking pro	On a modular enterpri se architec ture's disinteg ration of its supply and labor modules , and its inability to reveal the true status of progress
30 Aug. 2008	Bloomb erg, "Boeing Commu	Tom Wrobl ewski, preside	Firm- Labor	α	"Boeing believes that its offer, which is actually quite good would appeal to workers if only presented to them directly,' said Gary Chaison, a labor-relations professor at Clark University in Worchester,	On a modular enterpri se

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31 Aug.	nication s Strategy May Goad Machini sts Into Strike" (Susann a Ray) <i>Reuters,</i> "Boeing	nt of the IAM's Distric t 751 in Seattle Richar d	Firm	α	Massachusetts. 'The company seems to have confused public relations with collective bargaining,' usurping union leaders' role in communicating with members. Tom Wroblewski, president of the IAM's District 751 in Seattle, in an earlier interview, said the company had 'shot itself in the foot' with its tactics. "Richard Aboulafia, aerospace analyst at the <i>Teal Group</i> , said <i>Boeing's</i> latest offer has not eased the union's	architec ture's power struggle with labor. On a modular
2008	Machini sts Union Says Member s Should Stike" (Kyle Peterso n et al.)	Aboula fia, aerosp ace analyst at the <i>Teal</i> <i>Group</i>			concerns about job security and he put the chances of a strike at around 60 percent. 'Boeing and most manufacturing companies have shown zero willingness to compromise on that,' said Aboulafia."	enterpri se architec ture's zero- sum view of job security.
1 Sept. 2008	Financi al Times, "Boeing 787 Dreamli ner Threate ned by Strike" (Hal Weitzm an)		Firm- Labor	α	"Boeing aims to fly the 787 for the first time by December and to start making deliveries to customers by the third quarter of 2009, at least 14 months behind schedule. Another delay to that timetable would be a headache for the company, which is facing demands from customers for compensation. Boeing has already said it is assuming all 787 deliveries it expects to make next year will not generate profit because of compensation payments. During the union negotiations, Boeing opted for a strategy of appealing directly to workers over the heads of union leaders. The aircraft-maker posted its offer on the internet, rather than allowing union leaders to present the details to their members first. It stopped bargaining last week in order to give workers time to study the final offer before voting. As the company attempted to secure the support of one-third of union members it needs to avoid a strike, Boeing also held one- on-one meetings with machinists. The company says the meetings were merely intended to get feedback on the negotiations. However, the union filed an unfair labour practice complaint with the National Labor Relations Board, alleging that Boeing violated US laws prohibiting such 'direct dealing'. 'The disrespect they have shown for the negotiation process is exactly the same way our members have felt and why they have been marching in the factories at lunchtime for the past weeks,' said Tom Wroblewski, president of the union's district 751 in Seattle."	On a modular enterpri se architec ture's continu ed lack of trust between firm and labor.
1 Sept. 2008	Puget Sound, "Boeing		Firm- Labor	α	"It seems clear from the decision of the Machinists Union leadership to support a strike against <i>Boeing</i> that they have learned nothing of the lessons of how the modern	Percepti ons on the
	Machini				economy has evolved in the last quarter century. In the	inevitab

	sts: Penny Wise and Pound Foolish " (Eric Earling)			 next quarter century they'll likely have the declining jobs for their members to prove it. <i>Boeing</i> gave in on initial proposals to phase out retiree health care and traditional pensions - though those issues remain serious concerns for a company trying to avoid crippling legacy costs. Clearly, <i>Boeing</i> doesn't want to see a strike given the volume of cash being thrown at the Machinists and the number of other concessions the company has made. Nevertheless, the union says the deal isn't rich enough, including ongoing rank-and-file complaints about a lack of "job security." Sadly, no one seems to have told the union and its members that the era of a single job with one corporation for life is well nigh over. More importantly, it is obvious the lessons of the domestic auto, airline, and steel industries have been utterly missed by these guys." 	le logic of a modular enterpri se architec ture.
2 Sept. 2008	The Financi al Times, "Boeing Could Make Europea n Acquisit ions to Respon d to Toughe ning Domesti c Conditi ons" (Charles Rice & Berange r Guille)	Firm	α	"Boeing (NYSE: BA), the listed, Chicago, Illinois-based aerospace systems integrator, could be seeking defense acquisitions abroad, several sources told mergermarket. Possible reasons for acquisitions abroad include a target- poor environment in the US. [An] analyst said that Boeing has strength in the commercial side with its 787 project. However, the company could look to acquire some of its smaller suppliers, like its March stake purchase in Global Aeronautica, on that project to help shape things up."	On postulat ed reaons for a modular enterpri se architec ture's inorgani c growth.
2 Sept. 2008	Bloggin g Stocks, "A Strike at Boeing, A Mistake by Manage ment' (Dougla	Firm- Investo r	α	"Boeing (NYSE: BA) can't take a strike. It has too much depending on the launch of its new Dreamliner. That launch has been delayed three times and carriers are already asking for compensation for their costs due to the fuel-efficient plane being behind schedule. Boeing has been going at it with its large machinists union and it looks like the two sides have made no progress. Boeing's logic is that it does not want to face high costs in the future when its revenue may be lower. But that logic is deeply flawed, and the union knows it. Boeing has a heavy delivery schedule that goes out at least five years for the Dreamliner and other planes. The company also	On a more integral assessm ent of a modular enterpri se architec ture's pending strike.

s McIntyr e)		says that deliveries over the next two decades will be strong due largely to demand in Asia. Boeing management is making a tactical error and shareholders will pay for it. The stock is at \$65, but the strike will send it to \$50."	
3 The Aug. Street.c om "Boeing Strike Would Hurt, But How Much?" (Ted Reed)	Firm- Investo r		On a modular enterpri se architec uture's increasi ngly dis- integrat ed way to "negotia te" with labor.

Aug. Wa 2008 "E Un In en Pla for Pla in	ans r ants erman	Firm- Suppli er	β	"After the failed sale of its three plants in the German cities of Augsburg, Nordenheim and Varel, <i>Airbus</i> parent <i>European Aeronautical Defense and Space NV (EADS)</i> is whipping the sites into shape. According to a company spokesman, some 360 million euros (\$518 million) will be invested in the Augsburg and Nordenham plants. A new 180 million-euro plant will be built in the southern German city of Augsburg. According to the Augsburg plant manager Hans Lonsinger, it will be the most modern of its type, producing fuselages for <i>Airbus</i> A350 long-distance aircraft. Another 180 million euros will be invested in Nordenham, on the North Sea. Originally <i>EADS</i> wanted to get rid of the plants in order to minimize the A350 development risks. The planned sale fell through at the end of March, however, due to the falling dollar and the turbulence in the international financial market. Despite the failed sale, <i>EADS</i> still wants to form a new subsidiary called <i>Premium Aerotec</i> that will group together the two plants in Augsburg, along with the plants in Nordenham and Varel, said the spokesman. "We can't just lay our hands in our laps and wait and see what happens," he said. One of the main goals of the factory will be changing the material used in the fuselages	On an integral enterpri se architec tur's "reversa l" of its prior outsour cing decision
Sept. erg 2008 "E Be a of M sts Av Stt (S	Boeing ets on Third achini	Firm- Labor	α	from aluminum to carbon fiber." "Boeing's refusal to go along with changes the union sought on using outside vendors was enough to convince 23- year machinist Art Schilling to vote to strike. 'We're not asking for the moon; what we're asking for is a fair shake,' Schilling said today after casting his ballot at the union hall outside Boeing's Renton, Washington, factory, where 737s are built. Hundreds of machinists marched together from Boeing's factories to vote at union halls on their breaks, some carrying signs saying, 'Out the gate 2008' and 'Go fly this, Kight,' referring to Doug Kight, Boeing's lead negotiator. One wildcard is a change in the union's demographics since the last contract in 2005, when more than 18,000 workers walked out. Back then, 37 machinists were under age 30. Now there are 2,300 about 10 percent of the IAM membership in Boeing's main Seattle manufacturing hub because Boeing has recalled laid-off workers and hired new employees. 'The determining factor is going to be the new hires,' Tim Limestall, who's also worked for Boeing for 23 years, said after voting to strike at the Renton union hall. 'They're younger and a lot of them come from non-union shops.' Boeing's hiring spree since the last contract has cut the average age of machinists to 46 from 49. The average wage fell in the past year by \$1 an hour to \$26. 'This is to a certain extent a test for the machinists to see how good a job they've done socializing the younger workers into the IAM,' said John Budd, a professor of industrial relations at the University of Minnesota in Minneapolis.	On a modular enterpri se architec ture's approac h to labor.

				The question is whether they 'are willing to fight for pension benefits and retiree medical coverage and those types of issues, or whether they're more focused on salary and job- security issues.'	
				Tom Wroblewski, president of the IAM's District 751 in Seattle, said the younger workers seem to be united with older machinists and 'more resolved than we'd anticipated' to strike."	
3 Sept. 2008	Seattle Post Intellige ncer, "Boeing Waits on Machini sts Vote" (James Wallace)	Firm- Labor	α	"When we go out on strike, the price goes up,' Tom Wroblewski, president of local District lodge 751 of the International Association of Machinists and Aerospace Workers, said as he stood on a side walk down the street from the plant gate and slapped hands with many of the Machinists as they marched by toward the union hall and the all-important vote. 'They miscalculated,' Wroblewski said of <i>Boeing</i> . As the Machinists marched, they chanted, 'Union power! Union power!' 'It would surprise me if we came back before the first of November,'' said one longtime <i>Boeing</i> machinists who did not want to be quoted by name. 'The company is dug in and so are we.'''	On a modulat enterpri se architec ture's approac h to labor.
3 Sept. 2008	The Seattle Times, "Machi nists Turn Out to Vote on Boeing Contrac t" (Domini c Gates)	Firm- Labor	α	"We can't afford to go on strike, but we can't afford this contract,' said Lindsey Good, who has been an interior mechanic for six months. 'They want to stuff money in this pocket while taking money out of this one,' said Good. Philip Conklin, another Machinist of six months, voted against the contract even though it offers a raise that would give him better pay than some people who have worked there longer. 'My uncle has been here more than 20 years,' Conklin said. 'If I sat down at the dinner table with him on Sunday and said, 'Yeah, that's a great contract for me,' we wouldn't see eye-to- eye.' For Jimmy Le, who has worked at the company since 1986, it will be unusual if there is no strike. 'Only one time was there no strike,' he recalled. An electronic technician on airplane interiors, Le said that as long as <i>Boeing's</i> top executives receive big pay increases, so should the Machinists. 'They make good money, and the last two contracts they didn't give up anything,' Le said. Alicia Winkler, 24, who distributes and inventories tools for mechanics, sported pierced lips and eyebrows. She said she feels threatened by <i>Boeing's</i> lack of movement on the issue of subcontracting parts and tools delivery work. 'Mostly I'm concerned about outsourcing. I don't want to lose my job to someone else," said Winkler. "We need to stick together as Americans." The older generation of Machinists was for the most part equally supportive of the union leadership. 'I've been through three strikes,' said Patrick Ferguson, 48. 'I'm well-prepared.' Some Machinists indicated their willingness not only to strike but to stay out for a long time by wearing a black T-shirt with the slogan 'Walk the Line till '09.' The marchers from the factory carried signs leaving no doubt how most of them will vote. 'The best	On the zero- sum relation ship between the firm and labor in a modula enterpri se architeo ture.

3 Sept. 2008	Bloomb erg, "Bomba rdier Beats Boeing Returns in Turbopr op Revival " (Hugo Miller)	Bomba rdier	Firm	α	'Look out, Ford. Here comes McNerney," read another, referring to Boeing Chief Executive Jim McNerney and the fact that former commercial airplanes boss Alan Mulally left Boeing since the last strike in 2005 to become CEO at Ford. 'There's a few things in the medical plan I don't like, but the way times are, it's a fair contract,' said Tom Yardy, 40, who assembles doors on the 767 and has been with Boeing 20 years. 'I really don't want to go on strike.' Yardy seemed to be in a minority, but he pointed out that some who plan to vote yes will not advertise it but do so quietly." "Bombardier Inc., the world's third- largest commercial- aircraft maker, may widen its share performance gap over Boeing Co. with turboprop planes. The higher fuel prices that hurt sales of Boeing's biggest jetliners are spurring orders for Bombardier's 74-seat passenger planes and commuter-rail equipment, sending the two companies' shares in opposite directions. Bombardier has gained 41 percent in Toronto trading this year as Boeing has dropped 24 percent in New York. 'The higher the fuel price gets, the more attractive a turboprop market," Drew Hall, Bombardier's director of commercial aircraft product planning, said in an interview. Turboprops were fading into commercial-aviation history a few years ago. They owe their revival to a doubling of fuel prices since January 2007 and 30 percent greater efficiency than jets. The shares are valued at 15 times this year's estimated profit, higher than Embraer's 14 and Chicago- based Boeing's 11, according to Bloomberg data."	On contradi ctory claims between competi ng modular enterpri se architec tures about how high fuel prices increase demand for their product
4 Sept. 2008	Washin gton Post, "Boeing Waits on Count of Strike Vote" (Michae I Fletcher)		Firm- Labor	α	 'People feel that in a time of record profits, the company should not come with any takeaways,' said Connie Kelliher, a union spokeswoman. 'When times were bad, workers went for years without a salary increase. But now things are good.' Boeing officials have said that to offer more than it has already would hamstring the company with unsustainable labor costs. 'Our best and final offer rewards employees for the company's success and allows us to remain competitive,' Boeing said in a statement. 'Without a question, the company has drawn a line in the sand,' said Harley Shaiken, a professor at the University of California at Berkeley who specializes in labor issues. 'But it is a risky gamble given the stakes. High labor and benefit costs can be a burden, but if there is a strike, the company could be doing more damage to itself if it disrupts production and progress on the 787 Dreamliner.' 'Any further delay will have 	s. On the zero- sum game between the firm and labor in a modular enterpri se architec ture.

	N	D		both a tangible and intangible effect,' said Howard Rubel, an aerospace analyst at <i>Jefferies & Co.</i> 'The tangible will be that the planes are even later. The intangible is, 'When do we regain the trust of this company?''	On the
4 Sept. 2008	Bloomb erg, "Boeing Union Rejects Contrac t; Leaders Delay Strike (Susann a Ray)	Firm- Labor	α	 "Eighty percent of the voters opposed the three-year contract and 87 percent supported a walkout, the International Association of Machinists and Aerospace Workers said tonight in Seattle. Union leaders Mark Blondin and Tom Wroblewski were shouted off the stage by workers, many already holding 'On Strike' signs, who wanted to walk off the job tonight. 'It was our job to negotiate a contract that's acceptable to you, not to negotiate a strike,' Wroblewski told the crowd. Chicago-based <i>Boeing's</i> lead negotiator, Doug Kight, said he was 'disappointed' by the vote. 'Our job at this point is to listen to the union; we put the last contract offer on the table,' he said a press conference. 'We will seek to understand and then make an assessment to see if there is a path forward.' 	On the zero- sum game between the firm and labor in a modular enterpri se architec ture.
4 Sept. 2008	Washin gton Post, "Boeing Machini sts Vote to Strike (Michae 1 Fletcher)	Firm- Labor	α	hear out the union on the 'critical-few issues.'" "The disrespect they have shown for the negotiation process is exactly the same way our members have felt and why they have been marching in the factories at lunchtime for the past weeks,' the union said in a statement posted on its Web site early this morning."	On the zero- sum game between the firm and labor in a modular enterpri se architec ture.
4 Sept. 2008	The Seattle Times, "Machi nists at Boeing Reject Contrac t; Strike on Hold for 48 Hours as Mediato r Steps In" (Domini	Firm- Labor	α	"One thing that must worry <i>Boeing</i> management now is that a new generation of workers is learning about union power and joining older employees in the long history of bad blood between the IAM and the company. Brett Baehm, 20, is one of the thousands of younger workers hired since 2004. He was hired in June to work on the 777. The <i>Boeing</i> offer would have given Baehm an immediate wage increase that looks good to him. Yet he said he still voted to strike. At an Everett factory march on Wednesday morning, he reveled in the brotherly solidarity. 'For me, it's a decent contract. But if it's bad for everybody in general, I won't accept it,' Baehm said. 'Everybody is looking out for each other right now.'	On the zero- sum game between the firm and labor in a modular enterpri se architec ture.

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c Ga	tes)			use their leverage when the company is flush with profits and has a seven-year production backlog. Before the vote, <i>Boeing</i> was firm that its offer was final. 'If we go out one day, it'll be at least 30,' said Robert Fullerton, a lead mechanic on the 777 and 30-year <i>Boeing</i> veteran. 'This is the best time for our union to get what we need.'	
				One big stumbling block is outsourcing. For future airplanes, the union wanted to stop the subcontracting of parts-delivery work forced upon it in the 2002 contract and now a reality on the 787. But <i>Boeing</i> has always refused union demands to give up its ability to outsource. 'Our jobs in parts receiving and kitting are jeopardized,' said Judy Simpson, 66, a Machinist for nine years whose son and daughter also work at <i>Boeing</i> . 'They can bring anybody in there and lay us off.'	
				Boeing also appears to have miscalculated the appeal of the economic aspects of its contract offer to both the younger, newer hires and the more senior machinists at the top of the pay scale. One older Machinist, who asked for anonymity so as to avoid company retaliation, outlined the perspective of longtime workers in an e-mail message. "I have to foremost think of myself and my wife's future," he wrote. "We do get paid well, but we are more concerned with our health and retirement plans." Boeing's offer increased the basic monthly retirement pension from \$70 to \$80 per year of service. Machinists wanted the company to do better, given \$13 billion in net profits over the last five years, half of those profits from the commercial airplane unit. Soon after the initial offer from Boeing last week, Machinists started forwarding around e- mails from a 2006 Boeing filing with the Securities Exchange Commission showing that at that time low-level executives got monthly pensions of \$400 per year of service and top executives got \$4,000 for each year of service.	
				Jayleen Roman, who was hired 18 months ago as an electrician on the 787 line, was incensed that new hires will earn the same rate as her. 'We've been working one- a-half years for what?' she asked. Roman said her family has a long <i>Boeing</i> tradition. Her dad has been there 28 years and her brother 11 years. She knew to save for a strike. 'When you apply to <i>Boeing</i> , you learn to expect this,' she said."	
: Strik the Con	eing A A se apan can't	Investo rs- Firm- Labor	α	"The aircraft firm's executives have not been terribly adroit at making a case that they cannot give the unions more. <i>Boeing's</i> recent news releases are filled with announcements of sales of its new Dreamliner, and its older but popular 777. <i>Boeing</i> has also been bullish on its prospects over the next two decades, in part due to expected sales in China. The reasoning behind <i>Boeing's</i> statement that it has	On a modular enterpri se architec ture's oversell ing to investor

	(Dougla			- 1	given the union all it can is that higher labor costs	s, which
	(Dougia S				could hurt future earnings. That would be especially	gives
	McIntyr				true if the company hit a sales downturn. By Boeing's	bargaini
	e)				own admission, it has a multi-year backlog of aircraft	ng
	-,				orders, so the argument is a bit thin.	leverage
					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	to labor.
					Boeing's management has not done anyone a favor by	
					holding out.	
4	Seattle	Jim	Firm	α	"'Our negotiations team worked very hard to reach a	On a
Sept.	Post	McNer			contract agreement that handsomely rewarded a vital	modular
2008	Intellige	ney,			group of employees, ensured continued strong support of	enterpri
	ncer,	CEO,			our customer commitments, and maintained our long-	se
	"Boeing	The			term competitiveness against a strengthening and	architec
	/IAM	Boeing			growing list of commercial and military competitors,'	ture's
	Meeting	Compa			McNerney said. He added:	rare
	at	ny			'Clearly, we are committed to doing our best to prevent a	invocati
	Disney				work stoppage and the disruption it would cause inside	on of
	World"				and outside our company. But we will do so ever mindful	"long-
	(James				of our responsibilities to protect our long-term	term
	Wallace				competitiveness, maintain our ability to best serve our	vision";
)				customers, and to ensure fairness and equity for all	implicit
					employee groups."	in this
						claim is
						that
						outsour cing is a
		1				strategy
						for
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						g long-
						term
						cost-
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						tiveness
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						higher
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						tiveness
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						an
						opposin
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						on
						outsour
						cing.
4	Chicago		Firm	α	"But even without a strike, the 787 isn't likely to take	On the
4	Chicago		1.1111	u.	but even without a strike, the 707 isn't likely to take	

	<i>m</i> . 1					
Sept. 2008	Tribune,				wing 'until well into December, if this year,' said a senior executive of a major <i>Boeing</i> supplier. 'Officially,	systemi c
2008	"Boeing Laborin				they're not saying that, but through the grapevine it	consequ
	g over				seems like things may be slipping a little bit,' said	ences of
	787				Michael Derchin, aerospace analyst for FTN Midwest	over-
	Dreamli				Securities Corp. 'Instead of the first half of the fourth	promisi
	ner"				quarter, [the first flight] may be in the last half of the	ng and
	(Julie				quarter.' A strike 'obviously would be a blow to that,'	under-
	Johnsso				he added.	deliveri
	n)					ng
	,				The company missed an internal deadline to wrap up	-
					work on the first aircraft by Aug. 31 and isn't likely to	
					complete the tasks needed to make the airplane	
					airworthy before October, according to Flightblogger, a	
					site that closely tracks Dreamliner production. 'While	
					things are moving within the schedule, we're still on	
					track to fly in the fourth quarter,' said Yvonne Leach, a	
					Boeing spokeswoman."	0
5	The		Firm	α	"While [Jetstar] the Quantas offshoot is yet to be advised	On a
Sept.	Aurstral				of any changes in the program, sources in Seattle told <i>The</i>	modular enterpri
2008	ian, "Docina	52. 			Australian that the first flight of the 787 would be at the earliest in late December or, more likely, January.	se
	"Boeing				earnest in fate December or, more fikely, January.	architec
	Delays Deliver				Boeing has come in for considerable criticism over the	ture's
	y of 778				past year, for not being more proactive with updates on	general
	Again				the delays with the 787, with industry media becoming	tendenc
	(Geoffr				the leading source of information on the status of the	y to
	ey				program."	overpro
	Thomas					mise
)					and
						underde
I						liver; as
I 1						well as
						its
						tendenc
						y to
						conceal/ delay
						revealin
						g
						problem
						s.
5	Market	Ray	Firm-	α	"The Society of Professional Engineering Employees in	On a
Sept.	Watch,	Gofort	Labor-		Aerospace (SPEEA), IFPTE Local 2001, supports fellow	modular
2008	"SPEE	h,	Investo		union members at Boeing and congratulates them on	enterpri
	Α	executi	rs		the resounding defeat of the company's veiled	se
	Support	ve			substandard contract offer. 'This is a failure of Boeing	architec
	s IAM	directo			management," said Ray Goforth, executive director of	ture's
	751	r of			SPEEA. "By forcing this strike vote, Boeing	zero-
	Efforts	SPEE			management has again failed its customers, employees	sum
	to	Α			and its shareholders.' SPEEA is distributing 'I Support	game
	Secure a				IAM' signs for employees to display in vehicles and at	against
	New				work. 'The company has bulging coffers, plane orders	labor.
	Contrac				to the horizon and was faced with reasonable union	
	t from Boeing"				demands, Goforth said. 'Instead of sharing the success of <i>The Boeing Company</i> with the employees who made	
•			1	1	or the Roeing Company with the employees who made	

				it manuful Design in turing to four surfaces to	
				it successful, Boeing is trying to force employees to	
				accept takeaways.'	
				'There is no reason a strike should happen,' Goforth	
				added. 'Shareholders should hold Boeing executives	
		 D '		accountable.'"	0
9	Busines	Firm-	α	"Take two companies-let's call them A and B-	Compar
Sept.	sWeek,	Labor	&	competing head-to-head in the same business. Rank-and-	ing the
2008	"Boeing		β	file worker salaries at both are roughly comparable. But	modular
	's On			Company A is struggling financially. Most employees got	and
	Strike,			a 1.5% raise this year, and management has announced	integral
	So Why			plans to eliminate about one in five jobs. Company B,	enterpri
	Isn't			though, is in pretty good shape. Management recently	se
	Airbus?			offered workers an 11% pay raise over the next three	architec
	"			years, along with bonuses of more than \$5,000 and a 14%	tures:
	(Carol			boost in company payments into their pension plan. So,	zero-
	Matlack			guess which company's employees are out on strike? OK,	sum
)			so the headline gave it away: Airbus is Company A, and	competi
				Boeing Co. is B. On Sept. 6, members of Boeing's biggest	tion vs.
				union walked off the job, halting production and throwing	positive
				the timetable for the already late-to-market 787	-sum
				Dreamliner into confusion. Contrast that with Airbus,	coopera
				based in Toulouse, France. It has suffered only minor	tion.
				labor protests as it moves to eliminate 5,000 jobs over	
				the next two years as part of its so-called Power 8	
				restructuring plan. Union leaders also agreed to that 1.5%	
				pay raise, well below France's 2.5% inflation rate in 2007.	
				What happened to those famously militant French labor	
				unions? At Airbus, most of the rank-and-file is	
				represented by the Force Ouvrière, or Worker Power	
				union, one of the country's most hardcore labor groups.	
				Sounds ominousbut the truth is, private-sector strikes	
				in France are exceedingly rare. Transit workers,	
				teachers, even doctors, frequently walk off the job, but	
				factory workers almost never do. At Airbus, union	
				leaders may realize that a strike could aggravate an	
				already precarious situation. The company has posted	
				operating losses for the past two years as production delays on the A380 mega jet knocked billions off the	
				bottom line. The euro's rise against the dollar has seriously	
				dented its competitive edge against <i>Boeing</i> . And, it must	
				be said, <i>Airbus</i> is still a pretty good place to work.	
				Starting pay for the least-skilled production workers is	
				about \$15 an hour, and experienced machinists make \$26	
				or \$27 an hourroughly the same as the average machinist	
				salary at Boeing, though it's difficult to make direct	
				comparisons because French workers get more-	
				generous benefits than Americans. Among other things,	
				they pay practically nothing out-of-pocket for health care,	
				and under French labor law, most can expect nice	
				severance packages if they're laid off. Moreoever, Airbus	
				isn't laying anyone off: The job cuts are being made	
				through attrition and early-retirement buyouts. To the	
				unions' relief, Airbus also has scrapped plans to sell some	
				of its French and German factories, a move that had	0
				sparked fears that the new owners would shift jobs to	
				lower-cost countries. Airbus abandoned the idea after it	

÷					 was unable to find buyers. 'We were afraid of outsourcing, but things have calmed down,' says Matthieu de Georges, a Force Ouvrière representative. For the moment, he says union members have no major complaints about Airbus. 'Of course if they say they aren't happy, we'll act.' Asked if Force Ouvrière would care to comment on the Boeing strike, de Georges politely demurs. But it's hard to avoid the conclusion that Airbus stands to benefit if Boeing's unions stage a long and crippling strike, or if they win concessions from management that significantly drive up production costs. NEWS FLASH: Those Airbus union members now have a new reason to protest. Louis Gallois, the CEO of parent company European Aeronautics Defence & Space, tells French newspaper Le Monde in an interview September 9 that Airbus will begin producing some aircraft components in Tunisia to cut costs and reduce its exposure to the strong euro. Stay tuned!" 	
11 Sept. 2008	The Econom ist, "Boeing and Airbus: Striking Differen ces"		Firm- Labor	α & β		
11 Sept. 2008	Wired, "Airbus Kicks Boeing While it's Down" (Dave Demerji an)		Firm	β	"Airbus announced yesterday that starting in 2010, it will offer a higher gross weight version of its popular A330- 200. Airbus hopes that'll position the plane as a viable alternative to Boeing's much hyped and much delayed next-gen mega-jet, the 787 Dreamliner."	On an integral enterpri se architec ture's strategic , systema tic and increme ntal approac h to product develop ment
12 Sept. 2008	"Respec t and the Strike at <i>Boeing</i> "	Gary Chaiso n, Profess or of Industr ial Relatio ns, Clark	Firm- Labor	α	On September 3, when the 27,000 production workers at <i>Boeing</i> walked off their jobs in a strike, most observers began the usual searching for the underlying cause . After all, the parties were fairly close in their offers and demands (the unionthe International Association of Machinistsasked for a 13 percent wage increase over three years and the company offered 11 percent as well as a signing bonus of \$2500). Substantial wage increases are not common in manufacturing. The conventional wisdom seemed to be that the strike was over <i>Boeing's</i>	On a modular enterpri se architec ture's adversar ial <i>style</i> , as opposed

		I I a income			indictance on its night to sutsounce would done by the	to the
		Univer			insistence on its right to outsource work done by the union members. While this is certainly one of the	substan
		sity			contributing factors, I feel that primary reason for the	ce of its
					strike can be found in bargaining style , not bargaining	poor
					issues. Quite simply, <i>Boeing</i> was disrespectful. It didn't	offer, as
					treat the Machinists as the rightful bargaining agent.	the
					When the Machinists announced the results of the strike	reason
					vote (87 percent of the workers for it) and the rejection of	for a
					Boeing's proposed contract (80 percent against it), the	strike.
					union emphasized how the company had behaved	
					disrespectfully. There is ample evidence of this. First,	
					Boeing attempted an 'end run' around the union	
					bargaining committee by appealing directly to the	
					workerssomething that is never done in mature	
					bargaining. Boeing widely advertised that its contract	
			4		proposal was available on the company web page. Second,	
					it offered the workers a signing bonus if they approved	
					the contract. I see this as a bribe for going against the	
					union's recommendation that the contract be rejected.	
					Finally, Boeing told the workers know that the proposal	
					was its 'best and final offer'. When they used this phrase,	
					the company was declaring that as far as it was	
					concerned, bargaining was over. Boeing was mistaken	
					in it's belief that it could sell a collective bargaining	
					agreement to its workers. It confused public relations	
					with collective bargaining, assuming that it could be so	
					persuasive that the workers would vote against a strike, against their union, and for the contract. But it forgot that	
					the role of the union is to act as a bargaining agent by	
					standing between the workers and the company. The	
					workers knew that if they accepted <i>Boeing's</i> proposal and	
					rejected a strike it would be a vote of 'no confidence' in	
					their union and they weren't about to do this. Boeing	
					doesn't have to like the Machinists and it doesn't have	
					to like the process of collective bargaining, but it has to	
					respect the Machinist's role as an equal at the	
					bargaining table. The strike will be over when, and	
					only when, the company understands that if must first	
					persuade the union's bargaining team to accept the	
					terms of the new contract, and then let them to	
				0.000	recommend that the members' accept it."	
12	Busines	Jim	Firm -	α	"Just how <i>Boeing</i> and its workers went off the cliff yet	On a
Sept.	s Week	McNer	Labor		again, may be an object lesson in how tough it can be to	modular
2008	"Boeing	ney, Chair			bridge the gap between labor and management in a	enterpri
	Strike:	Chair mon &			globally competitive, old-line business. If Chief	se archtect
	No End in	man & CEO,			Executive W. James McNerney Jr. wanted to use this go- round to break a nearly 60-year cycle of acrimonious	archtect ure's
	in Sight"	The			relations between <i>Boeing</i> and the International	ideologi
	(Joseph	The Boeing			Association of Machinists & Aerospace Workers (IAM),	cal
	(Joseph Weber)	Сотра			he certainly hasn't succeeded. And if the IAM leaders	belief
	weber	ny compa			figured this was the time when they could humble	that
		ny			management and right the wrongs they felt done to	outsour
					them in prior contracts, they seem to have badly	cing is
					misjudged the determination of the CEO and his	the
					managers.	best/onl
						y way
						,

from 2005, when the LAM last vent on strike. Then, the machinists shut down commercial planemaking at <i>Boeing for 28 days.</i> This time a fresh team of <i>Boeing</i> negotiators, trying to iron out differences well in advance, began last May to sound out the union leadership on what contract terms might fly and what would be dead on arrival. The effort was part of a drive to 'listen very carefully to our employees,' chief management negotiator Doug Kight said. The company, he argued, wanted to share its success with the workers even while making sure it could stay competitive. In a May meno, Kight said the early talks were a chance 'to have open and respectful conversations.' For the union leaders, however, the early figured, just wanted more time to sell its least palatable plans to the workers. Among them: proposals to eliminate medical benefits for some retirees and to kill off a traditional pension program for new hires while giving them a 401(k)-like retirement plan instead. Though with the early start to talks. Now, he says, 'I sensed a PR thing coming, and sure enough that's what happened.' Just how much listening really took place is far from clear. By July, the union leaders didn't think they were making much headway. The proposed 'givebacks' on medical and pension benefits, which the union leaders had warned were sure strike-strarts, remained on the table. So the leaders told their members to start saving for another strike, which would be the sevent haunched by the LAM against <i>Boeing</i> since World War II. Sure that a walkout was inevitable, some longtime workers canceled summer vacations and set aside enough cash so they could get by on the \$15 a week in strike benefits. Despite the early start, no real movement took place until the end of August. With a Sept. 3 strike vote looming, management caved in on the plan to end medical benefits for some retires. They decide to stick with raditional pensions even hiking the amounts the company would contribute. Kight and his team made a best-and-final offer on the		
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,,	communications, they bristled, were nothing more than a	

bid to bargain directly with workers—an approach that seemed quickly to backfire as the leaders condemned "givebacks" that offended them. The workers, meanwhile, were furious. Angered by proposals the company was floating, they had been staging marches around the factories. The distractions made it impossible to get work done, some workers say.
The union pored over the offer and pounced on terms it found objectionable. Trims in health-care benefits loomed large, even though <i>Boeing</i> officials insist the changes on balance would be neutral, with higher co-pays offset, for instance, by cuts in premiums. Even more problematic, however, is the company's power to subcontract work, to let suppliers from around the U.S. and in other countries provide parts and have nonunion outsiders deliver such goods to the assembly lines in Washington. The union fears that such outsourcing, which it says has been on the upswing, will ultimately kill off jobs. Management contends that globalization requires it be able to have work done around the world—especially in countries where that might help it sell more planes. McNerney 'wants the flexibility to do what's right for the business,' says Noel Tichy , a management professor at the University of Michigan who has known McNerney since he was a rising star at General Electric (GE) in the 1980s. It's an issue, Tichy says, on which the CEO can't compromise.
'Can you together work out a reasonable compromise? Yes,' says the professor. 'But I think it's [McNerney's] position that there are some things that he does consider non-negotiable, and the other side is saying the same thing.' Part of the problem is union officials have long memories. Some are still troubled that the outsourcing power was put in place in a nettlesome contract in 2002. That contract went into force only because the union fell short of getting a two-thirds vote for a strike, even though most members opposed the contract. Then the union was unable to get the language pulled in 2005. "It puts our members' jobs at risk," says negotiator Blondin.
By Sept. 3, when 87% of the workers backed a walkout, it was clear the union had long been spoiling for a fight. Sporting T-shirts emblazoned with the slogan 'It's Our Time This Time,' the workers paraded to the union polls led by motorcycle-riding colleagues. Many were angry when the union leaders agreed to delay the strike for 48 hours, until late Sept. 5, to see if any common ground could be found.
Some machinists argue that <i>Boeing</i> , which has been blessed with record profits and its biggest backlog of plane orders ever, can well afford to scrap all "givebacks" and to "bargain up," as a union spokeswoman said. Gutting the outsourcing language is a

		[key part of what the union hopes to gain. Its leaders figure	
					that concerns about further delays for the new 787 Dreamliner on Wall Street and in the Boeing executive suite, give workers leverage. It's really anyone's guess just how drawn out and costly this fight will ultimately be. Analyst Cai von Rumohr of Cowen & Co. figures a strike could last between 29 and 65 days, pushing a conclusion into mid-November at the latest. He figures the end of health-care coverage, at the opening of October, will put the first bit of serious pressure on workers, while in November the approach of the holidays steps it up. The union went on strike at Boeing for 69 days in 1995.	
					Von Rumohr estimates <i>Boeing</i> could lose as much as \$2.3 billion in revenues this quarter. Some of that, of course, could include deferred rather than lost sales, but company officials do fret that demand for planes could slip over time, especially as the global economy slows. Some workers say they'd love to see a change in the contentious relationship between the company and the union that flares anew with every contract round. 'My family and I are completely exhausted with going through a financial disaster or potential disaster every three years,' says one 21-year veteran worker. On the other hand, he looks on the IAM as one of the last strong unions able to hold the line on hard-fought gains, while other industrial labor groups have folded.	
					For the company's part, when Kight began the talks with the union back in May, he seemed to do so with the best intentions. 'Boeing's goal is to create an open and honest environment by communicating frequently and having robust discussions,' he told managers back then in an e- mail message. But when the differences—and distrust— are deep, honesty may do little to bridge the gap. Instead, it boils down to which side can stand the pain of a strike long enough to claim victory."	
12 Sept. 2008	The Wall Street Journal, "Boeing Strike		Firm – Suppli er - Labor	α & β	"Triumph Composite Systems Inc., which produces air ducts and composite floors for <i>Boeing</i> , said it would lay off at least 220 of the 550 workers at is Spokane, Wash., plant. The company said it would be forced to lay off another 15% to 20% of its work force if the strike runs past Sept. 21.	Comari ng how integral and modular supplier
	Rattles Key Supplier s" (J. Lynn Lunsfor d & Daniel				Spirit AeroSystems Inc., which builds every Boeing 737 fuselage as well as the flight decks and nose sections for a variety of other models, said it was cutting production immediately and reduced its workweek to three days for many employees in an effort to avoid layoffs at its facilities in Wichita, Kan.	s respone d to an exogeno us shock (i.e. a labor strike at
	Michael s)				Although many suppliers say they hope <i>Boeing's</i> labor dispute is resolved quickly, some are also privately rooting for <i>Boeing</i> to hold strong . They know that any concessions <i>Boeing</i> makes will likely surface in their own labor negotiations down the road. 'It's a global industry in	its main custome r).

					more ways than one,' said an executive at a supplier."	
14	Fobes,	Jim	Firm -	α	"Boeing Co. chief executive Jim McNerney is betting his	On a
Sept.	"Boeing	McNer	Labor		career that the world's biggest-selling plane maker can	modular
2008	CEO	ney,			survive a strike by its assembly workers and emerge	enterpri
	McNern	Chair			stronger by holding firm on its right to outsource work	se
	ey	man &			on its aircraft. The decision to play hardball with the	architct
	Gamble	CEO,			company's biggest union is a gamble for McNerney, 59,	ure's
	s on Strike"	The			a star baseball pitcher at Yale, where he was a classmate of U.S. President Bush. The outcome will dictate the	logic which
	(Bill	Boeing Compa			direction of the most famous name in aerospace and one of	assumes
	(Bill Rigby)	ny compa			the biggest U.S. exporters. 'If it's a choice between	modular
	Rigby)	ny			getting it (the strike) stopped quickly, or doing what is	vs.
					good for the company in the long run, he's going to	modular
					choose the second,' said Richard Aboulafia, an aerospace	competi
					analyst at research firm <i>Teal Group</i> , based in Fairfax,	tion.
					Virginia. 'To a certain extent, he has no choice.	(This
					Compromising on the company's competitiveness is a	logic is
					losing game.' Simply put, Boeing wants to design and	orthogo
					assemble planes, but leave the labor-intensive	nal
					manufacturing to others. Its new 787 Dreamliner is being	when
					built by other companies in Japan, Italy, South Carolina	competi
					and elsewhere, and only assembled by Boeing in the	ng
					Seattle area. The machinists' union sees this as an attempt	against
					to destroy local jobs. But McNerney is committed to the	an
					new way of working and is calculating that the long-	integral
					term benefits of outsourcing will outweigh the bad will,	enterpri
					cost and delay caused by a strike. A week into the	se
					stoppage, he still has the support of Wall Street. The	architec
					company's share price is holding steady around its 12-	ture.)
					month low, but most analysts expect a jump when the	
					strike ends. 'Things could turn around here after the strike has been resolved,' said Paul Nisbet at aerospace	
					equity specialists JSA Research, based in Newport, Rhode	
					Island. 'I would expect things to start moving pretty	
					favorably in the company's direction.'	
					The International Association of Machinists and	
					Aerospace Workers (IAM), sensing the upper hand as	
					Boeing reaps record profits, is holding out for a hefty	
					pay rise and removal of contract wording giving Boeing	
					almost unfettered power to use outside suppliers. The	
					company came close to meeting pay demands, but is	
					refusing to budge on outsourcing with no further talks	
					planned. Resolving the strike, which is costing <i>Boeing</i>	
					\$100 million a day in revenue, looks to be the biggest	
					challenge in the CEO's career. Walter James McNerney	
					Jr., who prefers to be called Jim, worked his way quietly into one of the most important positions in U.S. business.	
					He came to <i>Boeing</i> after four and a half years at the helm	
					of manufacturer 3M Co. and a 19-year career at General	
					<i>Electric Co.</i> where he lost out to Jeff Immelt in the race to	
					take over from Jack Welch. His time in charge at <i>Boeing</i>	
					has been relatively calm, after the company lost two	
					CEOs in dubious circumstances . Philip M. Condit	
					resigned in December 2003 after it emerged that <i>Boeing</i>	
					had improperly offered a high-paying job to the U.S. Air	
					had improperty offered a high paying job to the 0.5. All	

					Force's No. 2 acquisition official. The successor, Harry C. Stonecipher, resigned in March 2005 when it was revealed he was having an affair with a <i>Boeing</i> executive. After taking over in July 2005, McNerney moved quickly to clean up <i>Boeing's</i> legal and ethical problems, settling long- running federal investigations into its procurement practices and illegal appropriation of <i>Lockheed Martin Corp.</i> rocket program documents. His leadership has coincided with a three-year boom in commercial plane sales and steady growth in U.S. defense spending. Last year, <i>Boeing</i> had a banner year, crushing rival <i>Airbus</i> with an industry record 1,413 plane orders and its highest-ever annual profit of \$4.1 billion. Despite those successes, <i>Boeing's</i> shares have plunged about 36 percent in the past 12 months, compared with a 15 percent drop in the <i>Standard & Poor's</i> 500 index, hit by the credit crisis sell-off, spiking oil prices, and worrisome delays on the 787. 'He's not coming out smelling too much like a rose at this point, with problems on the 787 and not being able to reach an agreement with the workers,' said Nisbet. 'But they (<i>Boeing</i>) are definitely right. They could be leading the aerospace industry down the same path of the airline industry and the auto industry if they didn't take a stand.'"	
15 Sept. 2008	Financi al Times, "GKN Pays £136m for Airbus Plant" (Kevin Done)		Firm- Investo r- Suppli er	β	"Around 1,500 employees, 25 per cent of the workforce at Filton, will transfer from <i>Airbus</i> to <i>GKN</i> . Tom Enders, <i>Airbus</i> chief executive, said the group's remaining wing, landing gear and fuel systems design and engineering business at Filton was core to its role of being an aircraft 'architect and integrator.' It would retain a workforce of around 5,000 at Filton including for the assembly and equipping of the composite wings for the A400M military transport aircraft."	On an integral enterpri se architec ture's method of divestin g and outsour cing capacity not knowle dge.
17 Sept. 2008	The New York Times, "Federa 1 Aid to Dtroit Seems Likely" (David Herszen horn)	Alan R. Mulall y, the chief executi ve of <i>Ford</i>	Firm- Gover nment	α	"Alan R. Mulally, the chief executive of <i>Ford</i> , was even more upbeat. 'It was a great day,' he said. When a reporter asked what Mr. Mulally might say to people who viewed the loan guarantees as a bailout, he replied in a chipper voice, 'I would characterize it as an enabler.'"	On a modular enterpri se architec ture's sporadic , "boom & bust" relation ship with govern ment.

18 Sept. 2008	Bloomb erg, "Boeing Enginee rs' Union Says Talks Many End in 'Train Wreck' " (Susana Ray)	Ray Gofort h, Execut ive Direct or, SPEEA	Firm - Labor	α	"'Things are looking worse,' Ray Goforth, executive director of the Society of Professional Engineering Employees in Aerospace, said in an interview after a meeting with <i>Boeing's</i> negotiating team yesterday. 'These negotiations will end up in the same train wreck as they did with the machinists if they don't change how they're approaching us.' The engineers are demanding the return of some work the company gave suppliers to help control costs while developing and building planes like the new 787 Dreamliner. In its first response to the union, Chicago- based <i>Boeing</i> said yesterday it's sticking to its outsourcing strategy. The current contract expires Dec. 1. 'We won't give up the flexibility that we have, but we're willing to talk about other ways to increase productivity or other initiatives like that,' Karen Fincutter, a <i>Boeing</i> spokeswoman in Seattle, said in an interview. <i>Boeing</i> says its business plan counts on external suppliers and it needs to make sure it keeps costs low enough to stay competitive. <i>Boeing</i> proposed a contract longer than the current three years. 'What they proposed today was full of take-aways, so even if we	On a modular enterpri se architec ture's method to compete in "Cost Leaders hip"
					were to accept such a terrible contract, why would we lock that in for longer?' Goforth said. 'They were completely unsympathetic to our concerns' about outsourcing."	
19 Sept. 2008	Financi al Times, "Airbus Sticks with Producti on Increase Goal" (Kevin Done)	John Leahy, <i>Airbus</i> COO, Custo mers	Firm	β	"Airbus is sticking with plans to raise commercial aircraft production by almost a third in the four years to 2010, in spite of the rapid deterioration in the financial state of the airline industry. John Leahy, Airbus commercial director, said the European aircraft maker had reviewed its production plans this week and remained "on track" to raise output of its single-aisle A320 short-haul jets from a current level of between 34 and 36 a month to 40 a month by early 2010. Output of its wide-body, long- haul jets, chiefly the A330, was being raised from eight to between 10 and 11 a month by 2010, he said. 'We are still seeing demand and we still have some overbooking [in the production schedule] for 2009 to 2011' for the A320 aircraft. 'You know someone will not turn up, but you don't know who.' The level of overbooking had fallen from a year ago, however, and the higher production schedule was being maintained 'with fingers crossed'. Mr Leahy said Airbus was 'increasing somewhat' the amount of 'back-stop' financing it was providing to airline customers facing difficulties in securing finance for new aircraft deliveries."	On an integral enterpri se architec ture's producti on at sustaina ble rates.
20 Sept. 2008	Hearld Net, "Boeing 's New Hires		Firm- Labor	α	"Even as its Machinists strike enters its third week, the <i>Boeing Co.</i> continues to hire new production workers who then go on strike. Most of the new workers report to picket duty rather than to <i>Boeing's</i> commercial jet factories, which have been silenced since 27,000	On a modular enterpri se architec

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Go		Machinists went on strike Sept. 6. 'It doesn't make sense	ture's
Right		to turn off the system,' said Boeing spokesman Tim	non-
on		Healy. Boeing's hiring process takes several weeks of	systemi
Strike"		screening and preliminary tests, including some unpaid	с
(Michel		time. Newly hired workers are informed of the ongoing	approac
le		strike and most opt to participate in it. Since Sept. 5,	h.
Dunlop)		the company has hired about 130 new Machinists, said	
		Connie Kelliher, spokeswoman for the union. That's not an	
		uncommon practice during a labor strike, she added.	
		Since 2005, <i>Boeing</i> has been on a hiring spree, bringing	
		on as many as 200 Machinists in a week to handle a big	
		backlog of orders. But that trend has slowed, according to	
		the latest Snohomish County job numbers reported by	
		 Employment Security Department this week."	
22 <i>ATW</i> ,	Firm-	"One worker who said he'd rather not be striking cynically	On a
Sept. "Boeing	Labor	observed that the Seattle area's great late summer	modular
2008 Machini		weather was contributing to the strike. Indeed, picket	enterpri
sts		lines observed by this website were quite small. The	se
Strike		disgruntled IAM member noted that Washington State's	architec
Enters		hunting season for deer and game birds started Sept. 1	ture's
Third		while elk season kicked off Sept. 8. Two other strikers	"boom
Week"		said the work action would give them a welcome break. 'I	& bust"
(Geoffr		want to spend more time with my family,' said one."	approac
ey			h to
Thomas			labor-
)			manage
			ment.
			Boeing'
			s over-
			promise d and
			under-
			delivere
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			787,
			caused the
			compan
			y to
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			machini
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			excessiv
			e
			amounts
			of
			overtim
			e in the
			months
			running
			up to
			the
			labor

						negotiat ions.
24 Sept. 2008	Forbes, "Boeing CEO Says Talks with Unions at 'Standst ill'" (Scott Malone)	Jim McNer ney, Chair man and CEO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm	α	"Analysts have warned that 25 percent of the sales backlog at <i>Boeing</i> and European rival <i>Airbus</i> , a unit of EADS, could be imperiled as a result of the economic slowdown. But McNerney said history suggests the effects would not be that severe. 'We've examined past economic downturns like we're experiencing now and it tends to be that the risk is in the 5 to 10 percent range,' McNerney said. 'Could be a little worse, could be better than that. We'll have to monitor the situation.'"	On the leader of a modular enterpri se architec ture being <i>unconse</i> <i>rvative</i> in represen tation of data.
24 Sept. 2008	Bloomb erg, "Boeing 's McNern ey Sees Financi ng Demand , Backlog Risk" (Edmon d Lococo & Susanna Ray)	Jim McNer ney, Chair man and CEO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm- Labor	α	"Boeing's plane factories have been shut since 27,000 machinists walked off the job Sept. 6, demanding more job security and better wages and benefits. Its 21,000 engineers, whose contract expires Dec. 1, also are insisting on a greater share of work now given to suppliers to help <i>Boeing</i> control costs on planes such as the 787 Dreamliner. McNerney today characterized Boeing's outsourcing strategy as a `management-rights' issue . Both sides have been `unable to find the common ground that we need to find to have the discussion we need to have to solve the problem,' he said."	On the leader of a modular enterpri se architec ture describi ng the zero- sum, non- collabor ative ideolog y.
	Kay)					Manage ment- rights and responsi bilities: "Manag ement- rights" do not seem to be associat ed with manage ment taking responsi bility for employ

					ee strikes.
Sept.ionalI2008HeraldATribune,C"AirbssC	John Leahy, <i>Airbus</i> COO, Custo mers	Firm- Labor	β	"Ten thousand job cuts are expected. Entire plants are being sold or split off. Union members are getting a pay rise of only 1.5 percent for this year, and managers are working to send more jobs abroad. Yet European workers at <i>Airbus</i> are not out on the picket lines. They are working round the clock to rewire at least 6 A380 superjumbos by hand to meet a target for completing 12 of them this year. Meanwhile, in developments that turn national stereotypes on their head, American workers at <i>Boeing</i> , worried about job security, have been on strike for almost three weeks, despite an offer of an 11 percent pay increase over three years. The strike is further delaying production and costing the company \$100 million a day in lost revenue. There is little rejoicing over <i>Boeing's</i> problems at <i>Airbus</i> , which has been through plenty troubles of its own over the past two years. But managers at the <i>Airbus</i> headquarters in Toulouse say their work force seems to agree on the urgency for change, at least for now. 'We have pretty good working relations with the unions, which are not nearly as adversarial as in Seattle,' John Leahy, the top salesman at <i>Airbus</i> , said Friday during an interview in Toulouse as <i>Qantas</i> received its first A380 here. 'We have more of a partnership here, and whether you are on the assembly line or an engineer you can understand the euro-dollar problem, and see the foreign exchange rate going in the wrong direction.'' <i>Airbus</i> has not been without labor problems as it tries to recover from its own stumbles, mostly related to A380 production, while adapting to tough market conditions. Work on <i>Airbus</i> assembly lines was disrupted three times in as many weeks in February and March of 2007 as more than 33,000 demonstrators protested thousands of planned job cuts. Smaller job actions continue sporadically. On Friday, as many as 300 workers from one small union walked off the job for two hours in Toulouse to protest the restructuring. But the hand-over ceremony to <i>Qantas</i> was not disrupted. Analysts	Compar ing modular and integral approac hes to labor.

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companies are battling to cut costs, and both are	
outsourcing supplies and parts of the assembly process.	1
Airbus is especially feeling pressure to shift production out	
of the euro zone and into lower-cost regions, including the	
United States. That is mostly because aircraft are priced in	
dollars, and Airbus has the disadvantage of bearing the	
bulk of its costs - labor and supplies - in euros. The strong	
euro also means that the discounts manufacturers usually	
5	
give to win big orders cut deeper into Airbus revenue.	
'Airbus has less margin to maneuver,' said Howard	
Wheeldon, senior strategist BGC Partners, a brokerage	
firm in London. 'It gives discounts that it can ill afford to	
give.' Thus, most of the recent expansion has been outside	
the euro zone and toward growth markets. Airbus is about	1
to start assembling some A320 planes in China, a fast-	() () () () () () () () () () () () () (
growing market. The company gets half of the doors for	
the A320 from Hindustan Aeronautics, an Indian	
company. Airbus also had big plans to start building the	
cargo version of its A330 in Mobile, Alabama, until its	
U.S. Air Force contract to produce refueling tankers, based	
on the A330, was thrown into jeopardy this year. Still, the	
company is moving ahead with plans to ship some of its	
production in France to Tunisia. Thomas Enders, the	
Airbus chief executive, said last Friday that 30 percent of	
the airframe of the <i>Qantas</i> A380 had been outsourced, half	
from suppliers in the United States. The level of airframe	
outsourcing on the wide-body A350 will be 50 percent ,	
Enders said. Though <i>Airbus</i> employees have not walked	
off the job en masse, that does not mean they are	
unconcerned about greater amounts of production	
being done outside the company and outside Europe.	
Workers fear that Airbus will make itself more	
vulnerable to delays if it loses control of core	
competencies, especially on new technologies like the	
lighter composite materials that will replace the aluminum	
and alloy fuselage on the new A350. This plane is the	
intended competitor to the Dreamliner 787, which has	
slipped behind Boeing's original production plan and may	
have been further delayed by the strike. Airbus said in	
May that Spirit AeroSystems, a former Boeing subsidiary	
based in Wichita, Kansas, would design and produce part	
of the central fuselage of the A350 at a new factory in	
North Carolina. An Airbus union official who had taken	
part in recent talks with managers expressed concerns	
about working with outsiders. 'With the A380, we didn't	
master all the production inside the group, and we are	
even more anxious with partners we don't know and	
who don't know our processes,' he said, speaking on the	
condition of anonymity because of the sensitive nature of	
relations with management. 'Airbus was solid enough to	2
support the cost of the A380, but we are not sure it can	
support the A350 if it is delayed.' Enders said Friday	
that the fear of losing control of its critical operations	
was a legitimate concern. 'That would be a danger if	
we didn't know what our core competencies were,' he	
said. 'But we've done studies into what should be core	

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L					and what noncore. There are risks to this concept, but	
I					I'm optimistic we can manage it.'	
I						
L					Geoff Dixon, the chief executive of Qantas, who had	
L					waited two years and two months for its first A380 and	
L					who had expected to have 8 to 12 by now, said Friday that	
L					he was not especially concerned about potential delays.	
L					Dixon said that Qantas had ordered 20 of the superjumbos,	
L					with options for 4 more, and that he intended to exceed	
L					number on order. 'Both Boeing and Airbus have	
L					outsourced,' he said. 'We can be critical if they don't	
L					meet deadlines. But with airlines also trying to find	
L					more efficient ways to run their business, we can	
L					understand it."	
ŀ	2008	Boeing	Firm	α	"Over the past 20 years, air travel grew by an average of	On a
I	2000	"Curre	1 mm	~	4.8 percent each year. This was despite two major	modular
I		100 C			world recessions, terrorist acts, the Asian financial	enterpri
	12	nt Market			crisis of 1997, the severe acute respiratory syndrome	se
I		Outlook			(SARS) outbreak in 2003 and two Gulf wars. During 40	architec
I		2008-			years of producing the <i>Current Market Outlook</i> , we have	ture
L		2008-2027"			learned that the resilience of air transport growth comes	being
I		2027			from its intrinsic importance to the livelihood of people	unconse
I					around the world.	rvative
L					around the world.	in
L					On anonage even the next 20 years, passanger travel will	represen
L					On average over the next 20 years, passenger travel will	tation of
L					grow at 5.0 percent and cargo at 5.8 percent. The fastest	data.
L					growing economies will lead the transformation into a	uala.
L					more geographically balanced market. More productive,	Innorm
L					new airplanes will play a greater role, and there will be	Ignores
L					relentless pursuit of further environmental progress."	the fact
L						that
L						global
L						populati
L						on
L						growth
I						rates
						have
						already
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I						decelera
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I						Assume
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I						will
						occur at
I						a lower
						rate
I						than
						experie
I						nced in

					the past.
28 Sept. 2008	Bloggin g Stocks, "Airbus Gets a Leg Up on Boeing" (Dougla s A. McIntyr e)	Firm- Investo rs- Labor	α & β	"It is hard to do business, make sales, and drive profits when your company is shut down by a strike. It also aids the competition. <i>Boeing Co.</i> is finding that out the hard way. According to <i>Bloomberg</i> , ' <i>Airbus SAS</i> , starting its first aircraft assembly today outside Europe, said it may buy up to \$1 billion of components from China by 2020, as the world's most populous nation may need 3,000 planes in the next 20 years.' By putting a plant inside China and offering to put money into the economy, <i>Airbus</i> is making best friends with the central government, a move that is almost certain to garner significant orders from the nation's commercial airlines. <i>Boeing</i> management made a huge mistake by allowing its machinists to go out on strike instead of improving their compensation packages enough to keep the	the past. Contrast ing modular and integral approac hes to labor & investor s.
29 Sept. 2008	The Seattle Times, "Simme ring Boeing Strike	Firm- Labor	α	company operating. Boeing said that its margins could be hurt by the size of the deal the union wanted. The machinists knew better. They could see the size of the Boeing back-orders for products like the new Dreamliner going out for years and year driving higher and higher sales. Each day that the strike goes on, Boeing risks losing more customers to Airbus. Management has not done the shareholders any favors." "With the aviation business teetering on the edge of a major downturn, however, Boeing management remains adamant the company must rein in long-term costs and cannot offer concessions on job security. Boeing also knows that making big concessions increases the chance of another strike in 2011. And sooner than that, any job-guarantee commitment to the IAM invites	Manage ment of Modlua r Enterpri se Archite
	Scorchi ng Both Sides" (Domini c Gates)			 matching demands from the Society of Professional Engineering Employees in Aerospace, the engineering union that has just begun contract negotiations. Most Machinists display a firm resolve to stay out, while handling the strike in individual ways. On Thursday, Jayleen Roman, a younger machinist on the 787 program, began a 10-day Hawaiian vacation with her parents. Her dad is a 28-year veteran machinist. They had long planned and saved for both the vacation and the strike. 'We're ready to stay out as long as it takes,' said Roman. Stephen Watkins, an electrician on the 777 program, has been building a fence for his brother-in-law while on strike, and will move on to do some work for his father-in-law. Like many veterans, Michael Spears, a team leader on the 777 jet program in Everett, has borrowed from his 401(k) retirement funds and set aside money for his mortgage payments through January. If the strike lasts a month or two, he expects to repay the loan from a signing bonus typically part of any IAM strike settlement. If it's more drawn out, he said he'll plan to work until 57 instead of retiring at 55. For now, Spears is enjoying the break from the heavy noise and vibration of his workplace. 	cures views job- security as a long- term cost, without seeing it a a source of long- term producti vity increase s, and therefor e a route towards reining-

			'For the past 18 months I've been working 10-hour days, seven days a week, sometimes a month straight. My body is appreciating the downtime.' Blondin says the possibility of a downturn in aviation — with the potential for layoffs at <i>Boeing</i> — makes the union demand for an end to outsourcing 'that much more important to fight for now. 'We need to get that job-security stuff solved first and the rest is doable,' he said. Kight counters that the option to outsource work or slow production in a downturn is key. <i>Boeing</i> , he said, must be able to 'react nimbly to what can be very sudden and dramatic changes in our marketplace.'	in long- term costs.
29 Sept. 2008	The Seattle Times, "Simme ring Boeing Strike Scorchi ng Both Sides" (Domini c Gates)	Firm	"A Seattle Times analysis using the company's online wage and benefit calculator shows that the current offer over three years gives the average Machinist approximately an extra \$22,000 over the 2008 compensation level. (The company has said the contract adds \$34,000 but it acknowledges that figure ignores substantial extras included in 2008 pay, including a lump-sum bonus.) Average pay with overtime and bonuses, all totaling \$68,000 in 2008, will rise to \$80,000 in 2011, said <i>Boeing</i> spokesman Tim Healy. Based on those averages, the company offer would increase <i>Boeing's</i> total annual cost for its IAM work force by some \$550 million, from \$2.43 billion this year to about \$3 billion in 2011. <i>Boeing</i> must weigh its goal of capping those future costs against the reality of profits drained away in the present. After the 2005 Machinists strike, which lasted 28 days, <i>Boeing's</i> regulatory filings pegged the hit to its profits at up to \$300 million for that year. However, those filings do not reflect the full financial impact because Boeing spreads its program costs over hundreds of airplanes and about four years of production. ' <i>Boeing's</i> accounting disclosures don't reveal the true cost of the strike,' said an analyst at a Wall Street firm that doesn't allow him to be quoted. A solid estimate for the real cost of the 2005 strike is revealed in an internal <i>Boeing</i> document obtained by <i>The Seattle Times.</i> It was prepared for then-Chief Executive Alan Mulally and his senior management team in October 2005, soon after the Machinists went back to work. The document projected that over a four-year period through the end of 2009, the net loss of profits due to the 2005 strike would be just over \$700 million. That figure included profits deferred from the planes not delivered during those four years, as well as more than \$200 million in "abnormal costs" including penalties paid to suppliers. The implication of the projection is that three years after the 2005 strike — and in the first month of a new IAM strike — <i>Boe</i>	On the non- systemi c hidden costs behind a strike in a modular enterpri se architec ture.

29 Sept. 2008	Washin gton Post, "Clearer Skies May Be Ahead for Boeing" (Klana Polyak)	Firm- Investo r	α	through to today. Extrapolating from the 2005 projection, based on today's much higher production rates and profit margins, the Wall Street analyst estimated that the total hit to profits for a one-month strike now would be at least \$1.3 billion. Balancing that, <i>Boeing</i> has plenty of money in reserve: more than \$10 billion at last report, compared with \$8 billion three years ago. 'The company is in a strong financial position should this situation get extended,' said Kight." "Then there's the 15-month delay of introducing <i>Boeing's</i> much touted fuel-efficient jet, the 787 Dreamliner. The program has been delayed four times. Should the strike continue for more than a few weeks, delivery of the Dreamliner could be pushed to 2010. Delays notwithstanding, the Dreamliner's potential is huge. 'Long-term,' says Fletcher Perkins, an analyst with <i>Hillman Capital Management</i> , 'it will turn into a very good profit source for <i>Boeing</i> .'	On a modular enterpri se architec ture's understa nding of comple xity.
8 Oct. 2008	Bloomb erg "Boeing , Union Say Crisis Won't Break Stike Resolve " (Susann a Ray)	Firm- Labor	α	"Boeing Chief Executive Officer Jim McNerney told employees in an Oct. 6 memo that the 'ongoing turmoil in the financial markets' shows why it's important for the company to be able to react quickly and not restrict its competitive moves through job promises. "Decisions on where to place work, to whom, when, must be owned by the company; that is a boundary that we're not going to cross," Kight said in an interview yesterday at <i>Boeing's</i> commercial-plane headquarters near Seattle. 'We are also not in a position, nor is any other employer, particularly when you look at what's going on in the world today, to guarantee employment.""	On a modular enterpri se architec ture's inability to acknowl edge how integral enterpri se architec tures guarant ee lifetime employ ment, in the face of challeng ing exogeno us events.
9 Oct. 2008	Forbes "The Upside of Downsi de for Boeing" (Carl	Firm	α	"Paul Nisbet of JSA Research beleives the recent global financial turmoil has brought added pressure on union members to start working again. 'I'm sure many of them have lost money in the market and in pension plans, Nisbet said, 'and as the situation has changed there are quite a few minds that have changed as well.' Although Nisbet believes <i>Boeing</i> will give in to some extent on higher wages, better provisions for health care and pensions, he	On commo nality between modular enterpri se architec

	Gutierre			expects the company to be steadfast in its stance on its	ture's
	z)			ability to outsource. 'I think Boeing's view on outsourcing is if it does give in it will lead the aerospace industry down the same path as the auto and airline industries have seen,' Nisbet said."	views across the aerospa ce, airline and automot ive industri es (the three industri es of the theoreti cal sample in this research).
9 Oct. 2008	Seattle Post Intellige ncer "Strikin g Machin sts Rally Around Union Leaders Before Talks Resume " (James Wallace)	Firm- Labor	α	"'We don't want subcontractors in our workplace setting up parts distribution centers. That's our work," [IAM Preseident] Blondin said. 'We will work with the company on lean activities and process improvements, but the IAM has to be a partner in that,' he added. 'But we are not going to have suppliers come in while our members are being laid off. That's really what it is all about. That's part of job security.' Boeing knows the union's position, so the fact the company is willing to start talking again is an encouraging sign it may be willing "to move" on this issue, Blondin said. 'I hope they are not wasting our time.' The other big issue that could prove difficult to reach agreement on involves outsourcing. The union wants more opportunity to compete for work that <i>Boeing</i> is contracting out. 'We are not looking to shut them (<i>Boeing</i>) down globally,' Blondin said. But what the union will insist on in any new offer, he said, is the right to bid on future work that <i>Boeing</i> wants to outsource. 'We don't get a look at the work that goes out the door day to day throughout the country, much less the overseas stuff,' Blondin said. 'We get a very narrow slice to look at. If the company determines that it is emergent or temporary, we don't get to look at it. What we are saying is that 'emergent' is not work that goes out for a year. If you are going to call it emergent or temporary it better be short term.' He said the union wants language in the contract that allows it to bid on that work. 'We want to be able to compete with all things considered, including material costs, labor costs, delivery costs and rework costs. The whole works,' Blondin said.	On a union's more integral approac h in working with a modular enterpri se architec ture.

					and mechanics from those carriers. They came to show	
					support for the <i>Boeing</i> strikers."	
10 Oct. 2008	Forbes "Boeing Shares Sink As Analyst Cuts Projecti ons"		Firm	α	"Goldman Sachs analyst Richard Safran lowered delivery forecasts for the Chicago-based airplane maker to 462 aircraft in 2009, down from an earlier estimate of 489, and 392 in 2010, down from 524. 'We believe that the inability to obtain financing will cause customers to defer or cancel orders,' he wrote in an investor note. 'As a result, we believe (<i>Boeing</i>) will lower production rates.'"	On a modular enterpri se architec ture's use of "exogen ous" events to drive growth/ contract ion plans.
10 Oct. 2008	Seattle Post Intellige ncer, "Analys t: 787 Won't Deliver Until 2010" (James Wallace)	Kataua	Firm- Labor	a	"Here is part of what David Strauss of UBS Investment Research said in his report Friday: "Watching flights into Paine Field in Everett: We are tracking movements of Boeing's modified 747 "Dreamlifter" fleet to gauge the progress of 787 production. Specifically, we are monitoring Dreamlifter flights into Snohomish County Paine Field Airport (KPAE) in Everett WA, adjacent to 787 production, to gauge the pace of shipments from the major structural suppliers. Major structural components are delivered via the Dreamlifter fleet to Boeing in Everett and include the wings from Japan, aft fuselage from Charleston SC, center fuselage from Italy (via Charleston), and forward fuselage from Wichita KS. Strike halts already slow-paced structural deliveries: We did not track any Dreamlifter flights into Everett in September as Boeing has apparently halted all 787 deliveries from its suppliers given the ongoing Machinists strike. We continued to track some center fuselage deliveries to Charleston. Flight test program now unlikely to complete prior to early 2010: Even prior to the Machinists strike that began in September, the slow pace of structural deliveries had led us to believe that Boeing was highly unlikely to hit its revised 787 flight test schedule. Boeing has now missed the scheduled assembly complete dates for the first three flight test aircraft and we believe the flight test program is unlikely to complete prior to early 2010.""	On the true effect of a strike on the delay of the 787.
20 Oct. 2008	Busines s Week "How Toyota Plans to Beat the Downtu rn" (Ian Rowley)	Katsua ki Watan abe, Preside nt of <i>Toyota</i> <i>Motors</i>	Firm	β	"After taking over as <i>Toyota</i> (TM) president in June 2005, Katsuaki Watanabe regularly warned of the dangers of complacency creeping in at the Japanese automaker (<i>BusinessWeek</i> , 3/5/07). But until recently, it was a tough message to get across. The company was doing too well: In the year through March 2008, <i>Toyota</i> sold 8.9 million vehicles, an increase of 32% over five years, while its net profits rose 53%, to \$17 billion. This year it will likely overtake <i>GM</i> (GM) to become the world's largest carmaker. These days, though, Watanabe need only point to <i>Toyota's</i> stock price to keep employees' feet on the	On how an integral enterpri se architec ture manage s in a low- growth

					ground. Since the beginning of the year, Toyota's shares	environ
					have fallen 37%. While roughly in line with Japan's	ment.
					benchmark stock index, the performance isn't much	
					better than troubled GM, whose stock is down 39%.	
					And Toyota's recent sales, though not nearly as bad the	
				6	Big Three's, hardly instill confidence. Some analysts are	
					sounding the alarm. In an Oct. 10 note to investors,	
					NikkoCitigroup auto analyst Noriyuki Matsushima	
				1, 1	predicted 'a sudden and substantial earnings decline' for	
					Toyota. 'We believe Toyota needs to draft a new	
				1	strategy that changes its existing course and includes	
					initiatives to secure appropriate sales volumes,' he	
					wrote. Lowering his projections for the current fiscal year,	
					Matsushima expects Toyota to post operating earnings of	
				0	\$11 billion, a 50% decline compared with the year that	
					ended Mar. 31, and \$5 billion less than the company's	
					projection. Time for investors to bail out? Not exactly.	
					Even if Toyota's earnings drop by half this year, the	
					company's operating profits are still likely to exceed	
					\$10 billion. And with a solid balance sheet, more than	
					\$20 billion in cash, and a slew of new car initiatives,	
					Toyota is better placed than most automakers to	
					weather economic uncertainty. 'Once [Toyota	
					executives] have made the decision to do something,	
					they can get on and do it without having to arrange	
					financing,' says Andrew Phillips, an analyst at KBC	
					Securities in Tokyo. For now Toyota's problems seem	
					minor compared with the Big Three's	
					(BusinessWeek.com, 10/7/08)—and it's moving to keep	
					it that way. <i>Toyota's</i> bulging coffers will help it most in	
I					the U.S. There, it's using the cash—\$3 billion at its U.S.	
					financing unit, as of the end of June—to plug falling sales.	
					Facing an increasingly severe slowdown and growing	
					inventory, <i>Toyota</i> on Oct. 3 began offering for one month	
					interest-free financing on 11 models, including the	
					Corolla, Camry, and Tundra full-size pickup. The risk, say	
					critics, is that 0% financing could undermine car-resale	
					values and hurt the brand if the company decides to extend	
					the offer. <i>Toyota</i> is also taking radical steps at its North	
					American factories. After opening a plant for big Tundra	
					pickup trucks in San Antonio in 2006, the company has	
					since curtailed production. It also has suspended	
					production at three U.S. plants for three months in August	
					to retool them so there's more emphasis on smaller, fuel-	
					efficient models. (It's not letting go of the 4,500	
					workers, though; they're keeping busy by doing	
					everything from training programs to filling in at	
					assembly lines elsewhere or volunteering in local	
					communities.) And for the first time, its hot-selling Prius	
					gas-electric hybrid will be built in the U.S., at a plant in	
					Mississippi—a move that will help it meet a target of	
					selling 1 million hybrids a year early in the next decade."	
21	The	Dar	Finne	0	"As <i>Boeing</i> and its engineering union prepare to sit down	On a
21 Oct	The	Ray	Firm-	α		on a modular
Oct.	Seattle	Gofort	Labor		next Tuesday for intensive contract talks, the perennially	1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.
2008	times	h,			contentious issue of outsourcing looms alongside the	enterpri
	"Boeing	executi			bread-and-butter questions of pay and benefits. Boeing's	se

	ve	technical work force, much like the striking Machinists, is	architec
, SPEEA	directo	anxious over the global-partner strategy used on the	ture's
will	r of the	787 Dreamliner as well as the hiring of thousands of non-	agency
Tussle	Societ	Boeing engineering contractors for in-house work. Ray	issues
over	y of	Goforth, executive director of the Society of Professional	between
Outsour	Profess	Engineering Employees in Aerospace (SPEEA), says the	manage
cing"	ional	787 outsourcing has produced program delays	ment
(Domini	Engine	unprecedented in <i>Boeing</i> history and has fueled	and
c Gates)	ering	'disdain for corporate management.' 'We want to	labor.
e Gates)	Emplo	make sure they never make this disastrous decision	
	yees in	again,' said Goforth, 'We would like the professional and	
	Aerosp	technical community to have a serious say in how future	
	ace	production systems are set up.' Across from Goforth	
	(SPEE	when main-table talks begin next week at the SeaTac	
	A);	Doubletree Hotel will be Mike Denton, vice president of	
	Mike	engineering for Boeing Commercial Airplanes. Denton	
	Denton	won't promise the union a say in organizing future	
	, vice	programs but says Boeing will address the errors it's	
	preside	made in the Dreamliner's design and production. On	
	nt of	its next plane after the 787, Denton said, Boeing plans	
	engine	to keep in-house some of the major work. Ahead of the	
	ering	talks, the two negotiators have opposite perceptions of	
	for	the mood of the technical work force. The Machinist	
	Boeing	union has been on strike against Boeing for more than six	
	Comm	weeks. And the looming recession must give pause to	
	ercial	anyone who contemplates forgoing a paycheck. Yet	
	Airpla	Goforth puts the chance of avoiding a white-collar strike	
	nes	at no better than 50-50. He says preliminary talks in	
		the past few months have gone badly. Goforth	
		complains <i>Boeing</i> officials have not engaged in genuine	
		discussion, instead rejecting union proposals out of hand, which he said will infuriate his members. 'If	
		[management] don't understand that, they are fools.	
		They know nothing about collective bargaining,' said	
		Goforth. 'And they will lead this membership to a	
		strike that is absolutely unnecessary.' But Denton sees	
		an engineering work force with restored morale and a	
		renewed faith in the company. He says that in 2000 —	
		when the union had its first and only extended strike —	
		many employees feared <i>Boeing</i> was on its way out of	
		the commercial-jet business. 'Today, people don't	
		doubt that we have a future,' said Denton. Denton said	
		that in meetings with his engineers he doesn't detect the	
		heightened anxiety he hears from Goforth and other	
		SPEEA officials. 'I truly hope they are wrong.' Boeing	
		engineers earn on average almost \$89,000 a year in base	
		salary, and technical staff average about \$67,000,	
		according to SPEEA. Overtime and incentive pay increase	
		those averages to \$108,000 and \$82,000, respectively,	
		according to Boeing.	
		Goforth, 40, has a youthful vigor and charisma. With a	
		rakish twinkle in his eye, he rattles off energetic threats	
		to Boeing with machine-gun delivery. The first in his	
		family to go to college, Goforth grew up 'working poor' in	
		Los Angeles, built an early career in social services, then	

went to law school. He worked his way up to a job in Seattle as strategic adviser with a local government employees union. Goforth took the top staff job at SPEEA at the start of this year. A month later, he signaled a startling new SPEEA militancy when he warned union members they should begin to save for a possible strike. At that stage, preliminary talks had barely begun. He says technical workers' frustration with Boeing's executive leadership is 'the culmination of years of being ignored, of having their experience discounted and of having to clean up the messes.' The design work done by Boeing's partners on the 787 or by Russian engineers at Boeing's design center in Moscow often 'comes back all screwed up,' he said, and his members must work constant overtime to fix the problems. And he says Boeing's use of a few thousand nonunion contractors to do in-house engineering work will leave the company ill-equipped to recover on future jet projects. 'What happens when the next program runs into development problems? They won't have the internal capacity to dip into to fix it,' said Goforth. SPEEA is proposing restrictions on Boeing's use of contractors to do engineering work. And Goforth will push the broader demand for more say in how future airplanes are designed and built, even though it's unclear how exactly that might be incorporated into the contract.

Denton, 53, a 31-year technical veteran of Boeing Commercial Airplanes, was a SPEEA member before joining the management ranks in 1988. Now Boeing's chief liaison between the executive leadership and the technical staff, he says, 'I think of the engineers as my team.' His father flew Air Force bombers in World War II and the Korean War, and was briefly a pilot for United, says Denton, so 'aviation is sort of in my blood.' Denton said Boeing has hired so many contract engineers to avoid pitching union members into a roller-coaster 'hire-and-fire cycle.' When the 787, the 747-8 and the 777 freighter all finally start production, there'll likely be a lag of some years when fewer design engineers are needed. Boeing can let the contractors go and keep its core technical team, he said. And he believes work-force morale is far better than at the time of the SPEEA strike in 2000. Denton recalled the 'depressing environment' at Boeing then: Executives had halted several new airplane developent programs, and then-company President Harry Stonecipher hit a nerve when he pushed for a profit-driven approach to replace what he called Boeing's 'family' culture. Today, Denton said, 'a lot of those wounds are healed,' because Boeing has combined 'the good of Harry's message with the good of the traditional Boeing culture.' 'I'm not shy of talking about family,' he says, but 'you have to recognize, too, that you are in business.' He concedes the outsourcing of the detailed design of major parts of the 787 -Mitsubishi of Japan does the wing, for example - has

					become a major issue for the technical work force as the	
					program has faced major delays. 'Some would have preferred doing that design work,' said Denton. 'The fact that they are having to fix it later is doubly irritating.' But Denton said that as a result of the lessons learned on	
					the 787, <i>Boeing</i> is likely to keep in-house 'some part of major production' on the next airplane. 'We want to	
					be on the leading edge of technology,' he said. 'Whether it's all of a wing, or all of the fuselage, or some [other] part of production — all of that is to be figured out.	
					But that's the general direction we will go."	
21 Oct. 2008	Busines s Week, "Pressur e Builds for Boeing and Machin sts to Settle" (Joseph		Firm- Labor	α	"Indeed, the union contends it has been willing to compromise, particularly around the sensitive issue of outsourcing. In the recent talks, for instance, the IAM suggested it would let suppliers enter factories and deliver parts to receiving areas near assembly lines, where the parts would then be transported further by IAM members. The arrangement could protect some 2,000 jobs, the union says. But the company argues it needs more flexibility than that, including the ability to cut jobs if needed. 'They want to put a bubble around these 2,000 jobs,' says <i>Boeing</i> spokesman Tim Healy. 'There's no way,	On a modular enterpri se architec ture's mis- aligned objectiv es between
	Weber)				especially in this economy, we can agree to preserve the jobs in perpetuity.'"	manage ment and labor.
Fall 2008	MIT Sloan Manage ment Review, "The Manage ment Lessons of a Beleagu ered Industry " (Michae I S. Hopkins)	MIT Sloan Prof. Thoma s A. Kocha n	Firms	β	"Southwest's model is a difficult model [to copy] because in some respects it's a bit anti-American." "The two most financially successful airlines in the world are Ryanair Holdings plc, in Europe, and Southwest, headquartered in Texas. Both emphasize low unit costs. That is, providing a service at low cost. The fundamental difference is that Ryanair get there by minimizing labor costs, by squeezing employees, by adopting very harsh working donditions, by high levels of turnover so that costs don't build over time. Whereas Southwest gets to low cost by emphasizing improved productivity [and] loyalty on the part of employees so they stay a long time and use their skills and knowledge to build a successful airline that meets customer service needs [and] that is designed with a work system that miximizes employee ideas and discretion for solving problems and achieving their financial objectives. So you have two highly successful airlines in financial terms but, on the one hand, Southwest does it by engaging employees, and Ryanair does it by squeezing employees are among the highest paid. They've moved to that position as the legacy carriers have either gone into bankruptcy and lowered their wages or cut wages through concessions outside of bankruptcy. Ryanair has taken some of those same attributes from	labor. On the differen ces in how modular and intergral enterpri se architec tures pursue "cost leadersh ip" in the airline industry – i.e. via <i>flexibilit</i> y and commit ment respecti vely.

22 Oct. 2008	Thomso n Reuters Researc h, excerpt from "The Boeing Compan y, Q3 2008 Earning s Call Transcri	Jim McNer ney, Chari man and CEO; James Bell, CFO, <i>The</i> Boeing Compa ny	Firm- Investo r	α	Southwest, but said, 'All right, we're going to do this but we're going to do it bare bones and make sure we don't get unions.' Ryanair has certainly been successful in keeping their costs down, just in a very different way from Southwest. Southwest said, 'Look, we're in the airline industry, just about everyone is unionized, we need to get off the ground, we need political support, we don't want to have theses battles.' Southwest is a low-fare competitor, and they've had high-quality jobs. They make sure they hold their employees accountable for providing the productivity that warrants a higher wage. If you look at evidence across industries, we see productivity differences between 20% and 35% among companies that have high-quality employee- management relationships and those that have standard labor-management relationships. That's an enormous number." (Note: [ph] means "problems hearing" for the transcript). "Joe Campbell (Barclays Capital): Yes good morning. My one part question is for James and it's about the Boeing commercial margins in the quarter. In the last quarter, we saw some issues related to overhead absorption related to the 787, and I suppose there is some extra block [ph] pressures from the strike that will be recorded in the margins going forward. And I wondered what was going on with the margin before R&D, at the program level not the unit level where we will see the strike, and whether these margins reflect their estimate of the impact of the strike, the ongoing strike, the recovery, the extra cost, as well as whatever is left over from that absorption issue?	On a modular Enterpri se Archite cture's defense of its finanaic al perform ance
	s Call				ongoing strike, the recovery, the extra cost, as well as	

		full block for the production airplanes. So I'm struck by how much the margins went down. So apparently, I mean I know you're not giving '09 guidance but unless something changes, your current estimate to complete the blocks is significantly lower than it used to be.	
		James Bell: No, I think the available margins – the margins that are on the airplanes, particularly those that slid out both due to the strike and the galleys, these issues are pretty, and so the impact on earnings this quarter is more significant as a result of that. In terms of the difference between what we would expect versus what we recorded, because as you know on the galleys, it is mostly the white [wide?] bodies that moved out, Joe.	
		Joe Campbell: But I'm still confused James with that, and we can do it offline if you want, but I mean if the program is coming, it would reflect the difference between unit and program, it would cause that thing to be really big and talk about the program margins [ph].	
		James Bell: Yes, the difference between unit and programs are large.	
		<u>Joe Campbell:</u> Yes, I know. That's what I say, but I don't understand why that would affect the program margins, unless you had made some big adjustments about what the future costs would be.	
		James Bell: Well, we did not make, we actually put the strike impact in there as well but if we excluded the strike impact and if we excluded the slide out, the program margins would have been 11%, about 11.1% in the operating. So and the pre-R&D margin would have been in the range we've always talked about around 30%.	
		<u>Robert Spingarn (Credit Suisse)</u>: Jim, you referenced two cancellations and 80 deferrals this year and talked about offsetting demand for those slots, but a little more color please. Are these generally front-ended in the backlog and has the pace of these types of discussions changed recently, and how should we think about strike deferred airplane supporting rates next year and in 2010?	
		Jim McNerney (<i>Boeing</i>): Well, first of all, the cancellations and deferrals are pretty much in line with what we've experienced over the last three or four years, and we still have a – I would say, a significant overhang of demand, people who'd like to move their positions forward if other want to move them	

out. Now, I would say the discussion slightly more, but I would not say step function more discussion along those line. So we're monitoring it very closely. But I think it does speak to the fact that a lot of our backlog is in economically strong parts of the world. I think that speak – and that our airplanes are relatively productive compared to their fleets that things were hanging in, but we're monitoring it very closely. In terms of the impact on production rates, again, the – we have steadily increased production rates in a measured way over the last few years, as you know. We have tried hard to meet demand without getting beyond our headlights, so to speak and I think that's serving us well now, because I – we'll provide guidance going forward once we understand exactly where we are post strike. But we're feeling good about our production rates over the next couple of years. But we want to make sure we understand the impact of – any impact of the strike before we give you a definitive answer to that question.	
Howard Rubel (Jefferies): I want to go back to an operational question and sort of use the 747-8 as the paradigm. I mean, you have again that looks like a charge or additional costs associated with that program. And if we kind of look, there's been – whether it's been the AWACS or the airborne early warning control or even the 787, you had just a series of what I call development misses relative to what normally Boeing is able to do. So, what are you doing to go back and look at program management or operational management to not have these misses?	
Jim McNerney (Boeing): On the BCA side, I think the 87, we're trying to learn from that. I think, in retrospect, we bit off more than we could chew. New composites, new design tools, new production process, global responsibility for design as well as production. I think there is a lot to learn from how we did that. There's a lot of good and there's some bad, obviously, that we are committed to learn from and hopefully, you'll see that reflected in some of our newer programs. On the -8, we're not particularly proud of how that is sorting out but we'll get that program done. And it's one that – it's suffered from a few mis-assumptions that we've caught up on now, and we're going to get fixed.	
Howard Rubel: And so when we look at some of this, there's – I mean, I don't think it's systemic. I mean, it just – I mean, what you've done to solve the problem, I mean, it's just not costing. I mean, it's process as well and I mean, could you just elaborate for one more moment on what sort of process changes you've done to help me feel more comfortable looking forward?	

		David Strauss: Yes, I guess what I was getting at was are you approaching a position where you think you might have to take a forward loss?	
		<u>James Bell:</u> No, that's why we're saying that there is none.	
		Lynn Lunsford (Wall Street Journal): Thanks. I wanted to ask a question regarding the strike and the situation where both sides of this dispute seemed to be pretty well dug in on the issue of – well for the union, it's job security and I think you and Jim had said it was management rights. But, I guess the thing that I'm trying to get a sense of this do you think there is a compromise in that area that would be possible without one side or the other completely capitulating?	
		Jim McNerney (Boeing): Yes. I think there's a way forward, Lynn, to be honest with you. I think the management rights issue is one that leaves us with the ability to manage our business. I think having said that, I think there's a way to work with the union to meet some of their goals and in fact I think discussions that are starting up again tomorrow – the federal mediated discussions that are starting up again tomorrow, although it is impossible to predict success or lack of success, I think both sides are approaching it with a constructive headset. So maybe we can find a way forward here.	
		<u>Lynn Lunsford:</u> Do you plan to get involved in these at some point?	
		Jim McNerney: I'm involved in the strike on a day-to-day basis and so I think Scott will be the lead – Scott and Doug Kite will be the lead negotiator as they always have been but I'll be involved 24/7.	
		Tim Klass (Associated Press): The last three Boeing strikes, both of the machinists and with the engineers' union have been settled only with the Boeing CEO and the President of each parent union getting together to reach a final agreement. Do you plan to be at the table or are you ready to be at the table directly in these talks that are resuming tomorrow?	
		Jim McNerney (Boeing): Well, like I say, your first statement wasn't true. I mean we've resolved strikes with a variety of people at the table, usually led by the commercial airplanes business leader who runs a \$37 billion business for whom the striking employees work. So like I say, I'm involved deeply. I've had a number of conversations with the union leadership, and I am open to be a constructive force in	

	this thing any way I can be, while also leading the company in a way that I think is best.	
	<u>Tim Klass:</u> Can you elaborate on the conversations you've had with the union leadership?	
	Jim McNerney: Not particular. I mean, I think the nature of these things are private constructive discussions and I think both of us would just assume they stay that way.	
	<u>Susanna Ray (Bloomberg News):</u> You mentioned the possibility of having to send some workers home. Was that the engineers or who were you talking about? You mentioned the possibility of having to send some workers home, and I'm wondering if you're referring to the engineers or to whom?	
	James Bell (Boeing): Listen, what I was talking about that as the strike goes on, if it goes longer, we would have to looking at more significant action to manage the ongoing costs that would, if in fact it went longer enough, could include sending people home. Right now, there are no plans to do that.	
	James Wallace (Seattle P-I Newspaper): Yes, Jim, in a couple of your messages to your employees since the strike began, you've commented about how disruptive this continual labor problems are. When it comes time to find a site for your next all-new airplane after the 787, how much consideration or how much of a factor will these strikes and labor unrest be in deciding where to build that new airplane?	
	Jim McNerney (Boeing): Well, it's far too early to figure out where we're going to build a plane that we haven't designed yet. But listen, the workers, not withstanding the strike and not withstanding the frustration on behalf of our customers that I have about interrupting their lives on a pretty regular basis, I think we're – I'm a human being, I think we're all human beings who are frustrated by that. Not withstanding all that, the workers on Puget Sound, represented by the IAM, are very fine workers. And they do a good job and I'm anxious to get them back to doing a good job, and they can compete for any work that we've got.	
	James Wallace: If I could follow up, Jim, when Alan Mulally and Mike Bear came to Chicago to make the presentation for the 787 to be built in Everett, you were on the board. Were you considering at that time that a possible labor strike like this one was going to disrupt production of the 787 just as you got started?	

		Jim McNerney: I don't think that that was a front and center consideration, to be honest with you, back then. I mean, I think we were trying to find the best production structure. Alan, at that time, was trying to find the best production structure and the best place to build the airplane. And I think that issue gets front and center during a time like this when you're making an investment decision. It probably wasn't a huge factor.	
		Andrea Rothman (<i>Bloomberg News</i>): Yes, hello. A question for Mr. McNerney. Can you tell me, do you have a threshold for order members on the 747 AC before actually committing to build that plane? I know you have (inaudible). I'm not even sure if Eric has actually signed firm for the four that they announced in (inaudible).	
		Jim McNerney (<i>Boeing</i>): Now, we have committed to build the plane.	
		<u>Andrea Rothman:</u> Okay. So even if you only had 30 or so orders, you will still move forward with it?	
		Jim McNerney: Yes. I mean we have – I think the combined orders are somewhere in the neighborhood of about 100 and 110 or so which is, I would say, about average in terms of this stage in a program development. So we – while we're frustrated by the incremental cost we're seeing, that doesn't change our mind about getting this done for our customers. There is good demand for this plane.	
		<u>Andrea Rothman:</u> Okay, can I just follow up to get a clarification from Mr. Bell? There's a question about who you would send home if you – if you had to send workers home, you said we might have to send people home. Who would those people be? I mean is it engineers or?	
		James Bell: We don't know. We'd have to get to there and see.	
		<u>Andrea Rothman:</u> So you don't? Okay.	
		James Bell: No, we're not planning on sending anyone and we have no plan yet. I'm just saying it was a hypothetical discussion around if the strike continued longer, would you have to make different decisions and the answer to that is, yes, including what we would do to manage and conserve our resources both here and with our supply team and collectively we will figure out what's the right thing to do. In order to that including –	

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					Jim McNerney: Cost reduction.	
					James Bell: - and that would drive cost down until we got them back to work."	
23 Oct. 2008	The Seattle Times, "Boeing Profits Dive; Execs Admit Strike Isn't the Only Producti on Problem " (Domini c Gates)		Firm	α	 to work." "The quarterly results Boeing announced Wednesday revealed big problems with jet production beyond the Machinists strike. Boeing profit dropped 38 percent in the third quarter, hit not only by the strike that began Sept. 6 but also by a major supply-chain glitch: German supplier Sell was unable to deliver onboard galleys so that five to 10 wide-bodies couldn't have been delivered from Everett anyhow. And on a teleconference to discuss the earnings, Chief Executive Jim McNerney also revealed that another major airplane program besides the 787 Dreamliner is in trouble: the 747-8 update to Boeing's iconic jumbo jet is costing more than expected and the delivery schedule is under pressure. The results also show Boeing's cash and liquid assets slashed by \$3 billion for the quarter, due to the strike, 787 costs related to delays before the strike, and spending on several defense acquisitions. Company spokesman Todd Blecher said the hit to Boeing's cash position that can be directly attributed to the strike's impact during September is slightly less than \$1 billion. Boeing ended the quarter with \$7.2 billion in cash. The galley glitch was responsible for 25 cents a share or about \$185 million in net corporate profits and reduced the commercial unit's pre-tax reduction operating profits by about \$250 million. Boeing said that its supplier Sell is now "making good progress" and the galley problem should be under control after the strike ends. Had the galley problem not existed, those wide-body jets would not have been delivered anyway due to the strike. So arguably the full strike impact on profit would have been \$445 million in net earnings (or \$600 million to pre-tax operating earnings). On the 747-8, McNerney said 'We're not particularly proud of how that is sorting out, but we'll get that program done It suffered from a few 	On a modular enterpri se architec ture's systema tic problem s.
					program done It suffered from a few misassumptions that we've caught up on now and we're going to get fixed.'	
					In July, <i>Boeing</i> said it would conduct test flights of the plane in the fourth quarter. But Wednesday it said it would offer no further details on the plane's schedule until the strike ends."	
23 Oct. 2008	The Seattle Post Intellige	Jim McNer ney, Chair	Firm- Labor	α	"As <i>The Boeing Co.</i> and its striking Machinists union renew talks Thursday aimed at settling the 47-day strike, Chairman and Chief Executive Jim McNerney said there is room for compromise. 'There's a way to work with	On a modular enterpri se

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ncer, "Dooing	man		the union to meet some of their goals,' McNerney said	architec ture's
"Boeing	and		Wednesday during a conference call to discuss the	- 10 C - 10
's CEO	CEO,		company's third-quarter earnings, which were severely	systema
Sees	The		affected by the strike. Profits declined by 38 percent from	tic
Room	Boeing		a year ago and revenue dropped 7 percent. Boeing	problem
to	Compa		delivered 35 fewer planes in the quarter because of the	s.
Negotia	ny;		strike and a supplier issue.	
te"	Tom			
(James	Buffen		McNerney sounded somewhat optimistic that the strike,	
Wallace	barger,		which began Sept. 6, could be resolved during the	
)	nationa		upcoming talks in Washington, D.C., with a federal	
	1		mediator. But Tom Buffenbarger, national president of the	
	preside		International Association of Machinists and Aerospace	
	nt of		Workers, told The Associated Press after the Boeing	
	the		earnings call that he had not spoken with McNerney and	
	Interna		he was 'not optimistic' about a quick settlement, in	
	tional		part because he was told McNerney would not be part	
	Associ		of the talks. McNerney said there have been	
	ation		'constructive' discussions behind the scenes since the	
	of		last face-to-face talks abruptly broke off after only two	
	Machi		days on Oct. 13. Since then, both sides have continued to	
	nists		talk with the federal mediator. He decided earlier this	
	and		week to call the parties back to try to end the strike by	
	Aerosp		about 27,000 Machinists in three states. The major issue	
	ace		has been job security and the company's use of outside	
	Worke		vendors to deliver parts directly to planes in its plants	
	rs		work traditionally done by Machinists. The union has said	
			it must protect those jobs. McNerney was asked if there	
			were room for compromise. 'Yes,' he said, adding,	
			'There is a way to work with the union to meet some of	
			their goals.' He said both sides are approaching	
			Thursday's talks 'with a constructive (mind set), so	
			maybe we can find a way forward.' Although McNerney	
			is not expected at the talks, Scott Carson, chief executive	
			of Boeing Commercial Airplanes, will likely be there.	
			Buffenbarger of the Machinists may also join the talks at	
			some point. His office is in Washington, D.C. Boeing	
			believes there is a better chance of resolving the strike	
			with Buffenbarger part of the talks, sources said. But	
			Buffenbarger, who indicated he thought McNerney	
			should be at the talks, was quoted as saying, 'I'm not	
			going to make a deal until McNerney signs off on that.'	
			'I'm involved, deeply,' McNerney said. 'I've had a	
			number of conversations with union leadership and	
			I'm open to be a constructive force in this thing any	
			way I can be.' But, he said, Carson and the company's	
			labor chief, Doug Kight, are leading the negotiations	
			for Boeing. The strike will be in its 48th day Thursday,	
			which will match the third-longest strike by the union	
			against Boeing, in 1989. James Bell, Boeing chief	
			financial officer, said it might have to lay off workers	
			who are not on strike, if the work stoppage lasts a lot	
			longer, and some suppliers might have to shut down.	
			'Right now,' he said, 'there are no plans to do that.'	
			The consequences of the strike have been significant.	

23 Oct. 2008 29 Oct. 2008	Flight Internat ional, "Cost Jump for 747 Frustrat es Boeing" (Stephe n Trimble)) Seattle Post Intellige	Jim McNer ney, Chair man and CEO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i> Ray Gofort h,	Firm- Labor	α	McNerney said the galley problem has been pretty much resolved and should not be an issue after the strike. <i>Airbus</i> recently said that because of the financial crisis, it will not boost production rates as expected. But McNerney said <i>Boeing</i> production rates in place before the strike 'look good' for the near term." "Higher costs reported by the 747-8 development program in the third quarter are causing frustration with <i>Boeing's</i> corporate executives, but the widebody is continuing to make design progress despite the strike. <i>Boeing's</i> third quarter earnings statement released yesterday contains two references to 'additional 747 program costs', but does not elaborate. Jim McNerney, <i>Boeing</i> chairman, president and CEO, noted executives are 'frustrated by the incremental cost we're seeing' on the 747-8 during a conference call with reporters. <i>Boeing</i> spokesmen declined to detail neither the amount of nor the causes for the cost increases. 'We don't provide specific details on the issues the program is having from a cost perspective,' a spokesman tells <i>ATI</i> . <i>Boeing Commercial Airplanes</i> reported overall research and development costs at \$2.1 billion for the first nine months of 2008. The third quarter outlay amounted to \$705 million, or about 7% higher than the same period a year ago. As a derivative aimed at a 'niche' long-haul market, the 747-8 may be more sensitive to cost pressure than <i>Boeing's</i> new-build development programmes." "Some 14 months late and still not flying, <i>The Boeing</i> <i>Co.'s</i> 787 Dreamliner will serve as a symbolic backdrop at the bargaining table starting Wednesday when the	On a Modula r Enterpri se Archite cture's systema tic "conspir acy of optimis m"
					Boeing lost about \$250 million in profits during September because of the strike, or 35 cents a share, Bell said, while supplier issues were responsible for another hit of about 25 cents a share. Until the strike ends, Boeing said, it will not provide financial guidance or outlooks. The strike has also delayed Boeing's 787 Dreamliner, which was about 14 months late even before the strike. Each day the strike lasts results in at least a day's delay in all Boeing airplane programs, including the 787, McNerney said. But even when the strike is over, it will take some time to get the company's production system and its supply chain back up to speed, McNerney said. That will add to the delays caused by the strike. The longer the strike goes, the longer it will take to get the production system back to where it was before the strike, McNerney said. Boeing will update the status of the 787 program and its other airplane programs and delivery schedules once the strike is over. The biggest supplier issue involves a German company, Sell, whose galleys for Boeing widebody jets have been late. According to a striking Machinist on the Everett	
Oct.	Internat ional, "Cost Jump for 747 Frustrat es Boeing" (Stephe n	McNer ney, Chair man and CEO, <i>The</i> <i>Boeing</i> <i>Compa</i>	Firm	α	delivery schedules once the strike is over. The biggest supplier issue involves a German company, <i>Sell</i> , whose galleys for <i>Boeing</i> widebody jets have been late. According to a striking Machinist on the Everett flight line, at the time of the strike about a dozen completed 777s were awaiting arrival of <i>Sell</i> galleys. McNerney said the galley problem has been pretty much resolved and should not be an issue after the strike. <i>Airbus</i> recently said that because of the financial crisis, it will not boost production rates as expected. But McNerney said <i>Boeing</i> production rates in place before the strike 'look good' for the near term." "Higher costs reported by the 747-8 development program in the third quarter are causing frustration with <i>Boeing's</i> corporate executives, but the widebody is continuing to make design progress despite the strike. <i>Boeing's</i> third quarter earnings statement released yesterday contains two references to 'additional 747 program costs', but does not elaborate. Jim McNerney, <i>Boeing</i> chairman, president and CEO, noted executives are 'frustrated by the incremental cost we're seeing' on the 747-8 during a conference call with reporters. <i>Boeing</i> spokesmen declined to detail neither the amount of nor the causes for the cost increases. 'We don't provide specific details on the issues the program is having from a cost perspective,' a	Modula r Enterpri se Archite cture's systema tic "conspir acy of optimis
Oct.	Post	Gofort	1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	α	issues the program is having from a cost perspective,' a spokesman tells ATI. Boeing Commercial Airplanes reported overall research and development costs at \$2.1 billion for the first nine months of 2008. The third quarter outlay amounted to \$705 million, or about 7% higher than the same period a year ago. As a derivative aimed at a 'niche' long-haul market, the 747-8 may be more sensitive to cost pressure than <i>Boeing's</i> new-build development programmes." "Some 14 months late and still not flying, <i>The Boeing Co.'s</i> 787 Dreamliner will serve as a symbolic backdrop at	On a modular

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ncer,	SPEE	company and its 'other' big union start their final talks on	se architec
"Boeing Faces	A	a new labor accord. <i>Boeing's</i> engineers and technical	ture's
	Execut	workers in the Puget Sound area say the oft-delayed 787	
Talks	ive	represents everything that's wrong with outsourcing	adversar ial
With	Direct	one of the key issues that will be on the table, just as it was	
Second	or;	for the Machinists union. The Machinists, who have been	relation
Unhapp	Mike	on strike for 53 days as of Tuesday, will vote on a new	ship
У	Denton	contract Saturday. If a majority approve Boeing's latest	with its
Union"	, vice	offer, which was announced Monday, the strike will be	unions.
(James	preside	over and 27,000 Machinists could be back to building	
Wallace	nt of	airplanes starting Sunday night. Regardless of what	
)	engine	happens with that vote, Boeing now must try to make	
	ering	peace with its white-collar union known as SPEEA, which	
	for	represents about 21,000 workers, mostly in the Puget	
	Boeing	Sound area. The union, which has had only one walkout	
	Comm	of any length in its history, has not been shy in recent	
	ercial	weeks about throwing around the 'strike' word. Its	
	Airpla	contract with Boeing ends Dec. 1. Talks with Boeing	
	nes	during various committee meetings since March have not	
		gone well, according to SPEEA. 'I'm flabbergasted by	
		how badly Boeing has bungled these negotiations so	
		far,' said Ray Goforth, executive director of the Society of	
		Professional Engineering Employees in Aerospace. While	
		a SPEEA strike wouldn't shut down jet-making operations	
		like the Machinists strike, it would disrupt plane	
		deliveries, Goforth said, because engineers must sign off	
		on those planes when they leave the factory. And, given	
		the amount of engineering work needed to get the 787	
		ready to fly, that program would 'grind to a halt' if	
		engineers and techs walk out. To be sure, bread and	
		butter issues such as wages, pensions and medical will	
		take center stage during the talks. But what has happened	
		on the 787 program, and the 747-8 program,	
		underscores the union's growing frustration, Goforth	
		said. 'We want some kind of say in these future	
		decisions (around outsourcing),' Goforth said in a recent	
		interview. 'The company ignored the advice of its	
		engineering and technical work force in establishing	
		the 787 model. And every single disaster that has	
		befallen that program was predicted by SPEEA. We	
		are not saying we told you so, but if you listen to your	
		professional work force upfront you can avoid these	
		problems.'	
		Mike Denton, vice president of engineering for Boeing	
		Commercial Airplanes, will be among the company's	
		negotiators during the so-called 'main table' talks with	
		SPEEA at the SeaTac DoubleTree Hotel. The company	
		wants to present the union with its best and final offer	
		Nov. 11. Denton, a former SPEEA member,	
		acknowledged in an interview that Boeing made	
		mistakes with the 787 business model and will make	
		changes when it's time to develop the next all-new	
		airplane. Boeing engineers will have more of the	
		detailed design work and more oversight of	
		engineering work done by partners, and <i>Boeing</i> will do	
		sugareering work done by partners, and boeing will do	

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	more of the manufacturing, he said. Jim McNerney,	
	Boeing's chairman and CEO, has said the company went	
	too far in awarding global partners so much	
	responsibility for the 787. On past programs, Boeing	
	took the lead in manufacturing. But for the 787, Boeing's	
	partners in Japan, Italy, Kansas and South Carolina	
	produce the large composite structures and Boeing	
	workers assemble them in Everett. Boeing argues this	
	business model will significantly reduce the cost of	
	making airplanes. But its partners quickly fell behind	
	with the untested manufacturing and production system,	
	and Boeing engineers and Machinists have been forced to	
	play catch-up during final assembly of the first 787s. As a	
	result, the Dreamliner's maiden flight has slipped from	
	August 2007 until late this year. The Machinists strike has	
	probably delayed that until early 2009. Some customers	
	have been told their planes will be up to three years late.	
	Denton said he understands SPEEA members'	
	frustration about the 787 partner model. But Denton	
	and Goforth see the mood of the SPEEA work force	
	differently as the two head into the final round of talks.	
	Goforth said the engineers and tech people are fed up,	
	especially with Chicago, <i>Boeing's</i> corporate home.	
	'There is a sense that Chicago is ruining this company,'	
	he said. 'They actually want to get to a place where	
	Boeing doesn't manufacture anything anymore. We	
	only assemble parts created around the world and then	
	they slap the <i>Boeing</i> logo on and call it a <i>Boeing</i>	
	airplane. One side is celebrating this as the future; the	
	other side is mourning it as the loss of one of the	
	greatest manufacturing companies in the history of the United States.' Goforth said he has no doubt the union	
	membership is prepared to strike. Denton, however, is not so sure the picture is as bad as Goforth likes to	
	paint. 'There is a part of me that thinks Ray is just	
	wrong and that he is exaggerating things to the	
	advantage of the union,' he said. 'I get the sense of	
	some anxiousness around the whole idea and prospects	
	of a strike For me in this process, the most	
	important thing is that I want the engineers and	
	technical staff to feel we respect them and we value them and that as a management from we have learned	
	them and that as a management team we have learned	
	lessons from the things that have caused us some	
	problems over the last couple of years.' Unlike the	
	blue-collar Machinists union, which has struck <i>Boeing</i>	
	seven times since 1948, SPEEA has been much more	
	mild- mannered. The union struck <i>Boeing</i> for 40 days in	
	2000. The union's only other walkout, for a day, was	
	largely symbolic. Goforth said the mood today is similar	
	to 2000. 'A strike is a real possibility and for the very	
	same reasons it happened in 2000,' he said. 'It was a	
	sense that Boeing corporate was not listening to them,	
	was not respecting them, was making decisions that	
	were bad for the company.' But Denton said much has	
	changed since 2000, when there was even speculation	
	by outsiders that Boeing might exit the jet-making	

				business. 'Despite the challenges today, there is a huge future for <i>Boeing Commercial Airplanes</i> ,' he said. 'It's not a question of it we build another new airplane after the 787. It's just a question of when.' <i>Boeing's</i> engineering and technical work force is bigger today than at any point in the last three decades, Denton said. The 14,000 or so SPEEA engineers and other professional workers earn an average of about \$83,000 a year. Overtime and incentive pay can push that well above \$100,000. The nearly 7,000 technical workers earn about \$68,000 a year on average. With overtime and incentive pay, the average is about \$82,000. SPEEA isn't asking for a specific percentage pay raise. Goforth said it wants 'market leading' wages, and Boeing is offering 'market average' wages. Another big issue for SPEEA is <i>Boeing's</i> use of contract engineers. Denton put the number at around 2,300 in Puget Sound. Goforth points to the 747- 8 as an example of the problems of relying too much on non- <i>Boeing</i> engineers. 'That program is falling apart,' he said. Last week, during a conference call to discuss <i>Boeing's</i> third-quarter earnings, McNerney acknowledged cost and schedule pressure on the program. Goforth said he talked recently with a 747-8 engineer, and she had not had a day off in six months. She's been too busy fixing mistakes made by Russian engineers on the 787 and could not shift them to the 747-8. He defended the use of contract engineers. They allow <i>Boeing</i> to have a more stable work force, he said. In the past, <i>Boeing</i> has had to lay off thousands of engineers after major programs have ended and during down cycles. He also noted that <i>Boeing</i> has had a difficult time hiring seasoned aerospace engineers. There are too few for market demand, he said. 'To find experience we have had to turn more to contract engineers and even then it has been very competitive,' Denton said. But Denton is optimistic. 'We have tried to underscore their (engineers and technical staff) importance to our long-term competitiveness and su	
				It's not that complex. But they (<i>Boeing</i>) are not doing the basic things you need to do to advance this process.'"	
30 Oct. 2008	Seeking Alpha, "Boeing Heading the Way of <i>GM?</i> " (Stephe n Rosenm an.	Firm- Investo r	α	"The market is celebrating the likely end of <i>Boeing's</i> strike by ramping up its share price from a low of \$40 to yesterday's closing price of \$49.80. Unfortunately, for <i>Boeing</i> , the bad news has just begun. <i>Boeing's</i> dismal Q3 earnings only captured the first three weeks of the strike. That leaves all of October without commercial aircraft work, a loss that is estimated to cost \$100 million in revenue every day. This amounts to another \$3 billion in lost revenues over October. If the proposed contract is ratified, machinists reap large pay increases, a promise of job security, and no relief for <i>Boeing's</i> burgeoning	On a modular enterpri se architec ture's under- investm ent.

	D				
	Disclos			health care costs. Moreover, Boeing still faces difficult	
	ure:			negotiations with its engineering and technician union.	
	Author			The company, already burned for a two month strike, is in	
	holds a			a tough spot. Another strike would be devastating. The	
	short			engineering union is in the driver's seat. Expect significant	
	position			concessions which will hit Boeing's bottom line. Boeing's	
	in BA)			balance sheet in Q3 did not look robust. Its \$56 billion	
				in assets includes \$3.5 billion in goodwill (nothing of use),	
				\$2.2 billion in intangibles (ditto), and \$6.5 billion in	
				pension plan over funding (not a good fall back). Take	
				away those and you get \$44 billion. Meanwhile, their	
				very real \$46 billion in liabilities should get steeper.	
				Remember that they didn't solve their cost problems -	
				health care costs, payroll - those get worse. At the same	
				time, they bled cash this October. It's a very good thing	
				that Q3 did not end October 31. I suspect a great deal of	
				their \$4 billion stash reported on their Q3 balance sheet is	
)			gone. Before the strike, the financial community was	
				worried about <i>Boeing</i> . Those problems still exist. The	
1				only change is that <i>Boeing</i> is in a worse position. The	
				787 is further delayed (2009? who knows). Every country	
				is in crisis mode. Airlines may cancel orders or negotiate	
				lower plane prices. How badly will <i>Boeing</i> suppliers be	
				disrupted by the strike and delays? A new administration	
				probably will cut their military orders. <i>Boeing</i> , like <i>GM</i>	
				and Ford, has been torched by its unions. Much as has	
				happened to Ford and GM, Boeing is going down the	
				path of increased payroll costs in the face of a	
				deflationary economy. Boeing's balance sheet is	
				eroding. While nowhere near as bad as those of Ford and	
				GM, it's starting to look weak. Boeing's Q4 balance sheet	
				should show further deterioration both on the asset	
				and liability side, not a good thing to be going into a	
				worldwide slowdown."	
31	US	1.17.250	rm- α	"For the three fiscal years from 2004 through 2006,	On a
Oct.	District	Er	nplo	Boeing failed its internal Sarbanes-Oxley (SOX) audits for	modular
2008	Court	ye	e	effective controls of its computer network nand software	enterpri
	Western			systems. If it failed the internal audits in 2007, Boeing	se
	District			risked being required to report a material weakness in its	architec
	of			annual audit as required by SOX section 404. To avoid	ture's
	Washin			this possibility, Boeing hired PriceWaterhouseCoopers	(alleged
	gton,			(PWC) to supervise Boeing's independent internal auditors) low-
	Compla			to ensure that Boeing's internal auditors did not report	trust
1	int for			deficiencies sufficient to constitute a material weakness.	and
	Retaliat			PWC did no compl with internal auditing standards.	confront
	ory				ational
	Dischar			Although the right to speak to the press when	relation
	ge of a			management fails to correct potentially illegal conduct	ship
	Whistle			is protected activity under the law, Boeing fired Tides.	with
	blower,			na na serie de la serie de	employ
	Nichola			Plaintiff Tides attempted to report this inappropriate	ees.
	s P.			activity directly to Boeing's Audit Committee on an	11120-50-5015
	Tides,			anonymous basis using the Company's online form on	
	Plaintiff			or about July 5, 2007. Even though SOX requires	
				Boeing to make this type of reporting available, the	
				function was not working. Vince Workman of <i>Boeing's</i>	
L				interior into not not mile, three norkinan or boeing s	

				Ethics Office confirmed <i>Boeing</i> knew the anonymous reporting did not function and said <i>Boeing</i> should look into fixing it someday. In mid-February of 2007, <i>Boeing</i> Vice President in charge	
				of corporate audit, Robert Jouret, presented a PowerPoint to the entire corporate audit staff. In response to a question why <i>Boeing</i> only had 10 IT SOX auditors, Mr. Jouret said in essence, 'Mr. McNerney believes SOX will be repealed and so we are using <i>PWC</i> temporary	
				auditors rather than permanent <i>Boeing</i> employees.' ' <i>PWC</i> is in charge. Stop complaining. SOXis being repealed and you will be lucky to keep your jobs. He said he was expressing the viewpoint of CEO James McNerney.'	
				On or about May 31, 2007, Plaintiff Tides was required to attend a mandatory meeting with Diane Kallunki, <i>Boeing</i> Director of Human Resources. At the meeting, Ms. Kallunki told Plaintiff Tides, 'We'd appreciate it if you'd just shut up.'"	2
31 Oct. 2008	Seattle Post- Intellige ncer, "Fired Employ ee Sues Boeing in	Firm- Emplo yee	α	"A fired <i>Boeing</i> employee struck back at his former employer Friday with a federal lawsuit leveling serious charges against the Chicago-based aerospace firm. Among other things, the lawsuit filued in the U.S. District Court in Seattle charges that <i>Boeing</i> was disingenuous in its efforts to comply with the federal Sarbanes-Oxley Act of 2002. In mid-2007, former <i>Boeing</i> information technology auditor Nicholas Tides raised concerns to several managers about 'potentially illegal conduct.'	On a modular enterpri se architec ture's (alleged) low- trust
	Whistle -Blower Case" (Andrea James)			Boeing's director of human resources told him, 'We'd appreciate it if you'd just shut up,' the lawsuit says. Such a comment would contradict <i>The Boeing Co.'s</i> public assurances that the company welcomes employees to raise ethics concerns. 'Instead of deciding to compy with SOx (the law) and avoid retaliation against employees who had engaged in protected activity, <i>Boeing</i> decided to huntdown employees who had assisted the P-I,' the lawsuit charges.	and confront ational relation ship with employ ees.
				Boeing attempted to coerce plaintiff Tides into keeping silent by creating a hostile work environment including discipline and hostile interrogations,' the lawsuit also says. 'Boeing caused plaintiff Tides to be followed to intimidate him.	
				The lawsuit seeks 'exemplary damages as permitted by law in an amount sufficient to deter <i>Boeing</i> from future violations of law.	
				The P-I spoke with dozens of employees. Many of them said they feared losing their jobs, buth they believed than <i>Boeing's</i> information technology department was mishandling its Sarbanes-Oxley compliance effort. The lawsuit charges that, ' <i>Boeing</i> intentionally ignored audit results, fabricated audit results and harassed auditors in order to avoid' publicly disclosing problems to the	

					Securities and Erschange Commission which some	
					Securities and Exchange Commission, which regulates companies such as <i>Boeing</i> that trade on the stock	
					market. To escape paying damages, <i>Boeing</i> has to	
					prove that it fired Tides for a nonretaliatory reason,	
					[Tides' Seattle lawyer John Tollefsen] said."	
7	Seattle	James	Firm-	α	"Here is the message from McNerney:	On a
Nov.	Post-	McNer	Labor			modular
2008	Intellige	ney,			'I applaud the work done by the union and company	enterpri
	ncer,	Chari			negotiating teams to finally hammer out a deal both sides	se
	'James	man &			could live with. However, the fact that it took 58 days to	architec
	Wallace	CEO,			resolve the dispute-let alone the fact that we had a	t's ex-
	on	The			strike at all-reflects the failure of a process that	post
	Aerospa	Boeing			company leaders and union leaders alike need to	discussi
	ce:	Compa			seriously address. The path to an agreement was longer	on of a strike
	McNern	any			and more torturous than any of us wanted. In	strike
	ey's				retrospect, we all wish the differences closed at the end could have been closed much sooner. And none of us	
	Messag				want to go through this again next time around.	
	e to the Troops"				want to go through this again next time around.	
	(James				Beyond the internal side of the strike, there's no doubt	
	Wallace				in my mind-and there should be none in yours-that this	
)				experience was nothing but a big disappointment to	
	1				both our commercial and military customers. It also	
					created hardships for our suppliers and our	
					communities. While it may sound cliché, no side ever	
					wins a strike, despite the efforts of analysts and the	
					media to determine otherwise after the fact. The costs	
					are more than just economic, and the reputations of all	
					parties suffer significantly. For the sake of our	
					customers, our company and our employees, we have	
					to find a better way.	
					Speaking of those times, the global economic realities that	
					have emerged since the strike began pose significant new	
					challenges for everyone, and they put particular pressure	
					on us to achieve additional productivity improvements	
					that will keep costs to our customers down and pay for	
					our investment in growth programs. I know there are	
					many efforts underway throughout the company to	
					address these challenges, and we should leave no stone	
					unturned as we seek new and better ways of doing our	
					work.	
1					Thanks again for your efforts to make Boeing stronger and	
					more successful each and every day.	
1					note successful caen and every day.	
					Jim"	
10	Wall	# 32	Firm	α	"As one of Boeing Co.'s top-ranking female executives,	On an
Nov.	Street	Caroly			Carolyn Corvi is known around the aerospace company as	intgral
2008	Journal	n			the Queen of Lean. Lean manufacturing, that is. The 57-	enterpri
	"The 50	10000000000000000000000000000000000000			year-old executive is widely credited with adapting	se
1	Women	VP			Toyota Motor Co.'s techniques for turning out large	architec
	to	and			numbers of high-quality cars to the production of	t within
	Watch	GM of			extremely complex airplanes. Former Boeing	an
1	2008"	Airpla			Commercial Airplanes President Alan Mullally said during an interview in 2005 that much of Ms. Corvi's early	modular enterpri
	(J. Lynn	ne				

Lunsfor d)Progra ms, Boeing Comm ercial Airpla nessuccess in Boeing's plants was accomplished 'sometimes through sher wilpower alone' as she challenged reluctant managers and machinists to learn new ways. She led the move to convert Boeing's 737 factory into a moving production line, where as many as six of the twin-engine jetliners roll nose-to-tail through the plant in an alumance conga line. Not only has Boeing cut the time it takes to turn out a 737 by more than half from 22 days in 1999 to 10 days in 2008 the company has generated record profits while simultaneously investing billions of dollars in new products such as the 787 Dreamliner. Now in charge of Boeing's overall production, Ms. Corvi has the challenge of duplicating her 737 success on much larger jetliners, such as the widebody 777 and 747. The results so far have been mixed while engineers invent ergonomically friendly ways to do away with heavy tooling that holds these 200-ton behemoths in place while they are being pieced together. Because Boeing relies increasingly on suppliers to build larger sections of its airplanes, Ms. Corvi must also find ways to get them to buy into Boeing's successful manufacturing techniques. In an interview last year, Ms. Corvi said the one thing she liked about her job is that if's never finished. 'No matter how efficient you are today, you can always do better,' she said.''On a a architee14Seattle ncer "CustoFirmα "Back in 1995, The Boeing Co. delivered its first 777 on time - to the very day it was promised, in fact - to Unide Airlines. Those were the days. Today, some customers won't get Boeing's promised 787 Dreamliner for up to three years after they were supposed to. It is not the only architee birthe
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Image: https://www.security.com/communicationmixed while engineers invent ergonomically friendly ways to do away with heavy tooling that holds these 200-ton behemoths in place while they are being pieced together. Because Boeing relies increasingly on suppliers to build larger sections of its airplanes, Ms. Corvi must also find ways to get them to buy into Boeing's successful manufacturing techniques. In an interview last year, Ms. Corvi said the one thing she liked about her job is that it's never finished. 'No matter how efficient you are today, you can always do better,' she said."14Seattle Nov. Post- 2008Firmα"Back in 1995, The Boeing Co. delivered its first 777 on time – to the very day it was promised, in fact – to United Airlines. Those were the days. Today, some customers won't get Boeing's promised 787 Dreamliner for up to se architecOn
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mers new <i>Boeing</i> airplane in trouble. <i>Boeing</i> announced Friday ture's
Waiting that the first new 747-8 will be up to a year late. That's systema
for not all. First delivery of <i>Boeing's</i> new 777 freighter will tic be delayed about two months because of the recently problem
toended 57-day Machinists strike. Boeing also has as.Deliverproblem with its popular 737. Before any more planes can
" be delivered from the Renton plant, workers must replace
(James hundreds of fasteners in completed fuselage assemblies
Wallace because they don't comply with specs.
)
'I don't know if it's resources or poor execution or
processes, but they have a problem, and they have to
turn this around,' said Richard Aboulafia, vice president
of analysis for the <i>Teal Group</i> , a consulting business in
Fairfax, Va. 'And it's spread to their military
programs, too, ' he added, noting a series of problems with <i>Boeing's</i> satellite programs. 'It could be a mix of
things, from bad planning to lack of engineering
resources,' he said. 'But it's something thay have to
work on. They either have to spend mor or change the
way they develop their products. There is some hubris
involved, too. <i>Boeing</i> has overpromised. They had a
very aggressive 787 schedule from the start."
17 Bloggin Firm- α "What Boeing will not be able to do is avoid a On a
Nov. g Investo decidedly downward revision in company and stock modular
2008 Stocks, rs performance expectations, so says Stock Analyst C. enterpri

	"With 787, 747-8 Roll- outs Delayed , Runway Getting Bumpy for <i>Boeing</i> " (Joseph Lazzaro)				Leonard Bauer. Bauer, not one to wax philosophic, nevertheless takes a historian's like view of Boeing's actions – and the actions of numerous other companies – in recent years. 'It's as if we decided as a nation to place all of the most idiotic, self-defeating, and economically-damaging business decisions in one decade,' Bauer said. 'Its as if the whole business community attended the wrong business school.' Boeing may ultimately end up representing the most tragic figure, Bauer says, if lower sales ensue for the commercial aviation giant. 'The Boeing case can drive you up a wall. They had no serious competition, on a product and price basis, just Airbus, which had suffered repeated delays in key programs and numerous cost overruns. And Boeing had a weak dollar against a strong euro to make its products more price-competitive. All they had to do was deliver the 787 Dreamliner on time and cost-effectively roll-out the 747- 8,' Bauer said. 'So what happens? First contractor parts delays, then design delays for the 787, a twomonth machinists strike, then roll-out dlays for the 747-8. They're squandering any advantage they had.' So far, order delays and cancellations have not piled up, but if they do, Bauer said Boeing 'will not have to look very far to identify who to blame.'	se architec ture's non- systemi c approac h; as well as a systema tic mis- understa nding of the differen ces with an integral enterpri se architec ture (i.e. a focus on executio
18 Nov. 2008	Testimo ny to U.S. Congres s	Rick Wagon er, CEO, <i>Gener</i> <i>al</i> <i>Motors</i>	Firm	α	"Mr. Chairman, I do not agree with those who say we are not doing enough to position <i>GM</i> for success. What exposes us to failure now is not our product lineup, or our business plan, or our long-term strategy. What exposes us to failure now is the global financial crisis, which has severely restricted credit availability, and reduced industry sales to the lowest per-capita level since World War II. Our industry, needs a bridge to span the financial chasm that has opened before us."	100000000000000000000000000000000000000
18 Nov.	<i>CNN,</i> "Heated		Firm- Gover	α	"The case for a bailout of U.S. automakers came under sharp scrutiny on Tuesday at a congressional hearing that	inability to change at an architec tural level. On modular

2008	Debate Over uto Bailout " (Steve Hargrea ves)		nment- Investo rs		portrayed the Big Three as both short-sighted in their business strategies and central to the economy. 'Their board rooms in my view have been devoid of vision,' said Sen. Christopher Dodd, D-Conn. 'We have little evidence this \$25 billion will do anything to promote long-term success,' Sen. Michael Enzi, R-Wyoming, said. 'Why should we believe your firms are capable of restructuring now when you weren't able to do it under more benign conditions?' Republican Senator Richard Shelby of Alabama asked.	enterpri se architec ture's sporadic relation ship with govern ment and
19 Nov. 2008	CNN, "Motor Bosses Arrive for Bailout Talks – on Private Jets"		Firm- Gover nment- Investo rs	α	"The top executives of General Motors, Ford and Chrysler appeared in front of Congress for the second day in a row Tuesday, to make their case for an emergency government loan. The three CEOs have said they don't have the cash to operate next year without help and warned that the faulure of the industry would have dire consequences for the U.S. economy. And yet GM CEO Rick Waggoner, Ford CEO Alan Mulally and Chrysler chief Bob Nardelli arrived for these historic hearings on pivate jets! That's right: The men at the helm of an industry so crippled that it has to ask for taxpayer money to survive flew on private jets. And they wonder why the American public is so angry about these bailouts. Their choice of transportation dominated Wednesday's hearing. Representative Gary Ackerman, a Democrat from New York said: 'there is a message here – couldn't you all have downgraded to first class or jet –pooled to get here? It would have at least sent a message that you do get it. If you're gonna streamline your companies, where does it start? And it would seem to me as the chief executive officer of those companies you can't set the standard of what that future is going to look like, that you are really going to be competitive, that your are going to trim the fat, that you don't need all the luxuries and bells and whistles it causes us to wonder.""	general myopia. On modular enterpri se architec ture's inability to empatha size with the needs of other stakehol ders.
20 Nov. 2008	Seattle Post- Intellige ncer, "Boeing : 'Nothin g Structur al' Caused Delays' " (Susann a Ray)	Scott Carson , Preside nt & CEO, <i>Boeing</i> <i>Comm</i> <i>ercial</i> <i>Airpla</i> <i>nes</i>	Firm	α	"The Boeing Co. said 'nothing structural' is to blame for production delays caused by a Machinists strike, plane design changes and problems with suppliers. 'It sometimes feels you can wake up snake-bitten, and the last four or five months have felt that way to us,' Scott Carson, the head of <i>Boeing's</i> commercial aircraft uint, said Wednesday in a Webcast presentation from a Credit Suisse conference. 'There isn't anything fundamentally broken,' and the company has 'made huge strides' by expanding profit margins amid the problems, he said. <i>Boeing</i> has been beset by delays since announcing the third setback to the 787 Dreamliner in April. The problems – parts shortages, suppliers not completing their work and a redesign – trickled down, forcing to postpone the new 747-8 last week. Carson said the 'rather dramatic economic uncertainty	On the non- systemi c thinking of a leader of a modular enterpri se architec ture.

	1				around the global beauty altered the second - 20	
					around the globe' hasn't altered the company's 20-year groth forecast."	
21 Nov. 2008	Wall Street Journal "Rival's Strike Benefits Airbus (Daniel Michael s)	Tom Willia ms, Execut ive Vice Preside nt for Progra ms, <i>Airbus</i>	Firm- Labor- Suppli er	α & β	"Airbus says it benefited from a recent strike by factory at rival Boeing Co. – not by stealing jetliner orders, but by getting aircraft suppliers to work harder for the European plane maker. During the 58-day walkout at Boeing, which ended earlier this month, overstretched suppliers that work for both companies were able to focus more on equipment for Airbus, wuch as galleys, seats and other cabin features. That relieved some pressure at Airbus, which in August warned that delays in receiving such equipent were holding up jetliner deliveries and risked reducing the number of planes completed this year. Boeing missed its second-quarter earnings projections in July partly because three big wide-body jetliners awaiting interior equipment couldn't be delivered on time. At Airbus, the tight supply pressure has abated, said its top production manager, Tom Williams, executive vice president for programs."	On a modular enterpri se architec ture's
25 Nov. 2008	Wall Street Journal, "Airbus May Cut Producti on Levels" (David Pearson)	Thoma s Enders , CEO, <i>Airbus</i>	Firm	β	"European commercial aircraft maker <i>Airbus</i> isn't ruling our the possibility it will have to slow production if the economic situation continues to deteriorate, Chief Executive Thomas Enders said. Mr. Enders called on European governments to encourage their export agencies to privde more guarantees for <i>Airbus</i> 's aircraft contracts and improve financing conditions. Governments should also provide funding for critical aerospace suppliers that are caught in the credit squeeze. <i>Airbus</i> decided a few weeks ago to freeze a planned ramp-up of its aircraft production rate ' at least temporarily ' in view of the quickly deteriorating outlook for economic activity, credit availability and airline profitability. The plane maker 'simply cannot exclude at this point' a possible cut in production levels, Mr. Enders said. 'Anything else would be irresponsible or not credible. But obviously the freeze that we have enacted right now is not enough,' he said. Speaking to French aerospace journalists late Monday, Mr. Enders stressed that the move to freeze the production ramp-up was a protective measure . If the situation changes for the better, he said, the company can reverse the move next year . But if it continues to deteriorate, he said, 'Certainly we would not exclude that we have to take further action.' <i>Airbus</i> has seen industry downturns in the past, he noted. 'We know how to cope with it. We know what our flexibility is,' he said. <i>Airbus</i> is in the middle of a cost-cutting program that will reduce its work force by 10,000, and Mr. Enders said the company has flexibility to slim down further by trimming temporary employees. 'That gives us some breathing space in a downturn scenario,' he said. 'It has turned out to be an annus horribilis, but we'll have more order intake than we predicted,' he said. 'I'd call that not a bad year,' he added. Mr. Enders indicated that <i>Airbus</i> will probably have to provide more financing to customer airlines that are having difficulty in	On an integral enterpri se architec ture's views of stability

				 obtaining credit from traditional sources. He noted, however, that the company's exposure to customer financing at the end of September was at the lowest level in more than 20 years: \$1.2 billion, compared with \$6.1 billion in 1998 and \$4.8 billion in 2003, 'so we still have some margin' to increase. Reflecting its Franco-German origins, <i>EADS</i> has two headquarters: in Paris and in Munich. Mr. Enders said he favors the creation of a single headquarters, preferably in Toulouse, France, where <i>Airbus</i> is based." 	
Nov. 2008	Flight Internat ional, "Boeing 's Enginee ring Resourc es Are Stretche d Too Thin" (Stephe n Trimble)	Firm	α	"Dealing with the latent issues created by last year's schedule reshuffling was only one of the causes for the recent delay announcement. As the 787-8 production crisis came to light from September 2007 to March 2008, senior <i>Boeing</i> executives consistently maintained that the company had enough engineering resources to solve that problem as well as keep other development efforts, such as the 747-8, on track. 'There's obviously engineering resources that have shown up late on the -8, but we found ways to work around that by accessing engineers throughout the company and external resources,' <i>Boeing</i> chairman and chief executive Jim McNerney said on 24 October 2007. That statement has been contradicted by more recent remarks from <i>Boeing</i> executives. For example, vice-president Randy Tinseth wrote on 14 November: 'The [747-8] programme has also been affected by limited engineering resources within <i>Boeing</i> .' As the 787-8 kept commercial aircraft engineers busy longer than expected last year, <i>Boeing</i> assigned engineering firms in Asia, Europe and Russia and the USA to make up for the shortfall on the 747-8F. But it did not take long for <i>Boeing</i> to realise that the distributed engineering strategy had partly backfired. It became a difficult chore for <i>Boeing</i> simply to keep track of all the work. In April, Ross Bogue, <i>Boeing's</i> new vice-president and general manager for the 747-8 and Everett site leader, said the company would change its approach for the 747-81 would use as many external engineers, but they would be concentrated in a few key hubs rather scattered all over the globe, he said. Driving demand for more engineering resources were persistent and self-perpetuating design changes caused by the new, super-efficient airfoil. To meet <i>Boeing's</i> original performance targets for the 747-8, so heig so fight and the tail section of the wing forward, but this has caused a variety of new problems. 'When we changed the wing airfoil and ultimately changed the centre of gravity on the airfoil from the aft section	On a modular enterpri se architec ture's systemi c problem s

					then the leads in the official shares of as we have to	
					then the loads in the aftbody changed, so we have to change the aft body.' While the engineers struggled to make their sums add up, the 747-8 supply chain was left waiting to adjust tooling and place long-lead orders for new materials. 'We knew which suppliers were going to make what so getting that through is the same,' Teal says. 'It's just a matter of estimating the amount of time required to get all the change in their factories.'	
25 Nov. 2008	The Daily Herald, "Boeing Finds Faulty Parts on 747, 767 and 777 Jets" (Michel le Dunlop)	Scott Carson , preside nt of <i>Boeing</i> <i>Comm</i> <i>ercial</i> <i>Airpla</i> <i>nes</i>	Firm- Suppli er	α	 The Boeing Co.'s widebody jets, except the 787, need to be inspected for faulty parts similar to the problem the jetmaker recently had with its single-aisle 737. Boeing partner Spirit AeroSystems discovered that nutplates from one of its three suppliers lacked an anti- corrosive coating. Boeing disclosed earlier this month that the nutplates, which work like fasteners, had affected its Renton-built 737 jet. The company confirmed Tuesday that its widebody jets the 747, 767 and 777 also were affected by faulty plates. 'There's a potential that every plane built since September 2007 could be affected, including all the planes in production,' Boeing's Bev Holland said. Boeing has delivered 19 747 jets, 12 767s and 82 of its 777 aircraft since September 2007. Earlier this month, Scott Carson, president of Boeing Commercial Airplanes, said that Spirit addressed the problem appropriately, bringing it to Boeing's attention. 'It shows the system is working,' Carson said. Boeing has seen several setbacks recently, including delaying the first deliveries of its 777 Freighter and 747-8 jumbo jet. The company also pushed back the first flight of its delayed 787 Dreamliner following the Machinist strike. But Carson dismissed speculation of a larger structural problem at Boeing. 'There isn't anything fundamentally broken, he said. Company spokesman Tim Healy declined on Tuesday to specify which airplane lines will remain open over the holidays for the extra work by volunteers. Boeing Machinists receive what amounts to triple time for each day worked during the holiday period. Work over the holidays for the extra work by volunteers. Boeing Machinists receive should be able to take the time off,' Healy said. Boeing engineers have been working a 'treenedous' amount of overtime, particularly in Everett, said Bill Dugovich, communications director for the Society of Professional Engineering Employees in Aerospace. About 23 percent of SPEEA engineers have been logging in more than 144 hours of overt	On a modular enterpri se architec tur'e systemi c problem s.
2	Financi	Louis	Firm	β	"Last month, Louis Gallois, EADS chief executive,	On an
Dec.	al	Gallois			suggested it was perhaps time to scrap the European	integral

2008	Timor	FADE			aerospace group's dual headquarters in Paris and	enterpri
2008	Times, "EADS	, <i>EADS</i> Chief			Munich. Far better to concentrate decision-making in	se
1	Rearran	Execut			one spot, and the obvious place was Toulouse - the	architec
	ges	ive			Airbus headquarters. Mr Gallois is now going further.	ture's
	Deckch	Officer			He thinks it would be a good idea to rename EADS	propose
	airs				simply Airbus. After all, Airbus is not only the group's	d
I	Ahead				flagship and biggest revenue earner, but the name has	"rationa
	of				become a globally recognised brand, far better known than	lization
	Gatheri				the cumbersome EADS acronym - short for European	"
	ng				Aeronautic Defence and Space company. He also wants to	
	Storm"				reduce the number of divisions from five to three to	
	(Paul				rationalise its activities. Indeed, many believe Mr Gallois	
	Betts)				would ultimately like to cut <i>EADS</i> down to two divisions	
					- civil and defence. This would transform its structure	
					into a mirror image of its main rival, <i>Boeing</i> , but without the US group's more even balance between civil	
					and defence activities. For this reason, Mr Gallois is still	
	2				keen to expand <i>EADS's</i> exposure to the defence sector to	
					reduce his overall dependence on Airbus. But the old	
					Franco-German frictions that have dogged EADS from	
1					the beginning are again likely to frustrate Mr Gallois.	
					Integrating defence and space activities into a single unit is	
1					likely to be blocked by both his German and Spanish	
					partners. The Spaniards are keen to gain a greater share of	
					business and are expected to resist losing their role in the	
1					A400M military transport operations. The Germans would	
1					find it difficult to agree to a French executive running a	
					new integrated defence division given that EADS is part of	
					the Eurofighter programme competing with the French	
					Dassault Rafale. And the French are bound to insist on leadership in the defence unit for strategic reasons, not	
					least the highly sensitive role of some of these activities in	
					the country's nuclear arsenal. It is hard to see Mr Gallois	
					persuading his French and German political masters to	
					agree to such a reorganisation. In any case, industry	
					analysts seem to consider these proposals a side issue. The	
1					real challenge facing the group is preparing for what	
1					many expect will be the deepest crisis that Airbus has	
1					faced in its 30-year history. As one expert warned: "It	
					is a bit like rearranging the deckchairs when the	
1					Titanic is heading for the iceberg." The big issue is how	
1					Airbus will weather the storm ahead. It still needs to sort	
1					out problems in its A380 jumbo. Its future A350 project	
1					seems to be going nowhere fast. The A400M has been delayed by about two years largely because of engine	
					problems."	
2	Seattle		Firm	α	"Another former <i>Boeing</i> employee has filed a federal	On a
Dec.	Post-		1 1111		whistle-blower complaint against the firm, charging that	modular
2008	Intellige				he was fired in retaliation for reporting ethics	enterpri
	ncer "A				violations. It is the second lawsuit of its type in less than	se
1	2nd				two months. In a complaint filed Tuesday with the U.S.	architec
1	Former	2			District Court in Seattle, former Boeing internal auditor	tur's
	Boeing				Matthew Neumann charges that company managers	systema
	Employ				ignored his warnings about violations of auditing	tic
1	ee Files				standards. Neumann was an internal auditor on the	control
	Whistle				company's Sarbanes-Oxley compliance team, which was	of

	-blower				created after the passage of the Sarbanes-Oxley Act of	systemi
	Compla				2002. Neumann had worked for The Boeing Co. for 10	с
	int"			j.	years until being fired late last year. He lives in	informa tion.
	(Andrea James)				Washington state and holds an engineering degree from the <i>Massachusetts Institute of Technology</i> , the complaint	uon.
	James				says. In August 2007, after complaining to several	
					managers that Boeing was ignoring audit results,	
					fabricating audit results and harassing auditors, a	
					Boeing human resources director asked Neumann about	
					his working conditions. Neumann says in the lawsuit that	
	,				he told the director about potential law violations. The director 'pointed to a pillow in her office embroidered	
					with the phrase, 'Get Over It,' the lawsuit says."	
3	Flight	Steven	Custo	α	"ILFC boss urges Airbus and Boeing to remove 150	
Dec.	Internat	Udvar-	mer	&	narrowbodies from 2009/10 deliveries Airbus and Boeing	
2008	ional,	Hazy,		β	should cut single-aisle production by around 10 units a	
	"Cut	Chair			month next year to avoid a glut of airliners on the market,	
	Single-	man,			warns International Lease Finance chairman Steven Udvar-Hazy, who says the airframers are 'starting to	
1	Aisle Producti	Interna tional			listen' to his pleas to reduce output. 'We are putting a lot	
	on by	Lease			of pressure on them to do something on production rates,'	
	10	Financ			he told Flight's Airline Business Daily at the Latin Airline	
	Aircraft	е			Leaders Forum in Cancun in November. 'From the June	
	a Month	Corpor			2009 to June 2010 period, if they knock out 120-150	
	Next Year:	ation			single-aisle aircraft [from the total] it would not hurt the industry,' says Hazy. 'This is only a total of five a	
	Hazy"				month on each side. If they do nothing there's going to	
	(Niall				be a surplus.'	
	O'Keeff				Although ILFC has relatively low aircraft delivery	
	e)				commitments for the next two years, it is likely that there	
					will be distressed airlines that are unable to fulfil their aircraft orders. 'There could be opportunistic transactions	
					for us to pick up some new and young used aircraft,' says	
					Hazy.	
					Airbus executive vice-president of programmes Tom	
					Williams, who predicts that the airframer will achieve a	
					net order total of 800 aircraft in 2008, says that while the <i>Airbus</i> order backlog is 'significant' at 3,700 aircraft, he is	
					'under no illusions' that the financial crisis will cause	
()					some of this to 'disappear'. A review of the business	
					situation conducted in September concluded that there was	
					some softening in the 'outer years' of the backlog, says	
					Williams, and that it was 'prudent to have a pause in the production ramp-up'. <i>Airbus</i> chief executive Tom	
1					Enders told the <i>International Herald Tribune</i> last week the	
					airframer does 'not exclude further action if the situation	
1					deteriorates'. Williams describes recent the fuel price	
1					decline as 'a doubled-edged sword' as airlines could be	
					tempted to 'hang on to older aircraft for longer'. This	
					contrasts with the situation that existed back in July at the Farnborough air show when Williams noted that although	
1					financing was a problem, the tendency to defer new	
					aircraft and retire older, less-efficient types had been	
1					dampened by spiralling fuel prices. Now the trends in the	
					finance market and fuel prices are incentivising deferrals,	

3 Dec. 2008	Flightbl ogger "Exclus ive: Airbus Dreamli ner Dossier Reveale d" (Jon Ostrowe r)	"Boein g 787 Lesson s Learnt." Docum ent was compil ed by Airbus Head of Engine	Firm- Suppli er- Compe titor	α & β	but Williams is confident that vacated delivery slots will be snapped up quickly, citing the interest in <i>Skybus'</i> recent cancellations. There is still demand for fuel-efficient aircraft with lower maintenance costs, he says. While <i>Airbus</i> single-aisle production will rise from 34 a month to 36 by December, a plan to increase it to 38 in spring 2009 and 40 by the end of December has been deemed too aggressive, as it would stretch the supply chain. <i>Boeing</i> 737 output had been averaging 30 a month in the period immediately before the machinists' strike in September." "PRODUCTION ISSUES Among the 'lessons learnt' by the European airframer, <i>Airbus</i> cites <i>Boeing's</i> challenges with beginning 787 production across the whole of its supply chain. <i>Airbus</i> believes <i>Boeing's</i> early production issues fundamentally originated in a lack of oversight on both design and assembly integration for the high level of outsourcing. All of this was further exacerbated, according to <i>Airbus</i> , by 'low-wage, trained-on-the-job workers that had no previous aerospace experience' working at supplier partners. <i>Airbus</i> believes 'inadequate supplier capability in design' contributed further, citing as an example that ' <i>Vought</i> had no engineering department when selected' by <i>Boeing</i> . Combined with an 'insufficient supply of frame, clips brackets and floor	On a modular enterpri se architec ture's low trust with employ ees and supplier s, revealin g the
	ner Dossier Reveale d" (Jon Ostrowe	ent was compil ed by			assembly integration for the high level of outsourcing. All of this was further exacerbated, according to <i>Airbus</i> , by 'low-wage, trained-on-the-job workers that had no previous aerospace experience' working at supplier partners. <i>Airbus</i> believes 'inadequate supplier	low trust with employ ees and
		of Engine ering Intellig ence,			example that 'Vought had no engineering department when selected' by Boeing. Combined with an 'insufficient supply of frame, clips brackets and floor beams' the result was a 'loss of configuration' control stemming from production records on 'deferred work that were found to be incomplete or lost in transfer.' In	s, revealin g the systemi c nature of the
		Burkha rd Domke and was present ed			addition, parts that did arrive complete to final assembly were 'found to be completed incorrectly' requiring additional rework in Everett. In addition, <i>Airbus</i> cites a quality assurance cycle time that was not in line with the production rate demand, as well as a 'lack of qualified non-destructive inspection / quality assurance personnel (NDI/QA) and equipment at Tier-	strategic errors.
		interna lly on 20 Octobe r 2008			2 and -3 suppliers.' With the pressure to expedite pre- assembly growing, <i>Airbus</i> believes <i>Boeing</i> and its partners chose to defer 'non-destructive inspection from its Tier-2 and -3 suppliers to Tier-1 partners.' The situation was only made more complicated by the additional deferral of NDI from its tier-1 partners	
					directly to Everett to rush major assembly. A shortage of fasteners has been a highly publicized challenge to the Dreamliner, yet <i>Airbus</i> delves deeper into the cause. The shortage, <i>Airbus</i> believes, was driven by a late redesign of a sleeved fastener for lightning strike protection that primarily impacted <i>Mitsubishi's</i> wing production. As a	
					result, Alcoa, Boeing's fastener supplier was unable to meet demand in time. Airbus says that at the time the redesign was completed, production lead-time was approximately 60 weeks, leading to 'limited availability of tailored-length fasteners.' As a result, fasteners were installed with stacks of washers as a work around for the improper length, forcing <i>Boeing</i> to publicly concede that thousands had to be removed and	

replaced to incorporate the proper design. <i>Alrbus</i> also believes the <i>Bachgy</i> fastener solution 'infringes a <i>BAE</i> patent owned by <i>Alrbus</i> , though it is not known if <i>Alrbus</i> has acted upon this alleged breach of intellectual property. WEIGHT GAIN & PERFORMANCE <i>Boeing</i> has publicly acknowledged that the Dreamliner is over its initial targeted weight, but the airframer has never specified the extent of the weight issue. An intensive weight reduction program is underway to minimize the impact on aircraft performance. Using a <i>Boeing</i> proprietary chart with additional labelling. <i>Alrbus</i> believes Dreamliner One has gained 21,696 lbb since firm configuration, which came in September 2005, three months later than initially planned. According to the chart, which appears to originate from a <i>Boeing Commercial Alrplanes</i> update that took place in April 07 2008, the significant weight growth originates from fuselage detail sizing and design, accounting for 3,250 lbs. Based on its April 2008 assessment, <i>Alrbus</i> such as weight of 4.5 tonnes higher than the original firm configuration of 95.5 tonnes. As a result, <i>Alrbus</i> estimates early 787 performance to be 6,570 km with 248 passengers in a two-class configuration, significantly legits Alar-02-00 with AlTOW of 238 tonnes, an increase in five tonney alrays and wertised by <i>Boeing</i> . Based on these <i>Alrbus</i> situates 7.670 km with 248 passengers in a two-class configuration, significantly legits than the 7,650 - 8,000 nm advertised by <i>Boeing</i> . Based on these <i>Alrbus</i> situates, this would impact launch customer <i>All</i> . <i>Night Alrows</i> anaxiums entry would offer an A30-200 with AlTOW of 237 sales by offering an A30-200 with a AlTOW of 238 tonnes, an increase in five tonnes, to blut the record 787 sales by offering an A30-200 with a base speculates that a 227.9 tonne. MTOW 787-8 variant will be introduced beginging with LO30. The report cits a photocopied <i>Baeing</i> proprietary document from a <i>Baeing</i> source dated Augus 2008' that baws beciales that both the center wing b	
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Trent 1000 low-pressure turbine could require Dreamliner	
One to switch to GEnx engines. Though, a 787 programme	
source confirms that Rolls-Royce compatible pylons had	
been recently reinstalled on Dreamliner One.	
RAMPUP FORECAST	
As far back as May 2003, Airbus had at its disposal the	
internal 787 (then 7E7) production guidance, when,	
according to the document, Boeing anticipated a peak	
production rate of seven 787s per month by 2010.	
However, by October 2005, with the order book	
swelling, <i>Boeing</i> shifted to a more aggressive ramp up	
with greater than 10 787s being produced per month	
by 2011. According to <i>Airbus, Boeing</i> upped its	
production guidance again in February 2007 as the 787	
order book climbed towards 500 to meet a rate of 10	
787s per month by the start of 2010. With the 787	
delays taking a toll on the projected ramp up, Boeing	
scaled back its delivery guidance in April 2008 to	
achieve rate 10 by 2012, two years later than planned.	
Airbus' own estimate, dated September 2008, of 787	
production does not have Boeing reaching rate 10 until	
2015. Airbus also cites one airline source that was,	1
'Advised by <i>Boeing</i> that the production ramp-up would be	
patterned after what was achieved with the 777 program.	
This would mean that only a rate of 7 would be achieved	
in 2012.' Airbus cites the supply chain as the central	
constraint to achieving a higher production rate, even	
as Boeing is being encouraged by customers to build a	
second final assembly line. Airbus believes partners	
Kawasaki, Alenia and Hawker de Havilland are	
investing in new production equipment to support the	
ramp up, while Spirit AeroSystems, Vought and Global	
Aeronautica are preparing for a more gradual ramp	
up. Also detailed in the report is <i>Boeing's</i> relationship	
with wing producer Mitsubishi Heavy Industries, which	_
Airbus believes has only committed to rate 7 for wing	
shipments with a factory sized for rate 10. The report	
adds that, 'Any plan to increase to rate 10 put on hold	
due to differences with <i>Boeing</i> over financing' and that	
'MHI did have a preliminary order for additional	
tooling which was cancelled' with 'no intention to	
invest in production beyond rate 10.' Airbus speculates	
privately on the future of <i>Boeing's</i> San Antonio facility	
intended for refurbishment of the first 20 787s,	
pointing out that the 'Site is on seven year lease, what	
for?' Within this supply chain constraint is a central	
question of the fundamental material choices Boeing	
selected for the 787. The monolithic carbon fibre fuselage	
barrels are produced by tightly wrapping, or laying-down,	
uni-directional carbon tape around a mold. <i>Airbus</i> believes	
the tape lay-down rates are a central pacing item to a	
robust production ramp up. Airbus analyzed a public	
lecture given on 13 November 2007 by Al Miller, 787	
Director of Technology Integration, regarding the	
Dreamliner at University of Washington. Airbus recreated	

a graph by Mr. Miller detailing the material lay-do rates. His chart assumed material could be laid-down w a 2006 demonstrated rate of 80 lbs/hour with a sing head machine. However, <i>Airbus</i> competitive intelliger tells a different story. <i>Airbus</i> believes that <i>Boe</i> suppliers were actually only able to lay-down 8-9 lbs/ho at the time production began in 2007 and had gradue increased to 19 lbs/hour . <i>Airbus</i> expects the rate increase to 30 lbs/hour once a dual-head machine arriv well below the initial goal of 100 lbs/hour with a sing head machine. <i>Airbus</i> cites <i>Spirit</i> , a tier-one structur partner on the 787, as the source of this actual lay-do rate data. <i>Spirit</i> is a major structural partner on the A3 XWB programme, responsible for the fabrication Section 15, the central fuselage composite structure, a new facility being built in Kinston, North Carolina. T A350 XWB competes directly with <i>Boeing's</i> 787 and 7 aircraft. When approached for comment, <i>Spirit</i> says it unsure of how <i>Airbus</i> obtained this information and add that the company 'takes great measures to protect intellectual property of our customers.' For the compose A350 XWB, <i>Airbus</i> selected a composite panel desi rather than the 787s monolithic design for its fusela sections.	ith le- ince ing our Illy to es, le- ral wn 50 of t a he 77 is ed che ite gn
LOOKING AHEAD TO 787-9 Airbus completes its analysis of the 787 programme with look at the future of the Dreamliner in the 787-9. The airframer examines the larger 787-9 variant that we follow the 787-8 with an entry into service in 2012. Aird believes Boeing will design significant performant improvements into the -9 that will then be incorporated into a major block point change around LN100 for the 8.	the vill us icce eed
'aero[dynamic] and engine performance data essent to determine need for additional weight savings.'"	ns at nt re' ito iin all for '-9 ne ies <i>us</i> ng a.' to nd ial
3 Wired" Firm- α "European aviation giant Airbus has compiled Dec. Airbus Suppli & surprisingly comprehensive dossier detailing every aspective.	

2008	Dossier		er-	β	of archrival Boeing's work on the 787 Dreamliner, using	enterpri
	Dishes		Compe		information gleaned from Boeing's own suppliers and	se
	Dirt on		titor		proprietary documentation to assemble a candid critique	architec
	Boeing 7 8 7				of the ambitious but troubled aircraft. The 46-page	ture's
	787 Progra				document titled <i>Boeing 787 Lessons Learnt</i> examines every part of the aircraft's development, including key	low
	m"				design, certification and production issues, to a degree	trust with
	(David				rarely seen and calls into question the European aerospace	supplier
	Demerji				consortium's intelligence gathering methods. There's no	s, and
	an)				question the document compiled by Burkhard Domke,	the
	uiij				head of engineering intelligence at <i>Airbus</i> , and presented	media's
					internally on Oct. 20 digs deeply into <i>Boeing's</i>	percepti
					development process. It examines nearly every aspect of	on of
					the 787 program, including the design of the aircraft's	the 787.
	1				wings, fuselage and engines. It provides succinct	
					summaries of the program's parts shortages, fastener	
					issues, quality control concerns and other production	
					woes. Even seemingly mundane issues like the plane's in	
					flight entertainment system are chewed over.	
					Elistet lagger hashe the stars this stars on a for writer	
					Flightblogger broke the story this afternoon after writer Jon Ostrower, who has made a name for himself	
					reporting on the inner workings of <i>Boeing</i> , obtained a	
					copy of the report from a source he declined to identify.	
					Ostrower told us shortly after posting the dossier that it is	
					unprecedented in scope. 'To my knowledge, there has	
					never been a comprehensive analysis of an airliner like	
					this,' he said. 'It looks at every angle of the program,	
					and analyzes it on a very granular level.' What makes	
					the breadth of the report so impressive is the fact Boeing is	
					still developing the 787. How did Airbus get its hands on	
					so much data about a plane relatively few have seen and	
					no one's flown. Ostrower says Airbus obtained	
					proprietary data and quizzed sources throughout	
					Boeing's global supply chain. 'One page explicitly cites	
					Spirit Aerosystems, which makes the 787 nose, as the	
					source of information about material laydown rates,' Ostrower told us, adding that <i>Spirit</i> claims to have no idea	
					how <i>Airbus</i> got its hands on the information. Ostrower is	
					even more intrigued by what appear to be seven slides	
		8			marked ' <i>Boeing</i> Proprietary" and written in a format used	
					in <i>Boeing's</i> internal presentations. 'How did they get	
					those?' he asks. "That's a big deal."	
					Boeing is keeping mum until it sees the Airbus dossier,	
					Ostrower writes in his post, and Airbus told him the	
					presentation and its intelligence gathering methods are	
					perfectly legal. Ostrower says the Airbus report will	
					force <i>Boeing</i> to take a hard look at the non-disclosure	
					agreements it has with suppliers and examine the	
					security of its information networks. But in the grand	
					scheme of things, he says, the Airbus report is good	
			с.		news for <i>Boeing</i> . 'Sure, short term there are going to be	
					some questions about how the information was obtained,'	
					he told us. 'But take a look at the document. Nowhere	
					does it say that the program isn't going to work or that	
					the plane isn't going to fly. At the end of the day, the	

4 Reuters, Dec. "The Boeing Company is expected to announce further delays to its new 787 Decaminer next week, or shortly after, when it takes into account the damage of a two- month strike by its machinists and a number of architec Image: I		1			report is a vindication of the program."	
Dec. "Boeing Set to Amoun ce New 787 delays to ifs new 787 Dreamliner next week, or shorty- after, when it takes into account the damage of a two- set month strike by its machinists and a number of production problems nagging at the program. The U.S. article strike plane maker has already said the first 787 test flight wort the over the original target. The latent is over the original target. The latent delay will be the fourth major schedule slip on the airplane, severely testing the goodwill of Boeing's dout two years after the original target. The latent delay will ab the fourth major schedule slip on the airplane, severely testing the goodwill of Boeing's customers and the faith of Wall Street analysts, both at a further delay will also seriously upset customer airlines, leading to deferrals of orders or ouright cancellations. A number of problems have beset the program, from shortages of bolts to hold the plane together, to software glitches and shoddy work from suppliers. But the real issue, according to industry experts, is that <i>Boeing</i> 's bait to use of more almost all production of the plane's structure and components has backfired because suppliers without <i>Boeing</i> 's long engineering experience simply could not do the job well enough, and rushed to meet deadines. 'It was over-ambition from the word go,' said Richard Aboulafia, an analyst at consulting firm <i>Teal Group</i> . 'The problem with an unrealistic schedule, the more difficult the remedial action needs to be to get things right', said Aboulafia. The plane is also heavier than it was designed to be, which poase a problem for <i>Boeing</i> still doesn'f have the is anso norther <i>Bry</i> program,'said industry consultant Scott Hamilton in a recent commentary on the issue. Boeing sid at the end of the machinist strike in early November that it would updata lits delivery schedules, but it hash't said when that would happen. 'We are currently conducting an assessment of our program schedule and when	4	Routors	 Firm	a		On a
2008 Set io norm after, when it takes into account the damage of a two- ex New 787 enterprise Delays" (Bill Rigby) after, when it takes into account the damage of a two- production problems nagging at the program. The U.S. plane maker has already said the first 787 test flight wort industry-watchers think first deliveries of the carbon- composite plane wort take place until well into 2010, about two years after the original target. The latest delay will be the fourth major schedule slip on the airplane, severely testing the goodwill of <i>Boeling</i> is that a further delay will also schedule slip to the which championed the fuel-efficient plane early in its development. But the main risk for <i>Boeling</i> is that a further delay will also schedule slip on the software glitches and shoddy work from suppliers. But the real issue, according to industry experts, is that <i>Boeling</i> 's plan to outsource almost all production of the plane's structure and components has backfired because suppliers without <i>Boeling</i> 's long engineering experience simply could not do the job well enough, and rushed to meet deadlines. 'It was over-ambition from the word go', said Richard Aboulafia, an analyst at consulting firm <i>Teal Group</i> . 'The problem with an unrealistic schedule is that it was over-ambition from the word go', said Richard Aboulafia, an analyst at consulting from <i>Teal Group</i> . 'The problem with an unrealistic schedule is the more difficult the remedial action needs to be to get thing right', said Aboulafia. The plane is also heavier than it was designed to be, which poses a problem for <i>Boeling</i> hitting the market- changing range and fuel-efficiency promises it made to customers, and could prease further delays. 'There remains a feeling anong some within that <i>Boeling</i> , stil doesn't have its arms around the 787 program,'said industry consultant Scott Hamilton in a recent commentary on the issue. <i>Boeling</i> ,				~		1077 5 10
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<i>Kooing</i> which means that worrying over short-term	
<i>Boeing</i> , which means that worrying over short-term costs trumps building for long-term survival. Had	
previous CEO Harry Stonecipher been able to follow	
his own ethics rules, <i>Boeing</i> would now be a dying	
company. He once bragged to me that he had made	
McDonnell-Douglas profitable without selling any	
airplanes. Not actually selling any of your product isn't a	
strategy, unless your goal is to go out of business.	
Stonecipher has been replaced by another GE disciple,	
James McNerney, who does at least seem to realize that	
you have to sell the product to stay in business. He may	
not value his current employees any more than Boeing	
ever has, however. Boeing argues that it has to	
outsource work in order to sell planes, which doesn't	
actually explain sending work to South Carolina. At	
the same time, the company effectively doesn't let its	I
own workers bid on those jobs, and then often spends a	
lot of money paying its workers to fix others' mistakes.	
This isn't a new phenomena, and <i>Boeing</i> engineers'	
mistakes on 787 fasteners show its persistence.	
Machinists' strikes routinely cost the company more	
money than simply meeting the Machinists' demands	
would have cost. But unions force companies to	
actually manage, and too many executives dislike	
having to treat their employees like something more	
than automatons. The same is true with layoffs. The	
production write-downs in the mid-1990s cost the	
company far more than laying off fewer workers in the	
early 1990s would have cost them, since having more	
experienced workers on hand likely would have	
negated the production problems."	
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	Dump			extraordinary because Boeing has a huge backlog of	percepti
	Boeing			aircraft orders. It might have given a little more to the	ons of
	Manage			union to avoid delaying the delivery of those planes and	Boeing'
	ment"			the customer discontent which accompanies it. Boeing	S
	(Dougla			management took to the ramparts and fought the	problem
	s A.			machinists. It may have saved some money over the	S
	McIntyr			three-year contract it cut, but it now seems certain that	
	e)			the incident and problems with parts will delay the	
	0)			delivery of its 787 Dreamliner again. This may push the	
				launch of the first plane out another six months. The	
				project had been delayed three times. Now, that will move	
				up to four.	
				According to The Wall Street Journal, In a recent	
				interview, Virgin Atlantic Airways Chief Executive Steve	
				Ridgeway voiced customers' growing frustration.	
1				'We're pretty fed up,' he said. 'We've got no clarity	
1				from Boeing.' The 787 trouble could well force some of	
1				Boeing's revenue into later quarters, undermining its	
				financial results. It could certainly put customers in a	
				position to ask for very large penalties for the late	
1				deliveries. Flying their older planes costs them more in	
				fuel and the opportunity to more efficiently configure their	
				fleets. <i>Boeing's</i> shares have dropped from a 52-week high	
				of over \$93 to \$39. That means they have fallen by over	
				55% during a period that the DJIA is off 35%. Almost	
				all of the plunge has been caused by poor labor	
				relations and bad sourcing and controls of components.	
				In other words, particularly poor management. Under	
				most circumstances, trouble at these levels causes a	
				board to make changes. At Boeing, now would be a	
				good time."	
11	Bloomb	Firm	α	"Boeing Co., whose 787 Dreamliner has already been	On a
Dec.	erg			delayed three times, may postpone deliveries by a further	modular
2008	"Boeing			six months as it struggles with production woes and the	enterpri
2000	's 787			legacy of a strike, Japan Airlines Corp. said.	se
	May			iegues of a surve, supun An mes Corp. sala.	architec
	Suffer			'It's like deja vu, all these things coming back to haunt	ture's
1 /				ILS USE UPTA VIL AN THESE THINKS COMING DACK TO BAUNT	
	Funthan				
	Further			us fasteners, flight-testing concerns and further	systemi
	Delay,			us fasteners, flight-testing concerns and further delivery delays,' Rob Stallard, an analyst at <i>Macquarie</i>	systemi c
	Delay, <i>Japan</i>			us fasteners, flight-testing concerns and further delivery delays,' Rob Stallard, an analyst at <i>Macquarie</i> <i>Research Equities</i> in New York, said in an interview	systemi c problem
	Delay, <i>Japan</i> Air			us fasteners, flight-testing concerns and further delivery delays,' Rob Stallard, an analyst at <i>Macquarie</i> <i>Research Equities</i> in New York, said in an interview yesterday. The first Dreamliner was rolled out of the	systemi c
	Delay, <i>Japan</i> <i>Air</i> Says"			us fasteners, flight-testing concerns and further delivery delays,' Rob Stallard, an analyst at <i>Macquarie</i> <i>Research Equities</i> in New York, said in an interview yesterday. The first Dreamliner was rolled out of the hangar in July 2007 and should have had its first flight	systemi c problem
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	Delay, <i>Japan</i> <i>Air</i> Says"			us fasteners, flight-testing concerns and further delivery delays,' Rob Stallard, an analyst at <i>Macquarie</i> <i>Research Equities</i> in New York, said in an interview yesterday. The first Dreamliner was rolled out of the hangar in July 2007 and should have had its first flight	systemi c problem
	Delay, <i>Japan</i> <i>Air</i> Says" (Susann			us fasteners, flight-testing concerns and further delivery delays,' Rob Stallard, an analyst at <i>Macquarie</i> <i>Research Equities</i> in New York, said in an interview yesterday. The first Dreamliner was rolled out of the hangar in July 2007 and should have had its first flight a month later. Boeing has said all its programs will face	systemi c problem
	Delay, <i>Japan Air</i> Says" (Susann a Ray			us fasteners, flight-testing concerns and further delivery delays,' Rob Stallard, an analyst at <i>Macquarie</i> <i>Research Equities</i> in New York, said in an interview yesterday. The first Dreamliner was rolled out of the hangar in July 2007 and should have had its first flight a month later. Boeing has said all its programs will face at least a day-for-day delay from the eight-week machinists' strike that ended Nov. 2 and kept the 787 from	systemi c problem
	Delay, <i>Japan</i> <i>Air</i> Says" (Susann a Ray and			us fasteners, flight-testing concerns and further delivery delays,' Rob Stallard, an analyst at <i>Macquarie</i> <i>Research Equities</i> in New York, said in an interview yesterday. The first Dreamliner was rolled out of the hangar in July 2007 and should have had its first flight a month later. Boeing has said all its programs will face at least a day-for-day delay from the eight-week	systemi c problem
	Delay, Japan Air Says" (Susann a Ray and Chris			us fasteners, flight-testing concerns and further delivery delays,' Rob Stallard, an analyst at <i>Macquarie</i> <i>Research Equities</i> in New York, said in an interview yesterday. The first Dreamliner was rolled out of the hangar in July 2007 and should have had its first flight a month later. Boeing has said all its programs will face at least a day-for-day delay from the eight-week machinists' strike that ended Nov. 2 and kept the 787 from flying for the first time this quarter under a schedule revised after earlier delays.	systemi c problem
	Delay, Japan Air Says" (Susann a Ray and Chris			us fasteners, flight-testing concerns and further delivery delays,' Rob Stallard, an analyst at <i>Macquarie</i> <i>Research Equities</i> in New York, said in an interview yesterday. The first Dreamliner was rolled out of the hangar in July 2007 and should have had its first flight a month later. Boeing has said all its programs will face at least a day-for-day delay from the eight-week machinists' strike that ended Nov. 2 and kept the 787 from flying for the first time this quarter under a schedule revised after earlier delays. While <i>Airbus</i> has also suffered program delays, the	systemi c problem
	Delay, Japan Air Says" (Susann a Ray and Chris			us fasteners, flight-testing concerns and further delivery delays,' Rob Stallard, an analyst at <i>Macquarie</i> <i>Research Equities</i> in New York, said in an interview yesterday. The first Dreamliner was rolled out of the hangar in July 2007 and should have had its first flight a month later. Boeing has said all its programs will face at least a day-for-day delay from the eight-week machinists' strike that ended Nov. 2 and kept the 787 from flying for the first time this quarter under a schedule revised after earlier delays. While <i>Airbus</i> has also suffered program delays, the Toulouse, France-based company's 525-seat A380	systemi c problem
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	1			Boeing is using new carbon composites instead of	
				aluminum in much of the 787, adding complications to a new manufacturing process. Suppliers in the U.S., Italy and Japan are supposed to build 70 percent of the plane and to ship completed sections to Boeing's Everett, Washington, factory for final assembly. The different languages and time zones involved hampered communication and stymied <i>Boeing's</i> ability to fix problems that cropped up, Joseph Campbell, an analyst with <i>Barclay's Plc</i> in New York, said in an interview yesterday. 'This program now has reached a level of delays and things going wrong that are really frustrating and beyond expectations' for both observers and long-time <i>Boeing</i> engineers, said Campbell, who has analyzed the company since the early 1980s. 'It's out of character for <i>Boeing</i> . Normally <i>Boeing</i> prides itself on being on- time and will overrun its budget in order to be on time.'"	
11 Dec. 2008	Bloomb erg "Boeing Delays Dreamli ner to 2010, Shuffles	Firm	α	"The jet won't fly for the first time until next year's second quarter, in part because factories were idled for eight weeks by a machinists' strike and some fasteners had to be replaced, Chicago-based <i>Boeing</i> said today. The company also shifted managers and created a new position to monitor operations by suppliers , who were blamed for previous delays.	On a modular enterpri se architec ture's systemi c
	Manage rs" (Susann a Ray)			'Not only is the timeline realistic, but the new organizational structure makes a lot of sense,' said Howard Rubel, a New York-based analyst with Jefferies & Co. who has a 'buy' rating on the stock. 'It's a little better than the worst case, and I think they know there's no more 'control-alt- deletes' allowed.' 'It's like deja vu, all these things coming back to haunt us fasteners, flight-testing concerns and further delivery	problem s
	0405			delays,' Rob Stallard, an analyst at <i>Macquarie Research</i> <i>Equities</i> in New York, said in an interview. His research note today was titled the '7 Late 7.'"	
11 Dec. 2008	Market Watch "Boeing Again Delays 787 Shakes up Jet Divisio n" (Christo pher Hinton)	Firm	α	"Boeing Co. restructured its commercial-airplanes division on Thursday, following an announcement that it would have to postpone the launch of its flagship 787 Dreamliner for a fifth time because of problems within its supply chain and the recent machinists' strike. In November, the Chicago manufacturer also announced delays in its 747-8 deliveries for the same reasons. On her way out was Carolyn Corvi, 57, in charge of airplane programs and responsible for streamlining the commercial division's supply chain. Boeing said the 34-year veteran will retire at the end of the year. Effective immediately, Boeing said that commercial	On a modular enterpri se architec ure's systemi c problem s, and apparen t blame attribute d to an
				airplanes-supplier management, fabrication and propulsion systems, as well as the manufacturing and quality groups will be part of a new organization, called supply-chain management and operations. Ray Conner, 53, who recently was vice president of commercial sales, will lead	d to an integral enterpri se architec

	the new group. Further, all current production and	t.
	development programs will be brought under a new	
	airplane-programs organization, headed by Pat Shanahan.	
	The new group includes the 787 program, previously run	
	by Shanahan. That looks like a well-deserved	
	promotion for Shanahan, 46, who they credit for	
	making progress with the 787's technical execution,	
	analysts said. Shanahan brought to the program	
	supply-chain management skills it needed, honed	
	during his tenure at the company's missile defense unit.	
	'The steps we are taking today will sharpen our	
	management focus and bring our organizational structure	
	to bear to improve execution in our supply chain, as well	
	as on our development programs,' Scott Carson, president	
	and chief executive of Boeing Commercial Airplanes, said	
	in a statement. The shakeup did little for Boeing's	
	stock, however. At last check it was down 1.3% to	
	\$41.14. Year to date, Boeing stock is down more than	
	50%, pummeled by concerns over the troubled financial	
	markets, slowing air traffic, a loss of defense revenue, the	
	machinists' strike, and delays in its 787 program. Boeing	
	said separately Thursday that the first deliveries for its 787	
	Dreamliner would now occur in the first quarter of 2010,	
	postponed from its most recent target of third-quarter 2009	
	about two years behind its original schedule. Industry	
	analysts have been highly critical of the 787 delays,	
	accusing the company of allowing sales and marketing	
	for the aircraft run too far ahead of its development	
	and technical execution, raising expectations it is now	
	struggling to meet. Further, it has tarnished the	
	company's reputation, raising comparisons to its rival	
	Airbus, which wrestled for years with delivery delays of	
	jumbo jetliner, the A380. The development of any new	
	aircraft can run into delays, said Jon Kutler, an industry	
	analyst and chief executive of Admiralty Partners. 'But	
	the A380 delays were so damaging to Airbus'	
	reputation that you'd think Boeing would have taken	
	every opportunity to do things differently,' he said.	
	Thursday's announcement marks the program's fifth delay	
	and raises concern that customers will demand more	
	penalty compensation, or even back out of their orders	
	entirely, at a time with air traffic is weakening. But to date,	
	only one order has been canceled due to the	
	postponements. 'I don't expect airline customers to cancel	
	their 787 orders,' Macquarie Research equities analyst	
	Rob Stallard said in an interview. 'The soft demand	
	environment at the moment is probably a helpful	
	coincidence in some cases, though I suspect that the	
	airlines would rather be making this decision on deferred	
	capacity themselves, rather than it coming from <i>Boeing</i> .'	
	Stallard added that some of Boeing's early customers	
	already have maxed out their contractual	
	compensation, and more recent customers are most likely	
	to seek compensation in the form of an interim aircraft,	
	such as a cheap 767. Boeing said it wasn't company policy	
	to discuss the compensation. Douglas Harned, an	
• • • • • • • • • • • • • • • • • • • •		

11	Internal	Scott	Firm	α	aerospace analyst with <i>Bernstein Research</i> , lowered his rating for <i>Boeing</i> on Thursday to market perform from outperform on anticipation that the delay could be pushed out to beyond mid-2010. 'Management has set several timelines that have broken, and we do not yet see evidence that the next one will hold,' Harned wrote to investors. 'We are concerned that there is no longer a clear bound on program risk.' Speculation that the 787 would see its fifth delay began soon after the machinists' strike came to an end in October, with customers and suppliers saying they didn't think a first delivery could possibly happen on time."	On a
Dec. 2008	Boeing Email	Carson , CEO Boeing Comm ercial Airpla nes			As you know, we currently have a record jetliner backlog, while at the same time we have encountered challenges in our airplane development programs and within our supply chain. The current economic slump is further compounding difficulties for our customers, who urgently need the newest and most efficient jetliners to help them succeed in today's dynamic and competitive environment. Today we are announcing a series of leadership changes and a restructuring to better align resources across development programs and strengthen our oversight of the global supply chain. • Carolyn Corvi, who previously led Airplane Programs, has decided to retire at the end of December after a 34-year Boeing career. Carolyn has been a driving force behind the company's successful implementation of lean production techniques. On behalf of everyone at Commercial Airplanes and the entire Boeing enterprise, I want to thank Carolyn for her outstanding vision and leadership in transforming our production system and dramatically improving our production system and dramatically improving our productivity throughout her career. • Ray Conner is named vice president and general manager of a new organization, Supply Chain Management, Fabrication, Propulsion Systems and the Manufacturing and Quality functional organization. Ray brings years of experience in sales, program management, manufacturing and supply chain manager of a restructured Airplane Programs organization. Pat reports directly to me, and his organization. Pat reports directly to me, and his organization is responsible for all current commercial airplane production and development programs, including the 787 and 747-8. Pat has an excellent track record as a program management executive in both Commercial Airplanes and Integrated Defense Systems.	modular enterpri se architec t's loss of its integral architec t.

		 		The new Airplane Descuence and Sumply Chain	
				 The new Airplane Programs and Supply Chain Management and Operations organizations will work together closely to drive lean initiatives, productivity and execution throughout the entire global value chain. The ultimate goal is to deliver value to our customers and protect our competitiveness in this challenging market environment. In addition, we're announcing the following leadership changes: Scott Fancher, who previously was vice president and general manager of IDS Missile Defense Systems, is named vice president and general manager of the 787 program, reporting directly to Pat Shanahan. Scott brings demonstrated leadership in program management, systems integration and technology development to the 787 program. Marlin Dailey is named vice president of Sales for Commercial Airplanes, replacing Ray Conner. Marlin, who most recently led the Commercial Airplanes Sales efforts in Europe, Russia and Central Asia, reports directly to me. All of these appointments reflect great depth and strength in our management team and position us for continued success. I look forward to the leadership of these individuals, and I'm counting on your support as we free the oballonge and appearent vision. 	
				face the challenges and opportunities in the year ahead.	
12 Dec. 2008	Bloomb erg "Boeing 's '7- Late-7' Dreamli ner Takes As Long As Pioneeri ng 707" (Susann a Ray)	Firm	α	Scott." "Boeing Co.'s latest delay means the 787 Dreamliner will take almost as long to develop as the planemaker's original model that ushered the U.S. into the Jet Age more than a half-century ago. The schedule Boeing announced yesterday would start 787 shipments to airlines in 2010, almost six years after the first order. That's about two years more than the average for other Boeing planes and rivals the six years and two months spent on the 707 in the 1950s. That aircraft, which started out as the Dash 80, was the forerunner of the more than 16,000 commercial jets the company has built since. Punsters have had their way with the 787 Dreamliner amid the four delays since October 2007: It's the '7- Late-7' and the 'Lateliner' in reports by Rob Stallard, an analyst in New York with Macquarie Research Equities. Newspapers including London's Daily Telegraph quipped about the Dreamliner turning into a nightmare. Chicago- based Boeing has lost 60 percent of its market value since the first delay. 'The 787 has seriously undermined the confidence that all stakeholders nreviously had in Boeing.' Stallard said in an e- mail	On a modular enterpri se architec ure's systemi c problem s
				previously had in <i>Boeing</i> ,' Stallard said in an e- mail interview. 'We think it will take a very long time to overcome the erosion to goodwill that has occurred.' The Dreamliner 'will be a phenomenal leap, but not without its problems,' said spokeswoman Liz Verdier in	

				Seattle, where <i>Boeing</i> has built commercial aircraft for almost a century. The Dash 80 made its first flight from Renton Field, south of Seattle, just two months after it rolled from the factory in 1954. The Dreamliner, in contrast, now isn't expected to have its first test flight until next year's second quarter, almost two years after it was unveiled to the public. <i>Airbus</i> has also suffered program delays, with its 525-seat A380 needing almost seven years before its first delivery last year. The superjumbo jet completed a test flight just three months after its roll-out, however, and encountered setbacks only once it entered production. 'The Dreamliner delays are likely to be as bad as the A380, or as some people called it, the A-3-Turkey,' said Richard Aboulafia, an analyst with aviation consulting firm <i>Teal Group</i> in Fairfax, Virginia. 'But it entered service successfully, and so will the 787.'''	
12 The Dec. Chicag 2008 Tribun "More 787 Heada hes f Boeing (Julie Johnss n)	e Cor	Firm- Custo mer	α	"Boeing Co. confirmed Thursday that its first 787 Dreamliner is again off course and won't be delivered to launch customer All Nippon Airways until the first quarter of 2010, nearly two years later than planned. But some in aviation circles question whether Boeing is setting itself up for even more delays. Chicago-based Boeing said the largely composite commercial jet won't make its first flight until the second quarter of 2009, a timetable that leaves it just nine months to complete flight-testing. One major 787 supplier told the Tribune that Boeing is more likely to need 12 months to gain certification for the all-new jet and to fix any problems unearthed during the flight-test program. Boeing's last new line of jets, the 777, required 11 months of test flights. 'It's going to take at least a year between first flight and first delivery,' said Richard Aboulafia, aerospace analyst with Teal Group, a Virginia-based consulting and market research firm. 'Of course, the production ramp-up schedule is going to suffer.' Boeing spokeswoman Yvonne Leach said the flight plan 'is aggressive,' but added that Boeing planned to operate flights around the clock, employing a platoon of more than 34 pilots. Boeing also has been extensively testing the aircraft and its components as the first planes wind through production. The string of delays is turning the Dreamliner into a nightmare for customers like Japan-based ANA, which had been counting on the aircraft to spur growth and cut fuel costs. Like other customers, ANA assumed the first aircraft would miss the latest delivery deadline of mid- 2009, given the strike that shuttered Boeing's production for nearly two months, the slow pace at which production has resumed and the discovery that thousands of fasteners on the first aircraft would have to be reinstalled. The greater concern, Mineo Yamamoto, chief executive of ANA, told the Tribune on Thursday how badly delayed subsequent 787s will be. Boeing has 895 of the planes on order, and analysts expect its production to be di	On a modular enterpri se architec ture's systemi c problem s.

			such savings will be much harder to achieve if Airbus has to trim production in a downturn, because fixed costs such as buildings and equipment will account for a higher percentage of total expenses. Airbus already has said it will postpone a planned increase in production rates, and CEO Tom Enders said last month the company could take 'further action if the situation deteriorates.' Evolution's Cunningham thinks production cuts are	
17 <i>Aimuina</i>	Firm	a	inevitable, as he predicts annual aircraft deliveries worldwide will fall as much as 50% from 2009 to 2013. What's more, the dollar is now weakening again."	On
17 Airwise, Dec. "Boeing 2008 , Airbus Seen Facing Mass Order Deferral s	Firm- Custo mer	α	"Boeing and Airbus could see up to 70 percent of the planes in their order book pushed back by struggling airlines as the global economic crisis puts a strangle hold on the recently booming travel industry, a leading analyst said this week. 'In terms of orders suddenly turning out to be firm as [jelly], that could be anywhere between 30 percent and 70 percent (of the backlog),' Richard Aboulafia, an analyst at <i>Teal Group</i> , told the Reuters Aerospace and Defense Summit in Washington. 'We are seriously in uncharted territory.' 'I'm not terribly worried about 2009; it's 2010 when we'll begin to see a shift,' said Aboulafia. 'Production cuts are inevitable after 2010,' said Aboulafia, as it will not be possible for airlines to put into service the thousands of new planes scheduled to be delivered, in the face of falling traffic numbers. Others in the industry who have a vested interest in the health of the plane production business have a more optimistic outlook. 'Most pundits talk about a tougher year next year, with air traffic flat to down a little bit, calling into question some deliveries,' Stephen Finger, president of jet engine maker Pratt & Whitney, told the summit. 'I don't think the delivery issue is as pronounced as some people worry it might be.' Airlines could bounce back from the downturn quicker than some expect, said Finger, keeping demand for new planes relatively strong. 'I don't dispute the flat-to-tough marketplace, but the optimist in me says we might see something by the second half of next year, with low oil prices,' said Finger. If airlines can get back into profit by next year, that would 'shore up the basics of aircraft acquisition,' Finger added, implying that deferrals and cancellations would not hit plane makers too hard. The coming dip in travel will not drastically affect plane makers in the long term, Tom Captain, leader of <i>Deloitle's</i> Aerospace and Defense practice, told the summit. 'The data says we are facing some rain clouds, but the longer term forecast is for 5 percent	On tempora l inconsis tencies in analysts of modula enterpri se architec tures. (Compa re with same analyst' s stateme nts in March 2008 and 2001.)

L .	C		D '	~	"I have a stand a second larger and have all a second a	On the
Jan. 2009	Comme		Firm-	α	"I have received a very large number of comments - from every management level - they have all been	On the reflectio
2009	nts on "Not		Emplo yee		extremely positive and supportive. A sampling - many	ns of
	Accepta		yee		from 90 Series. From all disciplines. Mostly from	former
	ble" -				retirees, but some from folks still on the payroll. The	employ
	Boeing				Expletives have not been deleted, nor the typos or	ees of a
	Progra				misspellings corrected; but the 'names have been changed	more
	ms				to protect the innocent."	integral
	Today				to protect the innocent.	enterpri
	http://w				"I am afraid you are right. Son Bill (working there) and I have talked about this. I think that all of the off-loading	se architec
	ww.rbo				we have done has resulted in the depletion of our	ture,
	gash.co				technical skills and the scheduling expertese and	viewing
	m/boein				knowledge that is demanded with it. I too am	the
	g com				embarrassed. I remember when Jaun Trippe asked us to	ongoing
	ments.ht				build the 747. If he were around today, I find it	disinteg
	ml				unimaginable that he would ask McNerney or Carson	ratioin
					to build him a 797."	of their
	(Robert					former
	Α.				"I too am amazed that the folks in charge of this	enterpri
	Bogash)				program at the get go are still Boeing employees. I am	se.
					also amazed that the current guys running the	
					program are still employees. McNerney is no idiot when	
					it comes to technical matters, but he's relying a guys	
					running BAC who came up on the defense side and who	
					have zero technical credentials. As you point out – this is what you get when non technical guys are trying to	
					what you get when non-technical guys are trying to manage highly technical companies."	
					manage nighty technical companies.	
					"Aloha Bob, great job,I could not agree more, the whole	
		.)			Boeing situation is embarrassing, especially the 787 and	
					tanker program. I agree the whole Boeing management	
					structure should be replaced and moved back to Seattle,	
					but how, count me in."	
					"I wonder if you sent an inquiry to the 90 series and	
					company directors on your mail list asking if they would	
1					sign or do they believe it would be wise to send a letter of	
1					concern and embarrassment to each Boeing Corporate	
1					board member about the deteriorating Boeing	
1					competitive position and flawed management of programs and Company strategy and suggesting the	
1					need of management change. Carson is the wrong	
1					person, he is part of the problem, I have been in two or	
1					three meeting with him and both he and McNerney	
1					don't know squat on how to manage airplane projects.	
1					Boy, the board really made a mistake when they let	
1					Malally get away. He is the only one left that has the	
					experience and ability to manage a project. Well I think	
1					the key is to communicate to the board member how	
1					bad the project and management situation is.	
1					How many will agree to sign a communication? Count me	
1					in."	
					"Daria	
1					"Bogie,	
					I finished reading your essay for the second time. I get	

	more angry every time I think of the down hill slide of a once World Class touchstone. I would send your letter to all of the people you mentioned. Maybe it will cause someone to take some action. I think most of us who have been involved in new programs keep assuming that certainly they will do the right thing, but they aren't going to. It is amazing how the culture at a company can change so dramatically in such a short time and never recover. What a case study for MBA schools." "I don't know where you get the time to put something like this together but you hit the "nail on the head". I have great concern about the future of "our" <i>Boeing</i> , our state and our country. It looks like that generation of no failure,	
	I am owed, and no fault has arrived. I pray that my grandkids are listening and learning their lessons well."	
	"Hello Robert.your recent summary of everything that has gone wrong in recent years is truly amazing,very well done,a real eye opener and heartbreaking all at the same time.how could such a great company fall so far in such a relatively short time? This current report is so rediculous it's hard to understand how a general manager's concept of accomplishment could be so far off the mark.Does <i>boeing</i> still have a core objective to design and build the best enginerred,manufactured and delivered airplanes in the world? How do you think we would have faired if we had put out a report like that? Keep up the good work."	
	"Bob, when ready, your documents have to get in McNerney hands. It is powerful - much broader than mine. He has got to know the rest of his programs are in trouble. You started something- I am happy to participate - it is worthwhile. Do not give up"	
	"Bob, As always, you've cut through the fog and BS and said it like it is – just like Blue, Wilson, Sutter, Paul Sandoz, Ev Webb and all the others taught us! You ought to get an Oscar for this one. In trying to think of a practical way we can be of help to the current crew, I can think of no better way of having a crowd of us ex-90 series managers signing this and sending it to the BoD , and the Company senior management. However, we have to be prepared to actually DO something if they acknowledge they need help. People like Carolyn , Mike Denton (now VP of Engineering) et al should still understand this stuff and, at least Mike, is really in a spot where he can take some action (if he and his colleagues have the balls to make the decisions). They will have to admit they're in a bind and can use help – even if we offer it for free! Will their	
	egos let 'em?? Great job,"	

that know how great Boeing was and where The Company is today. With all the real leaders you have known and worked with I have no misconception you will remember me. I was the XXX for the first 777 assembly. Remember ? Those were the days when we went to the Suppliers and made sure our products were completed with Quality built in and on time. I remember calling back to Seattle and saying there was no way the first section would ever make it on schedule. Within days we had an entire cadre of Boeing people on site helping. Sure do miss THAT Boeing. I am still working so I would appreciate your not sharing my name with others. Every day is a challenge. The 'New Breed' has no conception on how to complete the task but they are really quick to get rid of anyone who is not a yes man. Working Together -Reduce Flow Time - Eliminate Redundancy (meaning Inspection) have become the Mantra. If you do not support that then you are destined to disappear. It gets tougher each day because the Managers I grew up with are all retiring and I do not have much influence without them. There are just too many who have come from the New Breed and I don't stand much of a chance when it is me vs. them. I will say that as long as I am able I will do The Right Stuff and NEVER drink the bath water that would compromise safety. Oh well Just wanted to say Thanks."

"Bob,

You and I first had contact 22 years ago when a letter I sent to Frank Shrontz was handed off to you. Your posting is making the rounds internal to Boeing and I've invited my managers have a read. I suggest that it may be uncomfortable, but necessary to look into the mirror that others are holding up. Whether as a retiree or someone recently returned to the company, it is very painful to realize where we are and try to figure out how we got here. When Bair got up to pitch the 7e7 status and I saw all green squares with a couple of yellows, I waited for Alan to pounce. After all, there is no way that a project taking on so much technology and schedule risk could possibly be riding along with no critical issues at that stage in development. The pounce never came. I was stunned. I knew Alan had the experience to know better, but I guess maybe he had already checked out. My worries for our management culture and competence have grown since then. I'm not schooled in organizational development, but I believe that a culture of 'yes men' has taken hold over the past decade or so. Engineers who provided analysis pointing to problems now plaguing the 787 program were shooed out of the room and off the program. I looked at the RFQ for some of the avionics systems and I was mortified. System integration was not addressed. I was roundly criticized for carrying significant contingent risk in the out years of my proposed schedule because I

predicted that we would have to provide significant
resources in support of integration and test that was
not in the scope of work. This has come to be true for
many suppliers. Subsequent decisions such as shipping
structural shells just to hold to the rollout date have no
doubt cost us hundreds of millions of dollars, if not
billions. That said, many of our supplier development
efforts are chronically deficient. Thank you for posting
your observations on Boeing delays and facilitating dialog
and comments. Sharing this can only help."
"A couple of years ago the chief engineer of xxx made a
statement addressing a newly formed study team. He said,
'We need to work hard to achieve our 50% share of this
market'. I stood up and said in front of many leaders,
including
some VP's 'What do you mean 50%? My <i>Boeing</i> has
lived with 80%. Don't
brainwash our youngsters into thinking 50% is ok. It's not
ok with me'. Not a soul stirred. To me that was the day
the music died."
the music treat
"Sad but true. Is this the start of the book? Sounds as if I
should be buying puts instead of calls?"
should be buying puts instead of cans.
"I doubt you'll get many kudo's from the big boys at
Boeing, but it does call a spade a spade. It will be
interesting to see how its rec'd."
intercound to be new harded.
"Would you mind if I sent it to Carson? Answer: No.
(Subsequently went to Carson.)"
"Bob, If you have a list of people you send your blog to, I
would like to be on it. We met a couple of times over the
years. I was in Flight Test from 1965 to 1998. Advanced
to xxx, got busted in 1997 for speaking out about what
you describe and retired in xxxx. I am hearing rumors
about changes in flight test that disturb me. Not only will
they not make their pipe dream of a schedule, but think
that because of inexperience the chances of losing an
airplane are greatly increased."
"TJ forwarded your article to me and it was a great
pleasure and delicious treat to read another Bogash screed
peeling hide from the guilty. After all these years, you
probably don't even remember my name but I certainly
remember yours from your days as our Tech-Rep in
Montreal holding hands with the Nordair guys in the early
days of our 737 gravel runway travails. How the mighty
have fallen! Our once proud and venerated <i>Boeing</i>
Company seems incapable of doing anything
demanding these days such as bringing a program in on
time and on budget. Much of this failure I attribute to
the products of that ill-advised Sloan Program which
selected promising young guys very early in their
careers, extruded them through the B-school die at a

	 tender age, instilled perfect confidence in their immature judgment and assigned them rank and responsibility far beyond the merits of their wisdom and experience. These guys were rotated through the various chairs at warp speed and from my observation, many did not gain much real knowledge in the process. Most were definitely good guys, really smart, and several I counted as friends but most lacked the tempering which the fires of adversity forge. They needed more time as front-line grunts working night and day under some obstreperous airplane on the flight line to drive home the realization that there were NO small problems which kept the machine grounded. If it did not dispatch on schedule, we had failed, period and excuses were small comfort; very small. During the early days of the 737 when we were plagued with trailing edge flap problems, I was absolutely delighted when Dick Ault of Western came to town to explain things to our leaders. Dick had a colorful way of clarifying the impact of an AOG in idiomatic English that our leaders could understand. He, John Borger, Frank Kolk and several others whose names elude me at the moment were real airplane guys who knew how to make things work. Unfortunately, the wisdom accumulated during that era seems to have been displaced by quarterly results and political correctness; the precious legacy forfeit. Geezers have complained about subsequent generations for all of recorded history but in this case the objective results furnish solid basis for dissatisfaction. It isn't just a nostalgia trip." "Bob, well said and to my way of understanding, right on the mark, with your permission, I'd like to forward it to some of my pen-pals, but will wait until you give the ok. It seems ready to go to me." "Hi Bob, long time no communicate. I feel fortunate to have received a copy of your 787 analysis and sincerely hope you have somehow gotten it to the attention of those people at the top who really need to see it. I too have been retired for several y	
	 the mark. with your permission, I'd like to forward it to some of my pen-pals, but will wait until you give the ok. It seems ready to go to me." "Hi Bob, long time no communicate. I feel fortunate to have received a copy of your 787 analysis and sincerely hope you have somehow gotten it to the attention of those people at the top who really need to see it. I too have been retired for several years now and I dismay every day at the 	

"I never did meet you but having reviewed you web site I wish that I had. I spent 32 years of my life at <i>Boeing</i> , ended up as the chief engineer on the xxx retiring in 20xx.
I first thought that Boeing was going astray when we
sat through poetry sessions under the sponsorship of
Condit. I don't know if you had to undergo these. I am a
firm believer in the process of a master schedule, the war
rooms that are a part of it, and with the responsibility that
everyone has to ensure its completion. In all of my time at
Boeing we never deviated from the belief that schedule
was the most important (after safety) thing for Boeing. Our
task was to deliver airplanes on time to our customers. No
excuses. Keep up the good work."
excuses. Reep up the good work.
"Bob,
I can't believe the mess McNerney's allowing to
develop in Longacres. I haven't been able to reach
Carolyn, but I am dismayed to no end that she is
leaving. What's really missing is replacement of
Carson and Albaugh – the two most recent disasters as
CEOs."
"Bob,
I've now read your piece a couple of times.
There isn't a thing that I don't agree with. I believe you
have put your finger exactly on what's wrong at Boeing
presently - a paucity of true leadership and
management. I wondered how some of the people
currently in charge at Boeing might react to reading what
you wrote."
"Hi Bob:
Not sure you remember me, but I was the guy that your
group hired to take over for xxx when he retired. I started
the day you left. I just finished reading the whole page
you wrote and cannot believe how much of it I have ranted
about for 15 years. The management that came in after
you have all been poor, they all want to disengage the
supply base and manage by MBA. BO and MS were the
worst managers I have encountered in my 35 years and
they ran the quality group into the ground. I have been the
lead of the xxx group for xx years and have dug in on the
747-8 and will not allow building and shipping hardware
that does not conform. It has cost me raises and
promotions, which just shows you the mentality of the
leadership at <i>Boeing</i> . The 787 leadership ran right over
us technical experts and did what they wanted without
regard to quality. Even AS9100 proves their mentality as
it is a washed out version if D1-9000. You will be happy
to know that some of us are starting to hold leadership
accountable, some of us have enough time that we do not
care what they think and guys like me are on them daily
when they make stupid decisions. I have been kicked out
of many offices over the last couple years, and proud of
it! I keep telling them that after 35 years, it is my job to
hold them accountable. Thanks for saying it, just

validates what some of us old timers have been saying for years. We need that old management style back or we are doomed!"
"Whoayou really did blow a gasket! Not unjustifiable. but very sobering and as you say, embarrasing."
"One theory I believe in, is that shortly before McD bought us with our money they went thru a cleansing with all managers being removed from their current positions and all having to re-apply. What this did was weed out the timid and reward agressiveness. It was that pack of wolves which survived to get introduced into the current flock of <i>Boeing</i> folks who had been hammered the past 5 years on 'Working together', 'team building', 'concensus decisions', ie, the sheep. The result was inevitable, the wolves dined famously on the sheep. We could always spot a McD transfer from other new folks by behavior. Middle management was taken over, not to mention many top spots."
"Hi Bob, Good to see you are still your same old self. How "right" on you are - Quite insightful. I retired, but came back as a contractor. Believe it or not the Quality Director in place when the 787 started up, at that time, (Now two Directors ago) decided that we, <i>Boeing</i> Supplier Quality, should not
be part of the oversight on the 787 Program. Didn't take too long to figure that was a wrong management decision. My little saying, which I have told our management: When I came to Boeing 40 years ago, it was 'Kick ass, take names, build planes', now it is 'Sit down, hold hands, build plans', Unfortunately all we do is build back -up plans for those we built in the first place !!
"Bob, I share many of your feelings. I can remember going to a 'team meeting'
and asking the 'dumb' question, "who is in charge?" It turns out that no one was in charge. The team concept came from <i>Toyota</i> , who have a flat management. Dollars to doughnuts, the <i>Boeing</i> management is far from flat. I am surprised that the Board of Directors, if it
has any technical people on it, hasn't taken firm steps. I read your essay, and agree with you! I am for sending your material to the BOD. (From a former Board member.)"
"Yesterday, Dec. 12, marked 52 years since I hired into the <i>Boeing Co.</i> It has fed and clothed me and my family for all that time, or at least gave me the wherewithall to do it. I've been terribly disappointed in how a great company has been run, and thought I could just wash my hands of it. However, that just aint so. I think they need to get

some "corporate memory" back at the controls as the	
boys in charge just have no internal compass and/or	
the pride it takes to make schedule king. Naturally, as	
an old Quality guy, King Schedule sometimes made me	
crazy, but when all was said and done, they product out	
the door was usually pretty damn good, and mostly	
on time. I believe those guys breathed a huge sigh of	
relief when those shanked fasteners were found on the	
a substant for a second s	
787 as it gave them another excuse to be late. If you can	
call McNerney, you should. Just to be sure he sees the	
article. I would think his reaction to it would dictate	
where it goes from there. Bob, I know your getting	
advice from all corners, but in the end its your call. And I	
know you didn't ask any advice from me. So whatever its	
worth, at least its free. If I can be of help just let me	
know."	
(ID_L	
"Bob,	
It's an interesting tome. Have you thought of sending	
to Mr. McNerney	
'as-is'? What I'd really like to see is a national business	
writer do a post mortum on the Boeing/McDonnell	
Douglas merger (acquisition if you like). This is the one	
Condit can be hung with: Tell me Mr. Condit; what on	
earth were you thinking of when you hatched this dumb-	
ass move? You stayed at Boeing too long and Mr. Wilson	
was right: he promoted you over your head. Bottom line?	
With MDD, Boeing acquired ZERO long term business	
base along with a MDD personnel culture of "me first"	
and 'everything else is tied for last'. Sears goes to jail -	
no <i>Boeing</i> loyalty, Stonecipher gets fired for ethics	
issues - no <i>Boeing</i> loyalty, Albaugh tries hard for the	
CEO job at BAE Aerospace - no Boeing loyalty.	
Reading this self-congratulatory, syrupy litany of trivia	
makes me feel like Alice in Wonderland. It's little	
wonder these guys can't produce airplanes; they are	
too busy sitting around in quality circles, holding	
hands and singing Kumbaya. Where in the world did	
the once mighty Boeing Company find this bunch	
pansies and what lunatic installed them in positions of	
power, power to make or break our beloved Boeing	
where we happily toiled for so many years? When I	
read pronouncements from the 'company leadership'	
occasionally, I never recognize a single name anymore and	
ask myself 'who is this weenie, where did he come from	
and what has he ever accomplished'? During my	
checkered career, I knew almost all of the 'movers and	
shakers' at Commercial Airplanes, even those who were	
still grunts in the trenches. It wasn't hard to spot even	
new graduates who had the 'right stuff', but if any are	
still on active duty they have been suffocated by all the	
PC BS and will remain anonymous. If any of the tough-	
fibered, old guard are still with us, they must be having an	
attack of the vapors. Guys like Sutter, Gissing, Tattersall	
and a hundred more whose names escape my feeble	
memory at the moment would be pulling their hair out by	

the roots. What a pathetic mess!"	1
ule roots. What a patient mess:	
"Bob,	
JM forwarded your 12/13/08 email to me. I just finished	
reading it with increasing sadness. Fascinating - great	
work. In 1987, when we first started talking about	
what would become 'World Class Competitiveness', I	
knew that if Boeing stayed the course (not just the	
usual 6 months for another "yes we can" program), we	
would demolish the competition and dominate the	
industry for generations to come. We did stay the	
course quite a while. Alan Mulally embraced WCC	
and led the 777 to a smashing success. For the first and	
only time, I truly loved to come to work. It was fun and we knew we were finally doing it right That really	
was a major reason that the 777 first flight was nearly	
flawless. We ran the SIL through every nasty failure we	
could dream up. We found stuff and stuff got fixed.	
When the 737NG was proposed, I suggested that it should	
be a new airplane, built as a miniature 777 with a common	
cockpit and systems. This would also be an excuse to	
miniaturize and improve the 777 systems package, which	
could then be offered as a retrofit to all previous Boeing	
jets, as well as Airbus and Douglas jets. The airlines could	
finally have "common" fleets of airplanes – that all looked	
like Boeing 777's. But no! We went cheap and built	
the 737NG. We pulled it off at great expense and	
effort, but it was the beginning of the end of WCC. With the 'early retirement' of 1995 coupled with the	
demographic age bubble in engineering as well as our pilot	
office, I could see that if the company did not provide for	
our replacements in time for us to train them, there would	
be a two-thirds wipe out of experience in about 10 years.	
As you describe in the 'Tome', it happened. I had great	
hopes for Phil. I knew him when I was a new aero	
engineer at Everett in 1972. But alas, he sold us out to	
MD. We should have waited until they went bankrupt	
and then picked up the pieces – sans their	
management. But no! We let them run us into the	
ground, just like they did with <i>Douglas</i> and then <i>MD</i> . Then they move headquarters to Chicago with the rest of	
the mosters. 'You are known by the company you keep.'	
Well, other than that, I don't have strong feelings in the	
matter. I retired in 2002 and built a new house. There is	
life after Boeing, and it is good. Everyday is Saturday.	
I'm so busy now; I can't imagine ever having had any time	
to go to work."	
"If it were me, I would consider sending it to	
McNerney and others on the board and ask them if	
they cared to comment on it before you give it wider distribution, such as the times, etc. Once you let this	
cat out of the bag they are going to go into a defensive	
mode and will never listen. If the main goal is to right	
the ship, perhaps they need to give your piece a	
scrutinizing squint, before it falls on them like an A-	

bomb."		
"This is typical 'everything is just fine' attitudeWe have gone way to far to the right in our approach to teaming and consensus decision makingand rewarding a 'didn't get it done' behavior in my opinion. There needs to be fatalities (not real) but people being told they don't have jobs based on their lack of managing a program, meeting costs, and deliverables on time, and oh, forgot about a quality product. Sometimes I think I am getting too old for this stuff"		
(Current Director in Chicago)		
"Bob, I don't know how you do it I could never type fast enough to write that much no matter how much I knew. But I bet ol' Jim B. is rolling over and over. Personally, I think things started going south about the time <i>Boeing</i> began trying to not recognize individuals as heroes and standouts. Instead, it was Working Together. For example we no longer put the names of the fight crew on the sides of the cockpit it was the WT term (777). I talked a lot to Jack Steiner. He bemoaned the fact that <i>Boeing</i> no longer had 'faces in the window' (his term) in the form of chief engineers, designers, etc. Instead, everything was WT and was being reduced to the LCD. The Sutters, Wygles and their ilk were pushed aside. But the result was there was no one for the employees to look up to and worship as examples."		
"I read the whole thing. Great. You hit it right on the head. Touchy feely my ass. A sharp hard kick in the ass is what's needed. <i>Boeing</i> has become a company of wimps managed by incompetent wimps. If this happened in China, a lot of people would be making small rocks out of big ones. And they would make schedule. The triumph of bullshit over performance."		
"I read Bob's material from end to end and I learned a lot more than I knew. The situation is much worse that I expected. I am in full agreement in his analysis of the management problems. It just seems there is no one in full control. Kind of like lost sheep. Jim, I certainly don't want to sound like I am a sexist and biased, but I think a lot of the problems started by promoting a lot of people, women included, into positions they knew nothing about, just to fill quotas. Next, education and degrees are wonderful, but a degree does not guarantee the holder could organize and manage a goat roping contest. It seems the company is now only reactive instead of proactiveWhen did they throw out source and receival inspections, along with onsite monitoring of the critical stuff? It may very well be that the suppliers are held up for late engineering data. We have seen that before. I		

they asked when they might possibly expect the engineering for a small change that would have worked a big problem? They had been waiting about two years. I called Red McCallum and he got the ball rolling and that problem was solved in about a week, but authorization to proceed with the new change was instant. That is where an onsite interface really pays off. It just seems that it is only a matter of time before we see a major collapse of the company. When that happens, the time will be ripe for <i>Toyota</i> to step in and take over, as they said they will become the transportation system of the world. A retired <i>Douglas/Boeing</i> employee forwards the <i>Boeing</i> magazine to my dentist friend who is an aviation enthusiast. My friend asked me why are there so many Vice Presidents at <i>Boeing</i> . I told him it wasn't always that way. Anyway, I want no part of it, except I want them to get their act together as I am still holding a lot of stock certificates. will be interesting to see the results of the changes in the next six months. Better close. Stay warm out there, and stay healthy. My old knees are giving me fits, probably to many years on the hard concrete. I don't want any more surgeries."
"From my little knot hole I believe you're dead on. I felt the bull shit would sink us long before I retired and was sent to people skills class over and over to some how change my theory x way of thinking, It never worked and I'm glad it didn't. When I was young and fighting incompetent management I use to say to my self that's ok you bastards I'll out live ya. Then when I got to a point and time to make a difference along comes political correctness and make everyone feel warm and fuzzy.
They deserve what they've made and if it weren't for the fact that I still feel a sense of loyalty to <i>The Boeing</i> <i>Company</i> I grew up in I'd say fuck em all. Truth of the matter is the people down there today couldn't handle the old ways of doing our day to day business. They've been made soft with all the bullshit programs and management that doesn't know how to call bullshit when these limp dicks get up and starts pumping out their excuses. Time to remember 'The initial objective is to build airplanes'".
"I think you're a little bit soft on the reasons for failures. (just kidding) I have said before (and you touched on it) that the educated idiots got control of the Company and started playing silly games instead of building airplanes. People who don't have a clue about what it takes to actually build a product. I wonder how long before our retirement plan is canceled?"
"Bob has compiled an outstanding analysis of the evolution of <i>Boeing</i> commercial airplanes. It is a very thought-provoking peice of work. The main issue as I see it is that the new leadership's view of all of this truth this

would differ from yours or mine. While one would hope	
it would be received with the respect it is due and	
actually result in some sort of leadership "revival", I	
believe that the current leaders will not receive it well.	
As Bob stated at one point, 'maybe Boeing is reflective of	
our society as a whole', is something to think about. Take	
a look at the auto industry, banking, financial institutions,	
etc. Most of the major organizations seem to be	
performing similarly. They have well educated leaders	
who have bounced around other major organizations,	
built up thier resume's, and are able to put a 'spin' on	
just about any situation (like many of the spins Bob	
captured for this document). I'll bet a very similar	
document could be compiled for Chrysler, General	
Motors and others. As far as a solution goes, the new	
leaders have hit critical mass, so I don't now if turning	
back to basics is possible. I commend Bob for this	
magnificent effort, though I am not surprised. For a long	
time, I thought I would join Bob's team at some point. He	
was interested in hiring me just before I came to work for	
you and several times after. I believe he has always tried to	
make a big difference for Boeing."	
"re the 787 and general demeanor it's all true. Several	
people my level thru out lots of orgs (I am on a lot of 787	
teams) are all saying the same thing nothing is getting	
passed on to the top. One really smart woman who was	
a 'nay sayer' was removed from her job for not	
shutting up!! We will see that she is right real soon. I	
also agree there are going to be more delays, and	
finacially I can tell you things (not on line) that will	
make your toes curl. Thanks for all of the effort and	
blood, sweat and tears that went into your treatise. You are	
right on! I fear that a solution is beyound the capability	
of anyone currently on the Boeing payroll. I would like	
to think that this too shall pass, but I am afraild that what	
will pass will be <i>Boeing</i> ."	
and pass with de boeing.	
"OK my put. It will be concise. Bogash has given us a	
most insightful well researched, historical, account. J. has	
given us a more concentrated and good analysis. B., as	
usual, has put some balance into the discussion. I agree	
that we did not train the next generation or lost it by failing	
to transition. But, I think you have all missed a major	
dimension. To the extent that we are talking about the	
787, we are not talking about the kind of program we	
participated in bringing to successful conclusion, relatively	
on time and within the money. This program gave away a	
large degree of engineering responsibility and asked for	
the delivery of complete assemblies. The 6 o'clock stand	
up meetings should have occurred in other corporation's	
plants. Their managements should have seen to	
comprehensive manufacturing and assembly plans and so	
on. And while we had earlier program participants living	
with our engineering and our engineers in a supervisory	
role at major subcontractors, coupled to experienced	

planning, tooling and manufacturing, people, we left these them to their own devices."	
"I think that you've hit the nail on the head Straight forward and to the point. But given <i>Boeing's</i> current management tree nobody is left that thinks the legacy way and I don't for see anything changing except our bottom line, going in the negative column. And I have always said from the time that Stone Dicker took over, <i>Boeing</i> was on a down fall because of his putting non aerospace personnel in high positions that new nothing about an airplane Still the practice today. Lots of educated people but most without any aerospace experience I don't see things getting any better any time soon. I think <i>Boeing</i> is in for some really tough times in the not to distant future. Thanks for sharing."	
"Excellent evaluation. We need to get this in the hands of the right people. But who is that? The Board must be asleep."	
"I sent That Bogash article to my brother in law who was a corp. director reporting to T Wilson when he retired. His comments: Hi Ray - A rather lengthy study on <i>Boeing</i> management. I read it all and I substantially agree with it. Things have really changed at the old shop - 1 remember when Bill Allen ran things that the pressure to keep schedule was enormous (I believe we even bragged that <i>Boeing</i> had not missed schedules for 4 or 5 years. I seem to remember that heads of mfg and eng even lost their jobs when we missed schedules. There is no question that the 787 represents a great technical challenge, but so did the 747 and the article you forwarded referred to schedule slides on all kinds of programs. I don't know who the guy is that wrote that article, but it represented a lot of work. Pete"	
"Dear Bob, I worked for you from 1991 - your departure. I was in Chicago when you traveled there [for our midwest] staff meeting. You spoke frankly in that meeting and I shall never forget that heartfelt speech. Thank you. My name is T. I began with <i>Boeing</i> , fresh out of college, in 1978. Like most of us, I worked for some excellent managers and some poor managers. It's just the way it is. Further to your writings, it is my observation that the most essential <i>Boeing</i> 'paradigm shift' the past 30 years has been this: In the 1970's and 1980's you could be damaged or fired for lying to executive management; more recently you can be damaged or fired for not lying to executive management. I have seen this and experienced it first hand. Like you Bob, I have many friends who remain in management at <i>Boeing</i> . Several were drafted into the 787 program. Their consensus of the program is that the problems are seldom technical in a networe. But mether at the formation of the program is that the problems are seldom technical	
in nature, but rather stem from management	

corruption - for lack of a better , <i>or worse</i> , term . If I could pass along one management recommendation to Mr. McNerney it would be to simply reward ' <i>functional</i> correctness' (my word) instead of 'political correctness' which became so overwhelmingly prevalent during the 1990's. Best wishes to you Bob Bogash!"
"Bob, I thought it is a well written article. I would have added a few comments like "Some how, <i>Boeing</i> must shed its <i>McDonnell</i> symbol, relocate its Headquarters back to Seattle, and shed its <i>McDonald & McDonnell</i> executives within the Seattle area <i>Boeing</i> facilities. <i>Boeing</i> must return to a Quality Assurance plan that was introduced on the 777, and provide on site support in Engineering, Quality Assurance and Program Management at its major suppliers.' The real problem is to convince any of them that a) there's a problem, b) it is fixable, and c) that you have the solutions. These solutions would have to be cost effective and somehow be made palatable to the existing folks. That means acceptance at the highest levels and top down enforcement by edict. That's a big row to hoe maybe impossible."
"If Wilson was still in charge we/they would not be in this mess. Maybe management should answer the question; WWWD, 'What Would Wilson Do?' After that they could go fouth and fire someone"
"Your piece was on target! Promotions while I was still there (end of 2000) seem to fulfill quotas rather than promoting personnel with the capability to get the job done. Sort of a quick dance through the chairs to higher levels. I would like to see a video of the 'Head Shed' reading your tome."
"Thanks for the humor. I needed a lift. A friend of mine bumped into Frank Schrontz the other day and asked him what he thought of the program delays and the leadership in Chicago. Frank just rolled his eyes. It was Condit more than anyone who considered <i>Boeing</i> a fine place for his social experiments. What business does the company have diluting the workforce for all these warm and fuzzy programs. It's time to go back to basics, focus on airplanes, cut the meetings, do the work. Oh well, our days in the saddle were not perfect but surely it is more satisfying to struggle with an engineering or production problem than meeting environmental goals, etc."
"Jeez, what tripe. This guy couldn't find his ass with both handsprobably spend two hours every morning on their makeup. God, help <i>Boeing</i> . Do they even know how to spell priorities."
"Kind of makes me want to puke, he (Carson) should

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	have been candid about problems. Total dribble."	
	"Bob,	
	I have read your sixty some pages with interest, and have	
	taken the liberty of sharing them with others. I also must	
	say that I generally agree with the points you have made.	
	Since you have not read my analysis, here it is. I have not	
	read your latest draft, but I will. I have though, read your suggestions on what us old crocks can do. Some of us	
	have been thinking along similar lines, and have come up	
	with all the same suggestions, except the double box. And,	
	Oh yes, we did not limit participation in any solution to	
	retired 90 series, or execs. Will comment further on your	
	latest writing when I read it. But, I am on your side, and particularly agree with your post script."	
	"Bob,	
	In short, I think that all us old guys generally agree	
	that the root cause of the 787debacle, was the can do,	
	results oriented culture the company used to have,	
	going South and being replaced by a touchy feely,	
	efforts count, team oriented, culture. And it took about 20 years for that change. I don't see that any of the	
	suggestions for a fix that any of us have come up with	
	address that problem. First, the guys in charge, starting	
	with McNerney, have to agree that the culture has gone	
	to Hell. I don't think that they will do that, partly	
	because they don't have their ear to the ground, and partly because our general culture is tending to	
	embrace those values which we think are causing the	
	problem. They are apt to dismiss our concerns as	
	merely rants of old time Hard Ass management types,	
	out of touch with the times, who on principle, don't	
	think the new team knows what they are doing. But let's say that a miracle occurs, they agree with us, and	
	want to turn it around. How do you undo 20 years	
	worth of ingrained programming overnight."	
	"To a googer who has been 'out of the loop' for a very	
	"To a geezer who has been 'out of the loop' for a very long time, much of this sounds like touchy-feely,	
	PC bullshit. When did we cease responding to customers'	
	urgent requests for assistance and when did our Training	
	outfit cease to be 'customer-focused? What genius decided	
	that our business objective was demonstrating 'environmental leadership' rather than designing, building	
	and supporting the finest transport category aircraft in the	
	world? With such apparent confusion over a candid,	
	unambiguous mission statement among the leadership, is it	
	any wonder that the troops are confused and demoralized	
	or that things aren't getting done on time? I'm almighty	
	glad to be retired. Indeed, neither of us would have fit comfortably into what that outfit has become; we were	
	too much type A, let's get it done personalities."	
	"Gee Bob, you're on a roll!! I wouldn't have	
	expected Carson or Bogue or any of our 'leaders' to	
	highlight all the bad. I would like to think those	

responsible for the "bad", however, will be held accountablebut I doubt it." "I know the gay who wrote this quite well, Bob Bogash, have known him for probably 40 years and he has a unique window to see what is going on at the company today, and he tells it like it pretty much is. It is worth the time to read it if you wonder what is happening with the 787 and more importantly, the culture at Boding today. Those of you with fond memories of Boeing will be saddened." "If you want to understand what has happened to Boeing in the last 20 years, (I retired in 1990 & things were fine then) and have an hour of free time, (it's 20 pages long and I got to pg. 10 the first sitting), take a read of Bob's article below." "Read Bogash's attachment (its' overly long, but worth an hour of your time). I never knew the gentleman or where he was in the company, but he was somewhere where he really understood what it took to make a program a success. Supplier management really his home - so do the schedules. So do placing technical types into top management positions, even planners, instead of finance types and humanitarians. But as to what can be done now- maybe all of those concerned should volumeter to go go back and bail them out. Are you ready?" "The 777 program had a culture, as you say, of bringing ideas up, from below, early in the program, to make adjustments upstream involving suppliers, customers, FAA and others. The 787 has a culture of paralysis and indecision. Why is that? An engineer told me this story. He told his supervisor, "The supplier I monitor will not make their delivery date." How do you know?" 'I've worked on amay programs. I know what to look for. I talk to them on the phone, I've been to their facility, I know their resources – they won't make their delivery date." Have they missed a date, yet?' 'No' 'Tell me when they miss a date.' The engineer was furious, but he acknowledged the cultural message inherent in his supervisor's attitude. I told this story to senior 787 management. Their immedin			
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16	"Boeing	James	Firm-	α	 Similarly, the second level supervisor has no recourse. Even the program leaders I was talking to had no recourse, in the 787 business model, to act on information about pending problems. The 787 business model has no room for coordination costs. That's the whole point of the 787 business model. Write a contract. Give them their performance specifications. Snap the parts together. This will quickly create a culture of indecision and paralysis. To this day, engineers express frustration that the changes required now fall to them at <i>Boeing</i>, requiring duplication of effort, rework, and redesign. Even so, the computer tracking systems, decision-making processes and lines of authority have never been shifted to <i>Boeing</i> – everything is done on an ad hoc basis, and takes many times the effort and expense that it should. The fundamental business model has never been changed, and the culture it breeds cannot change in isolation. In the 777 program, change and authority and relationships were built into the program's culture. The 777 business model put <i>Boeing</i> in a decision-making position, and the other stakeholders were involved in close coordination. The 777 business model assigned authority and responsibility to suppliers. We gave them inadequate direction, poor oversight, no feedback, and let them fail at great cost. Now, we are paying the coordination costs downstream where they are messy, expensive and slow. The business model determines the program's culture. Outsourcing is not the issue, exactly. The program will work if it can do 3 things: Produce the best possible plan, Build in awareness of progress to the plan (meeting schedule, as you say) or timely awareness of deviation from the plan, and Reallocate resources to get back on plan. These conditions all require a capable and effective technical design and manufacturing community. The 777 program succeeded in all three. Predictably. The 777 program succeeded in all three requirements represent vertical integration, and	On the
Jan. 2009	to Rein in Dreamli ner Outsour cing" <i>Busines</i> <i>s Week</i> (Joseph	McNer ney, Chari man and CEO, <i>The</i> <i>Boeing</i> <i>Compa</i>	Suppli er		commercial deliveries of its 787 Dreamliner into early 2010, is rethinking the global outsourcing model that critics say has caused much of the nearly two-year holdup. The company is making plans to bring more work back in-house. The Failed 'Hollywood' Model: Union officials say past executives at <i>Boeing</i> used Hollywood as a model as they developed their plans to outsource production on the	"archite ctural logic" employ ed by a modular enterpri se architec

Weber)	ny. Scott Carson , CEO Boeing Comm ercial Airpla nes.			787. Moviemakers bring together independent contractors—actors, camera operators, publicists—on a project basis for many films, avoiding the expenses of having all such staffers constantly on the payroll. By treating planes as such projects, advocates of outsourcing figured they could do the same in producing aircraft. 'It turns out that we're not the motion picture industry,' quips Stan Sorscher, legislative director of the SPEEA. He says staffers and project teams are not easily interchangeable in manufacturing products as complex as jets. Chief Executive W. James McNerney Jr., who took the helm at <i>Boeing</i> in mid-2005, inherited the aggressive outsourcing approach from prior CEOs. He appears to be amenable to dialing it back, if needed. McNerney would not be available to discuss his plans, a company spokesman said. However, in his interview with <i>Aviation Week</i> , commercial planes unit chief Carson said the CEO [McNerney] had 'concerns' about 'the deals we had done in the supply chain.' Added Carson: 'The fact that we're struggling with it now verifies that his concern was valid.'''	ture for further modular ization.
22 Bloomb Jan. erg, 2009 "Toyota 's Toyoda Plans to Replace Most Top Manage rs" (Alan Ohnsma n and Naoko Fujimur a)		Firm	β	 <i>"Toyota Motor Corp.</i>, the world's largest automaker, will replace most of its top management later this year as incoming President Akio Toyoda aims to return the company to profit, people familiar with the matter said. Toyoda, who will succeed Katsuaki Watanabe in June, will replace the company's other four executive vice presidents and "many" of the 19 senior managing directors, said the people, who asked not to be identified because the changes haven't yet been announced. Watanabe will become vice chairman. Toyoda, the 52-year-old grandson of founder Kiichiro Toyoda, will have to stanch the carmaker's sales slump as it forecasts the first operating loss in 71 years. He may curb the expansion strategy that allowed the company like <i>Toyota</i> and very refreshing,' said Koichi Ogawa, who helps oversee \$28 billion at <i>Daiwa SB Investments Ltd.</i> in Tokyo. 'The new management is going to break the past hierarchies.' Honorary Chairman Shoichiro Toyoda, Akio's 83-year-old father, and Adviser Hiroshi Okuda, 76, may step down from <i>Toyota's</i> board, Chairman Fujio Cho said on Jan. 20. Paul Nolasco, a <i>Toyota</i> spokesman, declined to comment on any changes in management. <i>Toyota's</i> American depositary receipts fell \$5.80, or 8.6 percent, to \$61.72 at 1:34 p.m. in New York Stock Exchange composite trading. The ADRs lost 32 percent of their value in the 12 months through yesterday. 'His Own Team' 	On an integral enterpri se's slow modular ization in the face of exogeno us crisis.

				independent auto analyst and consultant in Greenwich, Connecticut. 'A new CEO wants to put together his own team.' Toyoda's challenges include reversing last year's 15 percent sales drop in the U.S., for decades the automaker's main source of profit, even as companies and analysts cut their 2009 outlooks. Auto sales may fall to between 10 million and 10.5 million this year, the lowest level in 27 years, from 13.2 million in 2008, according to <i>IHS Global Insight</i> , a Lexington, Massachusetts-based market forecaster. <i>Toyota's</i> total sales last year fell for the first time in 10 as the global recession and tighter credit decimated vehicle demand worldwide. The economic slowdown has prompted the company and Japanese rivals including <i>Honda Motor Co.</i> and <i>Nissan Motor Co.</i> to cut jobs and production and driven Detroit automakers <i>GM and Chrysler LLC</i> to seek government aid to stay in business. Production Cuts Toyoda also must find ways to utilize plants opened in North America since 2006 that have given the company too much production capacity in the region as overseas sales declined 4 percent to 6.82 million last year. <i>Toyota</i> last week announced broad production cuts affecting	
				all U.S. and Canadian auto-assembly and engine factories through the end of the current quarter. Last month, the company indefinitely suspended construction of a plant in Blue Springs, Mississippi, that was to start making Prius hybrids in 2010. The company's sales slipped by 4 percent to total 8.97 million vehicles in 2008. That compared with GM's 8.35 million. Toyota in December forecast an operating loss of 150 billion yen (\$1.7 billion) in the year ending March 31. That compares with a previous profit forecast of 600 billion yen. Next fiscal year will be worse, as the yen strengthens against the dollar and the U.S. market continues to shrink, analysts	
				said. Focus on Customers Toyoda will focus on customers and spend as much time as possible on the company's production and sales, he said earlier this month. 'I want to be president closest to the site,' Toyoda said in Tokyo on Jan. 20. 'I'll try to make changes without being tied down by the past.'"	
27 Jan. 2009	Bloomb erg, "Boeing Recover y May be Stunted as Custom ers Clamor for	Firm	α	"Boeing has been trying to put a rather upbeat face on the reality of the market, and I think they're behind the curve,' said Jon Kutler, chairman of <i>Admiralty Partners Inc.</i> , a Los Angeles-based investment firm that focuses on closely held aerospace companies. 'It's going to be a tough year.'	On a modular enterpri se architec ture's non- systemi c understa nding of its

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	a Ray)				
27 Jan. 2009	Bloomb erg, "Boeing Recover y May be Stunted as Custom ers Clamor for Credit" (Susann a Ray)	Firm	α	"'Boeing has been trying to put a rather upbeat face on the reality of the market, and I think they're behind the curve,' said Jon Kutler, chairman of Admiralty Partners Inc., a Los Angeles-based investment firm that focuses on closely held aerospace companies. 'It's going to be a tough year.' 'Operationally, 2009 will be a much better year than 2008,' said William Alderman, president of Alderman & Co. Capital, a broker dealer specializing in aerospace and defense in South Norwalk, Connecticut. 'But financially, we are in the midst of a deep global recession, and the financing sector is in pretty bad shape.' Boeing shares still may be attractive if the company meets its development goals with the 787 and other delayed programs and ships as many or more planes than in 2008, Alderman said. The company's average 12-month target price is \$48.71 in a Bloomberg survey of 14 analysts. 'There are troubles on the horizon for Boeing, but they're not operational or technological, they're purely financial," said Alderman, who doesn't own Boeing stock. 'Long-term, I'm wildly optimistic for	On a modular enterpri se architec ture's non- systemi c understa nding of its problem s.
28 Jan. 2008	The Wichita Eagle, "Boeing to Report on 787, More" (Molly McMilli n)	Firm- Investo r	α	 Boeing."" "Boeing is expected to give a status report on its much-delayed 787 and aircraft delivery outlook today as it releases its end-of-year earnings and hosts a conference call with analysts and reporters. It has been a tough year for Boeing stock, which closed Tuesday at \$43.22. Boeing shares have lost 45 percent of their value in the past year the Standard & Poor's 500 index is down 39 percent in the same period and are 60 percent off their October 2007 high of \$106.65. Today's conference call needs to go beyond the norm, Barclays Capital analyst Joseph Campbell said in an analysts report. Boeing must make an extra effort to clarify what's happening with its financials, he said. The company suspended financial guidance during the Machinists strike last year. 'This hiatus has left the investment community in the dark about much more than the strike,' he said. Shareholders have more unanswered questions than any time in recent memory, Campbell said. It should also provide insight on why the production and delivery rates are what they are, especially given lower demand for travel and requirements for aircraft, he said. Investors have numerous questions on the 787, which has had four schedule slips and a two-year delay, Campbell said. They want a road map of milestones that must be met on the 787's first flight, scheduled dates of delivery of each test aircraft to the flight test program and milestones for 	On a modular enterpri se architec ture uneven informa tion flow to investor s.

2009 rs I into <i>Boe</i> 'Fi (Cai Gut z)	vesto Look ings iture	Firm- Investo r	α	certification, he said. They also want details of the planned production ramp-up for the 787-8 and how the current schedule compares with the original one and with the last revised one, he said. That way, it is 'transparent whether and when <i>Boeing</i> is planning to recover to previous delivery commitments,' Campbell said. <i>Boeing</i> also has been quiet about the impact of the 787 program on its financials, he said. 'With the 787 program now two years late, it is clearly overrunning its cost targets, it has significant penalties to customers, and we feel it is time for <i>Boeing</i> to shed more light on what is going on with the 787 costs and how the 787 is affecting the overall <i>Boeing</i> financials,' he said.'' "Airplanes don't have rear-view mirrors, and neither, it seems to investors in aircraft makers. <i>Boeing</i> offered an expectedly weak fourth-quarter earnings report on Wednesday, but its shares rose after the company offered a reassuring view of its future. 'It was a relatively neutral performance compared to what was anticipated,' said Paul Nisbit of <i>JSA Research</i> , referring to the fourth quarter, 'but it's history now, and it looks like everything else is going to go along according to plan.' The aerospace and defense firm's performance over the final three months of 2008 was defined by a labor strike, which the company said led to passenger and cargo jet deliveries falling by more than a half. But even though Wall Street was fully aware of the strike, the Chicago- based company's 27.4% drop in sales was still short of analyst expectations. In addition to crippling deliveries, <i>Boeing</i> also blamed the 58-day machinists strike, which ended in early November, for the quarter's loss, because of an estimated \$1.09 per share charge it produced. <i>Boeing</i> also had a heftyand unexpected61 cents per share charge because of changes it had to make to its 747 line after finding its structure wasn't strong enough. There were other charges too, <i>Boeing</i> sid, like a legal reserve that cost nine cents per share. <i>Boeing</i> s	On the investor s' systemi c over- confide nce in their investm ent.
Jan. n 2009 Reu Res	ters ney, earc Chair	Firm- Investo rs	u	Starting with slide two, 2008 was a challenging year for our company. While we made progress on many fronts, that progress was outweighed in our results by the	modular enterpri se
h, exce fror The Boo	n CEO,			machinists' strike during the fall, the impact of delays on key development programs, and the effects of the unprecedented crisis in the financial markets. Across Boeing, the vast majority of our programs are	architec ture's interacti on with its

	0			innerten
	Compan	Compa	healthy and performing well. However, in our business, a	investor
	y 2008	ny;	small percentage of underperforming programs can	s,
	Q4	James	have a big impact to overall results, and we are	focusin
	Earning	Bell,	addressing that reality in our plans for 2009.	g on
	s Call	CFO,		exogeno
	Transcri	The	On the topic of development programs, let me first talk	us
	pt	Boeing	about the 747-8. The work statement on this airplane has	events.
	-	Compa	expanded since the start of the program to meet	
		ny	performance commitments to our customers, and to	
		, in the second s	recover from our original underestimation of the scope	
			of engineering work that needed to be done on this	
			airplane. The resulting design changes, which have been	
			substantial, coupled with limited availability of	
			engineering resources to do the work, drove the schedule	
			change we announced in November. Since then, a full	
			assessment of the supply chain impact of these and other	
			additional design changes, along with increased pension	
			costs, resulted in the reach-forward loss we recognized	
			in the fourth quarter. James will talk more about this	
			charge in a moment.	
			I'm disappointed that we weren't able to provide you	
			insight on this charge sooner, but our full assessment	
			was only completed earlier this week. I'm also	
			was only completed earlier this week. I in also	
			disappointed with the outcome. But let me say one more	
			thing. Notwithstanding the challenges this program has	
			presented us, we still believe the 747-8 is a very	
			competitive airplane with a strong future in a	
			significant market niche. It is worthy of investment and	
			will provide great value for our customers.	
			Turning to the 787, that program made notable progress	
			in 2008, including Power On in June, successful tests of	
			the landing gear, horizontal stabilizers and wing box, and	
			high pressurization of the static airframe. The FAA also	
			approved the 787 maintenance program. In spite of that	
			progress, however, we also endured challenges, including	
			delays from the machinists' strike and the requirement to	
			replace certain fasteners, all of which resulted in the	
			revised schedule we announced in December.	
			The fastener replacement activity is moving along and is	
			largely behind us on the first two flight test airplanes. We	
			are on track for first flight in the second quarter. Prior	
			to that, we will be exercising a series of gauntlet tests	
			during which we run the airplane systems on the ground as	
			if it were flying. After those tests and the ground vibration	
			test on airplane number two, it's all about getting airplanes	
			in the air and successfully completing the flight test and	
			certification process.	
			We also continue to make progress with our 787 program	
			partners to improve the condition of assembly of airplanes	
			coming into our Everett factory. Our main focus now is	
			working with the supply chain to get the production	
1			system into a rhythm and [rather] work back to normal	

	levels. As we've mentioned before, our plans call for reaching a production rate of ten airplanes per month in 2012, and we will evaluate possibilities to increase and/or accelerate that rate.	
	We are having ongoing discussions with our customers on how the delays and the current business environment are affecting their business models, and what steps we can take to constructively mitigate the impact. The 787 backlog remains high at about 900 airplanes. Although we booked 93 new orders in 2008, we do expect some puts and takes on 787 orders in 2009, with one customer's orders for 15 787s late in the next decade coming off the books this week. Despite a modest level of orders churn, we are confident in the long-term value of the 787 for our customers.	
	To address what has clearly been unsatisfactory development program performance at BCA, Scott Carson and I have undertaken a fundamental realignment and strengthening of the BCA organization, its processes and leadership. We are reintroducing rigorous functional discipline with clear lines of sight and accountability, and tighter integration of program, business unit and corporate decision making. We both believe it's time to end the era where development programs were stood up to operate as islands of their own.	
	While this structure served a purpose to foster the kind of tremendous innovation like the 787, our recent experience has shown it to do so at the expense of execution and predictable performance. Our objective is to advance a new era and operating model characterized by seamless integration of business unit and corporate functions, reliable and disciplined execution, and responsible and accountable program leadership.	
	More specifically, late last year we substantially reorganized BCA to strengthen airplane programs and supply chain management. We put all airplane programs together in one organization under Pat Shanahan to allow for more disciplined and efficient management of program resources. Notwithstanding this change, Pat will continue to own the 787 until its introduction; though we continue to add leadership to the program most notably Scott Fancher, the new program leader, who comes to us from managing some of the more difficult, technical and supply chain programs in IDS.	
	We also elevated the supply chain management function and we consolidated within it management of both internal and external suppliers under Ray Conner. With Scott's leadership, Ray and Pat are working closely together to improve both development	

	program performance, and overall operational performance and productivity at BCA. We will be taking the results of their work and additional measures to further strengthen the team and the operating model will be critical to our success in 2009 and beyond.
	Now, despite the significant challenges we faced in 2008, there were many areas of the business that performed very well. Virtually all of our production and services programs in both defense and commercial are executing to plan or better. Programs like the FA-18, the 737, commercial services and defense support systems, to name just a few, are providing customer value and delivering strong double digit margins .
	There are also many development programs, like GMD, FCS and the 777 freighter, that are achieving both technical and financial milestones according to plan. As we begin 2009, a year that no doubt will test us again, we are reassured by the fact that our fundamental product and services strategy and competitiveness remain intact.
	Fundamentally, this is a solid company with a strong growing core business.
	While it's hard for us to know the final impact of all of this, we can and must prepare for the continued market uncertainty, while ensuring our ability to fund our growth initiatives. In that regard, we have stepped up our drive to get more competitive and productive. We are being ever more aggressive in managing both costs and investments. Specific actions we are taking include streamlining organizational structures, reducing discretionary and capital spending, eliminating unnecessary work, and reviewing staffing levels, all to drive higher levels of productivity. Part of that, unfortunately, will mean reduced employment in certain areas of the company. We are targeting these reductions to exceed 6% of our current workforce, or approximately 10,000 positions to support our productivity efforts and infrastructure reduction. This will occur through a combination of attrition, retirements, reduction in some contract labor, and layoffs. While difficult decisions must be made, we will do as much as we can to assist our employees who are affected by them.
	Despite this challenging environment, our backlog is holding. In 2008, we had but six order cancellations at BCA and accommodated about 110 aircraft deferrals. The deferrals represent about 3% of our commercial backlog, which is not out of the norm. We do expect to see an increase in the numbers of deferral and cancellations in 2009. However, the size, diversity and quality of our backlog provides greater flexibility than we've had in the past to accommodate our customers.

As you all know, the financing environment also remains challenging. Boeing Capital regularly examines overall
financing capacity as well as specific financing sources for each aircraft to be delivered by BCA. In 2009, we believe
financing sources are sufficient to meet expected
requirements for our products. We are assuming in our
guidance that BCC will need to do about \$1 billion of new
financing in 2009. The actual amount could be more or
less, but we feel will be in a range that's manageable.
Let me summarize by reiterating that we are indeed facing
one of the more difficult commercial and financing
markets that most of us have ever seen. However, we have
a solid foundation from which to work through this environment with half our business in defense, strong
commercial products and a large backlog. Equally
important is the fact that the actions we are taking now
are not business as usual.
Looking forward this year, our 2009 EPS and cash flow
guidance prudently balances pension and other cost
headwinds with an aggressive productivity plan, while
recognizing both operational and market uncertainties.
James Bell (Boeing):
Thank you, Jim, and good morning. I will begin with our
2008 results on slide four. Revenue for the year was \$60.9 billion, which was down 8% from a year ago. Results were
impacted by the strike, which reduced commercial
deliveries by about 105 airplanes and revenue by an
estimated \$6.4 billion. Earnings per share was \$3.71, and
was impacted by an estimated \$1.63 per share due to the
strike. Operating cash flow for the year was a use of \$400 million, reflecting the strike impact of about 2.5 billion
and planned inventory buildup on the 787.
Now let's take a look at the fourth quarter performance on slide five. Revenue of \$12.7 billion was down 27% from
the prior year. The strike reduced fourth quarter revenue
by an estimated \$4.3 billion and commercial deliveries by
about 70 airplanes, including the recovery of the galley-
delayed deliveries from the third quarter.
Earnings per share was a loss of \$0.08, driven by the strike
impact of an estimated \$1.09 per share, the 747 charge of 0.00
\$0.61 per share and a litigation related reserve of \$0.09
per share.
Now let me talk about BCA in a little more detail on slide
six. Commercial Airplanes fourth quarter revenue of \$4.6
billion reflects an estimated \$4.3 billion strike impact. Operating margins were significantly impacted by both the
strike and the 747 charge. The 747 reach-forward loss
was \$685 million. Late maturity of the 747-8 design
drove substantial changes for our supply partners. This
coupled with the already existing schedule pressure

caused significant disruption throughout the supply	
chain resulting in the charge we took this quarter.	
Now, about 50% of the charge is related to the late	
maturity of wing design driving new load requirements	
into the fuselage and statement of work changes for our suppliers, causing both schedule disruption and increased	
recurring production costs. Approximately 15% is related	
to later than planned transition of component	
manufacturing to lower cost suppliers due to their	
production readiness. Another 10% is due to design and	
load changes, which resulted in reduced commonality	
with the 747-400 causing some of the procured	
components and systems inventory to be obsolete. 10% is	
the impact to our internal production process as a result of	
the issues facing our supply chain. The remaining 15% is	
due to, as Jim mentioned earlier, the higher pension costs	
in our program accounting cost base.	
Earlier this week, we concluded our detailed analysis of	
these impacts and recorded the charge. For the year, BCA	
delivered 375 airplanes and captured 669 gross orders,	
ending the year with a backlog of \$279 billion. This	
backlog continues to reflect the strength in the market	
demand for our commercial product portfolio.	
For the year, IDS delivered a solid 10.1% margin on \$32 billion of revenue, as all its business segments	
delivered outstanding performance that help offset the	
AEW&C charge from second quarter. IDS continues to	
pursue growth opportunities through targeted acquisitions.	
During the quarter we completed the acquisition of	
Federated Software and Digital Receiver Technology.	
Now let's turn to slide eight and talk about our backlog. As	
Jim mentioned, our backlog is at unprecedented levels. In	
the current market environment, we expect some of the	
backlog will get deferred to a later date or canceled. But	
the size of our order book provides us much greater	
leverage and flexibility than we've had in prior economic	
downturns. If deliveries move out, we have more	
opportunities to move other deliveries forward. It also	
provides us a solid foundation to continue improving	
productivity and financial performance.	
Other and unallocated costs declined during the quarter,	
primarily due to lower pension and environmental	
expenses. Within the unallocated segment, we recorded a	
reserve of approximately \$0.09 per share related to	
satellite litigation.	
strente augustoni	
Now let me turn to our pension plan performance in 2008.	
The overall equity market performance significantly	
affected our pension plan funded status. Our asset	
returns were down about 15% in 2008. The strategy we	
implemented last year to reduce volatility in our net	

pension obligations has paid off. Transitioning our assets from a high equity concentration to more fixed income assets matched with our liabilities, resulted in substantially better performance than the overall equity markets.	
Since the third quarter discount rates have turned down sharply which has increased our pension liability. Our discount rate at year end was 6.1%. The company's pension plans are now 83% funded on a financial accounting basis, down from 110% funding at the end of 2007. This resulted in an equity adjustment of approximately \$8 billion in the fourth quarter, which produced a negative book equity as of year-end. This accounting adjustment will not impact our ability to pay dividends or comply with our debt covenants.	
Now let's turn to slide ten and discuss cash flow. During 2008 we used \$400 million of operating cash flow reflecting the strike and planned working capital increases. During the year, we also paid down about \$700 million of debt at Boeing Capital, used about \$900 million for eight targeted acquisitions and used \$2.9 billion to buy back 42 million shares.	
Now let's turn to slide 11. Despite the significant challenges we faced last year, our financial position remains solid. We ended the year with \$3.6 billion in cash and marketable securities, and we reduced our debt loads. However, because of the strike and development program delays, we ended the year with a cash balance that was lower than in prior years.	
Turning to slide 12, our financial guidance reflects good performance at our businesses in an uncertain market environment. We're setting 2009 EPS guidance at \$5.05 to \$5.35 per share. Our 2009 revenue guidance is \$68 billion to \$69 billion, and includes the 787 and the 747- 8 schedules announced in fourth quarter.	
Our baseline assumption is that in-production commercial airplane programs remain at stable delivery levels over the next several years. However, our financial guidance does consider risk around operational performance and market uncertainties, including the risk of potentially having to take modest production cuts at BCA.	
We expect first quarter revenue, earnings per share and cash flow to be the lowest of this year based on timing of volume and deliveries. Our 2009 commercial delivery forecast is between 480 and 485 airplanes. We expect higher levels in 2010 as we begin delivering our 787s. Our 2009 operating cash flow guidance is greater than \$2.5 billion. This assumes continued inventory buildup on our development programs and an assumption that BCC will need to provide new aircraft financing of about \$1	

billion.
billion.
Now we will leverage our new aircraft financing with debt so the impact to our cash balance will be significantly less than the amount of airplane financing. For 2009, pension funding is assumed to be approximately \$500 million. Mandatory funding in 2009 and 2010 is expected to be less than \$100 million in each year. Future year's required funding will increase, unless markets rebound significantly. For example, in 2011 if markets don't recover, requirements could be in the range of a couple of billion dollars.
Total company pension expense is expected to be about \$1 billion in 2009. Our forecast reflects the actual 2008 asset returns, a 6.1% discount rate and a long-term expected rate of return of 8%, which is 25 basis points lower than our assumption last year. The business units will be recognizing greater pension expense than they have in the past. Essentially all the \$1 billion of pension expense in 2009 will be recorded at the units. IDS will realize about half of the expense, and we expect a portion of that to be reimbursable under government contracts in 2009.
We expect total unallocated expense to be approximately \$900 million in 2009, with other segment expense forecasted to be approximately \$300 million. R&D expense is forecasted to be between \$3.6 billion and \$3.8 billion, reflecting the 787 and the 747 program delays announced in the fourth quarter. We're not forecasting any supplier cost sharing payments in 2009. We expect R&D expense to decrease substantially in 2010.
Share repurchase will decrease significantly in 2009 to approximately 200 million, which will offset dilution from our compensation plans. We are forecasting total capital expenditures to be \$1.4 billion in 2009, which is nearly 20% lower than in recent years as we manage down discretionary spending.
Now let me turn to slide 13 to discuss how we will bridge our 2008 performance to our 2009 guidance. In 2008, we had significant impacts from the strike and charges that we don't expect to incur in 2009. Overall, pension expense will be higher by about \$300 million. We realized deferred compensation income in 2008 due to lower stock prices. We expect to recognize expense this year as the markets improve. Because of lower cash balances and short-term interest rates that are close to zero, we are forecasting significantly less interest income in 2009.
BCA is realizing greater cost absorption on existing programs because of the strike and development program delays offset by the business's aggressive pursuit of infrastructure cost reductions that Jim talked about earlier. Our 2009 guidance also considers

all of this, plus the operational and marketplace	
uncertainties. We plan to provide 2010 financial guidance	
later this year as we continue to evaluate the impact of market uncertainties on our business.	
market uncertainties on our ousiness.	
Jim McNerney:	
Thank you, James. To close, let me simply say that despite	
progress and strong performance in many areas, we were	
not satisfied with our results in what was a very	
challenging 2008. For 2009 and beyond, our driving focus	
is on improving execution where we have been	
underperforming, bolstering productivity across our long	
list of programs that are performing well and preserving	
financial strength to deliver growth through this difficult economic climate.	
economic chinate.	
While recognizing the risks at hand, we do feel we are	
relatively well positioned with the fundamental	
competitive strength of our product and services, the size	
and diversity of our backlog, and the long-term outlook for	
the markets we serve. I remain optimistic about this	
company's future and our ability to become the	
strongest, best and best integrated aerospace company	
in the world.	
Ron Epstein (Bank of America/Merrill Lynch):	
Jim, just a follow-up on your comments on how you are	
changing the product development process. You	
suggested that the programs can't be islands any more.	
Can you give us some more color on there? Because it	
almost seems like what happened on 787 cascaded into	
747-8, and in the past it doesn't seem like program development was as big an issue as it's become.	
development was as big an issue as it's become.	
Jim McNerney (Boeing):	
I think Boeing went through an era where creating	
islands in the name of innovation and entrepreneurship	
during a period, end of last decade, beginning of this	
where we needed entrepreneurship and innovation,	
was a very successful strategy. But I think as we look back on it, we waited too long to move as the	
requirement for execution around this innovation. We	
took too long to move back into a model that integrated	
functions that spanned the entire business that had	
disciplines, that allocated people most effectively, that	
shared best practices across programs. We waited too	
long to move back to that model.	
New executional them are being for example	
Now organizational, there are horses for courses and	
organizational models fit different times, different places. We are at a place where execution of supply chain	
and development are fundamental and we need to move to	
an organization that is single mindedly designed to do that.	
That's the discussion we've had internally. Those are	
That's the discussion we've had internally. Those are the moves you began to see at the end of last year. There	

and approval processes, around those. But it's all about execution and accountability, and leveraging the skills and size that we have as a company.	
Ron Epstein: So what do you have to change I guess?	
Jim McNerney: As I mentioned, we have to use an aerospace term, we have cored up our supply chain and development teams in BCA. We have reintegrated the engineering function more tightly into both the supply chain and the development programs. The supply chain and engineering were in the name of creating entrepreneurial programs which were somewhat isolated from other programs. Now they have to be tightly integrated and we also have review processes that are more, shall we say, more often and harder hitting.	
Doug Harned (Sanford Bernstein): On the 787, when you look at the flight test program that's planned, as it has been, it's a shorter flight test program than we've seen in the past. I know that's predicated on more integrated system testing and advanced and also more parallel flight test work. Could you talk about the timing of when you are likely to see flight test units two, three, four, and what you need to have out there in order to make sure you can deliver on that timeframe?	
Jim McNerney (Boeing): Doug, this is Jim. Obviously, getting the first two airplanes completed and into the program on the timing that we've talked about is step one and we are feeling comfortable with the timing around those. As we mentioned, some of the rework is largely the rework on those airplanes is largely completed. The software integration is moving I would characterize it as normally. We're integrating the systems with real pilots on real airplanes, and we're getting ready for the groundwork now. So we're feeling comfortable there.	
The next two airplanes are on schedule. You are right. It is a tight schedule on paper, although as you know we've been able to get a lot of work done. One of the benefits, I guess you would say of, the delay, a lot of the systems work done, and some certification work done earlier, which gives us a little bit of a tailwind. Just to specifically answer your question, the schedule has all six of the airplanes being in the air within four months of the first airplane being in the air, and it sort of comes out every few weeks from the first airplane. We see no reason to say that that schedule is not on track.	
<u>Cai von Rumohr (Cowen and Company):</u> Yes, thank you very much. IATA is, as you probably know, forecasting a 3% traffic decline this year. What sort	

of risk do you see to your out-year delivery schedules? Could you explain a bit more you talked about the accrual rates assume the schedules are flat, but you have a risk provision for lower rates. Are you assuming it flat or lower rates? I guess I was a little confused by that.	
James Bell (Boeing): Cai, let me take a shot, and then Jim can jump in. So the baseline assumption in our operating plan is that these rates will stay stable throughout the planning period. The reason for that is obviously we're under contract to deliver airplanes that would require the stable rates in order to meet those obligations. Now, we also said in our guidance, we've taken in consideration operational and market uncertainty, and so we have tried to provide for this, although we think '09 is pretty stable, and I think you'd probably agree it is also, but the out years are less certain. There is no question about things which could happen as the backlog moves around, and so we've tried to provide in our '09 guidance the eventuality if some of that does happen. But it won't impact our ability to make this guidance, because we're not naive to the fact that even though we have it in the backlog and under contract that there can be some uncertainties out there that could cause that to move.	
Jim McNerney: I think the only thing I would add, Cai, because you'd probably want some more definition around that knowing you. But it really is hard to predict. We've made a modest assumption in here. But as you know, until you understand timing, model mix, derivative timing, it's very hard to come up with a specific kind of assessment. So we've made a general, modest, should we say, sort of provision in our guidance.	
Heidi Wood (Morgan Stanley): James, I know there are different ways to account for the 787 delay, and its costs. I am aware these can include discounts on 777s and zero margin 767, so I'm going to approach the question from a different tact. If I were a Board member of <i>Boeing</i> asking you for an estimate of the all-in costs of the 787 between R&D, customer penalty payments, supplier support payments, discounts on other aircraft, everything, will the 787 cost to <i>Boeing</i> , does it range about \$15 billion, \$20 billion, \$25 billion? Can you help us just round to the nearest \$5 billion? Thanks.	
James Bell (Boeing): No, if you were a Board member you would be an insider, and we'd tell you exactly what the number is, Heidi, in terms of what our thinking and assumption is. But I think the best way to characterize it is we are working closely with our customers. We are doing better. I bet it's early yet than what we've assumed we would do	

	using all of what you said as ways to come to a way that deals with the customer needs, while maintaining a business case for <i>Boeing</i> that continues to have us believe this plane will bring value to the company and also deliver value to our customers. But you know we can't get into specific numbers.
	<u>Heidi Wood:</u> A range of \$5 billion is not specific. You can't give us any kind of a range just so we can have an outside sense as to what this could cost?
	James Bell: No, but let me just say this. When you think about the 87 and its introduction, as compared to other airplane models and other new introductions we've done in the past, we've sold almost a thousand of these airplanes, and obviously you know in terms of a profitability assessment of new products the most difficult assumption is that of market. Here even though this market has some risk, it's a lot lower than we've done in the past. The fact that we do have the stability of about a thousand units, we'll be able to work all these issues over time and be able to, I think, work them to a point that's satisfactory to both us and our customer sets. The same holds true with the productivity on the airplane being able to set the production rates for an extended period of time having sold so many planes that we still believe, and we do this assessment every quarter that this airplane is going to deliver value to our customers and to us. But I can't get into specifically the cost elements, Heidi.
	Heidi Wood: Okay. Then maybe one you can give us color on. Can you maybe then break us down the \$2.5 billion cash drain on the strike? That was pretty remarkable. How does that compare versus prior strike cash impact, James?
	James Bell: I think that the strike had a lot to do with the amount of advance payments we would've gotten on the 787, so those moved. Also some of the development issues that moved the schedule caused that issue as well as the 747-8. But all the production models obviously moved. Now at the early stage of the strike, our customers were still paying advances, so we had to true that up.
	Joe Nadol (JPMorgan): I'd like to get just a clarification, and as well as question, James. To clarify, could you help us with what the unit margin assumption that's baked into the BCA number for 2009 is relative to the 10% program? On the question, Jim, just on the 47-8 can you walk us through the cost benefit analysis you went through looking at the program as to why you are still going forward with

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it and all components of it? There's the \$685 million charge. There's obviously a lot of R&D, and there's the cash that you are going to be out in the next couple of years that you are recovering at the end of the program. So significant costs on this debt aren't sunk yet. Just wondering why you are still going forward with the program.
Jim McNerney (Boeing): Let me answer the second part while James gets set for the unit cost question. Look, obviously, we have applied a judgment here that says we have a very competitive airplane here that has already got a good start on orders. If we didn't believe that the revenues would outweigh the costs, you are right, we wouldn't go forward with it. I suppose if the airplane didn't have the margin of competitiveness that we see on both the freighter and the passenger side right now, we would stop it. But we are committed to customers who value this plane highly, and when you add it all up we still see a viable business proposition here. Now, obviously, if we ever got to the point where we didn't, we'd have to work with our customers to come up with a different answer. But that's not what we see right now.
<u>Joe Nadol:</u> Okay. Did you bake in, in your cost benefit analysis significant orders in addition to the 114 that are in backlog that will be more profitable at the end?
Jim McNerney: We did assume, like in most programs, where you've got 900 orders out of the chute. Most programs, if you look through our history, have many, many fewer orders, more are characterized sort of at the level of the 747-8. You typically assume an accounting quantity that reflects your view of reality, which is in general more than the actual bookings you have at that time, and it's that kind of thinking that we're applying to this 47-8 right now.
But, Joe, the accounting quantity is relatively conservative, and we've contacted units outside of this current accounting quantity. So we still think that this airplane is going to deliver value to us.
Robert Stallard (<i>Macquarie Research</i>): Jim, just a quick question on the deferrals. You said we could expect deferrals to increase this year. Could give us an idea of the scale of these. At what point you would start to be concerned that this would have a negative impact on your production forecast for 2010?
Jim McNerney (Boeing): As I mentioned, it's very hard to predict the deferrals we're going to see. I think our sense of it comes as we talk to our customers, who we talk to every day, is that they will be

				some respects is different. But that doesn't many that	
				some respects is different. But that doesn't mean that longer term we're immune from fundamental changes	
				in demand or fundamental changes in the credit	
				markets, and that's not what we're saying here today.	
				What we're saying here today is, in this long cycle	
				business that we're in, we have visibility on the next ten	
				to 12 months and we feel comfortable with it. We're not	
				issuing guidance for 2010. We need to read and react and	
				see what the impact will be longer term. But we are	
				different in the sense that we do have a little more visibility over the medium term than a lot of other	
				companies do.	
				companies do.	
				Lynn Lunsford:	
				Great. One last question with regard to the 787, where	
				do you see the [long pole] at this point that did	1
				somehow threaten the schedule that you are already	
				working on?	
				Jim McNerney:	
				I think the only thing that would concern me now, just	
				answering your question, would be something	
				unexpected that comes up in flight test. Some anomaly	
				or some operating characteristics of plane that we would	
				have to deal with. Now I don't worry that we couldn't deal	
				with it, but it could impact the schedule. There is a lot more modeling done these days before these airplanes get	
				in the air, so you have a higher degree of confidence. But	
				that the unknown in flight test is a possible long pole in the	
				tent.	
				Susanna Ray (Bloomberg News):	
				A UBS survey last week was suggesting that almost a	
				third of airlines are likely to defer their orders this	
				year. I think just a few minutes before you were talking	
				about anticipating a cancellation or deferral impact of $\frac{1}{2}$	
				just 2% to 3%. So I am wondering what makes you so much more optimistic.	
				-	
1				Jim McNerney (Boeing):	
1				All I can say is that we're talking to every airline every	
				day, and we are working through it. As I said, I think we had modest amount last year, and I think the numbers you	
I				just quoted were last year. We think there will be more this	
1				year and we're comfortable that we can deal with it. If it's	
				worse than our assumption, we'll be back to you."	
29	Market	Firm-	α	"Macquarie Research lowered its rating for Boeing Co. to	On a
Jan.	Watch,	Investo		neutral from outperform on Thursday, saying the	modular
2009	"Boeing 's '09	r		aerospace giant's outlook is too positive. 'We are concerned that <i>Boeing</i> is underestimating the potential	enterpri se
	Outlook			for lower airline demand in this downcycle,' said Rob	architec
	'Too			Stallard, an analyst with <i>Macquarie</i> . <i>Boeing's</i> commercial	ture's
-	Positive			customers are facing a fall-off in air-traffic growth and	overpro
	FOSILIVE				
	' for			tighter credit markets, potentially leading to order	mise
				tighter credit markets, potentially leading to order cancellations or deferments. So far the Chicago company has said it's confident that its five-year backlog will	mise and underde

	Danager	r	1	1	provide plenty of work despite an expected increase in	liver.
	Researc h"				deferments for 2009. Macquarie lowered its full-year	nver.
	(Christo				earnings outlook for the company to \$5.11 from \$5.67 a	
	pher				share, while the company anticipates earnings of \$5.05 to	
	Hinton)				\$5.35 a share."	
29	Bloggin		Firm-	α	"A consequence of a weakening airline sector is the pain it	On a
Jan.	gStocks,		Investo		will cause plane-maker Boeing. With capacity tightening,	modular
2009	"Boeing		r		the need for aircrafts is diminishing. Fortunately for	enterpri
	:				investors, that vision will take time to play out. In the	se
	Another				meantime, Boeing gets a free pass as they work through	architec
	Airline				years of order backlog that built up during the last business	ture's
	Loser"				cycle. If you take a look at Boeing during the last few	overpro
	(Jamie	1			months, it is clear that investors have yet to catch on to	mise and
	Dlugosc h)				a world of lower revenues going forward. Shares of <i>Boeing</i> did drop in tandem with the credit crisis, but	underde
	11)				there has yet to be the washout one would expect from	liver.
					a business environment that will be very difficult for	nver.
					Boeing going forward. Shares of Boeing hit a floor of	
					\$40 per share during the October/November stock	
					market collapse. That was before the carnage in the	
					airline industry became apparent. Since that time,	
					conditions have only become worse for the group. The	
					way to survive in such an environment is to cut capacity.	
					That is not a good thing for <i>Boeing</i> , and why I made it	
					one of my Top 10 Stocks to Avoid in 2009. Thus far, I	
					have been dead on with my list that <i>included Delta Air</i>	
					<i>Lines (NYSE: DAL) and United Airlines (NYSE: UAUA).</i> Both of those stocks are down big in 2009. <i>Boeing</i> , on the	
					other hand, has traded flat. In my opinion, the market is	
					missing something here. <i>Boeing</i> should be down in tandem	
					with these giant carriers. The fact that it is not, provides	
					investors an opportunity to sell before the market	
					catches on to the weakness. Wednesday Boeing	
					announced poor fourth-quarter results. The company	
					posted a loss of \$56 million, or 8 cents per share in the	
					period. Analysts had expected the company to make a	
		× 1			profit of 78 cents per share. This is a big miss made	
					worse with a weak forecast for 2009. The company now	
					expects to make \$5.05 to \$5.35 per share in 2009. That is	
					less than the \$5.68 per share analysts now estimate. Go figure. But the stock was up \$1 per share on the news.	
					Can you say inefficient? I can and I will. I would have	
					expected shares to be down 10% or more on this type	
					of performance. The real kicker for me is that 2009 is	
					baked into the cake due to the advance time for orders.	
					The fact that they are reducing that number is telling and	
					does not bode well for 2010."	
5	Thomso	Jeff	Firm-	α	Jeffrey Turner (Spirit AeroSystems):	On a
Feb.	n	Turner	Investo		"Let me welcome you to <i>Spirit</i> 's fourth quarter and full	previou
2009	Reuters	, CEO; Biali	r		year 2008 earnings call. 2008 was a year filled with	sly
	Researc	Rick			accomplishments and challenges for Spirit as we focused	modular
	h excernt	Schmi dt,			on long-term value creation for our shareholders . Overall, we executed our core business well and our	Enterpri
	excerpt from	CFO,			performance was solid across the company. Despite the	se Archite
	"Spirit	Spirit			machinist's strike at <i>Boeing</i> and the pension headwind,	cture's
	AeroSys	AeroSy			we achieved full year sales of \$3.8 billion, operating	defense
	Acrobys	Acrosy			we achieved tun year sales of \$5.0 billion, operating	derense

			
tems	stems	margins of 10.8%, and fully diluted earnings per share of	of its
Holding	Holdin	\$1.91. We made good progress on our growth and	finanaic
s Inc.,	gs Inc.	diversification strategy in 2008. We announced projects	al
Q4		underway with Gulfstream and Rolls Royce while winning	perform
2008		new business with Airbus, Cessna, and Mitsubishi. Each of	ance
Earning		these development programs are underway and making	
s Call		solid progress. We are also making progress on	
Transcri		establishing our new Spirit Malaysia manufacturing	
pť"		facility. Spirit Malaysia is on schedule to be operational by	
		the end of the first quarter of 2009. Spirit Malaysia's initial	
		focus will be on Airbus products but overtime we'll	
		provide value to products across the Company. And we'll	
		add value immediately in 2009. Additionally we	
		announced and commenced construction of a	
		manufacturing facility in North Carolina. This new facility	
		will support Spirit's new business content on the Airbus	
		A350 XWB. Spirit North Carolina is expected to be	
		operational in mid 2010. I continue to be pleased with our	
		performance on the 787 program. Our team continues to	
		work well with the customer and our suppliers regarding	
		future production plans. I'll provide you additional	
		thoughts on the 787 programs later in the presentation.	
		Now let me provide you with my perspective on the	
		challenges we faced in 2008. As I've mentioned before,	
		I'm extremely proud of how the Spirit team planned	
		and executed our business during the two months	
		strike by machinists at <i>Boeing</i> . Our internal planning,	
		partnering with our customers, and working with our	
		unions representing Spirit employees allowed Spirit to	
		maintain production while avoiding layoffs and	
		furloughs. The reduced work week schedule enabled	
		the Company to execute a balanced approach to	
		address this difficult situation. This plan successfully	
		balanced the requirements of our customers, our	
		suppliers, the employees and shareholders, while	
		minimizing the impact to our communities and	
		maintaining the health of our business. I'm proud of our	
		team's ability to take challenges head on and deliver solid	
		performance in a non standard business environment.	
		Pension asset performance and the discount rate also	
		impacted our results for the fourth quarter and full year 2008. However, as you know our U.S. plan was frozen	
		when <i>Spirit</i> was formed and pension income and expense is a non-cash item. The plan remains fully funded at year	
		end 2008. Now let's talk about some of the specific	
		accomplishments across the business beginning on slide 3.	
		All three of our business segments revenues and	
		operating margins were impacted by both the	
		machinists' strike at <i>Boeing</i> and the higher projected	
		pension expense which Rick will discuss in his comments.	
		Airbus products remained on track and our European	
		MRO operation is open at the Prestwick facility. And the	
		previously mentioned <i>Spirit</i> Malaysia facility is planned to	
		be operational in the first quarter of 2009. Now let me	
		turn to slide 6 and give you a brief update on the 787. We	
		delivered aircraft number five in late January and aircraft	

through the systems install quality remains high and supply base to enable a sm are continuing to work of incorporating necessary eng aircraft and the first in serv remained focused on pro- increased utilization of the of expect to restart forward pi	tt test aircraft is progressing ation process. Overall product we continue to work with the nooth production ramp up. We losely with our customer on gineering changes on flight test ice aircraft. Our internal efforts oductivity improvements and capability we have in place. We ece of large production later in over to Rick who will provide I results and outlook."
provides further details or pension plan in 2008 white at the time of the divestitut the year this plan was still planned assets at a 110% funding percentage is down due to a 23% reduction in point reduction in the d measurement dates. Overa strong fully funded plan.	Systems): morning everyone. Slide 15 n our U.S. defined benefit th you may recall was frozen re from <i>Boeing</i> . At the end of more than fully funded with of planned liabilities. The from 157% at year-end 2007, planned assets and a 53 basis iscount rate on a respective all <i>Spirit</i> contines to have a Although, it is still subject to experience by many other
brief comments. Our core we're conservatively capit Our continuous focus is commitments as we grow a the long-term. We're ex- containment and improve 2008, we implemented p intensified our efforts to im These efforts are yielding uncertain market environ challenges we've faced, I performance and I am of support our customer require we are doing the necess	rocesses to limit hiring and approve operational efficiencies. results as we enter into the nment. Overall, given the am pleased with our 2008 confident we're positioned to irements for 2009. In addition ary contingency planning to sible economic outcomes. We
Robert Spingarn (Credit S "Rick, you just talked abo in inventory, I think it was and then another 100 plus of are you amortizing per un <u>Rick Schmidt</u> : "787, is all being amorti	<i>uisse</i>): ut the capitalized development s 235 for the 787, 235 million on other programs. How much

5 Feb. 2009	The Street.c om, "Boeing Mulls Producti on Cuts"	James Bell, CFO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm	α	 amortized straight line again over those first 500 units." Heidi Wood (Morgan Stanley): "Jeff, I had a follow-up which is I'm just wondering you talked about the contractual commitments that you had with the OEMs. I'm just wondering if you've got any kind of an appetite to talk to them and renegotiate, just given that the world has changed so substantially. I mean just given the R&D that you're going to be spending on some plans where the outlook may be changed, do have much appetite to do that?" Jeffrey Turner: "Well, I think in general Heidi, I think we were open to negotiations that are appropriate, that's a pretty broad question I think. I mean clearly we feel good about the business that we won, the programs that we wanted on, and we feel very good about the long-term viability of the market. I think, I mean clearly things have changed in the short-term here. But we've been very conservative in the way we manage our business. So, we don't see anything on the horizon that would put us in a position where we had to go, renegotiate. So, if it makes sense to our long-term relationships and short-term needs, we certainly will. But, nothing really pops to mind that's having needed to do that at this moment." "Despite its bulging current order book, <i>Boeing</i> showed more signs Thursday that it is being impacted by the global recession. The company said its orders fell 72% in January and also disclosed that it may slow production in 2010. 'Our 2009 financial guidance considers the risk that we might have to make modest production cuts starting in 2010,' CFO James Bell told an investor conference. It was the first time that <i>Boeing</i> has acknowledged the possibility of production cuts, said Scott Hamilton, publisher of an online newsletter that monitors aircraft manufacturers. 'At last week's earnings call, <i>Boeing</i> sub it received just 18, down from 65 a year earlier, according to a posting on its We bsite. In his presentation, Bell said that the 'weakening g	On a modular enterpri se architec ur's focus on short term- pressure s, resultin g in unstable long- term growth.
					2009. <i>Boeing</i> has a backlog of \$352 billion, or five times its annual revenue, including \$279 billion in commercial aircraft orders. When the previous slowdown occurred, following the Sept. 11 terrorist attacks, the commercial- aircraft backlog was \$83 billion, Bell said. However,	

5 Feb. 2009	Cowen and Compan y Aerospa ce/Defe nse Confere nce	James Bell, CFO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm	α	Cai von Rumohr: [Regarding the 787] "I think you said on your Q2 call when you still had it in the forecast that you were assuming break-even but actually still hoped that the revenues would exceed the costshow do you feel today, is this going to be like a very low margin plane for a long period of time?" James Bell: (laughing) "No, obviously we're not going to expect that but right now, given what we know, this early on we're still guiding to zero margin on the initial deliveries and we're going to grow that over time, and for us to grow it there are a number of thing we're going to have to do. We're really going to work to get the productivity accelerated and a lot of that will be in the supply chain, and so we have plans in work to make that happen, and then obviously we're going to have to do a good job in negotiating with our customers on the delay penalties. So I think with those two things and the fact that we've sold a thousand of these airplanes it gives you the production level predictability over time that you need to go work those longer-term productivity issues. So we're still optimistic that this airplane is going to provide good value not only for our customers but for our shareholders." Cai von Rumohr:	On a modular enterpri se architec tur's over- promise and under- delivery
6 Feb. 2009	Seattle Post- Intellige ncer, "Virgin Group Founder Blasts Boeing" (Dan Richma n)	Richar d Branso n, founde r of the Virgin Group	Firm- Custo mer	α	"Terrific". "Sir Richard Branson, founder of the Virgin Group, blasted The Boeing Co. at a celebration of a new Virgin airline, held Friday morning on Boeing's own turf. 'If people in Seattle build our planes and deliver them on time and, to be frank, don't go on strike, then we'll continue to work with Boeing. If we have our airline completely messed up, with tremendous damage done to our own work force, then we'll go to Embraer or Airbus.' 'The delay on the 787 has been an absolute nightmare, and it's cost us a fortune. It really does make us think, 'Do we want to take a risk on Boeing in the future?'' Branson said. 'The strike hurt hundreds of thousands of our passengers,' Branson told reporters. 'It messed up Virgin Atlantic, it messed up Virgin Blue in Australia, it ruined people's Christmas holidays. It was absolutely and utterly ghastly.' He continued, 'If union leaders and management can't get their act together to avoid strikes, we're not going to come back here again. We're already thinking, 'Would we ever risk putting another order with Boeing?' It's that serious.' Boeing spokesman Jim Proulx said later Friday in an e- mail, 'We never want to disappoint our customers to such an extent. We are committed to doing everything we can in the future to satisfy our customers in the	On the further disintgr ation of firm- custome r link in a modular enterpri se architec ture.

	I			manner they deserve.""	
6 Seattle Feb. Post- 2009 Intellige ncer, "Virgin Group Founder Blasts Boeing" (Dan Richma n)	Steven Udvar- Hazy, CEO of Interna tional Lease Financ e Corp.	Firm- Custo mer	α	"At the same event, the CEO of International Lease Finance Corp. said Boeing and rival Airbus could see production drop as much as 35 percent in two years. 'It will come down in steps until it reaches equilibrium,' Steven Udvar-Hazy told Bloomberg News. 'It wouldn't surprise me if in 18 to 24 months there were cuts of as much as 30 to 35 percent at both Boeing and Airbus. Airlines are focused on survival, not ordering planes.' Both companies have predicted a drop in orders this year. Udvar-Hazy said the slump will be longer than the decline after the 2001 terrorist attacks. 'This could be a year where the number of net cancellations and deferrals actually exceed genuine new orders,' Hazy told reporters at the event. While Hazy said he's not predicting that, 'certainly the elements are out there for that to happen.' Indeed, Boeing has started 2009 losing more orders than it has won. Boeing said Thursday it won 18 orders in January and lost 31 through cancellations."	On the percepti on of homoge neity of enterpri se architec tures among competi tors.
 8 The Feb. Seattle 2009 Times, "FAA to loosen fuel- tank safety rules, benefiti ng Boeing's 787" (Domini c Gates) 		Firm- Regula tors	α	"The Federal Aviation Administration (FAA) has quietly decided to loosen stringent fuel-tank safety regulations written after the 1996 fuel-tank explosion that destroyed flight TWA 800 off the coast of New York state. The FAA proposes to relax the safeguards for preventing sparks inside the fuel tank during a lightning strike, standards the agency now calls 'impractical' and <i>Boeing</i> says its soon-to-fly 787 Dreamliner cannot meet. <i>Boeing</i> has worked closely with the FAA to make the change in time for the 787 Dreamliner, whose airframe built of composite plastic makes lightning protection a special challenge. But the move has stirred intense opposition inside the local FAA office from the technical specialists — most of them former <i>Boeing</i> engineers — responsible for certifying new airplane designs. The national union representing about 190 Seattle-based FAA engineers this past Tuesday submitted a formal critique to the agency, calling the new policy 'an unjustified step backward in safety.' In a lightning storm, the critique said, the less stringent rules could leave a commercial airliner 'one failure away from catastrophe.' FAA management, contradicting its own technical staff, argues that relaxing the spark-prevention standard is balanced by new technology to reduce fuel-tank flammability that will increase safety overall. Jim Hall, the former National Transportation Safety Board (NTSB) chairman who oversaw the TWA 800 investigation, said he's disappointed in the FAA but not surprised. 'It appears that management has overruled the judgment of the people that have day-to-day responsibility for the safety of aircraft,' Hall said. The rules the FAA is now reinterpreting have been in place since 2001 after the investigation into the TWA 800 fuel-tank explosion that killed all 230 people on board the 747 jumbo jet. In a detailed briefing on the 787's protection systems, two high-level <i>Boeing</i> lightning experts — who spoke on	On a modular enterpri se architec ture's integral relation ship with its govern ment regulato r.

					condition that they not be named — said the	
					Dreamliner cannot meet the requirement. 'Boeing	
					spent years trying to develop triple layers of structural	
					lightning protection for every 787 fuel-tank fastener	
					and joint, but we were unable to identify the technical	
					means at many locations in the wings,' one said. The	
					FAA will accept formal comments on the policy change	
					through Feb. 13. The critique submitted by the FAA	
					certification engineers' union, the National Air Traffic	
					Controllers Association union (NATCA), acknowledges	
					that the existing regulation is strict. It may have to be	
					revised in some way, said one FAA certification specialist,	- 1
					who, like other agency engineers interviewed for this	
					story, asked not to be named to avoid retribution. 'A	
					bunch of us are in agreement as to how we can do that	
					and maintain safety,' he said. 'But it's not what our	
					management is trying to do in allowing catastrophic	
					single failures.'	
					By all accounts, the 787's inerting system is very effective.	
					But there's a catch: The FAA is not requiring that it be	
					'full time.' If a 787's inerting system breaks down, to	
					save the expense of grounding the plane, an airline will be	
					free to continue to operate it for 10 days while waiting for	
					replacement parts. That's despite an internal	
					recommendation from one of Boeing's own safety-	
					engineering team leaders in November 2005 that the	
					787's inerting system should be required to be working	
					before takeoff. 'This inerting system, if it was full time,	
					it would definitely be an acceptable level of safety,' said	
					a second FAA engineer who has worked on the 787's	
					certification. But without that assurance, he said, to fly	
					on a Dreamliner out of a lightning-prone airport in the	
					summer is a risk he's not prepared to take. 'I wouldn't	
					put my family on a 787 out of Miami,' said the	
					engineer, who formerly worked for <i>Boeing</i> .	
					engineer, who formerly worked for <i>Boeing</i> .	
					EAA Pasing too place? Tomasa DiDasla MATCAL	
					FAA, Boeing too close? Tomaso DiPaolo, NATCA's	
					aircraft-certification national representative, charges that	
					when FAA engineers raised their safety concerns	
					internally management simply removed them from the	
					team developing the new policy. The FAA ignored its	
					own technical people, he said, while making sure	
					Boeing agreed with the policy change. 'It's another	
					example of the FAA getting too close to industry,' said	
					DiPaolo. 'It appears that whatever Boeing wants,	
					Boeing gets.' A Boeing internal document reviewed by	
					The Seattle Times shows the company had a 'team to	
					assist FAA in wording of interpretation' of the	
					lightning rule for the 787 as far back as August 2004,	
					just eight months after the new jet program launched."	
10	Barclay	Scott	Firm-	α	"So as you can see from this chart, the environment is both	On a
Feb.	's	Carson	Investo		challenging but at the same time presents great	modular
2009	Capital	, CEO,	rs		opportunities for those that have the courage to stand	enterpri
50000000000000000000000000000000000000	2009	Boeing			tall and move forward.	se
	Industri	Comm				architec
			L			

	al Select	ercial			The team continues to work successfully towards the	t noting
	Confere	Airpla			second quarter flight milestone and the challenges that the	that
	nce	nes			flight test program will bring. We continue to be	"courag
					confident that we will deliver those airplanes to those customers that want them so badly in the first quarter of	e" is required
					2010.	to lead
					2010.	the
					But behind that lies a production system that continues	enterpri
					to operate and improve itself at incredible rates. We began what we call our 'Lean journey' on the 737 product	se.
					about eight years ago. During the ensuing years, we have	
					reduced factory flow on the product by 50%, and we have	
					reduced our cost of quality by some 31% and continue	
					our relentless pursuit to drive even more cost out. Our fundamental factories are running well and have not been	
					adversely affected by the challenges we face on the two	
					development programs.	
					We are absolutely focused on continuing the journey of	
					driving productivity through our factories on the	
					current products. And this journey of Lean is a	
					journey that will continue forever.	
					Joe Campbell:	
					"The company has said that the 787 – whatever the	
					production quantities that you calculate your profits over – we should plan on the initial quantities being zero."	
					we should plan on the minut quantities come zero.	
					Scott Carson:	
					"Correct."	
					Joseph Campbell:	
					"But that means that - for example on the 747, you've	
					taken a forward charge so presumably any cushinon that was on the 747 has been stripped out and you really are	
					operating right at zero – but in the 787 you don't have that	
					and so the question really gets to whether or not for the	
					entire block of 500 airplanes or whatever the number turns out to be - you haven't disclosed - whether you really	
					think that we should as an investor group be thinking –	
					however long it takes you to ship 500 airplanes - you'll	
					have zero margins."	
					Scott Carson:	
					"No. You shouldn't be thinking that. So this is the	
					initial launch of the program, the initial deliveries and we've guided you in that direction, specifically for the	
					initial series of aircraft."	
10	Reuters,	Scott	Firm-	α	Boeing Co's delayed 787 Dreamliner remains on track	On a
Feb. 2009	"Boeing	Carson	Investo		for its first deliveries in the first quarter of 2010, Scott Carson, chief executive of <i>Boeing Commercial</i>	modular enterpri
2009	787 on Track	, CEO, Boeing	rs		Airplanes, said on Tuesday."	se
	for Q1	Comm			•	architec
	2010	ercial				ture's
	Deliver	Airpla nes				overpro mise
	у -	nes				mise

	Executi ve"				and underde livery to the investor s.
10 Feb. 2009	The Boeing Compan y Website	Firm	α	"Boeing today announced a series of personnel moves within its corporate and business unit Finance organizations that will leverage the capabilities and expand the experience of leaders in several key roles. Commercial Airplanes Chief Financial Officer Rob Pasterick, 53, has been named vice president of Finance and corporate controller, reporting to Boeing Corporate President and Chief Financial Officer James Bell. He succeeds Harry McGee, 59, who becomes vice president of strategy integration for internal services, a new position created to drive long-term efficiencies and greater productivity across the company's internal business support services. Ray Ferrari, 54, a 30-year Boeing veteran with broad experience across the company's defense and commercial businesses, succeeds Pasterick as Commercial Airplanes chief financial officer. Craig Saddler, 49, now president of Boeing Australia and the South Pacific, will replace Ferrari. Boeing also named Jon Emery, 51, vice president and controller of the Commercial Airplanes unit. 'These rotations and reassignments will broaden the skills and experiences of our senior team, strengthen our core finance capabilities, and improve the support we provide to our businesse will ensure our continued focus on execution, functional excellence and seamless integration across the Boeing enterprise.' The changes are effective immediately."	On a modular enterpri se architec ture's movem ent of top financia l manage rs amidst financia l reportin g problem s (announ ced that day)
10 Feb. 2009	Puget Sound Busines s Journal, "Boeing Shakes Up Comme rcial Airplan es Finance Divisio n"	Firm	α	"The Boeing Co. made major leadership changes Tuesday at the finance unit in its Seattle-based Commercial Airplanes division. The division's chief financial officer, Rob Pasterick, has been named vice president of the Chicago-based company's finance and corporate controller, and will move to Chicago. He's being replaced by Ray Ferrari, currently the vice president of finance for network and space systems at Boeing Integrated Defense Systems in Washington, D.C. Boeing also named Jon Emery its new vice president and controller for the Commercial Airplanes division. He'll move to Seattle from his previous job as leader of the company's program risk assessment group and internal services productivity initiatives in Chicago. Boeing also said Harry McGee, the company's former vice president of finance and corporate controller in Chicago, will move to Seattle to become vice president of strategy integration for internal services, a new position."	On a modular enterpri se architec ture's movem ent of non SBU finan ce manage rs into the SBU.

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11	Seeking	Firm-	α	"Much has been written about Boeing's murky future.	On a
Feb.	Alpha,	Investo		Will its customers cancel orders? Will the 787 ever be	modular
2009	"Boeing	r		delivered? What new production snafu will happen	enterpri
	's Bad			next? However, little has been mentioned about its	se
	Balance			crumbling balance sheet. In two previous articles, I	architec
	Sheet			wrote about Boeing's weakening financials (Boeing Can't	ture's
	May			Afford Another Strike and Boeing Headed The Way Of	systema
	Doom			GM?) and predicted a miserable Q4. Boeing did not	tic
	It"			disappoint. Its balance sheet saw tremendous asset	underin
	(Stephe			destruction this quarter. Cash and cash equivalents	vestmen
	n			were more than halved from Q4 2007 to Q4 2008.	t.
	Rosenm			Short term investments went from \$2.3 billion to	
	an.				
	Disclos			practically zero. Pension plan assets tumbled from	
	ure:			\$5.9 billion to nothing. In the meantime, inventory	
	Author			climbed from \$9.6 to \$15.6 billion on the halt in	
1	holds a			commercial plane productionwhile goodwill and	
1	short			other intangibles rose from \$5.2 to \$6.3 billion (not	
	position			much to hold onto).	
	in BA)				
				The liability side grew. Pension plan liabilities soared	
				from \$1.2 to \$8.4 billion. Ouch! All in all, tangible	
				equity dropped from \$2.7 to a minus \$6.8 billion, a	
				sad \$9.5 billion loss. Boeing goes into 2009 with a	
				weak balance sheet. It needed its cash, investments,	
				and pension plan assets, all victims of strikes,	
				production misteps, and a falling stock market. Those	
				cushions are now gone. It faces a large \$7 billion debt.	
				Moreover, it now faces a whole new problem in the	
				form of an \$8.4 billion pension liability that dwarfs its	
				debt. So far this year, Boeing has lost \$9.5 billion in	
				tangible equity. That's not how you want to enter one	
				of the most trying times in our nation's economic	
				history."	
				 Jake Berzon 	
				"Oh, who cares about fundamentals. Surely, US	
				government will rescue BA when its time comes -	
				they are a major government contractor, a huge	
				employer and our nation's pride and joy! :)"	
				• Marcap	
				"I agree with the author. <i>Boeing</i> is indeed in very bad	
				shape. With a negative book value for its shares,	
				and virtually no inside shareholders (less than 1/2	
				of 1%), it absolutely amazes me that their shares	
				are still trading at roughly \$40. Very scary indeed!	
				But perhaps the scariest of all, is just how much	
				they are cutting costs in the production of new	
				aircraft. It's certainly not a time that I would want	
				to be placing an order for any."	
				• Stephen Rosenman	
				"Tatertot: I wanted to dramatize the collapse of BA's	
				assets in one year. The market totally ignored the	

	 balance sheet. It will take a herculean effort to repair the balance sheet. Also the investing public ignored the looming problem BA faces with its new pension plan problems: pension plan assets went from \$5.9 billion to a \$8.4 billion liability. Someone needs to fire the guy in charge of the pension plan. Note above remark is a swing of \$13 billion in the pension plan." <u>o opa-opa</u> "Good article, but sort of useless for those of us who wants to know what will happen in the future, instead of what has already happened. But I guess it's easy to throw in words like 'doomed' these days and short everything to heck. Hope you shorts enjoy it while it lasts. The night is always darkest before the dawn."
	 <u>Stephen Rosenman</u> "Opa-opa: 'Doom' title was chosen by Seeking Alpha, not me. The future for BA is dimmer in great part because it has lost a vast amount of its assets. For those of us who have followed this company, it's pretty sad. Back, in 2005, tangible equity was \$8.5 billion. Now it's in the hole \$6.8 billion. That's \$15.3 billion in damages in 4 years! Who else could wreck so much equity and prosper? As to the future? Negative free cash flow, currency issues. higher salaries and health costs (from strike), customers walking or renegotiating contracts after BA's failure to deliver, decreased air travel, quality issues with fasteners, likely more 787 delays, pension plan pressure, all should create more than their share of problems for BA."
	 <u>lbrtkng</u> "Some smart account out there, please correct me if I have this wrong, but isn't the pension data presented here somewhat apples and oranges? Isn't the over-funded portion of the pension plan what is shown as a net asset on the balance sheet? And isn't the pension liability the actual long term pension obligation? As far as the cash situation, didn't <i>Boeing</i> make several acquisitions in the last quarter, thus using up some of their stash of cash? And wouldn't those acquisitions have just shown up as other assets on the balance sheet instead of cash? This piece comes across as not too well researched or insightful. And from a serious analyst perspective, the author's use of only two data points is just plain silly."
	 <u>Stephen Rosenman</u> "To lbrtkng: Per SEC 10K, BA has incurred an \$8.4 billion pension liability, largely owing to over a \$7 billion loss (read sour investments). Its pension

overfunding has disappeared, a \$5.9 billion gone. Therefore, the apples, oranges, together become one big tomato of a \$13 billion + drop in equity. Where are those acquisitions on the balance sheet? More goodwill, intangibles, and plants. As to 2 points, the market usually compares year over year earnings. This is a comparison to year over year equity, its breakdown into components of the asset and balance sheet."
 <u>Stephen Rosenman</u> "To lbrtkng: The balance sheet pension asset or liability is equal to the difference between pension assets and the actuary's estimate of pension liability plus or minus the unrecognized (unamortized) portions of past and prior service costs, actuarial/experience gains or losses. In other words, pension assets - liabilities are apples to apples."
 <u>Tatertot</u> "I understand that desire, but none-the-less, it would be useful to see whether these are one-time events or indicative of a trend. <i>Boeing</i> has already dropped from \$104 (peak) to about \$40, so I'm wondering how much this information has already been incorporated into the stock price. If we have a trend down, it may be worth going short side, but two data points don't allow for that kind of analysis. Like I said, I like the article, but I'd need more before really acting on it."
 <u>opa-opa</u> "Why don't you make a 2-point chart of BA's airplane order backlog from 2005 to 2009?"
 <u>Stephen Rosenman</u> "Tatertot: Tangible equity for 2004 was \$8.5 billion, 2005 dropped to \$8.2 billion, 2006 went to zero, 2007 \$2.7 billion. Now we are at minus \$6.8 billion. That's a 5 year trend, almost a \$4 billion dollar a year loss in tangible equity on average a year. The trend is worrisome. Opa-opa: This is a discussion about the balance sheet. However, looking at the above drops in tangible equity, it seems clear that BA has not been able to use its sales to keep its balance sheet in order."
 <u>PeteK</u> "You bet <i>Boeing</i> is following <i>GM's</i> footstep. The union is exactly the same as UAW or worse. They never LEARN. The STRIKE last year was a deadly BLOW to <i>Boeing</i>. What a timing to have a strike. They have to pay for their stupidity for sure." TFG
<u>• TFG</u>

	· · · · · ·					
					"Yeah, blame it on the strike. Disconnected and short sighted management has absolutely nothing to do	
					with it. Abandoning business and productions	
					systems that have worked for 75+ years, simply	
					because arrogance demands it, is not to blame	
					either."	
13	CNN,		Firm-	β	"Toyota Motor Corp. is taking additional steps to scale	On an
Feb.	"Toyota		Emplo	- e	back production at its North American plants, the	integral
2009	Unveils		yees		automaker said Thursday, in anticipation of worsening	enterpri
	New				auto sales. Toyota said it will schedule additional 'non-	se
	Efforts				production days' in April at certain plants. The company	architec
	to Trim				has production facilities in Kentucky, California, Indiana	tur's
	Producti				and Texas. Additionally, there is a 'strong possibility' that	value of
	on"				<i>Toyota</i> will shorten work weeks at certain plants to 72 hours from 80 hours, a program the company calls	employ ment
	(Ben Rooney				work sharing.' 'This philosophy of shared sacrifice is	stability
	Nooney				the best approach for us, and hopefully will make us a	stability
	,				stronger company in the long term,' said Jim Wiseman,	·
					a Toyota spokesman, in a statement. Toyota also said it	
					will eliminate executive bonuses and trim some	
					executive salaries, while bonuses for production	
					workers will be reduced. The company will offer 'no	
					wage increases for the foreseeable future' and a	
					'voluntary exit program' will be set up for employees	
					who wish to pursue other opportunities. <i>Toyota</i> said the	
					new actions 'are consistent with the company's philosophy of making every effort to protect jobs	
					during the sales downturn.' The new measures come	
					after Toyota had previously established a hiring freeze,	
					eliminated overtime and suspended capital spending.	
		5			David Cole, chairman of the Center for Automotive	· ·
					Research, said years of over-production in the auto	
					industry make scaling back output a necessity now that	
					demand for new cars has dried up. 'There's no	
					alternative,' he said. 'They have to balance production	
					with capacity.' <i>Toyota</i> , like most automakers, has high fixed costs that make it hard to absorb a sharp drop in	
					sales, and the credit crunch has made it difficult for willing	
					buyers to finance a new car, Cole said. ' <i>Toyota</i> is a very	
					smart company, but they acknowledge now that they	
					overbuilt, and when you do that, you pay a price,' he	
					said. Last week, Toyota lowered its sales forecast for the	
					current fiscal year to 7.08 million vehicles from an earlier	
					projection of 8.87 million. It also said it expects to suffer	
17	Sacttl-	Tim	Firm	α	a net loss this year for the first time since 1950." "Boeing Chairman and Chief Executive Jim McNerney	On a
17 Feb.	Seattle Post-	Jim McNer	Firm- Investo	^u	has told company employees in an e-mail that a	On a modular
2009	Intellige	ney,	rs-		suggestion by some of them to freeze wages across the	enterpri
2009	ncer,	Chair	Labor		company instead of cutting about 10,000 positions this	se
	"Aerosp	man			year is not the best way to weather the ongoing	architec
	ace	and			industry downturn. 'More than a few of you have	ture's
	Notebo	CEO,			written to me asking whether we could avoid layoffs	non-
	ok:	The			altogether by not paying incentive awards this year or	integrat
	McNern	Boeing			by freezing wages across the board,' McNerney wrote	ed
	ey:	Compa			Tuesday in a companywide memo. 'While these actions	approac
	Wage	ny			would preserve some cash during the year and lessen	h to the

	P				the transitions import on people our indement (and	factors
	Freeze				the immediate impact on people, our judgment (and	of
	Wont't				one shared by most major companies) is that they	producti
	Work"				would put us at a competitive disadvantage when it	on.
	(James				comes to attracting and retaining the high-performing	011.
	Wallace				people we need to consistently perform for our	
)				customers.' The incentive awards that McNerney referred	
					to in his memo is Boeing's Employee Incentive Plan,	
					which is a cash bonus paid to eligible workers each year	
					and is linked to how well <i>Boeing</i> did in meeting certain	
					financial targets the previous year. The payout can be for	
					up to 20 days' extra pay. Nonunion workers at Boeing, but	
					not executives, are eligible for the incentive plan bonus, as	
					are most engineers and technical workers represented by	
					the engineers' union known as SPEEA. But members of	
					Boeing's Machinists union are not part of the employee	
					incentive plan. Boeing announced last month that it	
					met enough of its 2008 financial targets for the plan to	
					pay out six extra days. In Washington state, about	
					48,120 eligible employees will receive an estimated	
					payout of \$96.5 million this month. Companywide,	
					110,000 eligible recipients will receive an estimated	
	~ .		D '		\$220 million."	On a
17	Seattle	Jim	Firm-	α	McNerney memo:	modular
Feb.	Post-	McNer	Investo		I' Malan	enterpri
2009	Intellige	ney,	rs-		Jim McNerney	se
	ncer,	Chair	Labor		Chairman, President and Chief Executive Officer	architec
	"James	man,			"History tells us that the quicker a company acts to	ture's
	Wallace	Preside			counter adverse economic conditions, the better able it	non-
	on	nt and			will be to work its way through a downturn and	integrat
	Aerospa	CEO,			emerge stronger when the economy recovers. That's	ed
	ce:	The			why we began last fall to stress even more the importance	approac
	Boeing	Boeing			of improving productivity and finding new ways to operate	h to the
	Won't	Compa			more efficiently. As we suspected then, the economy has	factors
	Freeze	ny			continued to struggle mightily, putting even greater	of
	Wages"				pressure on our commercial customers and potentially	producti
	(James				further straining defense budgets. We have compounded	on.
	Wallace				the situation ourselves with the setbacks we had last	0
)				year with the machinists' strike and our performance	
					issues on key development programs. As I told	
					shareholders and analysts on our quarterly earnings call	
					last month, our strategy for weathering this storm is to	
1					improve execution on our underperforming programs,	
1					maintain strong performance on the vast majority of our	
1					programs that are performing well, and preserve our	
1				1	financial strength to enable continued investment in our	
1					business and our employees, including our pension and	
1					benefits plans. With that in mind, we have been taking	
1					decisive action:	
1						
1					* To improve programs that have not been performing to	
1					plan: We have bolstered program-management	
1					processes, increased functional discipline and	
1					oversight, applied additional resources and technical	
1					expertise, and made leadership changes where we	
					believed it was necessary to improve the team's	

performance . As part of that, we have also rebalanced our program-review schedule to place greater time and attention on underperforming programs . Reliable, disciplined execution across all programs is not merely an aspiration for us; it's an imperative. Our customers have choices, and disappointing them has consequences for our business and relationships.
* To maintain strong performance where it exists: We are asking all employees to redouble their efforts to focus on sustained, strong execution and to leverage our growth and productivity initiatives to drive even higher levels of efficiency and competitiveness. Sharing and replicating best practices, ensuring functional discipline and excellence, and raising issues and concerns early are all key to keeping the hundreds of healthy, successful programs inside our company healthy and successful.
* To preserve our financial strength: We have put a spotlight on cash and asset management. In prior years, we generated substantially more cash than we needed for daily operations. Despite strong performance across most of our programs, last year's strike, delays on development programs, and lower returns on our investments (due to the financial crisis) changed that. In response, we have reduced discretionary and capital- spending budgets. We have centralized and consolidated organizational structures to both slim and strengthen them. We are eliminating work that doesn't add value to our customers, and we are reducing staffing levels to support a trimmed-down infrastructure.
None of these actions are easy, especially those that affect employment of our people. But they are all necessary elements of our strategy to support our customers during uncertain times and to ensure our competitiveness and growth over the long haul. They require stepped-up responsibility and accountability by leadership as well as the involvement of every employee. As we work through them, it's also vital that we stay fully engaged with our customers. We cannot let our attention to internal efforts distract us from serving them, nor can we leave any impression that our focus on them has waned. Regarding 2009 employment plans: When we looked at it last fall, we said we expected reductions in excess of our normal attrition rate of 4 to 5 percent by the end of this year. Our current estimate of 6 percent, or about 10,000 jobs, is consistent with that initial expectation and the business assumptions behind it. It's important to note that while the planned reductions include some layoffs, they also rely on attrition, retirements, not filling some open positions, and cutbacks in contract labor. The mix of these elements varies by business area and geography, and the reductions, while weighted heavily in the first half, will be spread over
the course of the year. We're keeping close watch on the dynamics of our business environment and the factors that

affect employment. We will be sure to keep you informed	
should anything in our outlook change. More than a few	
of you have written to me asking whether we could	
avoid layoffs altogether by not paying incentive awards	
this year or by freezing wages across the board. While	
these actions would preserve some cash during the year	
and lessen the immediate impact on people, our	
judgment (and one shared by most major companies) is	
that they would put us at a competitive disadvantage	
when it comes to attracting and retaining the high-	
performing people we need to consistently perform for	
our customers. Having said that, I want to assure you	
that we have taken (and will continue to take) steps to	
mitigate the impact to our team. For example, we are	
consciously restraining salary growth this year in order to	
lessen the number of job cuts we need to make while	
retaining flexibility to fund growth projects and preserve	
key skills across the enterprise. We also continue to	
provide the best transition assistance we can to laid-off	
employees. The next 12 to 18 months promise us a steady	
flow of tough business challenges and increased	
opportunities to support our customers. Many experts	
believe the economic news could get worse before it gets	
better, and we've tried to anticipate some of that in our	
plans. While it's hard to know the final impact, we must be	
prepared should conditions worsen beyond the already	
difficult environment we have assumed. But, as I've	
mentioned above, we have a plan to deal with the situation	
and it is a good one. We know what we need to do to	
navigate this turbulence. If we execute well with	
integrity and always consistently with our values	
we will prevail through even the most difficult of times	
and emerge stronger when the economic tide turns.	
Thank you for all you are doing to support <i>Boeing</i> and our	
customers. Jim"	
customers. Jim	
Proto 1 house is to set 2/17/00 4:46 mm	
Posted by unregistered user at 2/17/09 4:46 p.m.	
"After all these statements in this memo, <i>Boeing</i> will still	
see its shares drop to new lows and this time you will	
have no one to blame but your so called top	
performers."	
Destad by supervision of a supervision of 2/17/00 5-12 minut	
Posted by unregistered user at 2/17/09 5:12 p.m.	
"Corporate Greed!"	
Posted by unregistered user at 2/17/09 5:33 p.m.	
"I hate to say it but from what I've seen Boeing's	
productivity has to be the lowest of any coporation!	
Mechanics goof off most of their day!"	
Posted by unregistered user at 2/17/09 5:40 p.m.	
"And nothing says come work for us like layoffs!"	
Dested by unregistered upon at 2/17/00 7.25 p.m.	
Posted by <i>unregistered user</i> at 2/17/09 7:35 p.m.	
"As thus the dysfunctional relationship between Boeing	
Mgmt and it's employees continues. Boeing mgmt	

						
					views it's employees as a cost to be minimized, and will always default to layoffs rather than recognize their own mismanagement. And the employees (union and non-union) will always default to the get what you can while you can mindset because there will be hirings and layoffs every few years. And yes, the unions will strike for the short term gains knowing the hire - layoff cycle will continue. It is a self perpetuating cycle and it can be endlessly debated about who's to blame. But the results are clear for all to see."	
					Posted by <i>ikkeman</i> at 2/17/09 11:31 p.m. "what a blowhole. spouting it high and far without any direction or intention"	
					Posted by unregistered user at 2/18/09 1:39 a.m. "General Electric Chief Executive Jeff Immelt has waived his right to a bonus and performance-based pay that would have netted him more than \$12 million in cash. So Jim McNerney we are waiting."	
					Posted by unregistered user at 2/18/09 4:42 a.m. "Anyone else who leads a large corperation which has had such a poor record in creating a new product would have been sacked long ago. Where does the buck stop? Thie guy should be paying <i>Boeing</i> to employ him with his record."	
					Posted by Leelaw at 2/18/09 6:08 a.m. "If for whatever reason it's not possible for Boeing's board of directors to remove a failed CEO like Mr. McNerney from office, can't they at least muzzle him a la Mike Bair?"	
18 Feb. 2009	Forbes, "Boeing CEO Says Pay Freeze Counter producti ve" (Tim Klass)	Jim McNer ney, Chair man, Preside nt and CEO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm- Investo rs- Emplo yees	α	"Freezing wages and eliminating bonuses to avoid layoffs would be counterproductive for the <i>Boeing Co.</i> and other big employers, the aerospace company's chief executive said. In an e-mail Tuesday to <i>Boeing</i> employees, printed in full on the Web site of the <i>Seattle</i> <i>Post-Intelligencer</i> newspaper Wednesday, CEO Jim McNerney wrote that such moves would hurt the company's ability to attract and retain high- performing employees. The memo is one of the first responses by a major corporate chief executive to proposals for layoff alternatives. Such requests have gained force in the deepening recession since President Barack Obama praised 'the selflessness of workers who would rather cut their hours than see a friend lose their job' in his inaugural address last month."	On a modular enterpri se architec ture's views of incentiv ies for employ ees.
18 Feb. 2009	Flight blogger, "Crane Co. Reopen s 787 Brake Softwar	Eric Fast, CEO Crane Co.	Firm- Suppli er	α	"As far back as May of last year, <i>Boeing</i> publicly discussed that the brake control system was a key pacing item for the 787 program. Tracing the evolution of this issue, which <i>Crane</i> and <i>Boeing</i> have stated is resolved, today we find <i>Crane</i> announcing they need to develop a new version of the software, potentially for the 787-9, later blockpoint 787-8s, or even an additional evolution for initial certification. The	On a modular enterpri se architec ture's inability to

19	e Problem s" (Jon Ostrowe r)	Firm		recipient of the new software is unclear at this point, but it certainly something to be aware of moving forward. <u>Aviation Week - May 23, 2008</u> : While Boeing VP and 787 General Manager Pat Shanahan says most systems are ready to go, the airplane's brake control monitoring system supplied by <i>Crane Aerospace</i> to the former <i>Smiths Aerospace</i> division of <i>GE Aviation</i> has fallen behind schedule and remains a threat to first flight in the fourth quarter this year. Design concerns about the brake monitors arose during build and test reviews by <i>GE</i> and <i>Crane</i> . As those issues were being worked out, power supply issues also cropped up. A <i>GE</i> manager says the team is making 'good progress' toward supporting <i>Boeing</i> 's flight test schedule. 'They are later than we want, but they will support first flight,' the manager said. <u>FlightBlogger - August 5, 2008</u> : <i>Boeing</i> expects to have all of the hardware on Dreamliner One qualified by the second or third week of August, 'with the exception of the brakes.' <u>Boeing - October 31, 2008</u> : 'The issues with the brake software are behind us, functionality required for flight test is in the labs and is working well. (The final 'blue label' version for flight test is in the lab and is undergoing tests, all known software problems are resolved. The formal 'red label' version will follow in two weeks. We plan on a service-ready update during flight test that adds some additional functionality including tire pressure, operator initiated test, and dataload),' said 787 spokeswoman Yvonne Leach. <u>Crane Co. CEO Eric Fast - February 18, 2009</u> : 'The Company expects to complete development of the brake control system for the <i>Boeing</i> 787 that meets the originally specified requirements during the second quarter of 2009 although engineering efforts at reduced levels will be needed to support test flights. However, <i>Boeing</i> has communicated certain changed aircraft requirements that affect the brake control system, and we have recently entered into discussions with our customer, <i>GE </i>	manage a modular supply chain for an integral product architec ture.
Feb. 2009	Seattle Times, "Crane says it	Supj er	7 and 1	supplies the brake control system for the <i>Boeing</i> 787 Dreamliner, said today that it has to develop a new version of the brake control system because <i>Boeing</i> has changed requirements. In advance of an investors	modular enterpri se architec

develop new 787 brake system as Being and CB, over who will pay for the extra system as inability brake system as inability brake brake control system as being behind index compared system as being behind schedule. Crare said today that the original version of manage as inability in anage as 19 Seattle Post- ments" Tom Enders Arbbas Firm- cas a "Underscoring the difficult state of the industry, and the implications for the two biggest makers of commercial product modular supply 2009 Seattle Post- neer, ", (James Wallace j Tom Enders Arbbas Firm- cas a "Underscoring the difficult state of the industry, and the implications for the two biggest makers of commercial pelvices On a modular supply 19 Seattle Post- neer, ", (James Wallace j Firm- production rate increase for its biggest planes. The development came four months after Arbbas said it would not boost rates as planned of the single-asile tays to 40 a month from 36. The rate is coming down to 34 an annoth starting in October. 'May aritimes are taking capacity out of the market. I do not exclude further production cuts if the need arises," Airbus Chief executive Tom Enders said in a statement. 23 Filght Forca sing the Long- term Firm a 24 Filght is the forcas are utiling on how may orders are deferred or canceled. Any significant cut in production rates in the two-asise category- teers are driven by each in a statement. On the deferity out of the market and on on the is the forcreasing commercial jobs in the rout in eptore		must		1		conference Friday, Crane said it is in a dispute with	ture's
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system a a Boeing changes a a changes require b b b ments" Tom Firm- c b b 19 Seattle Tom Firm- c b c b c <td< td=""><td></td><td>•</td><td></td><td></td><td></td><td></td><td></td></td<>		•					
$\begin{bmatrix} as \\ boing \\ changes \\ require \\ ments" \\ \end{bmatrix} \\ \begin{bmatrix} 5eatile \\ Post \\ Intellige \\ netry \\ Debring \\ Debring \\ Debring \\ Defright \\ Preb. \\ 2009 \\ netry \\ Trome \\ Trome$		brake				the Crane brake control system as being behind	manage
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require ments" Firm. α "Underscoring the difficult state of the industry, and the ture. for an integral product architec ture. 19 Scattle Tom. Firm. α "Underscoring the difficult state of the industry, and the industry, and the industry. On a moular integral production retrest so for an integral production retrest so for the two biggest makers of commercial integral integral production retrest integral integral integral production retrest integral integral production retrest integral integral integral integral integral integral integral integral production retrest integral integral production retrest integral integral integral production retrest integral integral integral integral integral integral production retrest integral integral integral production retrest integral integral integral production retrest integral production retrest integral integral production retrest integral integral production retrest integral integral production retrest integral production retrest integral integral production retrest integral integral production retrest integral integral integral production retrest integral integral integral integral integral production retrest integral integral production retrest integral integral integral integral integral production retrest integral int		Boeing				Boeing, and ready to fly on the first test aircraft."	
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19 Seattle Post- Intellige "Booing Delivers "Boing Delivers "777 Tom Freighte r", (<i>James</i> <i>Wallace</i>) Firm Custo (<i>Lames</i> " <i>Wallace</i>) G b mer (<i>James</i> <i>Wallace</i>) "Underscoring the difficult state of the industry, and the implications for the two biggest makers of commercial policy and the work of the subject makers of commercial demand veakens. And it will not go ahead with a production rate increase for its biggest planes. The two und not boost rates as planned of the single-aisle jets to 40 a month from 36. The rate is coming down to 34 a month starting in October. 'Many airlines are taking capacity out of the market. I do not exclude further production cuts if the need arises,' <i>Jirbus</i> Chief Executive Tom Enders said in a statement. and an and integral and an an and integral capacity out of the market. I do not exclude further production cuts if the need arises,' <i>Jirbus</i> Chief Executive Tom Enders said in a statement. Boeing does not publicly reveal its production rates, but it is known to be building about 31 of its single-aisle 375 sa an month at its Renton plant. Although <i>Boeing</i> hass Scott Carson recently said production in 2010 could be cut of by about 10 percent, depending on how many orders are deferred or canceled. Any significant cut in production positions this year, including 4,500 commercial jobs in the Puget Sound area. But most of those commercial jobs are not in jet production. Some industry experts believe <i>Boeing's</i> outlook is much too rosy." On the differences and and integral enterpri se "(Max Kingsle y-Jones Firm args "(Max Kingsle y-Jones Firm angs stretch of the 747 around a decade ago - has go consistent by put demand at fever than 1,000 around frown. On the difference throw y some and integral enterpri							Participation and Alexandra
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consistently put demand at fewer than 1,000 aircraft. turure)					
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					and has been updating its forecast annually ever since. <i>Airbus</i> began publishing 20 year market studies in 1988 - which crystalised as its 'global market forecast' in 1995 - but has not stuck to the annual publishing schedule of its rival. While short-term shocks such as 9/11, last year's oil price escalation dramas or the current global financial crisis have some bearing on demand in the near term, the tendency is to assume, backed by historic prerogatives, that any impact will be ironed out and will not influence long-term trends. For example, <i>Boeing</i> says in its latest current market outlook, produced amid the high fuel prices in 2008, that 'the forecast has been developed in a manner that considers today's market environment, but takes a long-term view of the market and the fundamentals that drive commercial aviation. These include economic growth, world trade and new aircraft capabilities.' So how close have forecasts come to matching reality? Comparing <i>Boeing's</i> 10-year outlook published in its 1998 current market outlook for fleet growth from 1997-2007 with the actual fleet data included in its 2008 current market outlook indicates that its demand forecast was optimistic. The fleet (excluding regional jets) was expected to grow to 17,700 airliners in 2007, but the data in <i>Boeing's</i> 2008 current market outlook shows that the 2007 fleet was 15,840 units. However, in 1998, <i>Boeing's</i> current market outlook did not include regional jets - the boom was still in its infancy then. This category is now included, putting the total airliner fleet in 2007 at 19,000 units. Significantly, back in 1998 when <i>Boeing</i> was still toying with ideas for a 500-seat airliner, it predicted that the fleet in this category would grow to 1,240 units, whereas in reality it would contract over the 10 years from 1,016 units to 910. <i>Airbus</i> has traditionally stuck to taking only a long-term, 20-year view in its global market forecast, failed to predict the size of demand for the A380 from Emi	r demand.
					However, it is worth pointing out that its 2003 global market forecast failed to predict the size of demand for the A380 from Emirates as it did not include the airline's Dubai base among its forecast of the top 10 large-aircraft hubs. In the wake of Emirates boosting its A380 orders to more than 50 aircraft, <i>Airbus</i> quickly remedied this omission in its next global market forecast and now has Dubai placed third in the rankings behind London	
23 Feb. 2009	Wall Street Journal, "A Scion Drives Toyota Back to Basics" (Norihi	Shoich iro Toyod a former Preside nt, <i>Toyota</i> <i>Motors</i> <i>Corpor</i>	Firm	β	Heathrow and Hong Kong." "Toyota Motor Corp.'s incoming president, Akio Toyoda, has a sobering message for the giant company founded by his grandfather: It has gotten too fancy for its own good. On Monday, three top executives who helped lead Toyota the past four years including Mitsuo Kinoshita, one of the primary architects of the company's global expansion announced their retirement. The departures clear the way for Mr. Toyoda's planned makeover of the world's biggest auto maker. He is expected to focus, most of all, on abandoning kakushin,	In the reintegr ation of a gently disinteg rating integral enterpri se architec

ko	ation;	or 'revolutionary change,' current president Katsuaki	ture.
Shirouz	Katsua	Watanabe's term for changing the way <i>Toyota</i> designed	ture.
u and		its cars and factories. It spawned technological	
John	Watan	advances, but led to cars that were often costlier to	
Murphy	abe,	produce. The 52-year-old Mr. Toyoda is also working to	
)	outgoi	fix a pricing strategy that put the company at odds	
/	ng	with some U.S. dealers, who felt its cars were getting	
	Preside	too expensive, according to people familiar with the	
	nt,	situation. Auto makers world-wide are in pain, and <i>Toyota</i>	
	Toyota	is much stronger than rivals such as General Motors	
	Motors	Corp., which is flirting with a bankruptcy filing. Still,	
	Corpor	Toyota is expecting its first annual net loss in 59 years.	
	ation;	Mr. Toyoda may shutter factories in North America and	
	Akio	Japan, where <i>Toyota</i> bulked up in recent years and is now	
	Toyod	stuck with too much manufacturing capacity. It might	
	a,	also be faced with its first layoffs in Japan since 1950,	
	incomi	when 3,000 workers were let go. Mr. Toyoda blames	
	ng	more than the recession, according to people familiar	
	Preside	with the matter. He is sending the message that his	
	nt,	predecessors worsened the problem by straying from	
	Toyota	core ideas of thrift and efficiency. Among other things,	
	Motors	there's a move away from technologically sophisticated	
	Corpor	in-car gizmos like a solar-powered cooling system	
	ation	designed for the new Prius. In addition, an expensive new	
		assembly-line technique of dipping car bodies into a vat of	
		paint and swirling them around nicknamed shabu shabu,	
		after a popular Japanese hotpot dish is under the	
		microscope. Toyota said in a statement that it feels its	
		management decisions made in the past were appropriate	
		for their time. Mr. Toyoda is the first member of Toyota's	
		founding family to take the helm in 14 years. 'I think	
		Toyota probably over-expanded a little bit in order to	
		compete with the American auto makers,' said his	
		father, Shoichiro Toyoda, 83, who himself was the auto	
		maker's president during the 1980s. 'There are a lot of	
		things that we have to review.' The younger Mr. Toyoda's	
		appointment as president is pending shareholder approval	
		in June. Mr. Watanabe, whose appointment as vice	
		chairman was announced along with Mr. Toyoda's	
		promotion, had been president since June 2005. The	
		shakeup reflects the sense of crisis within Toyota as it	
		navigates one of the toughest periods in its 70-year history.	
		For the past decade, it expanded at breakneck pace.	
		Under Mr. Watanabe, 67, <i>Toyota</i> posted record net profit	
		1.72 trillion yen in the ended March 2008. Last year it	
		unseated rival GM as the world's biggest auto maker in	
		terms of unit sales. Now, it is forecasting a 350 billion yen	
		net loss for the current fiscal year, ending March 31. And	
		not only are sales plummeting, but earnings are getting	
		further hurt by the strong yen, which means money earned	
	1 1	abroad isn't worth as much when converted into Japan's	
		currency. In a recent sign of the distress, at a meeting late	
		last year Mr. Watanabe appealed to mid-level managers	
		to 'share the pain' code for a salary cut then made	
		them wince by asking them to also consider buying a	
		new car to help shore up sales, according to people who	

attended the meeting. An unprecedented number of unsold cars in Japan has forced <i>Toyota</i> to stockpile them in the parking lots of Fuji Speedway, a company- owned track near Mount Fuji. Koichi Shimokawa, a professor of business administration at Tokai Gakuin University in Nagoya, says <i>Toyota</i> was so focused on becoming the world's largest auto maker that it failed to cut production quickly enough last year as economic crisis struck the U.S., its largest market. ' <i>Toyota</i> was overconfident in its competitiveness and they just kept pressing the accelerator,' he says. Until late last year, it appeared to be a horse race for the presidency between Mr. Toyoda and Mr. Kinoshita, 63, the righthand man to Mr. Watanabe, the current president. As recently as late last year, when <i>Toyota</i> 's powerful elders huddled to discuss who should succeed Mr. Watanabe at the end of his two- year term, some worried Akio Toyoda was too young. Others felt that a large, publicly traded company like <i>Toyota</i> should'nt pick a family member for the top job, even though Mr. Toyoda is a veteran who oversaw rapid growth in China, among other things. A turning point came in a meeting in November at the company's global
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come in a meeting in Nevember at the company's global
headquarters in Toyota City. Akio's father, Shoichiro
Toyoda, made a subtle remark to the assembled group,
according to people familiar with the matter. 'Why are
all the key decisions these days made by Watanabe-kun
and Kinoshita-kun?' the elder Mr. Toyoda said, using a
standard honorific for the two men. According to those
people, Shoichiro Toyoda seemed annoyed that Messrs.
Watanabe and Kinoshita had broken with Toyota
protocol last year by singlehandedly deciding what
vehicles would be built at a factory under construction
in Mississippi. They had switched to the Prius, a gasoline-
electric hybrid, from the Highlander, a sport-utility
vehicle, without first consulting other key executives. The
language was subdued. But the comment, along with
additional criticisms from other executives in other
meetings, ultimately tipped the scale in Akio Toyoda's
favor, the people say. Shoichiro Toyoda says he doesn't
recall the meeting. Toyota said in its statement that it
decided a new management team was needed to tackle the
tough situation it faces. It's not clear if a back-to-basics
approach will be enough to revive growth at the
sprawling firm, particularly amid the weakening global
economy. Other auto makers have promoted founding-
family members, with limited success. Ford Motor Co.'s
own founding-family scion, Bill Ford , took over from
Jacques Nasser in 2001. But Ford failed to launch popular
models, while sales of its profitable SUVs wilted as
gasoline prices rose. In 2006, Mr. Ford handed over the
CEO position to a nonfamily executive, Alan Mulally, a
former <i>Boeing</i> executive, who is still struggling to right
the ship. Asked whether the family name influenced the
choice of top executive, Shoichiro Toyoda said: 'We never
know who is going to be president. The current president
made the best decision about who is appropriate for the

	
	next president, and it just happened to be my son.' The
	family controls roughly 2% of Toyota stock. Akio
	Toyoda himself, as one of five executive vice-presidents,
	isn't entirely free of blame for the company's recent woes.
	Since June 2007, he has overseen the Japanese market,
	where sales and market share continue to fall. Toyota now
	aims to generate 'reasonable profits' even if is global
	sales (excluding sales of its two main affiliates, car maker
	Daihatsu and truck company Hino) slump to seven
	million, down from an all-time high of 8.4 million it
	sold in 2007. Toyota currently has capacity to produce
	about 9.7 million vehicles, according to an estimate by
	consulting firm CSM Worldwide. Akio Toyoda has long
	preached a traditional Toyota practice called genchi
	genbutsu, a leadership maxim that boils down to get
	out of your office and visit the source of the problem.
	For the past year, Mr. Toyoda has been practicing genchi
	genbutsu to quietly collect evidence that the company
	had strayed, according to people familiar with the
	situation. They say he was particularly concerned that
	Messrs. Watanabe and Kinoshita placed strong
	emphasis on achieving two trillion yen in annual
	operating profit, a level it passed in the year ended March
	2007. Driven by that profit objective, Toyota executives
	reasoned American consumers would be willing to pay
	a premium for a <i>Toyota</i> a change from a long-held
	strategy of pricing cars at a value. Two years ago,
	<i>Toyota</i> started raising prices on an array of models
	including the redesigned <i>Corolla</i> , one of its most
	prominent vehicles, launched in early 2008. Toyota's U.S.
	sales arm had tried to price the <i>Corolla</i> about \$1,000 to
	\$1,500 above what its U.S. dealers thought people would
	pay for a basic family car, according to U.S. dealers. Not
	surprisingly, sales were weak. <i>Toyota</i> sold 21,000 Corollas
	in February 2008 down 25% from a year earlier. When
	Mr. Toyoda got wind of the slow Corolla sales, he flew to
	the U.S. to meet with dealers and investigate for himself.
	Cliff Cummings, a veteran southern California dealer,
	warned Mr. Toyoda over a steak dinner with a dozen other
	dealers last March that premium pricing was the wrong
	way to go. Toyota had built an image of sturdy
	affordability, 'but now they were wrecking it,' Mr.
	Cummings says he told Mr. Toyoda. Based on
	subsequent conversations with the younger Mr. Toyoda
	and other executives, Mr. Cummings says he expects the
	company to overhaul its pricing strategy. The company
	is also reining in its engineers, who have been designing
	new features that occasionally appear to be out of
	character with the company's utilitarian roots. For
	example, the new <i>Prius</i> , launching this year, has an option
	for a solar-powered ventilation system designed to keep
	the interior cool when parked. Gizmos like these helped
	lift the car's retail price to an estimated \$28,000, according
	to analysts, compared with the \$22,000 currently.
	'Frankly, that does worry me,' says Earl Stewart, one of
	the top Prius dealers in the U.S., based in North Palm

					Beach, Fla., He anticipates stiff competition from <i>Honda's</i> new low-priced hybrid, Insight. 'I am already drastically discounting my Priuses to maintain my sales rate,' Mr. Stewart says. Then there's the shabu shabu paint system. <i>Toyota's</i> manufacturing division is one of the company's proudest operations, having developed a highly efficient 'lean manufacturing' philosophy that has been emulated over the years by everyone from <i>GM</i> and <i>Hewlett-Packard</i> to hospitals and supermarkets seeking greater efficiency. Mr. Watanabe, the current president, had backed the new technology as he encouraged his engineers to radically shorten the painting process. To replace the traditional system of slowly dragging a car through a 115foot-long bath of anticorrosion undercoating, <i>Toyota</i> engineers came up with a new process in which a car body gets picked up by a robot arm, then swished around in a pool of paint, cutting the length of the line. Engineers compare it to shabu-shabu, which involves picking up slices of meat and swishing it around in a hotpot to cook it. However, the new system costs roughly four times as much to set up as the traditional process, while producing what Mr. Toyoda felt were minimal improvements in the quality of the paint job and its efficiency, according to people familiar with the situation Also likely to be axed: A new 'ecological plastic' that emits less carbon dioxide over the course of its life than more traditional alternatives, but which is costlier to produce. Another tough area Mr. Toyoda must tackle promptly is the excess manufacturing capacity in Japan. In the late 1990s, when a strong yen made Japan a costly place to make cars, <i>Toyota</i> slashed capacity at home and added production overseas. But the yen reversed its direction, weakening to as low as 120 to the dollar between 2005 to 2007. <i>Toyota</i> decided to take advantage and do more of its manufacturing at home, since a weak yen has the effect of making exports more	
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					profitable. By 2007, it was producing 4.23 million vehicles in Japan a million more than it made just eight years before. That move was directly at odds with <i>Toyota's</i> long-held philosophy not to make long-term decisions	
					on where to put factories, based on shortterm currency-exchange rates, which can swing rapidly. "We are not gods, we are not infallible," says Shoichiro Toyoda, speaking of the company's management team. 'Sometimes even Tiger Woods misses a shot.""	
6 Mar. 2009	Financi al News, "Boeing Hits a New Low" (Eric	Jim McNer ney, CEO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm- Investo rs	α	"Back in December, <i>Boeing</i> announced that its board of directors approved a 14 percent increase in the company's dividend. <i>Boeing's</i> quarterly dividend will now be 40 cents per share, up from 35 cents, while the annual dividend will be \$1.60 per share. This is the fifth dividend increase in the past five years. CEO Jim McNerney said, 'This dividend increase reflects our strong financial performance, record backlog and significant	On a modular enterpri se architec ture's non- systemi
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10 Mar. 2009	Forbes, "Boeing says 787 Remain s on Schedul e"	Scott Carson , Preside nt, Boeing Comm ercial Airpla nes	Firm- Investo rs	α	spars due to premature buckling. <i>Boeing</i> said at the time that aircraft seven would be the first 787 to have that change incorporated at the supplier level, whereas the first six test-flight aircraft required a retrofit to be added on the final assembly line in Everett. In addition, to better enable the forthcoming production ramp-up and to speed up final assembly time, a terminal fitting has been relocated from the wing to the integrated centre fuselage section, although this change presented a unique challenge to the 787 supply chain. By relocating the fitting for its first incorporation with aircraft seven, <i>Boeing</i> found that the width of the centre fuselage had increased, causing a 'slight interference' with a damage indicator panel within the 747 LCF Dreamlifter's cargo bay, preventing optimal loading. The interference was enough to warrant a simple retrofit to the Dreamlifter that will be prepared in time for the first delivery, which is expected in the second quarter. <i>Boeing</i> plans a service bulletin to address this issue across the LCF fleet." <i>"Boeing Co.</i> said Tuesday the initial test flight and delivery of its long-awaited 787 jetliner remain on schedule. The Chicago-based aerospace company has postponed the introduction of the next-generation aircraft, built for fuel efficiency from carbon composite parts, four times due to production glitches and a two-month strike last fall. The delays have cost <i>Boeing</i> continues to work toward the inaugural 787 test flight in the second quarter of this year and the first delivery in the first quarter of 2010. 'The progress on a daily basis is gratifying,' he said at an investor conference in New York. 'We have now cleared all the equipment on the airplane for first flight and are continuing to work through the integrated software and hardware testing.'"	On a modular enterpri se architec ture's optimis m.
10 Mar. 2009	CNN, "EADS Profits Take off Despite Downtu rn"	Louis Gallois , CEO, <i>EADS</i>	Firm- Investo rs	β	"European aerospace group <i>EADS</i> has announced 'satisfying' results for 2008, posting a net profit of $\in 1.572$ billion (\$1.987 billion), despite the economic downturn. <i>EADS</i> CEO Louis Gallois announces the 2008 results during a press conference in Munich. In a statement on its Web site, the company revealed earnings before interest and taxes (EBIT) for the period amounted to $\in 2.8$ billion (\$3.55 billion). This compared to a $\in 446$ million net loss in 2007. The Munich and Paris-based company attributed the results to its excellent underlying performance and significant positive foreign currency effects. 'We made significant headway in reshaping the company,' Louis Gallois, chief executive of <i>EADS</i> , said."	On a modular enterpri se architec ture's "reshapi ng" efforts to become more efficient
10 Mar. 2009	Wall Street Journal, "Corpor ate		Firm- Investo rs	α	"The corporate bond market has been strong in March, as companies with high credit ratings and solid balance sheets take advantage of investors' appetite for yield. Energy and utility companies have favored smaller issues - - usually averaging \$300 million to refinance maturing	On a modular enterpri se architec

	Bond Supply Remain s Strong in March" (Kellie Geressy)			debt. Investors see those sectors as much less risky than others, including banks and finance companies. Boeing Co. is also in the market with a \$1.85 billion offering which will include five-, 10- and 30-year pieces. The aerospace company is taking advantage of historically low interest rate levels combined with investor demand for high-quality names, according to Todd Blecher, a spokesman for Boeing. The proceeds will be used to support the company's general liquidity position, which may include debt repayment, repurchase of common stock, acquisitions, capital expenditures and pension funding, he said. Boeing is an infrequent issuer in the corporate bond market, having last been seen in the U.S. market on Dec. 22, 2003, when it sold a miniscule \$11 million medium-term note. 'Now is a good time to take a step in building our liquidity, given our overall debt structure. It seems a prudent step to have a cushion in place on our balance	ture's financin g strategie s.
13 Mar. 2009	"Boeing 's McNern ey was Paid \$14.8 million in 2008" (Domini c Gates)	Firm	α	sheet, given what's happened in the economic spectrum,' Mr. Blecher said." "With Boeing's poor 2008 performance, especially in the commercial airplane division, the compensation of its top executives was lower than it could have been. But somehow, despite the stock's dive and the depressed profits, pay still rose for three out of the top four. Chief executive Jim McNerney earned 14 percent more than the previous year. Only Commercial Airplanes chief executive Scott Carson took a real hit. His total compensation fell 19 percent from the previous year. Adjusting figures reported Friday to reflect true 2008 compensation, McNerney got \$14.8 million in salary, bonuses and perks. That compares to \$12.9 million in 2007. Carson's total compensation was \$3.2 million, down from \$3.9 million in 2007. The pay for top company executives was detailed in a filing Friday with the Securities and Exchange Commission. Boeing's filing noted 'below target' economic performance in 2008 largely due to 'product development delays.' The company's 787 Dreamliner program was further delayed to almost two years behind schedule, and the 747-8 was pushed out by nine months. However, the Boeing board's compensation committee did not let another problem — the two-month Machinist strike in 2008 — factor into its executive pay awards. The compansition measure that factors in the company's economic performance was specifically adjusted 'to eliminate the impact of the IAM strike' to ensure that the awards 'reflected underlying growth and performance,' the filing said. McNerney requested cuts to his annual and long-term incentive plan bonuses to reflect the depressed profits, and the company board accordingly shrunk each by 25 percent, knocking about \$2.2 million off his compensation. His 2008 annual bonus was 65 percent lower than in 2007. But that was more than made up for by the long-term incentive plan bonus, which is based on a	On a modular enterpri se architec ture's executiv e compen sation, based on the labor strike and firm perform ance.

16	Flight	Firms-	α	three-year performance from 2006 through 2008 and was buoyed by good results in the first two years. The perks McNerney received in 2008 included \$287,000 worth of personal use of <i>Boeing</i> private jets, \$67,000 in personal legal services, and \$60,000 for personal use of a company car and driver. Top <i>Boeing</i> executives receive individual performance scores annually that are one factor in calculating their bonuses. McNerney's and Carson's individual scores came in below target. The head of the defense unit, Jim Albaugh, and chief financial officer James Bell both received individual scores above target. Albaugh got \$5.1 million in 2008 salary, bonuses and perks, compared to \$4.1 million in 2007. Bell's total compensation was \$4.6 million, compared to \$3.7 million in 2007. Both men were up 23 percent on the previous year."	On the
Mar. 2009	Global, "Future Aircraft and Engines : When Will they Hit the Market? " (Max Kingsle y-Jones)	Suppli ers	&β	models face even bleaker prospects for new orders in 2009. But of more immediate concern to <i>Airbus</i> and <i>Boeing</i> is the need to get to grips with production issues that have dogged both their programmes. <i>Boeing</i> , which has accumulated orders for 106 747-8s (78 -8F freighters and 28 -8I passenger models) since launching the <i>General Electric</i> GEnx-powered family three years ago, should now be flight-testing its 747-400 successor. But after a series of schedule delays - and two changes of programme leadership within 18 months - assembly of the first 747-8F (the lead variant) is still not complete and first flight is at least three to four months away. Deliveries to launch customer <i>Cargolux</i> , which were due to begin late this year, will now start no earlier than mid-2010. <i>Boeing</i> blamed the slip on a combination of issues including supply chain problems, engineering requirements (including the need for revisions to the wing design), the 787 crisis and its machinists' strike. 'After we got to the 90% release milestone of engineering drawings in early third quarter of 2008 and started to begin production we realised we weren't getting the parts in on time. A lot of [the issues] came home at that point,' said 747 chief engineer Michael Teal when the slip was announced last year. <i>Airbus</i> , meanwhile, has just reached the 200-order threshold for the A380 and has delivered 13 aircraft since the first went to <i>Singapore Airlines</i> in October 2007. But it is still battling with the overspill from production issues that have dogged the programme. 'Production is not fully under control, we've still got a bit of work to do,' says <i>Airbus</i> executive vice-president programmes Tom Williams. Output was due to rise from 12 aircraft in 2008 to 21 this year (having been reduced last year from the earlier target of 25) and this has since been revised further downwards to 18 as assembly lines struggle to transition from the almost hand-built process used for early aircraft to secome the fourth customer to receive the giant, at yea	future rate of technol ogical (quality) innovati on in the ecosyste m and its supply ecosyste m.

 end. The near-term commercial prospects for both the A300 and 747-84 look difficult, with few if any new customers on the horizon. Indeed Atbwar chief salesman John Leahy predicted in January that A300 alses would be flat this year - in the order of 10 aircraft. Until recently All Nappon Airways had been the most serious new-customer prospect for an ultra-large airliner deal. However, in December last year the airline 'suspended' the actions of its large aircraft selection committee and said that any deal would have to wait 'until the market conditions look right'. The lack of any serious new sales campaigns might be a pain for the A380 sales team, but it could be far more serious for the 747-8, which accrued just three orders in 2008. To make matters worse, Baading has managed to land only one airline customer for the - 81 passenger version - Luffhamas – which became launch customer for the 450-sater in 2006. Like the freighter, the -81 has been subject to schedule slips with Luffhansa's first delivery sliding from mid-2010 to the second quarter of 2011. In the meantime, the market for the freighter version - which is by far the stronger of the two variants commercially - has disappared as the cargo industry faces a crisis of rapidly declining demand. In the wake of the 747-8 delay - and the related 5658 million charge - Bacing chile executive Jim McNerney hinted in January that continuation of the programme should not be seen as a foregone conclusion: 'We still see a viable business proposition here', he said. 'Now obviously if we ever got to a point where we didn't, we'd have to work with our customers to come up with another answer.' Faced with thes development and commercial issues. Bacing is understood to have privately studied various options for the programme, including terminating the 747-81 and running the 747-87 as a standalone. In contrast to the current woes at Bacing, Airbus has eloyed a priod of good publicity as the A380 lanch airlines have experienced a relatively trouble-free introduc		
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unanticipated strengths and weaknesses in the technology. With significant financial and engineering resources occupied on preparing the 787 for its first flight, certification and entry into service, the airframer has neither significant staff nor capital to devote to the future of the large-twin and narrowbody markets. As a result, Airbus is waiting on the 787 to fly to inform its own ongoing design and planning for its slightly larger composite A350 XWB, which is expected to make its first flight in late 2011 followed by a 2013 entry into service with Qatar Airways. The cyclical planning logic then returns to Boeing's doorstep as it waits for the larger 350seat A350-1000 and 314-seat A350-900 performance expectations to firm up so the US airframer can decide how to proceed with its 301 to 365-seat 777 programme. On the smaller end of the aircraft spectrum, narrowbody replacement appears to be pushed out beyond the next decade as robust build rates and backlogs on the Airbus A320 and Boeing 737 continue, though the material of such a replacement for Airbus and Boeing remains undefined. The manufacturers have each discussed openly that the benefits of composite technology in lowcycle long-haul operations may not carry over to highcycle short-haul operations. In the near-term, the question for *Boeing* is whether or not it can deliver the high performance expectations it has set for itself with the 787. Boeing has always touted a 10% better cash mile cost over the 767, 20% improvement in fuel efficiency and 30% savings in maintenance costs. Many of these ambitious performance considerations have been hit by reductions in the projected range of the aircraft from between 8,000nm and 8,500nm to between 7,650nm and 8,200nm, stemming from unanticipated weight gain and speculation regarding lagging fuel burn targets. Both Boeing and the 787's engine suppliers, General Electric and Rolls-Royce, are undertaking aggressive weight reduction and engine performance improvement that will be incorporated by entry into service as well as later block-point improvements. Some airlines have begun to publicly speculate as to whether or not the 787 will meet performance targets. For example, Aeromexico chief executive Andres Conesa recently expressed fears that the five Boeing 787-8s his airline has ordered may fail to meet original performance specifications including the ability to operate nonstop flights from Mexico City to Asia. Prior to the global economic collapse, both Boeing and Airbus accumulated orders for their respective mid-size long-range widebody jets at an unprecedented pace, garnering 878 and 483 firm orders respectively. Airbus may regard its 2013 entry into service date for the long-range twin as an unintentionally shrewd move that positions its first deliveries in line with an upswing for this inherently cyclical industry. Yet, Boeing's almost two-to-one 787 backlog advantage provides an example of aggressively tackling the replacement market of its own predecessor

ahead of its chief competitor. Whichever product claims	
the title of market leader, both will be instrumental for	
airlines with global long-haul ambitions. The A350 and	
787 will hold an overpowering advantage over the ageing	
A330 and 767 as they approach the mid- and later product	
life.	
Open rotor: Engines of the future	
(Niall O'Keeffe in London)	
Dramatic performance improvements are required of the	
next generation of narrowbody aircraft, and open rotor	
engines have been mooted as the means of delivery.	
CFMInternational, a GE-Snecma joint venture which	
provides engines for both the Airbus A320 and Boeing	
737NG families, is pursuing two programmes ahead of	
those families' replacement. LEAP-X, an advanced ducted	
turbofan due for certification in 2016, is targeted to	
deliver a 16% fuel-burn reduction 'relative to today's	
best of CFM', while an open rotor design, due by 'the	
end of next decade', will deliver a 26% reduction,	
according to the manufacturer. 'Given the potential fuel-	
burn improvement, we just can't afford not to go on	
investing and studying the open rotor potential,' says	
Ron Klapproth, LEAP-X programme manager. In	
Klapproth's view there is a natural overlap between	
CFM's two programmes. 'If you've got a great open	
rotor but you don't have a world-class core, you're not	
going to meet the kind of performance goals that we set	
out.' From April, GE and NASA will conduct wind tunnel	
tests of counter-rotating fan-blade systems at the latter's	
Glenn Research Center in Cleveland, Ohio. These tests are	
geared toward noise limitation, a significant hurdle in open	
rotor design due to the absence of a fan case. 'By looking at variations in blade number and blade diameter and	
spacing, as well as advanced shaping of the airfoils, we are	
pretty optimistic that we're going to be able to make	
significant improvements over what we flight-tested back	
in the late 1980s,' says Klapproth, referencing prior	
research into unducted rotor efficiency. Among airlines,	
the open rotor concept has a vocal supporter in the shape	
of <i>easyJet</i> , which in June 2007 proposed an open rotor-	
powered 'ecoJet' as a solution to aviation's impact on the	
environment. 'If you're going to spend \$10-\$15 billion	
dollars on a new plane, it's got to be considerably	
better,' says easy.Jet strategic planning manager Hal	
Calamvokis. 'If you don't go open rotor you don't really	
deliver those significant benefits.' By this reasoning, the	
required performance gap simply cannot be bridged with	
crew productivity and maintenance cost improvements	
alone. The potential fuel savings steer Calamvokis toward	
open rotors. 'The price of jet fuel is not going to go down	
in the long term and in the long term carbon will be priced	
in some way, shape or form,' he says. 'For this generation	
of aircraft, it's fuel burn that we should be solving for.'	
On the noise issue, Calamvokis predicts that open rotor-	
powered narrowbodies will be quieter than the aircraft	

they replace. He cites the investigative work of <i>Institute of Sound and Vibration Research</i> at the University of Southampton. Even the lower speed of rotor-powered aircraft (Mach 0.75 against the of narrowbodies' Mach 0.78) is not, in Calamvokis' opin major drawback. 'As the price of fuel goes up wo	
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major drawback 'As the price of fuel goes up w	
rational airlines, who are incentivising their	
correctly, flying slower,' he says, adding that some	of the
time lost in cruise can be clawed back through	faster
climb-out and descent. But enthusiasm for open	rotor
designs is not shared by all. 'Initial hopes that	open
rotors would be as fast as turbofans and have	better
fuel consumption have proven unfounded,' argues	s Alan
Epstein, vice-president of technology and environm	ient at
Pratt & Whitney, which plans to develop a version	of its
geared turbofan (GTF) engine for the next generat	ion of
narrowbodies. 'Open rotors' specific fuel consumption	on per
pound of thrust might be lower, but this is mislea	ding,'
says Epstein. 'The fuel burn required to push the air	
is what's important Open rotors will add tonnes of	extra
weight.' He insists that the GTF represents a 'faste	
enormously quieter' option. CFM's Klapproth of	
very different assessment. 'We see no real advantage	
geared turbofan configuration, but we see som	
headwinds in terms of operational relia	
particularly,' he says. Rolls-Royce has kept its	cards
close to its chest, but battle lines are clearly being dra	wn in
the race to power future narrowbodies. It is now the t	ask of
Boeing and Airbus to decide which option is best pla	ced to
deliver a bold leap forward. 'It's actually possibly	quite
fortunate that given the 787, A350, etc, they're ju	
physically capable of doing anything quickly, which	
us time to think radically," says easyJet's Calamvokis	S.
Narrowbody replacement: Receding pressure	
(Mary Kirby in Philadelphia)	
Less than two years ago, airlines seemed largely un	ited in
their demand that Airbus and Boeing accelerate pla	ans to
develop single-aisle replacement aircraft. But the pr	
on airframers has subsided, for now, as carriers for	
	f epic
the task of weathering a global economic crisis o	
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17 The Mar. Seattle 2009 Times, "Jet Financi ers Sei Product on Cut Coming Throug Throug	directo r of Germa	Firm- Custo mer's Investo rs	α & β	for 30 of the type, firming its 2008 initial commitment for up to 60 of the new jet. But other firm deals for the aircraft have not yet surfaced. 'Airlines still need to replace aircraft in 2013 – that's the year CSeries enters service. What we are finding, understandably, is that given the current financial situation many airlines are focused on short-term issues rather than completing their fleet negotiations for the long term," says Bombardier. If <i>Airbus</i> and <i>Boeing</i> feel threatened by the 110/130-seat CSeries, they are not showing it. Neither of the two firms has defined replacement plans for the A320 and 737. The lack of clarity has not slowed interest from engine makers, which are working to introduce significantly more efficient products. But, as it stands today, no new airframe is expected to appear until at least the last few years of the next decade. <i>Airbus</i> has been clear on this point. While remaining closed-mouthed as to how it aims to keep its A320 family competitive in the interim, the European firm's chief operating officer John Leahy says he does not expect a replacement aircraft to come available before 2020. That gives <i>Bombardier</i> 'a competitive advantage to be sure, particularly as CSeries is the only current family of aircraft designed specifically for the low-end, single- aisle market', says <i>Bombardier</i> . The company estimates the needs of the 100- to 140-seat commercial aircraft market to be 6,300 aircraft, representing more than \$250 billion over the next 20 years. Should the CSeries fail to gain traction, however, the industry 'should probably mourn rather than cheer', says Aboulafia, as it will give airframers little incentive to move forward their timelines for replacement narrowbodies, especially in light of today's 'major impediments' to such development – slack passenger demand, cheap fuel and pressured research and development budgets. 'This is going to have a damaging impact on the arrival of new technology,' he says. <i>Air</i> <i>France-KLM</i> has been trying to persuade <i>Airbus</i> an	On modular and integral enterpri se architec tural approac hes to
ers Ser Product on Cut	ng directo r of Germa ny's DVB	Investo		in insisting upon a forecast that at least in the short term is rosy, saying commercial-airliner production can hold steady this year. But the audience — people who	se architec tural approac

		[]		Bertrand Grabowski, a managing director of Germany's	
				DVB Bank, a major European financier of airplanes, said	
				that with the airlines facing rapidly falling demand, the	
				only question is how much and how soon both Airbus	
				and <i>Boeing</i> will cut production for 2009 through 2011.	
				'They will have to do it. It's a matter of fact,' said	
				Grabowski in an interview. 'How would you like to see	
				your client bleeding by taking delivery of aircraft they	
				don't need?' He expects production cuts starting later	
				this year, and worse to come in 2010 and 2011. That	
				assessment, in line with those of other analysts who asked	
				not to be named, contrasted with the presentation by	
				Mark Pearman-Wright, head of leasing and investor	
				marketing at Airbus. Pearman-Wright insisted funding	
				for this year's Airbus deliveries is secure and that the	
				plane maker will flatten rather than cut production in	
				2010 and 2011. 'We don't see a problem in funding the	
				deliveries until the end of the year,' he said, echoing the	
				message of Boeing Commercial Airplanes Chief Executive	
				Scott Carson to a Wall Street audience last week. 'I've	
				noticed the manufacturer mindset is more bullish,' said	
				Pearman-Wright. 'It's not so much Airbus versus	
				Boeing. It's the manufacturers versus the financiers.'	
				In a sobering assessment to kick off the conference	
				Monday morning, respected industry economist Adam	
				Pilarski, of <i>Avitas</i> , at least agreed with the manufacturers	
				that this year's deliveries are relatively safe. But Pilarski went on to forecast that production will 'fall off a cliff' in	
				2011. 'The crash has to happen and it will be severe,'	
				said Pilarski. His prediction of combined <i>Airbus</i> and	
				Boeing production for that year is an ominous 666	
				airplanes, a 30 percent drop from today. Pearman-	
				Wright protested: 'We don't see that at all.' Yet across	
				the conference, the complaint is that credit is frozen and	
				money is not available. Leasing companies in recent	
				years have had ready access to debt to finance the bulk	
				of their purchases of new airplanes. They have sold	
				either older airplanes or stock to raise the cash for the	
				roughly 20 percent equity they must put up with such	
				purchases. Now, they have access to neither cash nor	
				credit. 'Raising equity and debt has become more than a	
				challenge,' said ISTAT President Mike Platt, chief	
				investment officer with jet-leasing company Aircastle.	
				Pilarski ended his presentation grasping for optimism. He	
				agreed that eventually air traffic will return to its historic	
				upward climb and the industry will recover. 'The long-	
				term future of aviation is still solid,' said Pilarski. But as	
				DVB Bank's Grabowski put it: 'The problem is 2009,	
			6	2010 and 2011.'	
17	Busines	Custo	β	"Executives who are able to produce halfway decent	On an
Mar.	aWaak	mer		business figures have become a rarity in the current	integral
	sWeek,		.	financial crisis. Thus it comes as no surprise that Louis	
2009	sweeк, "Emirat				enterpri
	"Emirat es			Gallois, 65, visibly enjoyed his appearance at a press	se
	<i>"Emirat</i> es Slams			Gallois, 65, visibly enjoyed his appearance at a press conference held in an aircraft hangar belonging to an	se architec
	"Emirat es			Gallois, 65, visibly enjoyed his appearance at a press	se

A380	defense giant <i>EADS</i> , was clearly in high spirits as he r	ration.
Defects	reported on the group's successes from the previous year.	ation.
"	Sales rose by 11 percent and profits increased to about	
(Dinah	\in 1.6 billion (\$2.1 billion). <i>EADS</i> even exceeded its	
Deckste	internal cost-cutting targets. But Gallois became	
in) –	significantly more subdued when he was asked about the	
translate	coming months. He said that he had no idea how many—if	
d from	any-aircraft orders will be cancelled by customers in the	
Der	near future. The A400M, a military transport plane which	
Spiegel	has been delayed for more than four years, also	
online	apparently poses a considerable potential threat to Airbus	
	and its parent company, EADS. Gallois conceded that if	
	the buyer countries pulled out of the prestigious project,	
	the group would have to repay close to €6 billion (\$7.8	
	billion) to their governments. This would put an enormous	
	dent in <i>EADS's</i> ample financial cushion of around €9	
	billion (\$11.7 billion).	
	There is another over more pressing problem, and that the	
	There is another, even more pressing problem, one that the band of $FADS$ preferred not to even mention. And yet it	
	head of <i>EADS</i> preferred not to even mention. And yet it has triggered consternation at its most important	
	subsidiary, <i>Airbus</i> . In mid-February, senior executives	
	from <i>Airbus</i> and the airline <i>Emirates</i> , the biggest customer	
	for <i>Airbus's</i> A380, attended a crisis meeting in Toulouse to	
	discuss the super-jumbo. Last summer, after a roughly	
	two-year delay, the Arab airline took delivery on the first	
	of 58 A380s it had ordered. The airline currently operates	
	four jets in this series. Nine others are in use at Singapore	
	Airlines and the Australian airline Qantas. The Airbus	
	executives could not have liked what they were told and	
	shown by the <i>Emirates</i> representatives. In a 46-slide	
	presentation, the aviation experts painstakingly listed	
	what they viewed as the giant jet's serious growing pains.	
	To illustrate their points, they included snapshots of	
	singed power cables, partially torn-off sections of	
	paneling and defective parts of thrust nozzles in the	
	engines as evidence of what they described as a shoddy	
	work ethic at <i>Airbus</i> and its suppliers. The confidential	
	manufacturer's information has since been leaked to employees, triggering a mood of panic. 'Many good	
	people have resigned and are trying to move to other	
	projects,' reports a concerned insider. <i>Airbus</i> is doing its	
	best to calm the waves. 'We take our customer <i>Emirates</i> '	
	criticism very seriously and are doing everything in our	
	power to correct any reports of deficiencies as quickly as	
	possible,' says an Airbus spokesman. He also confirms a	
	'number of individual incidents that have impaired the	
	operation but not the safety of the aircraft.' Crisis	
	meeting? Cable problems? These words are reminiscent of	
	a humiliating chapter in the company's more recent	
	history, one that Airbus managers and their CEO, Tom	
	Enders, would rather see stricken from the annals of the	
	company. Because of production problems and labor	
	disputes in recent years, the mega-plane, celebrated by	
	experts and aviation fans alike, has been the cause of vast	
	amounts of additional work and a significant loss for its	

producers in the past few years. Some senior executives
are even suspected of having lined their pockets through
stock deals and of having concealed the true extent of the
A380 debacle from outside shareholders for far too long.
Through a massive effort, the group did manage to deliver
12 of its flagship jets last year. It expects to build another
18 this year and hand them over to customers. The
problems seemed to have been corrected, and the
company recently began a gradual shift from the costly
and time-consuming manual assembly of the A380 to
the long-planned commercial series production. Airbus
seemed to have cleaned up its act, only to be confronted by
the incendiary information from the Middle East. The list
of defects was long on clear language and short on
diplomatic niceties. On one of the slides, the experts
provide a detailed list of the prestigious plane's various
breakdowns. They say that the A380 has already been
grounded nine times, which represented a loss of close to
500 operating hours. In 23 cases, say the Emirates
managers, replacement aircraft had to be obtained at short
notice. Minor glitches, the critique continues, happen in
Emirates' A380 fleet about once every two days. In the
medium term, the Emirates experts write, the airline could
face the 'threat of a loss of confidence in the aircraft
and the brand image of the Emirates A380.' The Airbus
managers want to make sure that this doesn't happen. They
have sold only about 200 of their flagship jets to date.
According to industry estimates, Airbus will have to sell
about twice as many A380s to recoup its costs. Enders
and his staff are now doing everything possible to placate
angry customers. Each individual problem report is
analyzed and simulated. 'Defects are traced back to their
origin and corrected,' explains an Airbus spokesman.
'We have already made great progress in this respect in
recent weeks.'
Both Airbus and Emirates have reacted to this story since
it was released on Saturday ahead of publication in
Monday's edition of <i>Der Spiegel. Airbus</i> said Sunday it
was taking <i>Emirates'</i> criticism of the A380 'very
seriously.' 'We are doing everything we can to overcome
the issues,' an <i>Airbus</i> spokeswoman told <i>Reuters</i> .
<i>Emirates</i> for its part told the news agency that it has a
'good relationship with <i>Airbus</i> ' and that it would
'continue to work closely with them to address these
technical matters.' The <i>Emirates</i> spokeswoman said
that the airline remained confident in the A380 and
had no plans to cancel orders. In addition, the aircraft
manufacturer is storing additional replacement parts
directly on-site in places where the super-jumbo is now
in use, so as to be able to respond more quickly to
problems as they arise. Airbus also plans to expand the
rapid response team it created specifically to address A380
concerns. It is even considering making some changes to
individual components. In private, Airbus executives point
out that problems are also encountered with other new

aircraft models when they are used in commercial	
aviation. Some 23,000 individual parts are used in the	
cabin area alone, managers say, meaning that teething	
problems cannot be ruled out completely. After all, they	
say, the reliability of all parts and systems can only be	
proved once the aircraft is in operation. Whether these	
and other explanations will convince Emirates remains to	
be seen. In its damning presentation, the company also	
sharply criticizes the production processes at Airbus. For	
example, the Emirates report concludes, the A380	
models were not sufficiently tested before being	
delivered to customers. Experts, on the other hand, note	
that no other jet has ever been as thoroughly tested as the	
giant Airbus. Nevertheless, they say, not all conceivable	
scenarios involving every single part could have been	
simulated in the dry runs. Some of the problems could	
hardly have been foreseen, such as one involving the	
plane's shower facilities. So far Emirates is the only A380	
customer to provide two showers in first class. A	
determined female passenger who was unable to operate	
the showerhead promptly tore out the entire fixture-and	
flooded the shower room. The Emirates experts believe	
that Airbus should choose its suppliers more carefully	
and limit their numbers. They also say that the	
constant transport of parts and employees among	
Airbus's locations throughout Europe makes it more	
difficult to comply with prescribed quality standards.	
'Our work is well organized and properly inspected,'	
counters an Airbus spokesman. He also points out that	
A380 production is becoming more and more	
normalized. It is still not clear how the spat between the	
aircraft maker and its dissatisfied customer will end.	
Competitors Singapore Airlines and Qantas have also had	
to ground their A380 jets several times in recent weeks	
and months. The Asians have had trouble with the fuel	
pumps and the on-board electronics. The Australians	
noticed that the highly sensitive measuring sensors in the	
tank were not working properly, although it is still unclear	
whether the problem was attributable to the devices	
themselves or was caused by impurities in the fuel.	
Unlike Emirates, Singapore Airlines and Qantas have	
taken a more relaxed approach to the problems.	
However they, unlike the Arabs, have not just ordered	
dozens of new A380s. Since the end of last week, the	
Dubai-based airline has however tried to defuse the	
conflict. 'Technical problems are to be expected in a	
new aircraft, especially one in which so many new	
technologies are used,' says an Emirates spokesman.	
He is also quick to point out that order cancellations	
are not planned. The A380, he says, is an 'outstanding	
airplane.'''	
(Reader Comment from "Handsome"):	
"These growing pains will be overcome - the B747 had a	
bunch of them also - back in the day! Airbus will solve	
these issues - I have found Airbus to be more agile and	

r						p
1					aggressive in solving new product development	
					problems than their brethren in Chicago/Seattle/DC -	
					based on my experience with the two supply chains!!"	
18	Seattle	Bob	Firm-	α	"The leading players in the world of aviation financing	On
Mar.	Times,	Genise	Custo	&	said Tuesday there is a multibillion-dollar 'funding gap'	modular
2009	"Money	, chief	mer-	β	between all the Boeing and Airbus jets due for delivery	and
	's Short	and the second sec	Custo		this year and the money to pay for them. Bob Genise, the	integral
	to Pay	ve of	mer's		chief executive of Dubai-based airplane lessor DAE,	enterpri
	for	Dubai-	Investo		provided a stark image of what that means to Boeing.	se
	Boein,	based	rs		Genise, who maintains a home in Seattle, said he'll be	architec
	AirbusJ	airplan			surprised if he doesn't see 'white tails' parked alongside	tural
	ets,	e			Boeing Field when he's driving on Interstate 5 toward the	approac
	Experts	lessor			end of the year. That's aviation slang for completed jets	hes to
	Warn"	DAE;			whose buyers don't have the money to take possession.	managi
	(Domini	Stephe			There haven't been any white tails at <i>Boeing</i> for years.	ng
	c Gates)	n			Walt Skowronski, president of Boeing Capital, the	capacity
		Udvar-			company's jet-financing unit, conceded that a gap exists,	•
		Hazy,			pegging it at somewhere between zero and \$5 billion. Yet	
1		chief executi			he offered assurances that <i>Boeing</i> can manage its scheduled deliveries through the problem. Stephen Udvar-	
		ve of			Hazy, chief executive of <i>International Lease Finance</i>	
		Interna			<i>Corp.</i> (ILFC), the world's largest aircraft lessor and the	
		tional			biggest customer of both <i>Boeing</i> and <i>Airbus</i> , wasn't	
		Lease			reassured. His company is owned by AIG, the giant insurer	
		Financ			that's still struggling despite billions of dollars in federal	
		e e			bailout money. 'When a bomb explodes, the light flash	
		Corp.;			travels a lot faster than the sound,' said Udvar-Hazy.	
		Bertra			'The flash occurred in September. But the sound hasn't	
		nd			reached Seattle and (Airbus headquarters in) Toulouse	
		Grabo			yet.' He and other leading airplane-financing experts	
		wski,			spoke at the annual conference of the International Society	
		managi			of Transport Aircraft Traders (ISTAT). They suggested	
		ng			the funding gap caused by the virtual freezing of bank	
		directo			lending is much bigger than Skowronski's estimate,	
		r of			anywhere from \$10 to \$20 billion, and that Boeing would	
		Germa			face severe consequences, such as:	
		ny's			• Cutting production rates as early as the fourth quarter,	
		DVB			eventually reducing output by as much as a third —	
		Bank			which inevitably would mean slashing jobs.	
					• Having to finance airplanes itself, putting in up to three	
					times the \$1 billion it anticipates, yet still not closing the	
					funding gap.	
					Debart Marin was president of the federal Furnet furnet	
					Robert Morin, vice president of the federal <i>Export-Import</i>	
					<i>Bank</i> , said the government is ready to offer as much as \$10 billion in guarantees to help finance U.S. airplane sales	
					billion in guarantees to help finance U.S. airplane sales going overseas, mostly for <i>Boeing</i> jets. But that likely	
					won't be enough to close the gap, said the experts at	
					ISTAT. <i>Boeing</i> executives offered repeated assurances	
					that all deliveries for this year are financed. But Bertrand	
					Grabowski, managing director of Germany's DVB Bank,	
					called that an 'act of faith.' In an interview, he said	
					troubled banks have made soft commitments to both	
					Boeing and Airbus customers that they may not be able to	
					keep. 'Some of the <i>Boeing</i> deliveries are not secure for	
1					the last quarter of this year,' Grabowski said. Some	
					and have quarter or and jour, Gradowski suid. Some	

					recently European nationalized banks "have absolutely no clue if they can deliver what they signed term sheets for," he said. European banks have dominated aviation financing in the last decade. Udvar-Hazy said at least half of those that used to be in aviation are now 'totally shut out' of the market. Grabowski forecast that \$5 to \$7 billion of deliveries scheduled for 2009 — mostly for <i>Boeing</i> and <i>Airbus</i> and with a few for Brazilian jet maker <i>Embraer</i> — will 'evaporate' by year-end. <i>Boeing</i> and <i>Airbus</i> would then have two choices, said Robert Martin, chief executive of <i>BOC Aviation</i> , a Singapore-based leasing company owned by Bank of China: 'They either fund those deliveries themselves or cut back production.' <i>Boeing Capital's</i> Skowronski said the company expects to have to provide about \$1 billion in financing to its customers this year, but is ready to give more. 'If it were to go to \$2 billion or \$3 billion, that's generally not going to be a problem,' he said. The U.S. government, represented by the <i>Export-Import bank</i> , will close part of the gap by increasing its loan guarantees from a typical \$4 billion to \$5 billion a year, to \$9 billion or \$10 billion. Ex-Im's Morin said 2009 could be the toughest year of the down cycle. He expects to finance 150 to 170 airplane deliveries in 2009, mostly <i>Boeing</i> wide-bodies. The <i>European Export Credit Agencies</i> will offer a similar dollar amount in loan guarantees to support between 200 and 300 <i>Airbus</i> deliveries, mostly less expensive narrow- bodies. 'This is making 9/11 look like a speed bump,' said <i>DAE</i> 's Genise. 'The liquidity crisis is not turning	
					around in three months,' he said. 'It's not turning around in six months. It's a major disaster for the global economy and it will be a major disaster for the airline industry	
18 Mar. 2009	Air Transpo rt Intellige nce news, "ILFC Chief Recom mends Airbus and BoeingS lash Producti	Steven Udvar- Hazy, CEO <i>ILFC</i>	Firm- Custo mer- Custo mer's Investo rs	α & β	and the manufacturers." "Leasing companies today recommended that Airbus and Boeing should slash production by about 25 percent due to the current difficulties faced by operators and lessors in financing aircraft in today's economic environment. <i>ILFC</i> chief Steven Udvar-Hazy believes a 25-to-30 percent cut makes sense, while others on a leasing panel today at ISTAT suggested 'similar' reductions, albeit at a slightly lesser range. Whatever the amount, Udvar-Hazy believes it is 'inevitable' there is going to be production cuts, 'it's just a matter of when and to what degree'. Most speakers this week at ISTAT have identified a significant funding gap in aircraft ordered and those that will be financed. Responding to these comments, a <i>Boeing</i> executive in the	On modular and integral enterpri se architec tural approac hes to managi ng capacity
	on 25%" (Mary Kirby)				audience said aircraft are committed to production in 2009 and if an airline can't finance it, 'we'll have whitetails'. But in 2010 and beyond <i>Boeing</i> 'will be looking very carefully at supply and demand so that we don't overproduce', he says. An <i>Airbus</i> executive in the audience also chimed in, noting that <i>Airbus</i> is currently producing 34 A320s per month, down from a previous rate of 40 per month. 'We continue to monitor it' and <i>Airbus</i> is	

				being 'realistic and proactive', he says."	
18 Air Mar. Transpo 2009 rt Intellige nce news, "ILFC's Hazy: Boeing' s Initial 787s will be Overwe ight" (Mary Kirby)	Steven Udvar- Hazy, CEO <i>ILFC</i>	Firm- Custo mer	α & β	"Boeing's initial batch of 787s will be delivered overweight, despite Boeing's strong efforts to rectify the problem, <i>ILFC</i> chief Steven Udvar-Hazy said today at the ISTAT conference in Phoenix. "Rest assured that the first batch of 787s will be overweight,' said Udvar-Hazy in response to a question posed by ATI. The <i>ILFC</i> chief notes that Boeing is injecting a lot of resources 'into rectifying that problem' and rectifying the additional 'empty weight' on the first 787s. 'In the long run, this will be an excellent aircraft. But I pity the airlines that get the first ones. Obviously those aircraft will not be the same standard as those 787s later on.'"	On a modular enterpri se architec ture's over- promise and under- delivery
Kirby)19SchaeffeMar.rs2009Research,"WallStreetSentiment SoursonTheBoeingCompany"(JoceylnnDrake)		Firm- Investo r	α	"The Boeing Company is struggling to climb into the black this morning after some negative brokerage comments hit the Street. Falling freight demand is likely to bring about more delivery deferrals for <i>Boeing's</i> popular 777 jet plane, <i>JPMorgan</i> stated in a note. Before the open, the brokerage firm slashed its earnings-per-share estimate for <i>Boeing, Precision Castparts Corp.</i> , and <i>Spirit</i> <i>Aerosystems Inc.</i> . The brokerage firm cut its delivery expectations for the 777 this year to 80 from 82, and to 70 deliveries next year from 80. 'The correction of global economic imbalances, particularly the credit-fueled bubble of American consumer demand, has significant implications for the 777 perhaps more than any other aircraft,' <i>JPMorgan</i> said. 'We believe the announcement of a production cut could be in the cards in the coming weeks.' Sentiment on Wall Street has somewhat bearish leanings at the moment. <i>Zacks</i> reports that the security has earned 7 "buy" ratings, 10 "holds," and 2 "sells." Considering the stock's weak technical performance, there is still room for potential downgrades, which could pressure the security lower. What's more, the average 12-month price target for BA stands at \$49.37, according to <i>Thomson Reuters</i> . This estimate implies that analysts are expecting the shares to skyrocket more than 46% during the next 12 months. Any price-target cuts from this group could also have negative implications for the shares. Technically speaking, the security has rolled higher from its March low and is currently sitting on support at its 10-day moving average. However, the stock is still below staunch resistance at its declining 10-week and 20-week moving averages. These intermediate-term trendlines have guided the shares lower since mid- October 2007, resulting in a loss of more than 67%. Not surprisingly, this negative price action has garnered the stock some pessimism from options players. The Schaeffer's put/call open interest ratio for BA comes in at 1.14, as put open interest outnumbers call open int	On the mental models of investor s of a modular enterpri se architec ture.

					that antions playars have been more possimistically	
					that options players have been more pessimistically aligned toward the shares just 7% of the time during	
	,				the past year. This preference for puts can also be seen in	
					the action on the International Securities Exchange.	
					During the past 10 trading sessions, 5 puts have been	
					purchased to open for every 1 call purchased to open. This	
					ratio of puts to calls is higher than 98.8% of all those taken	
					during the past 12 months, pointing to extreme	
					pessimism among options players. Digging into the	
					stock's open interest configuration, we find that peak put	I
					open interest in the March series sits at the 30 strike, with	
					nearly 4,500 contracts. The April 30 put also has open	
					interest of nearly 4,500 contracts. Meanwhile, the bulk of	
					the stock's put open interest sits in the May series. The	
					May 50 put has open interest of 21,400 contracts, the May 25 put has open interest of 18,700 contracts, and the May	
					35 put has open interest of 18,700 contracts, and the May 30 put has open interest of 10,100 contracts. On the other	
					hand, peak March call open interest sits at the 35 strike	
					and numbers fewer than 4,100 contracts. The April 35 call	
					has open interest of 8,800 contracts. Meanwhile, peak May	
					call open interest sits at the 35 strike, with 15,200	
					contracts. The overall preference for puts over calls	
					indicates that investors have low expectations for the	
					shares during the near term. However, considering the	
					stock's weak technical performance, this pessimism is to	
					be expected. One group hasn't jumped on the bearish	
					bandwagon. Short sellers have avoided this stock, as	
					less than 2% of the company's total float has been sold short. If the equity continues its downtrend, it's likely	
					to attract some of these bears. An increase in short	
					selling could pressure the security lower."	
26	USA	Scott	Firm-	α	"The biggest sales boom in Boeing's cyclical history of	On a
Mar.	Today,	Carson	Custo		making commercial passenger jets has come to a	modular
2009	"Boeing	, CEO,	mers		screeching halt. After selling 4,134 planes the past four	enterpri
	Says	Boeing			years, Boeing Commercial Airplanes, the company's	se
	It's	Comm			jetliner division, is racking up more cancellations than	architec
	Flying	ercial			orders for new planes this year. Industry analysts warn that	ture's
	High	Airpla			more cancellations may be in the offing as people are	attempts
	Despite	nes			flying less in the global recession. But top executives at <i>Boeing</i> , the USA's largest exporter by value of goods sold	at output
	Recessi on"				abroad, remain publicly confident. They've announced	stability
	(Dan				only 4,500 job cuts so far — far fewer than the roughly	like an
	Reed)				30,000 laid off after the downturn in travel following	integral
	Í Í				the Sept. 11 terror attacks. And none of the cuts are on	enterpri
					the assembly line. They're betting on two things to keep	se
					production humming for years: the company's staggering	architec
					\$270 billion backlog of orders; and belief that the 30-year	ture.
					trend of growing demand for air travel will continue	
					beyond the current downturn. At current production rates, it will take seven to eight years for <i>Boeing</i> to deliver the	
					nearly 3,700 jetliners on backlog, says Randy Tinseth, the	
					company's marketing vice president. 'We've clearly got a	
					much larger backlog than we've ever had in previous	
					cycles,' Tinseth says. 'That gives us flexibility as we go	
1						
1					through this downturn.'	

·····		
	DREAMLINER: Boeing's long-awaited 787 may	
	finally take to air	
	Scott Carson, CEO of the commercial airplanes division,	
	told investors at the JPMorgan Chase conference in New	
	York earlier this month that over the next 20 years the	
	market 'is a rich opportunity for us,' whether the ultimate	
	demand for commercial jets is 29,000 planes, as Boeing	
	projects, or just 27,000 if cancellations continue. 'We're	
	playing from a position of strength,' he said. Are	
	Boeing's leaders just whistling past the graveyard by	
	believing that economic forces that have engulfed many	
	large and successful companies in the past six months	
	won't ensnare the manufacturing giant? Richard	
	Aboulafia thinks so. 'Yes, Boeing has a record backlog,	
	but only a fool would believe in it,' says Aboulafia, an	
	aircraft manufacturing analyst at Teal Group in Fairfax,	
	Va. If airlines in the USA and around the world are	
	flattened financially by severe recession and deeply	
	diminished demand, they will not hesitate to forfeit down	
	payments and walk away from so-called firm orders for	
	new planes, he says. Even if carriers negotiate delivery	
	deferrals rather than cancellations, Boeing won't get	
	hundreds of millions of dollars in the next few years that it	
	expects to be paid upon completion of those planes, he	
	says. Boeing will start feeling the pinch in 2010,	
	Aboulafia predicts. He says financing is available for all	
	the planes that Boeing and its chief rival, Europe's Airbus,	
	plan to deliver to the airlines this year. 'But after that,' he	
	says, 'all bets are off. In a serious downturn — and this	
	certainly is one — production typically falls by about a	
	third. I can't see why in this downturn it would be	
	different.'	
	Others much less confident	
	Others are more pessimistic. Robert Stallard at	
	Macquarie Research in New York lowered his rating on	
	Boeing in January, warning that the company 'is	
	underestimating the potential for lower airline	
	demand.' Joseph Nadol at JPMorgan last week cut his	
	earnings estimates for Boeing and Airbus for this year and	
	next. In addition to rapidly weakening demand for	
	passenger planes, Nadol said, the cargo version of	
	Boeing's 777 is in particular trouble because air freight	
	volumes have 'collapsed' by 25% from a year ago.	
	Giovanni Bisignani, head of the International Air	
	Transport Association, the airlines' global trade group,	
	warned last month that Boeing and Airbus might not be	
	able to deliver up to half the commercial planes they	
	build this year. In Boeing's case, that would be about	
	240 of the 485 planes it is scheduled to deliver.	
	Bisignani said he based his prediction on conversations	
	with several airline CEOs who told him they can't afford	
	to pay for the new planes. Even more chilling was the	
	warning shot fired last month by Steven Udvar-Hazy, head	
	of International Lease Finance, the world's largest lessor	
	of commercial airplanes and the largest single customer of	

		both Boeing and Airbus. Speaking with reporters at a	
		Boeing media event in Seattle, he predicted that both	
		airplane makers will be producing 'white tails' by the end	
		of this year. 'White tails' are planes completed without a	
		buyer, so they have no logo on their tails. Chris Tarry, an	
		independent industry analyst and consultant based outside	
		London, estimates that 1,600 to 1,800 already-ordered	
		Boeing 737s and Airbus A320s, both of which carry	
		about 150 passengers, are in danger of not being	
		delivered over the next three to 10 years. '(Airlines)	
		simply don't need them,' he says. If there's anything	
		Boeing understands, it's the wildly cyclical nature of	
		the aviation business. Past downturns have led to massive	
		layoffs, regional economic upheaval and larger U.S. trade	
	,	deficits. <i>Boeing</i> officials believe they can avoid most of	
		that pain this time by better managing production.	
		Carson told investors at the JPMorgan Chase conference	
		that the company won't decide until May or June	
		whether to slow production of planes scheduled for	
		delivery in the last half of 2010. Planes to be delivered	
		then would go into production early next year.	
		Suppliers need about six months advance notice of a	
		change. 'There's lots of uncertainty in 2010,' Tinseth,	
		Boeing's marketer, admits. 'That's why I'm trying to sell	
		some additional planes in the back half of 2010 in	
		expectation that there'll be some 'melt-away' from our	
		backlog, through deferrals mainly. 'But we've been	
		pretty successful in managing our business the last few	
		years during our biggest sales boom ever. We've been	
		very measured in our approach to increasing	
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		very measured in our approach to increasing production rates. We're not producing planes at nearly the rate we did in the past, and that should keep us	
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of 'an impact on the price of the planes' - a clear signal to the	1	Contraction and Contraction of the					
		Charles Structure contents					
A400M seven governments that launched the troublesome €20bn		10120203010					

	"				(\$26.3bn) project in 2003 that they should not push too	
	(Peggy				hard for concessions. Mr Gallois' comments came as	
	Holling				EADS sought to reassure customers and the market that it	
	er and				remained committed to the A400M programme, already	
	Sylvia				€2bn over budget and three years late. Doubts over	
	Pfeifer)				EADS's determination to continue with the programme	
					were raised at the weekend by Tom Enders, head of the	
					group's aircraft arm Airbus, who suggested in an interview	
					with Der Spiegel magazine that he would rather scrap the	
					programme than continue under the current contract.	
					Cancellation could force EADS to pay back \in 5.7bn in	
					advance payments, more than half its net cash. Occar, the	
					pan-European procurement agency that placed the original	
					order for 180 aircraft, is preparing to launch official	
					negotiations with EADS over the terms of the contract.	
					This month, the governments agreed a three-month	
					moratorium on cancellations from today to allow the talks	
					to go on. But talks come as the enthusiasm of some of the	
					original customers - notably Germany and the UK - for the	
					aircraft may be waning. Mr Gallois said yesterday he was	
					confident a solution would be found. The EADS chief	
1					appears to be betting that politicians will put pressure on	
		-			defence ministries to resolve the disagreements over	
					penalties in order to preserve jobs in a highly sensitive	
					sector. 'This programme is going to fly because the	
					defence and industrial challenges are considerable,' he	
					said. 'They need this plane and it is also about 40,000	
					highly qualified jobs in Europe. We have to find a	
					solution together.' Nonetheless, the UK government,	
					which ordered 25 aircraft and urgently needs a new	
					transport aircraft for operations in Afghanistan, increased	
					pressure on <i>EADS</i> yesterday, warning it would 'not be	
					content with a gap in capability'. John Hutton, secretary	
					of state for defence, told MPs the delays were a 'matter of	
					extreme regret' that posed 'very serious questions' about	
					the future of the UK's military logistics capabilities. He	
					said the government would decide whether to go ahead	
					with the programme at the beginning of July but warned:	
					'We will not be content with a gap in capability.' The UK	
1					is considering alternative options to bridge the delivery	
1					gap, including extending the out-of-service dates of the ageing C-130 Hercules aircraft, and buying more C-17s	
					from <i>Boeing</i> , the US jetmaker. Mr Gallois said he	
1					expected <i>Airbus to</i> deliver a new timetable to customers	
1					after agreeing a delivery date for the propulsion system	
1					software, known as Fadec."	
21	Aniation	Scott	Firm	α	"Demonstrating a degree of public humility many feel has	On a
31 Mor	Aviation Internat	Scott	rum	u	been all too absent among the bankers collectively	modular
Mar. 2009	Internat	Carson			responsible for the global financial crisis, <i>Boeing</i>	enterpri
2009	ional Nous	, CEO,			Commercial Airplanes CEO Scott Carson offered no	se
	News "Humbl	Boeing			further excuses for the delays that have plagued the	architec
1	"Humbl	Comm			787 and 747-8 this month during the J.P. Morgan	ture's
	ed Regime	ercial			Aviation and Transportation Conference in New York.	overpro
1	Boeing	Airpla			'The stumbles we have made have been embarrassing for	mise
1	Prepare s to Fly	nes			us,' Carson said. 'They've been embarrassing for our	and
	s to Fly 787"				customers, who were counting on us to have the right	under-
	/0/				customers, who were counting on us to have the right	anaor-

—	(Gregor				product in place at the right time.' To avoid further	delivery
	(Gregor y Polek)				embarrassment 'will require us to be humble,' continued Carson. 'This will require us to not be taken at our word, but to be [judged] by our actions.' Meanwhile, said Carson, <i>Boeing</i> continues to make 'solid progress' toward a third-quarter 2010 first delivery of the 747-8, the first wing for which was ready to come out of its jig and be placed into the so-called lay- down position in preparation for attachment to the fuselage."	
3 Apr. 2009	Wall Street Journal, "Boeing Shuffles 787 Order Book; No Takers for First Six" (Ann Keeton)		Firm	α	"Boeing Co. has reshuffled the customers for initial deliveries of its delayed 787 and set aside plans to send the first six aircraft into commercial use, according to a published report. The move would see launch customer All Nippon Airways take 11 of the first 30 aircraft, while Chinese carriers appear to have slipped from the first deliveries scheduled for next year, according to flightblogger.com published by U.Kbased Flight International. Boeing declined comment on the report, which comes ahead of the first test flight scheduled for June. The 787 is more than two years behind schedule, with its launch delayed several times by supply and design problems. According to flightblogger, Boeing is switching some aircraft to ANA that had been destined for Chinese airlines, who originally hoped to have the 787 in time for last year's Beijing Olympics. The Japanese carrier declined comment."	On the addition al costs associat ed with an overly- aggressi ve design and producti on schedul e of a modular enterpri se architec ture.
6 Apr. 2009	The Wall Street Journal, "Airbus Aims to Pul back Without Stalling " (Daniel Michael s)	Tom Willia ms, <i>Airbus</i> VP of Operat ions	Firm- Suppli ers	β	"Airbus production boss Tom Williams has spent the past five years raising the European plane maker's output. Now, as airlines defer deliveries and cancel orders, he faces a difficult balancing act: downshifting factories without killing prospects for a recovery. Airbus said Friday that it booked orders for just 16 planes in March, compared with 54 orders in March 2008 and 37 orders the previous year. The company has said it may capture only between 300 and 400 new orders this year, down from 777 orders minus cancellations last year. Building jetliners is so complex that slamming on the brakes can be almost as tough as hitting the gas. Factories that Mr. Williams had recently optimized for fast production by adding equipment and staff must pull back without letting the fixed expense per plane rise painfully. Airbus's dozens of suppliers, which provide components ranging from tiny rivets to massive landing gear, can't get stuck with warehouses full of unsold parts or idle factories, or they will be too weak when demand returns. And laying off skilled workers could cause a brain drain that slows an eventual recovery. 'It takes a long time for us to train our folks who design and assemble planes, so we've got to be careful,' said Mr. Williams, Airbus's executive vice president for programs, in an interview at the company's headquarters here. Since 2003 Airbus has increased production of its planes by 60%, to a	On an integral enterpri se architec ture's approac h to stable growth.

			record 483 deliveries last year. But in October the unit of	
			European Aeronautic Defence & Space Co. shelved plans	
			for further increases, and in February said it would reduce	
			deliveries of its popular single-aisle models to 34 a month	
			from 36 and consider further cuts. Airbus is trying to	
			trim output without hurting chances for a recovery.	
			Airbus, and U.S. rival Boeing Co., which said it would lay	
			off 4,500 workers but keep output steady this year, are	
			reacting much more cautiously than other major	
			industrial companies to the global economic slowdown.	
			United Technologies Corp., which makes aerospace	
			equipment, air conditioners and elevators, in March said it	
			will cut 5% of its work force, or 11,600 jobs. Caterpillar	
			Inc., which makes construction equipment, has announced	
			some 24,000 layoffs as it slashes output and mothballs	
			production lines. Airlines and industry officials predict	
			Airbus and Boeing will have to cut output more	
			drastically to avoid producing planes that customers	
			can't take. Douglas Harned, aviation analyst at Sanford	
			C. Bernstein & Co. in New York, predicted in a report	
			published last month that Airbus and Boeing will have	
	1		to cut deliveries next year by 20% from current plans.	
			Aircraft lessors recently called on both plane makers to cut	
54			production to avoid glutting the market and undermining	
			the value of planes on their balance sheets. Airbus and	
			Boeing officials say building jetliners is different from	
			other industries because the planes, which carry	6
			catalog prices ranging from \$50 million to \$300 million,	
			take roughly a year to build. As a result, the cycle	
			moves more gradually. Boeing's experience shows that	
			sudden shifts in production can be crippling. A decade	
			ago, the plane maker tried to boost output in a short	
			period and quickly faced shortages of parts and	
			qualified staff. Dozens of unfinished jetliners sat	
			outside factories under tents as workers scrambled to	
			finish them. Resolving production problems pushed	
			Boeing deep into losses even as it delivered a record	
	1		number of planes. Since then, both Boeing and Airbus	
			have tried to avoid big swings in production volumes.	
			European labor restrictions mean Airbus can't cut staff	
			as easily as Boeing does. That's why over the past few	
	1		years the European plane maker has hired an	
			increasing number of part-time workers and outside	
			contractors, who predominantly work in less-skilled	
			areas. Mr. Williams says that by using them less, he	
			can cut output by roughly 20% without firing full-time	
2			staff. Mr. Williams's first retrenchment over recent	
			months has been to reduce overtime shifts, which	
	1		Airbus had been using to meet strong demand, said the	
			56-year-old Mr. Williams, who has 37 years experience	
			THE REPORT OF THE PARTY OF THE	
			making motors, jet engines and aircraft. Managing	
			suppliers poses a bigger challenge. More than 80% of	
			the value of each Airbus plane comes from outside	
			companies, according to EADS CEO Louis Gallois. Some	
			of these suppliers are much smaller and financially	
			weaker than the plane maker, and so aren't as well	
		·		

					equipped to handle a downturn, executives say.	
					Trimming production to 34 jets 'isn't such a big shift	
					for Airbus,' said Henri Courpron, a former	
					procurement boss at Airbus who now runs the aerospace	
					practice at aviation consulting firm Seabury Group. 'But if	
					in that process you kill one supplier, you may lose the	
					ability to build those 34 at all.' In 2005 copying a	
					model originally developed by <i>Toyota Motor Corp.</i> and	
					adopted by <i>Boeing Airbus</i> started working more closely with its suppliers. Instead of simply ordering up	
					parts, Airbus gave its contractors more leeway to	
					design components and choose materials, while also treating them more as partners by sharing information	
					and seeking greater feedback. Now, Mr. Williams said	
					Airbus procurement staff are 'walking the shop floor'	
					at suppliers' factories to spot signs of weakness, such as	
					thin staff or insufficient inventories. Suppliers say they	
					like Airbus's new openness, but still face a delicate	
					balance between meeting its needs and preparing	
					themselves for a sharper downturn. Claude Bolette,	
					director general of <i>Belairbus</i> , a consortium of <i>Airbus</i>	
					suppliers in Belgium, says that in addition to consulting	
					<i>Airbus</i> , he talks with other contractors to judge the market.	
					'Of course we'd like to have more robust information,	
					but it's very difficult for Airbus themselves to have an	
					accurate forecast,' Mr. Bolette said. In France, the	
					government has said it can now help small aerospace	
					companies that hit trouble by tapping a special fund of	
					up to [euro]100 million (\$136 million) that was	
					established last year. Dubbed Aerofund and financed	
					partly by EADS, the kitty was initially envisioned to	
					help suppliers grapple with the strong euro and the	
					challenges of investing for expansion. Mr. Gallois at	
					EADS recently urged other European governments to	
					follow the model. Even as Airbus and its suppliers	
					throttle back, Mr. Williams is planning for an eventual	
					upturn. From the day Airbus decides to boost or cut	
					output, its supply chain needs around a year to react	
					through steps such as hiring staff, buying machine	
					tools and sourcing raw materials. To shorten that	
					period, Mr. Williams' team has violated a key tenet of	
					lean manufacturing keeping parts inventories to a	
					minimum and squirreled away extra supplies of	
					components that take particularly long to prepare,	
					such as the metal forgings inside landing gear. 'With a	
					limited investment, we'll buy strategic components	
					with very long lead times and carry them ourselves,'	
10	The	Saatt	Firm	~	Mr. Williams said. 'It gives us more flexibility.'	On a
10 A mail	The	Scott	Firm-	α	"Hit by the global trade downturn that has left airlines	On a modular
April 2009	Seattle	Carson	Suppli ers-		struggling, <i>Boeing</i> finally conceded Thursday it will	enterpri
2009	<i>Times,</i> "Job	, CEO,	Labor		slash production at its widebody jet-assembly plant in the middle of next year. The move will hit employment	
		Boeing	Labor		the middle of next year. The move will hit employment in 2010 at the Everett plant, which has some 28,000	se architec
	Cuts Will	Comm ercial			workers, and could cause layoffs at <i>Boeing</i> suppliers	ture's
	Follow	Airpla			even this year. It also triggers accounting changes that	delayed
	Follow Boeing'				will cut back company profits starting this quarter.	respons
	Dueing	nes			will cut back company proms starting this quarter.	respons

a lat	I	Reasing analyzaman lim Brouly said the company	e to
s Jet- Assemb		<i>Boeing</i> spokesman Jim Proulx said the company anticipates the work slowdown will bring 'employment	e to cutting
ly		reductions beyond those already announced.' Earlier this	producti
Slowdo		year, <i>Boeing</i> said it would reduce its commercial-airplane	on.
wn"		work force by 4,500 by the end of 2009, but said it	011.
(Domini		planned no slowdown in output. In the most significant	
c Gates)		production change, <i>Boeing</i> will slow monthly output of	
e cuito)		its large 777s in June 2010 from seven planes a month	
		to five — a 28 percent cut. The planemaker also said it	
		will delay previous plans to modestly increase production	
		of its 747-8 and 767, each currently at about one per	
		month. Some cuts to jet production were widely	
		anticipated. Last month, Boeing Commercial Airplanes	
		Chief Executive Scott Carson said a 10 percent	
		production-rate cut was possible next year. But the	
		company has downplayed industry observers'	
		predictions of wider slowdowns. Boeing's airline	
		customers, especially those buying cargo jets, have been	
		postponing scheduled deliveries. World air-cargo traffic	
		declined by almost a quarter in 2008, according to Seattle-	
		based consultancy Air Cargo Management Group. The	
		production cut's effect on Everett employment may be	
		offset somewhat when assembly of the new 787	
		Dreamliner ramps up at the plant. But that will take some	
		time. An executive at a Boeing supplier said the 787	
		program is no longer planning for a furious buildup, as	
		many customers are likely to defer their Dreamliner	
		deliveries, too. 'Rather than ramping up, the (787	
		suppliers) are really slowing things down,' the	
		executive said. If the global economic crisis continues	
		and air travel doesn't recover, further cuts are likely at	
		other local Boeing plants. Though Boeing said that 'at	
		this time' it intends to hold production steady at its	
		single-aisle 737 assembly plant in Renton, aviation	
		experts believe a slowdown will occur there, too. Rob	
		Stallard, a financial analyst with Macquarie Research,	
		cited 'a widespread expectation that this is just the first	
		of several cuts for this downcycle, with the 737 rate likely to be the next that goes down.' Because of the	
		shorter lead time needed to build parts for the much	
		smaller 737, Stallard said <i>Boeing</i> still has a couple of	
		months before it has to finalize the narrowbody production	
		rate for 2010. He predicted a cut from 31 per month this	
		year down to 25 per month in 2010. In a note to clients,	
		Stallard also warned that because some parts for the large	
		777 have longer lead times, 'The impact of the cut to the	
		777 rate will likely be seen in the aerospace supply chain	
		before the end of this year.' That could trigger some	
		layoffs at suppliers. Boeing warned that the	
		production decisions and unfavorable pricing trends	
		will reduce its first-quarter earnings 'by approximately	
		\$0.38 per share. ' That's a hit of about \$275 million, or	
		about 30 percent of Wall Street analysts' average first-	
		quarter profit estimate of \$1.24 per share. With reduced	
		deliveries, Boeing has to spread its production costs	
		over fewer airplanes, resulting in higher costs per	
		, source per	

13 Apr. 2009	Market Watch, "Boeing Lowere d to Underp erform at <i>Cowen</i> " (Christo pher Hinton)		Firm	α	plane and lower profits. 'These are extremely difficult economic times for our customers,' Carson said in a statement. 'It's necessary to adjust our production plans to align supply with these tough market conditions.' Boeing insisted that the production slowdown is purely a result of deferrals and not outright cancellations. Airlines have canceled 32 orders for the 787 so far this year, but no 767, 747 or 777 orders have been canceled." "Boeing Co.'s announcement last week it would cut commercial aircraft production is likely just the beginning of a long downturn, said Cowen & Co. in a Monday research note that downgraded the aerospace giant to underperform from neutral. 'The last three delivery declines averaged four years with 14% average annual drops,' said analyst Cai von Rumohr. 'But this cycle's early [airline] traffic dip is worse, and lower oil prices and limited airline credit availability will restrain replacement when the cycle turns.' Boeing shares were down about 5% in premarket trading to \$37.12"	On a modular enterpri se architec ture's value in a downtur n.
16 April 2009	Businee ss Week, "South west's Red Ink and Baggag e Fees" (Justin Bachma n)	Gary Kelly, CEO, Southw est Airline s	Firm- Custo mers- Investo rs	β	"Would Southwest Airlines have turned a profit the past quarter if it had charged checked-baggage fees? That was the interesting question posed during the company's conference call to discuss its \$91 million first-quarter loss, which was a penny per share worse than Wall Street had expected. A year ago, Southwest (LUV) earned \$34 million. Operating revenue dropped 7% to \$2.4 billion from \$2.5 billion. The company's vaunted oil-hedging strategy turned sour late last year when oil prices collapsed, and caused another \$65 million hit in the most recent quarter. Moreover, the airline anticipates second-quarter revenue to fall short of the same quarter of 2008, although CEO Gary Kelly said weekly sales declines that accelerated throughout March have stabilized. Southwest is offering all employees but senior management a buyout package to leave, but says it has no targets on how many of its 35,500 workers it wants to shed. Southwest is working to align staffing to capacity reductions. 'Honestly, we don't know how many people will take this offer in this environment,' chief financial officer Laura Wright said. 'We think that whatever number takes it will be good.' But it is the bag fee issue that cuts to the heart of why Southwest will succeed or, if the lousy economy turns truly draconian, becomes yet another ailing airline where the revenues don't match the costs. The question was proffered by Morgan Stanley airline analyst William Green and spurred a somewhat spirited discussion (by the relative standard of a Wall Street earnings call). In the aggregate, \$91 million is not a large sum for a huge airline like Southwest to amass across its system and a \$15 fee certainly could have yielded more than that in the first quarter. If one figures that only half of Southwest's 19.7 million revenue-producing passengers had checked a bag, the take totals \$148 million. "Why not put those in place?"	On an integral enterpri se architec ture'e mainten ance of custome r loyalty and lock-in

		1		Croop asked	
17WallAprilStreet2009Journal"AirbusSaysGovernmentsShouldAssistPlaneSales"(Adam)	Thoma s Enders , CEO, <i>Airbus</i>	Firm- Gover nmen- Custo mers- Suppli ers	β	Green asked. Save for JetBlue (JBLU), every other major carrier has imposed a fee and they have been pleased greatly by the new revenue. So why won't Southwest do it? 'I'm not at all convinced it would be revenue positive and it would certainly be disruptive to all the things we're trying to do on behalf of the brand,' Kelly said. 'It is a very competitive environment out there. We know that for a fact.' What's more, Southwest operates firmly committed to the belief that it stands alone in the airline industry with a unique relationship to its customers, who are extraordinarily price sensitive Southwest's average one-way fare is under S114 - but fiercely loyal. 'If you lose one customer that's the equivalent of a handful, if not ten or 12, bag fees,' Kelly said. Southwest also thinks its ubiquitous 'No Hidden Fees' campaign is taking hold among consumers and reaping positive business results. Mike Linenberg, a Bank of America analyst, further suggested that bag fees could help Southwest maintain its financial lead over the rest of the industry. As many others restructured in bankruptcy, the cost advantages Southwest once enjoyed have eroded, and its once-stellar revenue performance is no longer remarkable. Kelly bristled at that line of argument. 'The bottom line is that we don't believe it would be revenue positive anymore than we could argue that we could push through a S10 fare increase in this environment,' he said. 'There's just so much that can be done there.' The airline stressed repeatedly that it has no plans to charge bag check fees. But if 2009 continues along the same dismal path in terms of traffic, revenues and red ink, Kelly can expect the chorus calling for a checked bag fee to grow increasingly persistent.'' "Governments should help provide financing for airlines to buy planes, stepping in where credit channels are blocked, Airbus Chief Executive Thomas Enders said Thursday. Speaking to journalists after a meeting of European aeronautics companies, Mr. Enders said aircraft makers	On an integral enterpri se architec ture's dampin g of the value chain.
Sales" (Adam Cohen)				struggling as airlines around the world cut routes and postpone orders amid a steep decline in passenger traffic. In addition, low fuel prices give airlines little incentive to upgrade their aging fleets with more fuel-efficient planes, according to industry analysis. <i>Airbus</i> , a unit of <i>European</i> <i>Aeronautic Defence & Space Co.</i> , earlier this year said it would trim production of its single-aisle A320 planes. The company's U.S. rival, <i>Boeing Co.</i> , this week said it would cut the number of wide-body 777 planes it produces next year by 29%. Mr. Enders declined to say whether <i>Airbus</i> is planning further production cuts. 'Every one of us has	

18 April 2009	The Seattle Times, "Boeing Parking Jets Around Puget Sound, the Desert As Buyers Stuggle " (Domini c Gates)	C	7irm- Custo ners	contingency plans,' he said. The industry estimates a \$10 billion-to-\$20 billion shortfall in the funding needed to support 950 to 1,000 Airbus and Boeing deliveries this year, according to a presentation delivered at Thursday's meeting of the AeroSpace and Defence Industries Association of Europe, an umbrella organization representing 17 companies and 30 national associations. Earlier this year, the French government offered €5 billion (\$6.6 billion) in loans to help airlines buy Airbus jetliners. However, this facility hasn't been used yet, said Mr. Enders." "They look like ghost airplanes and they are a bad \$300 million omen for the airplane business. Two brand new Boeing wide-body freighter jets painted all white are parked at Paine Field outside the Everett assembly plant. Two more freighters freshly painted in the colors of China Southern and worth another \$300 million flew this week not to Asia, but to a jet parking lot in the Arizona desert. Meanwhile at Boeing Field, three 737 single-aisle jets have been parked outside for many weeks awaiting delivery to Arik Air, of Nigeria. Next to them is a completed but idle AirTran 737. And in Renton, outside Boeing's single-aisle assembly plant, two 737s originally ordered for a Chinese airline are now repainted in the livery of a Dubai-based airline that doesn't start service until June. Because of a global downturn in air traffic, with the airfreight sector particularly hard-hit, many airlines don't need new jets. In some cases, they can't use the planes they have committed to take from Boeing. Boeing insisted Friday that even the all-white airplanes are not technically 'white tails,' industry jargon for planes that have been built but don't have a customer to take them. 'We have no white tails,' said Boeing spokesman Jim Proulx. 'We have not built any airplanes that are not designated for delivery to customers.' What Boeing clearly does have is customers.' What Boeing clearly does have is customers.' What Boeing clearly does have is	On a modular enterpri se architec ture's dealing with capacity problem s upon entering a downtur n.
				are not technically 'white tails,' industry jargon for planes that have been built but don't have a customer to take them. 'We have no white tails,' said <i>Boeing</i> spokesman Jim Proulx. 'We have not built any airplanes that are not designated for delivery to customers.' What <i>Boeing</i> clearly does have is customers in distress and some airplanes sitting as expensive excess inventory far longer than the plane	
				of the jet from seven to five per month from the middle of next year. One of the ghostly white-painted jets in Everett is a 777 freighter owned by <i>Air France</i> . The list price is \$256 million, though according to data from airplane valuation firm <i>Avitas</i> , after discounts it has a value of \$150 million. The second is a 747-400ERF cargo jet ordered by <i>LoadAir</i> , a Kuwaiti airfreight company. Its list price is \$253 million, worth about \$147 million after discounts. A second <i>LoadAir</i> 747 freighter, the last 747- 400 that will ever be built, rolled out of the Everett factory Thursday and will join its all-white twin. 'Those 747s for <i>LoadAir</i> are on target for delivery in September,' Proulx said. In February, <i>Air France</i> took delivery of the first 777 freighter off the line and a second one days later. The carrier has yet to decide whether to store the third 777, an <i>Air France</i> spokeswoman who asked not to be identified	

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1		1			told Bloomberg News. Painting the plane white perhaps	
1		1			is to leave open the option of leasing it to someone else.	
					The airline said in February it will defer delivery of two	
1					more 777 freighters to sometime between 2010 and 2012.	
					As for the two China Southern 777s now in Arizona, the	
					airline hasn't yet accepted delivery of the 777s. They were	
					stored by Boeing, an airline executive told Bloomberg	
					News on Friday from Guangzhou. Boeing declined to	
					comment on whether the aircraft have been put in storage.	
					China Southern, the nation's biggest carrier, said this week	
					it will save \$1 billion this year by delaying aircraft	
					deliveries. It will delay delivery of the two 777s until the	
					end of this year or early 2010 and is discussing the timing	
					of two more planes now in production, the airline	
					executive said. 'We're working with them on their	
1					delivery schedule,' said <i>Boeing's</i> Proulx. 'The fact that	
I				1	two of the largest cargo operators in the world are	
I					parking brand-new freighters is a sign of just how	
I					awful the global airfreight numbers are,' said Douglas	
1					Runte, managing director at <i>Piper Jaffray Cos.</i> in New	
1					York, in an interview with <i>Bloomberg</i> . Global air-cargo	
					volumes will probably fall 5 percent this year, outpacing a	
					3 percent decline in passenger traffic, the <i>International Air</i>	
					Transport Association said last month. The 737 jets at	
					Boeing Field and Renton are passenger jets.	
					boong ried and renton are passenger jets.	
					When asked about Arik Air's parked 737s last month, the	
					airline's managing director, Michael McTighe, said they	
					were being phased in and would be delivered by the end of	
					this month. He insisted that Nigerian aviation is not as	
					affected as elsewhere and 'Arik Air is set for major	
					expansion throughout West and Central Africa.' But at	
					least two of the planes have been parked at <i>Boeing</i> Field	
					for more than two months, creating a financial holdup for	
					Boeing. Airlines generally make down payments when	
					they sign purchase agreements and then pay the rest to	
					Boeing upon delivery. The AirTran jet parked beside the	
					Arik Air jets may also be slow to deliver. AirTran has cut	
					back its fleet plans and either deferred or sold 47 of the	
					Boeing jets it ordered. That includes two 737s it sold to	
					Arik in 2007. And Boeing was forced to look for a new	
					customer for two 737s in Renton originally destined for	
					delivery to OK Airways, a private Chinese airline. The	
					Chinese government suspended OK's service in December.	
					The two jets are painted in the colors of FlyDubai, which	
					doesn't begin operating until June. Boeing said the two	
					airplanes are parked waiting for refitted interiors."	
20	ATW	Gary	Firm-	β	"Southwest Airlines Chairman and CEO Gary Kelly	On an
April	Daily	Kelly,	Custo		last week strongly rejected Wall Street advice that the	integral
2009	News	CEO,	mer		LCC begin charging for checked baggage to generate	enterpri
		Southw			more revenue. During a conference call to discuss SWA's	se
		est			third consecutive quarterly loss, multiple analysts	architec
		Airline			pushed Kelly to follow other US carriers and implement	ture'e
		S			baggage fees. But he insisted the move would drive away	mainten
					customers. 'The bottom line assessment is we believe	ance of
					content in bottom mit assessment is we believe	

				we're having a meaningful impact [telling consumers] that we are alone in not charging bag fees and that [impression] is increasing our demand,' Kelly explained. 'Southwest is a very well-known value brand. and it would be disruptive to all of the things we're doing to build the brand. You just risk losing customers.' He continued: 'I don't see there's any reason for us to panic based on the first-quarter results. [Not charging bag fees is] no different from us not charging \$400 Minneapolis-to-Chicago one-way. We don't want to be another airline that nickles and dimes customers. We don't believe it would be revenue positive any more than we could argue imposing a [large] fare increase right now would generate more revenue compared to the customers we'd lose.'"	custome r loyalty and lock-in
21 April 2009	Bloomb erg, "Boeing Profit Buffete d by Producti on Slump that May Reach 737" (Susann a Ray)	Firm- Investo r	α	"It's 'increasingly possible' that the Dreamliner's maiden flight could be delayed again, slipping into July rather than taking to the air this quarter, <i>JPMorgan's</i> Nadol wrote in an April 15 note. 'The first-delivery target of February 2010 is highly ambitious,' he wrote. 'We are still looking for a late second- quarter first delivery, and even there, our confidence level is not high.'"	On a modular enterpri se architec ture's expecte d overpro mise & underde livery.
21 April 2009	Financi al Times, "Airb us and Boeing' s Plans Fly in the Face of Recessi on" (Paul Betts and Kathrin Hille)	Firm	α & β	"Airbus and Boeing seem to be in denial. The two civil aircraft makers are not fully facing up to the worst recession in decades, which has sent air traffic into a tailspin and many airlines into the red. The International Air Transport Association expects the industry to lose about \$4.7bn this year as revenues fall by \$62bn, or 12 per cent compared with last year. It is not only the weaker airlines that are suffering. Last week Air France-KLM, Europe's largest carrier, said it was planning to cut 2,500 to 3,000 jobs by 2011. The week before, it warned that for its fiscal year ending March 2009 it would be reporting its first operating loss since the merger of the French and Dutch airlines six years ago. It warned that it was unlikely to return into the black this fiscal year. It is not surprising to see more and more airlines deferring or cancelling orders for new aircraft placed during the boom years. As in previous cycles, the first sector to suffer is demand for more expensive wide-body airliners. Qantas, China Southern and Cathay Pacific have all in recent days announced plans to delay delivery of some 93 mainly long-range aircraft including nine A380 super jumbos. Air France-KLM a couple of weeks ago said it was planning to delay delivery of two A380s. This is bad news for European aircraft manufacturer, Airbus, since delays in the delivery of its flagship jumbo will put pressure on the financial viability	On the modular enterpri se architec ture of the media.

					of its programme. But its US rival <i>Boeing</i> is in the same boat and is cutting production of its 777 wide-body aircraft. Both <i>Airbus</i> and <i>Boeing</i> expect to deliver the same amount of aircraft this year as last, largely because airlines are unlikely to cancel or push back orders for aircraft due for delivery this year given that they have paid about half the cost of these airliners with their downpayments and progress payments. The problem the two manufacturers face is with deliveries next year and beyond. Cash-strapped customers will increasingly seek either to delay or cancel orders for aircraft they can no longer afford, or negotiate more favourable terms with the manufacturers. The current cycle is proving more challenging than previous ones largely because of the credit crunch. Industry analysts estimate a \$10bn to \$30bn shortfall in funding needed to support 950 to 1,000 <i>Airbus</i> and <i>Boeing</i> deliveries. Yet the two big makers are insisting the shortfall will only involve \$4bn to \$5bn. France, for example, has offered €5bn (\$6.5bn) in loans to help airlines buy <i>Airbus</i> aircraft. Both manufacturers admit that the big test will come next year and they are bracing for more customer deferrals and cancellations. But they remain relatively optimistic that the cycle will turn and pick up in 2011, hence their resistance to making sweeping production cuts in 2010. They have so far only announced 5-10 per cent production cuts in their various aircraft ranges next year. Most industry watchers believe this is wishful thinking. Cycles in the boom-and-bust civil aircraft business are long and the manufacturers will probably be forced to cut production by 20 per cent to 30 per cent, if not by as much as 40 per cent, according to a UBS study."	
21 April 2009	China Daily, "Crisis not Dampen ing Airbus China Assemb ly Target"		Firm	β	"Airbus, the world's major aircraft producer, plans to cut its monthly global production of A320 in October, but its assembly target in China will not change, a senior Airbus official said Tuesday. Due to the global financial crisis, Airbus will cut the monthly production of A320 passenger planes from 36 to 34, but its target to produce 11 planes this year in China will not change, Marc Bertiaux, vice president of Airbus Cooperation and Partnership with China told Xinhua. By the end of 2011, the Airbus Final Assembly Line in north China's Tianjin City will produce four A320 aircraft per month, mainly for the Chinese clients, he said. Since China was not as badly impacted as some other countries by the financial crisis, the country's economic growth has been maintaining a sound momentum, he said. 'The stable and fast economic growth of China has also strengthened our confidence to stabilize our aircraft production.'"	On an integral enterpri se architec ture's stability in output, despite negative exogeno us shock.
21 April 2009	<i>Edubou</i> rse, <i>"Airbus</i> / <i>EADS</i> Sign a Titaniu	Tom Enders , CEO, <i>Airbus</i>	Firm- Suppli er- Gover nment	β	<i>"Airbus/EADS</i> and <i>VSMPO-AVISMA</i> boost their long- term relationship. <i>Airbus,</i> the world's leading aircraft manufacturer, its parent company <i>EADS</i> , a global leader in aerospace, defence and related services and the Russian Technologies State Corporation's integrated structure <i>VSMPO-AVISMA Corporation</i> , the Russian Titanium	On an integral enterpri se architec ture's

	[1	1	T	Contractions from strend at a literation of the	danalar
	m Summ ha				manufacturer, have signed the biggest and longest-term	develop
	Supply				contract in the history of Airbus/EADS cooperation	ment of
	Agreem				with Russian industry. The agreement was signed today	long-
	ent with				in Moscow by Sergey Chemezov, General Director of the	term
	VSMPO				Russian Technologies State Corporation and Tom Enders,	supply
	-				President and CEO of Airbus in the presence of Vladimir	contract
	AVISM				Putin, Russian Prime-Minister, Walter Jürgen Schmid,	s in the
	А,				German Ambassador to Russia, Jean de Gliniasty, French	midst of
	Integratt				Ambassador to Russia and Juan Antonio March Pujol,	a global
	ed				Spanish Ambassador to Russia. The agreement covers	recessio
	Structur				the supply of Titanium to Airbus and other EADS	n.
	e of the				Divisions until 2020. The scope of the contract includes	
	Russian				the supply of Titanium and covers die forging parts for all	
	Technol				existing Airbus aircraft, including new programmes such	
	ogies				as the A350XWB. VSMPO-AVISMA Corporation may	
	State				also machine Titanium products in order to develop a	
1	Corpor				vertically integrated Titanium supply chain, starting from	
1	ation"				raw materials to finished products. The contract comes as	
1					a confirmation of the framework agreement signed in July	
1					2008 at Farnborough Airshow. The new agreement	
					further boosts the relationship between the companies,	
1					which dates back to the early 1990s. It also enlarges	
1					Airbus' cooperation with the Russian aviation industry,	
1					which currently includes production of components for	
1					<i>Airbus</i> at Russian plants, passenger to freighter aircraft	
1						
					conversions (P2F) and joint Research & Technology	
					(R&T) projects. VSMPO-AVISMA Corporation	
					strengthens its role as a leading supplier of Titanium to	
					Airbus/EADS, covering major Titanium requirements. The	
					benefits of Titanium include strength and low weight	
					properties that are in high demand in the aerospace	
					industry. On aircraft, it is used in particular for landing	
					gear systems, pylons and structural parts of the fuselage	
					and wings. 'Airbus is preparing for long-term growth.	
					This agreement is an important pillar of our	
					internationalisation and especially our strategic	
					relationship with Russian industry,' says Tom Enders,	
1					President and CEO of Airbus. VSMPO-AVISMA	
1					Corporation, integrated structure of the Russian	
					Technologies State Corporation, is the world's largest	
1					Titanium producer. At present the Company exports 70	
					per cent of its products, 30 per cent are sold in the	
					domestic market. Major customers of VSMPO-AVISMA	
					are the world's leading aircraft-building companies. The	
					Company is fully vertically integrated and employs	
					over 20 000 people."	
21	"We are	Scott	Firm	α	"Now I believe that when it comes to ethical behavior in	On a
April	All	Carson			an enterprise like ours, that responsibility rests with every	modular
2009	Ethical	, CEO,			one of us. Every one of us is a leader in that regard. And	
2009	Leaders					nenterpr
	"."	Boeing			it's become far too easy for us to defer that to the Ethics	ise
		Comm			office. It's really a leadership issue. It is really the	architec
	Boeing	ercial			responsibility on the part of the employees to work	ture's
	Comme	Airpla			through their leaders to resolve issues that	stated
	rcial	nes			cause uncertainty and stress in their lives. I've	value
	Airplan				emphasized that with my senior managers. I've	placed
	es'				emphasized it with our mid-level managers.	on

22	"Excell ence Hour" Thomso	Jim	Firm-	α	I've emphasized it on shop floors when I have visited them. We need to have a culture where we're not afraid to talk to each other, where we don't allow ourselves to become intimidated by or intimidate others in our communications if we are going to be successful and survive. And so I would ask all of us to think about it in that context and to act in the future as if ethics is our responsibility and not the responsibility of the Ethics Office. It's important in our business dealings, but it's even more important in our personal dealings inside the enterprise today." "Jim McNerney (<i>The Boeing Company</i>):	ethical leadersh ip
April 2009	n Reuters Researc h excerpt from "The Boeing Compan y, Q1 2009 Earning s Call Transcri pt"	McNer ney, Chari man and CEO; James Bell, CFO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Investo r		Thank you, Diana, and good morning everyone. Let me start today by discussing our first quarter performance and the unprecedented market environment that we're currently facing. As part of that I will talk about the things we're doing to respond to those challenges. After that James will walk you through our results and then we'll take your questions. I will start with Slide 2 please. Our first quarter results reflect the impact of the steep global economic downturn on the commercial airplane market, which overshadowed the otherwise good performance in our Commercial Airplanes business and continued strong performance of our Defense business. As announced earlier this month we had decided to bring 777 production rates down from seven to five airplanes per month, affecting deliveries beginning in June 2010. We are also delaying plans to modestly increase our 747-8 and 767 production rates. In addition, the weak global economy has driven significant declines in the indices that are the basis of our price escalation forecasts for commercial airplane deliveries. Together the production decisions and the lower escalation forecasts reduced our first quarter earnings per share by approximately \$0.38 most of which represented a charge on the 747 program. Commercial market factors aside, our underlying business performance remained solid in the quarter. BCA production programs continued to execute well and improve cost performance. Our Commercial Services business generated strong earnings in margins even with softening revenue from spares and passenger to freighter conversions. We're making progress on the 747-8 program with fuselage and wing assembly continuing on the freighter airplane. The first freighter is scheduled to deliver in the third quarter of 2010. We are also working on the detailed design of the 747-8 Intercontinental, however with the softening freighter market and the resulting decision to delay a planned increase in 747 production first delivery of the Intercontinental, is now expected to move fro	modular Enterpri se Archite cture's defense of its finanaic al perform ance

	airplane systems, including engines, are cleared for first
	flight. We've also completed the structural testing on the
	static airframe that is required for first flight. Final
	analysis is underway, but the results are positive. Earlier
	this week we completed a full simulation of the first flight
	using the actual airplane. The simulation exercised all
	flight controls, hardware, and software. In the coming days
	airplane #1 will move out of the factory to the flight line.
	There it will be fueled and its engines operated prior to
	doing a final systems check and the high-speed taxi tests
	that lead to first flight. We are also making excellent
	progress on airplane #2 on which ground vibration tests
	need to be completed before first flight. Those tests are
	expected to begin later this week. The 787 backlog
	remains strong with 886 orders from 57 customers around
	the world. This includes previously disclosed cancellations
	of 32 airplanes and the order for eight 787s finalized with
	Gulf Air last week. As mentioned last quarter, we expect a
	modest level of orders churn on the 787 during the year.
	Even so, the backlog is unprecedented for a new
	airplane and we are confident in the long-term value of
	the 787 for our customers. Our total company backlog
	remains large at \$339 billion. While that number is down
	from last quarter due to current period deliveries, modest
	cancellations, and price adjustments from lower escalation
	it still represents nearly 5x our current and annual
	revenues. New orders include the U.S. Air Force contract
	for 15 C-17s that were previously funded under the fiscal
	2008 budget, as well as integrated logistics and support
	contracts. Fundamentally, this is a solid company with
	strong core businesses. We are of course, like all
	companies, facing a very challenging market environment
	which I will address on Slide 3.
	The global economy has further deteriorated and we are
	facing economic times that are more difficult than many of
	us have ever seen. This, of course, is impacting our
	commercial customers in the form of lower air traffic
	growth and challenging financing conditions. These
	pressures, which are being addressed by various
	governments' economic recovery packages, are also
	putting pressure on defense budgets. Because of the
	commercial and defense market uncertainties, we continue
	to step up our drive to become more competitive and
	productive. As discussed last quarter, we are
	aggressively managing both costs and investments.
	Unfortunately part of this means a reduction in
	employment in certain areas of the company. We are on
	track towards the estimated 10,000 position reductions we
	expect by years end. We will continue to evaluate the
	appropriate infrastructure levels at the Company,
	especially in light of our recent decision to reduce
	commercial production in 2010, as we get more clarity on
	the U.S. Defense budgets. Despite the challenging
	environment our backlog is holding strong. The only
	commercial airplane cancellations so far this year have

87s I mentioned earlier. We have, however, g with customers to defer airplanes in he unprecedented economic environment. In rter we accommodated about 60 airplane a 2010 and 2011 into future periods. We are of working on more deferrals beyond that all factored into our production decisions made nonth. Deferrals are occurring across all all models. I should point out that our this time to hold 737 production rates practice of over committing 737 deliveries y, which have so far offset the current and eferrals. Now I have just a word on cisions. I want to emphasize that these are ecisions for the Company and are not simply today's view of the market. The market is ctor. It is obviously a factor. But, we also omer contracts, significant cost elements and ment implications. While we monitor it all e scope, and impact of these calls are d need to be made deliberately. As you all financing environment continues to be <i>coeing Capital</i> conducts a bottoms up as well malysis of financing requirements by tracking	
<i>Coeing Capital</i> conducts a bottoms up as well malysis of financing requirements by tracking each commercial delivery while at the same of the sources of global capital availability. still believe financing sources are sufficient eted requirements for our products in 2009. cludes an assumption that BCC will need to t \$1 billion of new financing this year. recognize the financial markets are fragile ge quickly. We believe we are in a good ndle any resulting outcomes this year. Let ze by saying, again, that we are in 1 times right now, but I believe we have a tion from which to work through this with strong products and services and a large ortantly, we are aggressively managing our e, costs, and investments.	
ation impact are recorded in the current all units in the accounting quantity as ecording the impact over time as the units iscuss BCA in a little more detail on Slide 5. Airplanes recorded first quarter revenue of	

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\$8.6 billion which is 5% greater than the prior year.	
The increase was driven by higher airplane deliveries	
offset by lower commercial service revenues. Operating	
margins of 4.9%, seven points lower than last year, were significantly impacted by the \$347 million charge	
driven by production rate decisions and lower	
escalation forecasts. Our Commercial Airplane	
contracts have escalation provisions which state prices	
in current year dollars at time of contract signing and	
allow for economic adjustments to be paid by	
customers at the time of delivery. These adjustments	
are determined from broad price indices. During the	
first quarter the global recessions impact on	
commodity and retail prices, coupled with moderating	
wage growth, significantly reduced these indices. This	
change does not affect current year commercial	
revenues since pricing is fixed approximately 11	
months before delivery, but it does impact our forecast	
of future revenues. Lower revenue forecasts reduced	
program accounting gross margins during the quarter	3
for our profitable programs and increased the loss recorded on our 747 program. The first quarter impact	
of escalation was approximately \$235 million, \$180	
million of which were increased the 747 reach forward	
loss. The Twin-Isle production decisions, which impact	
production rates beginning in 2010, also affect current	
period gross margins. Rate change disruption costs and	
redistribution of hard to vary costs over fewer units in	
the accounting quantity are the principle drivers. The	
impact recorded in the first quarter reduced earnings by	
approximately \$200 million, \$175 million of which was	
included in the 747 charge. This impact was net of a	
favorable adjustment to our prior 747 cost estimates. The	
BCA team is focused on right sizing its infrastructure and the associated costs to address the current market	
challenges.	
Now let's turn to Slide 7. Boeing Capital delivered	
another solid quarter with pre-tax earnings of \$37 million	
on revenue of \$163 million. BCC had modest new aircraft financing in the quarter of approximately \$135 million	
which was offset by portfolio run-off. Our guidance still	
assumes that we will finance about \$1 billion of new	
aircraft sales during the year. Now I want to remind you	
that as BCC reduced its portfolio from a high of \$12	
billion to the current level of \$6 billion we have been	
preparing for this time of reentering the financing	
markets. We are well positioned and are entering the	
markets in a disciplined and a prudent manner.	
Now let's turn to Slide 8 and discuss cash flow. We	
generated \$200 million of operating cash flow in the	
quarter reflecting cash from earnings and liquidation of	J.
inventory that we paid for during the strike last year. This	
was offset by continued planned working capital build up	
on our development programs, lower cash advances, and	

timings of receivables. During the quarter we paid	
approximately \$300 million in dividends and used \$50	
million to buy back 1.2 million shares. We have	
significantly reduced our share repurchases in light of the current business realities.	
the current business realities.	
Now let's turn to Slide 9. Our financial strength	
remains solid. We ended the quarter with \$4.7 billion	
of cash and marketable securities including proceeds	
from the \$1.8 billion of new debt issued in March.	
After our announcement to reduce commercial	
production rates S&P put our A+ long-term credit	
rating on watch, but confirmed our short-term rating.	
Moody's reaffirmed our A2 long-term rating and our overall credit ratings remain among the strongest in the	
industry.	
Now I will turn to Slide 10. We are upgrading our	
financial guidance to include the lower price escalation	
forecast and the resulting charge on the 747 program.	
Earnings per share for the year are now expected to be	
\$4.70 to \$5.00 per share. Now, we expect second and	
third quarter earnings to be lower than fourth quarter earnings reflecting revenue and R&D profiles. 2009	
revenue guidance is unchanged at \$868 to \$869 billion.	
The 2009 commercial delivery forecast also remains	
between 480 and 485 airplanes. 2009 operating cash	
flow guidance remains at greater than \$2.5 billion. We are	
diligently managing our cash and have action plans in	
place to preserve our strong financial position. Having said	
that, there are risks to our cash flow due to market	
uncertainties and in particular its potential impact on advances for commercial airplanes. We continue to	
assume pension funding this year of about \$500 million.	
Total company pension expense is expected to be about	
\$900 million in 2009 with slightly more than that recorded	
at the business unit and a small offset in the unallocated	
segment. The R&D expense forecast is unchanged at \$3.6	
to \$3.8 billion and we continue to expect R&D expense	
to decrease substantially in 2010.	
Now let me turn to Slide 11 and discuss our change in our	
earnings guidance in more detail. As we mentioned last	
quarter, our guidance at the time considered the potential	
impact of modest production rate cuts. Had the Twin-Isle	
production decision has been the only impact this quarter,	
we would have maintained our earnings per share	
guidance. However, the lower escalation forecast had a	
sizable impact on our results, which is the principle driver of our reduced EPS guidance. We're expecting somewhat	
lower pension expense since last quarter, but higher	
interest expense from the new debt issued in March.	
We plan to provide 2010 financial guidance towards the	
end of the year.	
Jim McNerney:	

	Thank you, James. To close let me simply say that we are diligently working on improving productivity, right sizing our infrastructure, and preserving our financial strength given the current uncertainties in both our commercial and defense markets. While recognizing the risks at hand, we continue to feel that we are relatively well positioned with the fundamental strength of our products and services, the size and diversity of our backlog and the long-term outlook for the markets we serve.	
	Ronald Epstein (BAS-ML): I have a question on the 787 program. As we start to think beyond kind of the flight test program and into the ramp- up, what I have heard is <i>Global Aeronautica</i> is still a bit of a long tent pole that the center fuselage integration is taking over what 300 days per section. How do you work through that and how should we think about the ramp of the program?	
	Jim McNerney: Well I think the Global Aeronautica bottleneck, as you characterized it, is something that is not unusual. I mean the main body join is typically a challenge. But, there is nothing we see, as we work through it, that will prevent us from meeting our ramp schedule. As you know, after the ownership change awhile back we have taken more direct control of that factory, which I think has moved along process improvements significantly and we're making good progress there. While it has represented a bottleneck we are confident that it won't as we meet our production schedule.	
	Ronald Epstein (BAS-ML): Okay and if I can I have a follow up question on 78. When you look at the suppliers, and different suppliers are developing either parts or subsystems for the program, you have seen multiples of their original R&D budget that they thought they would be investing. When we think about the <i>Boeing</i> investment on 787 can you just broadly say, I mean, how many times is it what you thought it was originally going to cost the company?	
	Jim McNerney: Well there is not an integer involved in the multiple, okay? There has certainly been some pressure on research and development, as you know, on some non- recurring costs and there have been some cost pressures that both we and our supplier partners have born. But, it remains a very economic proposition over time. I think this is a very innovative product that did cost more and take longer, but the market has recognized it as an innovative product by ordering many multiples times any commercial airplane that's ever been ordered before. So, we have a base over which to spread some of these increased costs, but I wouldn't characterize it quite as direly as your	

 	-	
	question implied. We have been wrestling with	
	pressures and they're slowly getting back into the box.	
	I mean the condition of assembly by our partners from	
	airplane 7, which is the first production airplane, on	
	out has improved dramatically. We are in very good	
	shape and quite frankly, I'm heartened by what I'm	
	seeing in the ramp-up right now.	
	Howard Rubel (Jefferies & Co.):	
	If I did the math right you did about 8.5% to 9% margins	
	in commercial and about 17.2 per R&D and that compares	
	with 19.8 a year ago. There are two parts to this question.	
	What are you going to do to recover part of the loss of	
	deflation? I mean the index works against you, but there	
	should be a lot of opportunities with the rest of the	
	industrial commodities being down to get some of that	
	back. The second part of this is cash is clearly a	
	challenge. Could you be a little more specific in terms	
	of what you're doing to try to improve the balance	
	sheet fund, but could you make it even better?	
	James Bell:	
	Let me try to answer that. As you know, on the escalation	
	side, particularly in the commercial airplane where this	
	impact has been felt, every quarter we get different	
	escalation forecasts and we basically have two	
	commodities, one is the CPI index and the other is for,	
	which is the consumer index, and the other is more	
	commodities related. They do change over time, so we	
	will naturally see some of that happen. As it deals with	
	the costs associated with that, the timing is different. As	
	you know we have long-term contracts which are fixed	
	price with our subcontract community, so to the extent that	
	some of those costs are going down we will have an	
	opportunity to renegotiate future contracts at lower prices	
	and then there are some contracts that we do have that see	
	an immediate impact, but it's minor. You will see some of	
	that and some of that is already into the impact you saw on	
	that escalation provision. But, over time it generally	
	balances it out. If we go into an inflationary period you	
	could see that change pretty rapidly. On the cash side,	
	clearly we're looking at a number of things relative to	
	how we manage our cash and be more disciplined	
	relative to inventory turns. Be more efficient with just	
	in time. We're looking at making sure as we move the schedules on production rates and on the deliveries out	
	that we also align that as perfectly as we can with the	
	subcontract community so that we're not getting	
	inventory before we need it. We've cut back on capital	
	expenditures. We are really looking at everywhere that	
	we spend money that doesn't affect or go into the	
	product. We're cutting back on all things that we	
	would call non-essential. We're having daily cash calls	
	where we're making sure we're monitoring advance	
	pays and we're monitoring our disbursements to make	
	sure that we're paying just in time in accords with our	

contract terms and that we are aggressively pursuing our payments as they are required by contract. We think the combination of all of that is going to make a strong balance sheet even stronger. <u>Robert Spingarn (Credit Suisse):</u> James, could you walk through your cash flow guidance? You know with a flattish quarter here in the first quarter, you talked to some of the pressures and things that are going on in the beginning of the call, but how do you get to generate operating cash of \$2.5 billion in an environment where we would suspect your building 787 inventory the advances are drying up from the absence of orders and you'll be increasing financing	
through out the year.	
James Bell: There are a couple of things. First of all, the advances really aren't drying up as a result of the orders. We are not expecting a lot relative to cash receipts on the orders. In fact it is a relatively modest number because the deliveries are so far. The orders that we would write today are for deliveries so far out in the future. The real issue is we do have quite a bit of receipts that are associated with deliveries after 2009 and those are the PDPs that are set on the payment schedules and the inventory; so clearly, we're looking at making sure we stay on track and we are able to collect those. The financing, as you know, is going to be leveraged, so even though it is included in the total in cash in the cash balance, it is not going to have a major impact, but we have included the billion dollars already in that guidance. Again, we've only done \$135 million so far this quarter, but we think we'll do the whole billion over the course of the year. We think we're in pretty good shape and with the run rate in terms of what we'll deliver this year, and with the other initiative that we put in place to manage cash we think we're going to be in pretty good shape.	
Joe Campbell (Barclays Capital):	
I have a question about the numbers, which I think Jim gave us, on the 60 deferrals from 2010 and 2011 that you saw in Q1 that moved to the out years. Now, I think that the number, I don't know, we probably guessed it or triangulated, that the number of wide bodies that moved was something a little over 50. So, it sort of suggested there really wasn't much movement in all the other	
airplanes. I was wondering if that is about right. I mean, I would have thought that there was a lot of in and outs	
and that that was what you were trying to convey. If	
you could give us a sense of even if the 73s, which are apparently so far okay, can you give us some sense of	
how many moved out and somebody else moved in so	
that we can get a sense for the fluidity of the 73?	
Jim McNerney:	

Yes. The number is more like half-and-half narrow
body and wide body deferrals. As I also said in my
comments, we're working others beyond the [interposing].
In Comphell (Parolaus Canita)
Joe Campbell (Barclays Capital): But Jim you moved, I mean if you cut the production of
seven 77s from seven to five than that is going to be more
than 30 airplanes, so how could it be half-and-half? I
mean we cut the wide bodies by almost that much, I would
have thought.
Jim McNerney:
I'm sorry, would you say it again Joe? I mean, we're
talking about 60 airplanes, a little more than half of which
were narrow bodies, a little less than half of which were
wide bodies, and we're working some additional deferrals
right now, as I commented on; when you add that all up
that does roughly true up to the production decision.
Remember, we are taking into account some things we're
working now beyond just the 60.
Joe Campbell (<i>Barclays Capital</i>):
Yes, okay, but what I really wanted to talk about was
what is actually going on in the narrow bodies?
Presumably there is movement even though it nets out,
apparently, to a number that's consistent with
production. I just want some sense of whether it is 100
guys moved out and 100 guys moved forward or
whether it's five guys moved out and five guys moved
forward.
Jim McNerney:
There is more moving out than moving forward, but
what you have to remember, I think, Joe is that remember
we restrained production rates. The big picture is that
Airbus and us had roughly the same number of narrow
body orders over the last few years. They ramp up
much more aggressively on production rates and we
were restrained. Remember they were in the high 30s
we were in the low 30s, so we had a lot more over
ordering in our backlog, anticipating that someday
there may be a softening, which is what we're seeing right now. So, we are working through the over ordered
portion of the backlog and when you look at what we
deferred within the 60 plus the other ones we're working
now and are estimating based on that experience, we still
think we're in good shape on the production rates. And, it
is because we had a much larger margin of unslotted
orders that we took, okay?
Heidi Wood (Morgan Stanley):
I want to take a step back for a moment. In the first quarter of '08 the 747-8 was described as on track, and
over the span of four quarters things went so awry that
you took over \$1 billion in charges. Even as recently as
the January call you described the -8 as a viable

business and adding a lot of value to customers. While acknowledging that the 787 is likewise going to deliver value and is a viable business can you describe the key under pinnings that anchor why the 787 won't be susceptible to reach forward loss kind of four quarters from now?	
Jim McNerney: There is a specific accounting calculation, Heidi that I know you are aware of, but I think the big picture is a large accounting quantity when the time comes to make that decision, which will be when we deliver the first airplanes. Having worked through a lot of the non- recurring up front costs and having a much better handle now on the cost curve that is in front of us, when you make the assessment it trues up to where we are. There is not a loss on the program right now. Could things change, yes, but there just isn't. It is largely driven by the market acceptance of this product.	
James Bell: Heidi, let me just add one comment. Traditionally when you look at us on a new airplane development program, at this stage in the program we've only sold 100. So, the major risk is the risk to market and the pricing associated with that. The fact that we've sold so many has given us a lot more cushion on this particular airplane in terms of a forward loss, because we really, having sold them we have the market and we have the pricing pretty much set. Then obviously there are a lot of moving parts on the cost side, but as Jim mentioned, as we move through time we're getting a better handle on that. Now, could something happen in four years and four months? I mean unless it was dramatic, I think something coming out of the flight test program that would cause a major new cost element obviously that is always a potential because it is a development program, but generally I would say to you we are in much better shape on this program to avoid that than we have been on any prior program.	
Heidi Wood (Morgan Stanley): That's excellent and James, how do cancellations flow through to relieve the presumed costs on customer penalty payments? I mean doesn't early cancellations relieve the entire skyline and presumably save you quite a bit of money?	
James Bell: Obviously if a customer cancels you have more space to work with. The space was crowded otherwise so it does provide you more opportunities to move airplanes up and back depending on what the customer needs are. But, as you know, cancellations are not what we're looking to achieve in order to deal with our penalties. We would rather just go ahead and get this program back on	

			track, but obviously you get some relief, but that is not	
1			what we're aiming for.	
			Myles Walton (Oppenheimer & Co.):	
			The \$787 deposits on the 880 aircraft or so, are those at	
			this point, are those refundable deposits or are they both	
			still nonrefundable deposits?	
			James Bell:	
			They are non-refundable.	
			Joseph Nadol (J.P. Morgan):	
			Back on the 747 program, I am just wondering if we could	
			get sort of a bigger picture update, Jim, on where we are	
			there. I mean freighter demand is part of the reason	
			you cut the 777 rate and that's where if it's only part of	
1			the backlog for 777 it's most of the backlog for the 47.	
1			You have this delay in the Intercontinental by a couple	
1			quarters which may have not been disclosed previously,	
1			but you decided that a number of months ago. In any case,	
1			anytime anything goes wrong anywhere in the commercial	
			business whether there is a 37 cut, an 87 slide, anything.	
1			Are you going to have another 47 charge? I am just	
1			wondering what your comfort level is here with the	
			backlog, the freighter demand, and that we're not	
			going to have significant more problems down the	
			road.	
			Jim McNerney:	
			Well listen, the economic situation is uncertain and it has	
			had significant impact on the freighter market, as you have	
1			seen. We can't predict with absolute certainty that our	
			current read of the market will hold forever; so adjusting	
			production rates is part of this business. We think	
			we've got it right now, but we'll have to keep reading	
1			and reacting. Now that is a separate question from do	
1			we have a good business. You have to live through	
1		1	some ups and downs. Unfortunately we're getting a	
1			down here in the midst of the development phase of the	
1			program. But, we have seen very few signs that	
1			customers are running away. We see signs that	
1			customers want deferrals and in fact want to hold onto	
1			the business and are willing to keep making the	
			progress payments required to have it. It is more of a	
	r I			
			story of an adjustment to a very difficult economic	
			story of an adjustment to a very difficult economic environment than it is a story about a program that	
			environment than it is a story about a program that doesn't make sense to customers. These new airplanes,	
			environment than it is a story about a program that doesn't make sense to customers. These new airplanes, the 87 and the 47-8 that you're talking about are very	
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Joseph Nadol (J.P. Morgan): I think where I'm going, Jim, with this is the 87, I think we can all agree, has unprecedented demand and it's going to be a great platform for airlines over the very long term. The 47 just seems to me much, much ore in doubt. The basis of it is freighter demand and we're in a loss position now. I guess I am trying to get my arms around how much worse things can get on the 47. I mean what's the number?
Jim McNerney: Well, I mean the number is the number we've given you now, is what we think it is. Again, customers are not running away. There are a number of discussions for other orders that, admittedly, are doing slow in the current economic environment. We think this is a good niche airplane. I mean, this is not a brand new innovation like the 87 is to your point, but this is an airplane that fills a good, solid niche and we typically launch airplanes with 100 orders. This is more like the normal airplane we launch. Everything isn't the 87. Could it get worse? Sure. I mean if the market, the economic environment continues to tank for another three or four years I think the impact of deferrals and production rate changes could put additional economic pressure on it. Is it enough to kill the program? I don't think so. I think this is a good product that serves a good market.
Joseph Nadol (J.P. Morgan): Are we past the point where you could kill the program, or is that still a potential? Jim McNerney:
We don't intend to kill the program. <u>Cai von Rumohr (Cowen and Company):</u> In terms of opportunities, your commercial R&D was down sequentially in the quarter despite a lot of activity on the 787; should we expect it to continue on down sequentially in the second?
James Bell: No. We will be, it was sort of the timing that really impacted this quarter. You will probably see it a little higher in the second. Third quarter will probably be pretty stable and then we will come down in the fourth quarter. We should be down year-over-year, but don't take away from the first quarter. That is going to do down second and third, but it will go down in fourth.
Cai von Rumohr (Cowen and Company): Excellent, thank you very much and good quarter.
<u>Itay Michaeli (<i>Citi</i>):</u>

I wanted to dig in a little bit more on the two-year cash flow picture. Do you think you can get back to the cash flow power that would enable you to have the flexibility back into a billion plus in share buybacks in the next couple of year? How should we think about that playing out in the next two years?
James Bell: Relative to the buy back program, we'll look at what that looks like in the next year. Obviously we're going to minimize it this year given what we see as pressure on cash, but going into 2010 we'll take a look at and see where we are then and see whether or not we have the cash to continue to get back up to the buying levels we've experienced in the past. We obviously have the authority from our board to buy the shares, so that is not the issue. The issue is the priorities that put demands on cash and then how we address those with the current cash flow in the current environment.
Itay Michaeli (Citi): That's helpful. You did raise some debt opportunistically in Q1. Is there a minimum cash balance you like to have at this part of the cycle that we should be thinking about? You know, for you to maybe tap the market again if cash flow comes under some more pressure. How should we think about where you like to have your baseline fall?
James Bell: Well we need about \$2 billion for operation cash, so that's kind of it. Then in this environment you surely want a safety net, given the fact that we have two major development programs that haven't gotten through their flight certification programs yet; so you would want that. So we could possibly do more, it just depends on what the circumstances are as we view the opportunity in the market pricing wise and other factors.
Dominic Gates (<i>The Seattle Times</i>): I have a very specific question about the 787 flight test plans. First, I just want to clarify my own understanding of a response you gave earlier to Ron Epstein, when he asked about the multiple in terms of the spending on the 787, you said no integer involved. I am taking it that means it is less than two, correct?
Jim McNerney: Yes. Dominic, I was being somewhat facetious in response to a question that implied that it was some egregious multiple. I think, as you know, there have been some cost pressures that both us and our suppliers have faced and we're dealing with it.
<u>Dominic Gates (<i>The Seattle Times</i>):</u> But it hasn't doubled from what you originally

					expected in '03? From that response you gave, is it	
					right of me to make that assumption?	
					Jim McNerney:	
					I think that's true, Dominic.	
					Dominic Gates (The Seattle Times):	
					All right and to my own question, the first six tester planes are apparently now unallocated after you refigured your	
					customer delivery schedule. Are there concerns about	
					selling those planes, getting those planes placed, given the weight problems that they have and where do we	
					stand on weight with the ones that follow on?	
					Jim McNerney:	
					Listen, the first production airplane that will be delivered	
					is airplane #7 as I mentioned today. We will find homes for the first six airplanes. We have discussions ongoing	
					with people and I am confident that they will end up placed."	
23	Conde	Jim	Firm-	α	"Two years late, Boeing's Dreamliner jet makes its maiden	On the
April 2009	Nast Portfoli	McNer ney,	Investo rs-		test flight this spring—straight into the turbulence of the financial crisis. <i>Boeing</i> is losing billions in canceled	systema tic
2005	0,	CEO,	Suppli		Dreamliner orders and has been repeatedly passed	problem
	"Boeing and	The Boeing	ers		over for Pentagon contracts. Can it break its losing streak?	s with a modular
	Dreamli	Compa				enterpri
	ner Trouble	ny			Even when it races, nose up, into the sky, the initial test version of the Dreamliner will go aloft with temporary	se architec
	s:				fasteners-and missing some less critical parts, such as	ture.
	Bumpy Ride"				those for lighting and bathrooms. One reason is that <i>Boeing</i> has redesigned 30 percent of the plane to	
	(Jeffrey Rothfed				reduce weight, an unprecedented degree of change for	
	er)				an aircraft this late in development. As one of many grim jokes making the rounds on <i>Boeing's</i> factory floor	
					goes, 'Maybe they meant a bad dream.'	
					The Dreamliner's delays are expected to cost Boeing as	
					much as \$10 billion in canceled orders and compensation to airlines. The fiasco has become an	
					object lesson for manufacturers in how not to do global	
					outsourcing and has eroded <i>Boeing's</i> reputation for efficiency and innovation.	
					Now, on the eve of its big launch, the Dreamliner carries	
					the company's hopes of recapturing lost revenue and	
1					repairing the damage to its image. If the plane passes the rigorous yearlong series of flight tests that begin this	
					spring, it could lead Boeing out of the financial crisis.	
					But if the Dreamliner fails, <i>Boeing</i> could become the <i>General Motors</i> of the skies, with enormous repercussions	
1					for the U.S. economy and the U.S. manufacturing base.	
1					Although <i>Boeing</i> announced in January that it was laying off 10,000 workers, it still employs more than 150,000	
					people in the U.S. and is the nation's No. 1 exporter.	
					About 70 percent of Boeing shares are held by	

institutions, including all of the major mutual funds and Bank of America Corp., its biggest shareholder.
Indeed, a machinists strike last fall crippled <i>Boeing's</i> production and contributed to a 6.2 percent decline in the U.S. gross domestic product in the fourth quarter. <i>Boeing</i> is so vital to a recovery that if it sputters, the federal government may be forced to bail it out, as it has automakers <i>GM</i> and <i>Chrysler LLC</i> .)
The plane fell victim to infighting between <i>Boeing's</i> bean counters and engineers, who had to gamble on a low-cost—but unrealistic—manufacturing strategy. 'We may have gone a little too far, too fast' with the technology and materials and in outsourcing production, <i>Boeing</i> chief executive James McNerney told <i>Condé Nast Portfolio</i> . 'The program was more than we could handle.'
The Dreamliner debacle would be bad news in good times, but it is a nightmare for <i>Boeing</i> in this global economic crisis. <i>Boeing</i> has received about 900 advance orders for the Dreamliner, the most of any new plane, at about \$200 million apiece. But with air traffic down from last year, carriers have begun to cancel orders. 'I'd have concerns about every customer right now,' says Richard Aboulafia, a vice president at <i>Teal Group Corp.</i> , a consulting firm that follows the aerospace and defense industries. Aboulafia estimates that between 30 and 70 percent of all orders for jets industrywide will be at least deferred, if not canceled. In his worst-case scenario, 630 orders would be postponed or dropped outright, a potential loss of \$126 billion in revenue.
Airlines could seek as much as \$4 billion in compensation for losses linked to delays, and <i>Boeing</i> is not expected to make any money on the first 100 or so Dreamliners it delivers. Some carriers, weary of waiting for the Dreamliner, bought or leased planes from <i>Boeing's</i> biggest rival, <i>Airbus SAS</i> , a European consortium. 'We're pretty fed up,' says the chief executive of one major carrier that ordered 15 Dreamliners. 'We've gotten no clarity from <i>Boeing</i> .'
Perhaps worst of all, <i>Boeing</i> has forfeited a significant revenue stream—from Dreamliners that would have been delivered and paid for—that could have propped up the company through the downturn. <i>Boeing's</i> cash reserves plummeted during 2008 from \$7 billion to \$3 billion, which will make it difficult to develop new planes.
While conceding that the next few years will be tough, CEO McNerney dismisses the notion that the Dreamliner's moment has passed. Because of the long lead time from conception to delivery, he says, it's not unusual for a new plane to bump up against a recession. And since <i>Boeing</i>

	can make fewer than 100 Dreamliners a year, the company would have a five-year backlog even if half of the 900 orders were canceled. 'The fact is that 95 percent of the pipeline for the Dreamliner would have been exposed to this financial crisis even if we delivered on time,' says McNerney.	
	The Dreamliner's problems have exacerbated the broader decline of <i>Boeing</i> , once one of the world's most admired manufacturers. In the past year, <i>Boeing's</i> stock price has lost about 60 percent of its value, more than the Dow Jones industrial average. In trying to fix the 787, <i>Boeing</i> shifted engineers away from other projects, causing a lag in developing freighters and other passenger planes. <i>Boeing's</i> revenue dropped 8 percent, and its operating income fell 32 percent from 2007 to 2008. The latest results offer no comfort. In early April, <i>Boeing</i> reduced expectations by 38 cents a share for first- quarter earnings, which will be announced April 22, and said production of the 777 will be trimmed from seven to five aircraft per month starting in June 2010. In response, a number of top analysts downgraded <i>Boeing's</i> stock and <i>Standard & Poor's Rating Services</i> began a review of the company's debt for a possible downgrade. And after dominating jet manufacturing for decades, in 2008 <i>Boeing</i> fell behind <i>Airbus</i> in orders and shipments by more than 100 planes.	
	Boeing's slide can be traced to the company's ill-fated \$13 billion purchase of McDonnell Douglas Corp. Under chairman John McDonnell and chief executive Harry Stonecipher, McDonnell Douglas starved its design and engineering operations and became little more than a sales organization, barely surviving on offshoots of its aging DC-9 and DC-10 models. The 1997 acquisition infected Boeing's forward-thinking culture, emphasizing cost-cutting at the expense of innovation.	
	McDonnell and Stonecipher, both of whom joined Boeing's board, successfully argued for improving profit margins on existing lines instead of introducing new commercial jets. Boeing cut its annual research- and-development budget for commercial aviation from more than 4.5 percent of airplane sales in 1997 to slightly more than 3 percent in 2003. At the same time, Airbus' R&D budget topped 8 percent of sales.	
	But by 2003, Alan Mulally, who headed <i>Boeing's</i> commercial-airplane division, was convinced that <i>Boeing</i> needed a fresh plane. Inspired by <i>Toyota's</i> combination of technological prowess and lean efficiency, Mulally had spearheaded development of the 777 in the early 1990s, transforming <i>Boeing</i> into a world-class manufacturer. Now he believed that to preserve its eroding market-share leadership, <i>Boeing</i> had to produce a jet that would capture	

the imagination of the airlines and the attention of Wall Street. Originally called the 7E7, Mulally's baby was renamed in a public contest that drew 500,000 online voters. By a large majority, they dubbed it the Dreamliner.
Mulally's ambitions collided with the frugality of the former <i>McDonnell Douglas</i> executives. Conceptual drawings showed that the Dreamliner's cost would at least match the \$10 billion-plus price tag of the 777. After becoming chief executive in 2003, Stonecipher said he intended to seek board approval for the Dreamliner. However, the unspoken message was 'but not at the current price,' says Jon Ostrower, an aviation insider who writes for Flightglobal.com. Mulally was told that the plane's projected development costs would have to be 50 percent or more below the 777's.
To meet this demand, Mulally came up with a wildly unorthodox plan: He would farm out the design, engineering, and manufacturing of the 787—virtually everything except final assembly—to suppliers that would shoulder more than \$9 billion of the project's \$13 billion cost, in exchange for lucrative, multiyear guaranteed contracts and a slice of the plane's sales. These outside companies would coordinate with one another to produce whole sections of the plane, stuffed with assembled components, systems, ducting, insulation, and wiring. <i>Boeing</i> workers in Everett would merely have to connect the major parts of the aircraft.
No large manufacturer had ever before so audaciously turned over control of the entire process—from concept to shipment—to outside firms. In a critical oversight, no provision was made for monitoring the suppliers. Mike Denton, vice president of engineering for <i>Boeing's</i> commercial-airplanes division, recalls that the vision for the Dreamliner was 'not to encumber the partners with the <i>Boeing</i> way of doing everything. So we erred on the side of giving them more free rein than in retrospect we should have.'
By the end of 2003, the company had greenlighted the Dreamliner. Moving quickly, <i>Boeing</i> signed up dozens of suppliers. Japan's <i>Mitsubishi Corp.</i> agreed to make the wings; France's <i>Messier- Dowty SA</i> took on the main landing gear; and Italy's <i>Alenia Aeronautica SpA</i> would build the 64-foot-wide horizontal stabilizer. The vertical fin, the sole piece of the airframe slated to be made in the Seattle area, would connect to a rudder from Chengdu, China, and a front-facing edge from Shenyang, China.
In 2005, Stonecipher was fired for having an inappropriate relationship with a female executive. After McNerney was chosen as chief executive, Mulally left <i>Boeing</i> in 2006. Whether Mulally could have made a success of the

outsourcing strategy, had he stayed, is one of the great what-ifs of the Dreamliner saga. He became chief executive of <i>Ford Motor Co.</i> , where he introduced more efficient techniques in the automaker's factories. In part because of Mulally's streamlining, <i>Ford</i> has been able to wave off government bailout money taken by its rivals.	
The suppliers were expected to deliver their completed parts in early 2007, giving <i>Boeing</i> enough time to assemble the initial Dreamliner for its first public display on July 8, 2007—or 7/8/07—a date chosen to match the plane's model number. Under pressure from <i>Boeing</i> , the suppliers sent to Everett as much as they had finished. Sections arrived in an incomplete or defective state, or failed to fit adjacent parts made by other suppliers. The Dreamliner that <i>Boeing</i> rolled out to the applause of 15,000 workers and their families and friends resembled a mismatched model airplane.	
Unbeknownst to Boeing, one important supplier was being pared down by a prominent private equity firm. Vought Aircraft Industries Inc. was supposed to build the two aft barrels of the fuselage in a new factory in Charleston, South Carolina. Once completed, these parts were to be sent next door to another new factory—a joint venture between Vought and Alenia Aeronautica—to be connected to fuselage sections, wiring boxes, and the main landing gear.	
But <i>Boeing</i> didn't realize that the <i>Carlyle Group</i> , which had acquired <i>Vought</i> in 2000, was starving it of resources while making a few cosmetic improvements to attract potential buyers—a once-common private equity tactic. By early 2006, <i>Vought</i> was facing a severe 'liquidity crisis' and nearly went bankrupt, chief executive Elmer Doty told analysts. It couldn't afford the new plants, employee training, and fuselage design and assembly and had to 'reconstitute' its engineering department. 'We are among the riskiest, if not the riskiest' of the Dreamliner suppliers, Doty acknowledged.	
When <i>Vought</i> sent empty fuselage barrels that were short of vital fasteners, <i>Boeing</i> finally took notice. The company compelled <i>Vought</i> to fire the executive in charge of operations in Charleston and then acquired <i>Vought's</i> 50 percent stake in the joint venture with <i>Alenia.</i> After having spent almost \$300 million on the Dreamliner project in 2008, <i>Vought</i> had to borrow \$200 million more last year, when it finally shipped the first of its fully completed fuselage sets. <i>Vought</i> has asked <i>Boeing</i> to redraw its contract to cover more up- front expenses. So have other hard-pressed suppliers, potentially costing <i>Boeing</i> hundreds of millions of dollars.	

					McNerney says <i>Boeing</i> has learned from its mistakes and	
					McNerney says <i>Boeing</i> has learned from its mistakes and now monitors suppliers closely. Hundreds of <i>Boeing</i> employees were dispatched to suppliers to implement the 'Boeing way,' and McNerney has visited many of the factories, sometimes unannounced. 'We overwhelmed the suppliers with <i>Boeing</i> folks in reaction to not having enough early on,' he says.	
					Across from the Dreamliner's placid bunker, on the opposite side of the vast barnlike plant, <i>Boeing's</i> storied past and manufacturing prowess are impressively on display. A platoon of 777s is under construction on a production line superior to any other in the aerospace industry—one <i>Boeing</i> decided not to use for the Dreamliner because outsourcing was cheaper. Rather than assembling 777s one by one, parked side by side—the traditional approach for jet builders— <i>Boeing</i> has coupled its famed wide-body to a continuously moving platform	
					that creeps along at a scarcely noticeable 1.8 inches per minute. <i>Boeing</i> does its utmost to avoid assembly delays of even a few minutes. <i>Boeing</i> workers monitor each 777's exact coordinates on the factory floor from the time the jet ambles in from the plant's rear gate, with just its aft fuselage joined to its main body, to the time it reaches the 300-foot-wide hangar doors as a completed plane. <i>Boeing</i> consistently makes about seven "triple sevens" a month and boasts a backlog of about 350 orders for the \$250 million plane. In the first two months of this year, the	
					777 had a net gain of three orders while the Dreamliner lost 32. The moving assembly line in the 777 plant in Everett—and another in Renton, Washington, where the 737 is built—has produced impressive results that the Dreamliner program can only, well, dream about. Assembly time is down 21 percent, time spent in the factory has been reduced from 26 days to 17, and 20 percent of mistakes have been eliminated. By these measures, <i>Boeing</i> is at least four years ahead of <i>Airbus</i> .	
					Despite <i>Boeing's</i> recent failures, its innovative spirit— reflected in the 777 and in the Dreamliner's design— remains praise worthy. If the economy rebounds by the time the Dreamliner makes its first commercial flight next year, the plane could still become the blockbuster <i>Boeing</i> envisioned. But so far, it's just a cautionary tale. 'The lesson is that manufacturing programs cannot operate as islands,' McNerney says, but must meet companywide standards. 'I think we are centered on that now,' he notes ruefully. 'A little later than we needed to be for the 787.'"	
28 Apr. 2009	The Olympi an (Associ ated Press), "Boss	Jim McNer ney, Chair man and CEO,	Firm- Investo rs	α	"CHICAGO – The Boeing Co. Chairman and Chief Executive Jim McNerney assured shareholders Monday that the company is in strong shape to ride out the 'once- in-a-lifetime' downturn that has walloped its profits, jetliner orders and stock price. Putting an upbeat spin on a slump that has hit both the aerospace company and its customers hard, he cited as reasons for optimism: Boeing's	On a modular enterpri se architec ture's exogeno

_		a	m1				
		Sees	The			huge backlog of orders, diversification between	us
		Upswin	Boeing			commercial airplanes and defense, and its continued, albeit	explanat
		g After	Compa			halting, progress on the 787. McNerney also reiterated	ions
1		recent	ny			that that off-delayed new passenger jet will take to the air	
		Slump"				before the end of June. 'We are on track to fly this	
		(David				quarter,' he said, without giving a more specific date	
		Carpent				on its first flight. A week after Boeing posted a sharp	
		er)				drop in quarterly earnings, McNerney acknowledged that	
						the company still is going through 'a tough patch.' He	
						noted that the world's airlines are expected to see a 12	
						percent decline in revenue this year, or about twice the	
						drop they experienced after the terrorist attacks of	
						2001. 'Almost overnight, we have gone from flying	
						with the wind at our backs to flying into the teeth of a	
1						strong headwind,' he said at Boeing's annual meeting at a	
						museum in Chicago. Nevertheless, he maintained that the	
						current downturn is 'a once-in-a-lifetime storm and not a	
Ε.						permanent condition.' The company, he said, believes	
						that the recession will inevitably give way to a new era of	
						economic growth and prosperity."	
28		Forbes,	Jim	Firm-	α	"We have to run the place tight from a cash	On a
	pr.	"Boeing	McNer	Investo		viewpoint,' added McNerney, who spent more than four	modular
20	009	CEO:	ney,	rs		years at the helm of 3M Co. and 19 years at General	enterpri
		Current	Chair			Electric Co. before arriving at Boeing."	se
		Downtu	man				architec
		rn an	and				ture's
		'Aberrat	CEO,				strategy
		ion'"	The				of
1		(Kyle	Boeing				efficien
		Peterso n)	Compa ny				cy.
M	lay	(Transc	Execut	Firm	α	Wanda Denson-Low:	On a
)09	ript of	ive	rum	~	"We need leaders, talking about the decisions that they	modular
20		ethics	Counci			make every day. They need to discuss how they solve	enterpri
		training	l, The			the ethical dilemmas that occur in the workplace. All	se
		video).	Boeing			leaders are responsible for ethics & compliance, not just	architec
		viacoj.	Compa			Ethics Advisors."	ture's
			ny:			Darres May 15015.	stated
			James			James McNerney:	views
			McNer			"A workplace culture guides the way we behave. It has	on
			ney,			our values and principles embedded in it, it has patterns	ethics,
			Chair			of behavior that are acceptable. It has things we do that are	trust
			man &			valued. We have to have accountability for our culture."	and
			CEO;				open
			James			James Bell:	culture.
			Bell,			"Open culture allows you to have that real discussion	
			CFO;			because when you talk about trust, you're really basically	
			Scott			saying 'can I rely on somebody else for my success?""	
			Carson				
			,			James Bell:	
			Preside			"People are going to be hesitant to speak up in groups,	
			nt &			they're going to be hesitant to talk about issues that are	
			CEO,			controversial. You have to create trust, you have to set an	
			Boeing			environment where people feel it's safe."	
			Comm				
1			ercial			James Albaugh:	

Airpla	"Trust at every level of the organization. Trust between
nes;	management and employees, and between employees and
James	management."
Albaug	9
h,	Scott Carson:
Preside	"People feel trusted when their opinions are sought, and
nt &	received."
CEO,	
Integra	Shephard Hill:
ted	"Do we trust each other, do we trust the organizations
Defens	and the motivations that we have—do we have a sense of
A CONTRACTOR OF	second
e Svistom	shared objectives?"
System	"As a company daugland to business starts in the
S;	"As a company develops its business strategy it has to
Wanda	assume ethics, it has to assume integrity."
Denso	
n-Low,	John Tracy:
Senior	"If you don't have a supportive culture then no matter
Vice	how good the strategy is, it won't succeed. Not only is it
Preside	beneficial for the ethics world but this culture also will
nt,	allow us to bring ideas together to better solve our
Office	customer's problems."
of	
Interna	James McNerney:
1	"That's a great example of an open culture supporting
Gover	business performance as well as inclusiveness and ethics
nance;	because the more ideas we get on the table, the better the
Mike	result is going to be, particularly in a tough environment
Cave,	like we have now."
Senior	
Vice	Thomas Downey:
Preside	"We value the courage that it takes for people to speak
nt,	up, to offer ideas in an open environment."
Busine	up, to otter fucus in an open entrionments
SS	Richard Stephens:
Develo	"I think that's going to be the real test in the current
	economic environment, and people have to make
pment	decisions, and will they have the courage to make the
& . Strotog	
Strateg	right decision or not?"
y; Shonha	James Albeuch
Shepha	James Albaugh: "The designers that you're going to make are going to be
rd Hill, Proside	"The decisions that you're going to make are going to be
Preside	the right ones for the customer, for the employees, and
nt,	they're not going to be ones that are driven by, you
Boeing	know, what's good necessarily for you."
Interna	
tional;	Richard Stephens:
John	"puts the company above self or self-interest is an
Tracy,	important element. It's about how we all work together
Chief	for our success as opposed to our individual success.
Techn	Employees want to go do the right thing. But they need
ology	leaders who understand the environment and give them the
Officer	tools to be successful."
;	
Thoma	James McNerney:
S	"This is another place where leadership and ethics

Downe	come together. Leadership definitely matters,
у,	especially when it comes to ethics."
Senior	
Vice	John Tracy:
preside	"Ethical leadership is when a leader's thoughts, actions
nt,	and words are all aligned."
Comm	C POCINE CAR IS A CORE INCOMENTATION AND CARLINES
unicati	Scott Carson:
ons;	"Ethical leadership is the responsibility of each one of
Rick	us."
Stephe	4.07
	James Bell:
ns, Senior	
Vice	"Ethical behavior is absolutely fundamental to how we
	conduct business."
Preside	
nt,	Scott Carson:
Human	"Each one of us has an obligation to do our part to not
Resour	only help create, but then to maintain the culture that we
ces	value."
and	
Admin	James McNerney:
istratio	"The temptation to cut corners is always there. Our
n;	people are going to be challenged now and we have to
Timoth	be very clear on the subject."
у	~ ~
Keatin	"We want no trade-offs between performance and values."
g,	
Senior	Timothy Keating:
Vice	"The one thing I can't fix with a simple phone call is my
Preside	own credibility, and that's what it comes back down to."
nt,	
Gover	Wanda Denson-Low:
nment	"Our employees already understand that ethical
Operat	decision making is already a part of how we do
ions;	business. It's not what they do, it's who they are."
Micha	sublicites it s not must may do, it s must may and
el	Shephard Hill:
Luttig,	"That derives directly from unquestioned integrity and
Execut	
ive	ethics in everything we do."
Vcice	"A strategy that accommodates unethical behavior is a
Preside	strategy doomed to failure."
nt,	strategy domined to failure.
Genera	Michael Luttig:
	Michael Luttig: "We are defining the <i>Boeing</i> culture and the <i>Boeing</i>
Couns	values, each and every one of us as we go along everyday.
el	In an open culture , the likelihood of unethical conduct is reduced."
	reduced.
	Mishael Course
	Michael Cave:
	"A culture where people are not afraid to raise issues,
	and not afraid to admit that they don't have all the
	answers is probably a culture where people are going
	to ask the right questions and bring the right resources
	to bear."

—	T	r	1	r –	James Bell:	
					"The end result of that is going to be ethical behavior in everything you do."	
					everytning you do.	
					Shanhand Hills	
					Shephard Hill:	
					"There can't be any question about what motivates us,	
					other than doing the right thing."	
					Scott Carson:	
					"It's my expectation that we all be part of owning and	
					perpetuating the culture that we value that has led to	
					our success."	
					James McNerney:	
					"By living within the values that produce the culture,	
					and by interacting and setting examples for others, it's	
					a big deal."	
1	Thomso	Jeff	Firm-	α	Jeff Turner (Spirit Aerosystems):	On a
May	n	Turner	Investo		Overall, we executed our core business well during the	modular
2009	Reuters	, CEO	r		first quarter of '09. Our results reflect solid performance	Enterpri
1	Researc	Spirit			across the company as we return to full rate production on	se
	h,	Aerosy			Boeing programs following the machinist's strike at	Archite
	excerpt	stems			Boeing which occurred late last year. Despite that strike at	cture's
	from				Boeing we achieved first quarter sales of \$887 million,	defense
	"Spirit				operating margins of 11% and fully diluted earnings per	of its
	Aerosys				share of \$0.45. Financially, the impact of the strike at	finanaic
	tems				Boeing reduced the first quarter earnings by \$0.18 per	al
	Holding				share. During the quarter the primary end market for	perform
	s, Q1				<i>Spirit's</i> core business continued to soften as demand for	ance
	2009					ance
	 Interview states and R 				commercial air travel declined. We've been taking the	
	Earning				appropriate actions over the past several months as we	
	s Call				focus on meeting our customer requirements and	
	Transcri				managing through the business cycle. I'll discuss	
	pt"				several of those actions we have taken in more detail in a	
					few minutes. During this quarter, we opened our new	
					Spirit Malaysia manufacturing facility as planned. Our	
					Spirit Europe team and Wings segment leadership did an	
					outstanding job of bringing the new facility online and the	
					new Malaysian team is doing a great job. As you know,	
					Spirit Malaysia's initial focus will be on Airbus products,	
					but over time, we'll provide value to products across the	
					company. The new operation is adding value immediately	
					in 2009. I continue to be pleased with our performance on	
					787 program. Our team continues to work well with the	
					customer and our suppliers regarding change management,	
					flight test preparation and production plans. We look	
					forward to making solid process on the 787 program	
					through the remainder of 2009. Now let me turn to slide	I
					six and give you a brief update on the 787. We delivered	
					aircraft number six in March, and aircraft number seven,	
					the entry into service airplane is progressing through	
1					systems installation process. Overall, product quality	
					remained high and we continue to work with the	
					supply base to enable a smooth production ramp up.	
					We are continuing to work closely with our customer as	
					we are continuing to work closely with our customer as we incorporate the necessary engineering changes on the	I
					we underline the necessary endineering changes on the	

initial end-service airplanes. Our internal efforts
remained focused on productivity improvement and
increased utilization of the capability we have in place.
We expect to restart forward fuselage production later in
2009. Now let me turn to slide seven, and provide you my
thoughts on the business environment. Clearly these are
challenging times. The global economy continues to
impact air travel across regions of the world. In the face of
these challenges, we are seeing our customers work to
match supply with demand. We've seen our customers
announce plans to delay development programs, to reduce
production rates on certain products, to forego previously
planned production rate increases on other products and
indicate caution yet continued solid demand for other
products. This tailored response by our customers due
to current market conditions from my view is a direct
result of the more measured increase in production
rates undertaken since 2006. The more measured and
tailored response is to market demand with the goal of
reducing the magnitude of cyclical swings to the extent
possible benefits stakeholders across the industry. We
know that the airplanes business go through cycles. And
we've learned much from the past that positions us well for
the future. We've structured business arrangements to
share upfront development costs for new programs. We've
maintained a continuous focus on cost and inventory
management as well as productivity improvement. We've
been prudently conservative in estimating future demand
for products, and we've taken aggressive proactive action
freezing executive management and some non-
management salaries, and are hiring only to revised (ph)
critical skills. At Spirit we've shown that our team can
respond effectively to changing business requirements in
difficult situations, and do so in innovative ways that keep
our company positioned to support our customers and to
create long-term value. We believe we are well
positioned to accomplish this at <i>Spirit</i> . Now let me turn it
over to Rick who will provide more details on our
financial results and outlook. Rick.
Rick Schmidt (Spirit Aerosystems):
Thanks Jeff, and good morning everyone. Slide nine,
summarizes our financial results for the first quarter
which continue to be influenced by the residual impact
of the strike at <i>Boeing</i> .
or the strine at boong.
Operating income margins were 11% in the quarter,
about a 160 basis points below the prior year period
largely due to the lower revenues from the strike and
the small negative cum-catch adjustment. Sequentially
margins were up significantly from the fourth quarter due
to higher sales volume in the absence of a \$27 million
negative cum-catch adjustment booked in the prior quarter.
a second a s
Jeff Turner:
Thank you, Rick. And I will wrap up on slide 18, with just
Thank you, thek. This I will mup up on shide to, will just

a few brief comments. Our core business is performing well. We are conservatively capitalized, and remain financially strong. While are passed the challenges posed by the strike, we are taking the necessary steps to successfully manage through this cycle, and our core businesses, and meet customer requirements on new programs. There is no question these are challenging times across the commercial aviation and aerospace industry. And we are well-positioned to manage through them. I believe that the current difficult economic time will pass, and when it does, Spirit is well-positioned to take advantage of future growth opportunities and to create value. We'll now be glad to take your questions.

Howard Rubel (Jefferies & Co.):

I want to talk about gross margin a little bit. I mean, it's significantly better than the fourth, but not quite as good as you've done. Could you put it in context of what you'd like to see for the balance of the year. And I mean, there are a number of offsetting items you have at some point of 320 rate change of 737, you might want to be preparing for some change there. And then, the 787 obviously becomes a greater part of the mix. So how should we think about what you're going to do with them, what you can do with gross margin to improve it from where it is and deal with some of the challenges?

Jeff Turner:

Well I think Howard. First of all clearly margins do come under pressure in reducing volume environment. Also I'd remind you of **the difference in margins as we shift to newer products, specifically the 787**, we've talked about that in the past. Clearly, we remained focused on working margins and productivity in our processes and so on. **But I do think we're in a period of time where margin expansion is going to be difficult,** and managing it to the right balance is appropriate for us, as we look to manage effectively through whatever downturn happens to be here, and prepare our self for the upside. Rick, you have anything to add to that?

Rick Schmidt:

Yeah, I would add to that Jeff. If you just look at margins for the remainder of 2009, and I got you saw from the margin percentage standpoint in the first quarter is pretty much what you'll see for the rest of the year. Now right now, all of our current contract locks largely extend through the end of this year. So, we're approaching to end of these locks and usually at the end of the blocks you don't have a lot in away of the prices or adjustments in your contract profitability, because most of it is driven by actual costs it's behind you. So, pretty consistent margins in the second half, Jeff mentioned mix, certainly, 787 as we've talked about in prior calls has lower margin on a base business. So that picks up, that will generate some downward pressure on margins. But offsetting that is

some revenue recognition and profit recognition on some of our newer programs, which have somewhat better margins than our legacy programs, and also our
aftermarket business continues to do well. And it has
somewhat better margins than our legacy business. Well,
for the near term, we those largely offsetting margins and
being fairly consistent over the next three quarters.
Doug Harned (Sanford C. Bernstein):
I am interested and wondering on the 787. And when you look at the design changes that you've tried, and seems
like there have been a pretty consistent flow of design
changes. How are you looking at now the sort of scale and
the timing of when you might get reimbursed from <i>Boeing</i> on this?
on uns?
Jeff Turner:
Well again I think we've talked about that in previous calls. There is a long term program, and a number of, the
number of pieces to that puzzle. I think it's sufficient for us
to say that we're making process with our conversations
with <i>Boeing</i> and we continue to work through the issues.
Doug Harned (Sanford C. Bernstein):
But you can't you don't know whether this will be
something that is likely part of the pricing that you have when you deliver as opposed to something that you will
receive in advance?
Jeff Turner:
Well, we've had some advances and Rick talked about that
from the impact on the finance of this quarter. And those
will continue in the future. But, I don't have anything to announce there in what we have other than the fact that
we continue to make progress. And we continue to have
discussions on a number of fronts. Rick, you want to add
anything to that?
Rick Schmidt:
No I would just I think Doug, you'll probably see a combination of both, as these issues get resolved.
Although I would say, given the kind of the current state
of discussions. It would gravitate much more towards
future price changes on products. Would be reflected over our contract lock and influence of the margins that
we've recognized in that lock.
Doug Harned (Sanford C. Bernstein): Okay. And than second question on labor , as you look to
the miscellaneous (ph) contract ending in 2010, how are
you approaching that today in terms of the way you are
thinking about discussions in advance, any kind of a timeline you may have for looking at those?
timenne you may have for looking at those?
Jeff Turner:
Sure. Let me just say, we've been approaching that for

	three and half years now. So, we see the relationship with our employees, and their representatives as a partnership that we have to work all the time. And clearly, we have a contract point mid-next year. But, you can rest assure that conversations are underway, have been. Clearly, we expect to reach agreements that are meet to needs our employees that are market based that clearly support the long-term viability of our company and achieve goals. It's in certainly, in the interest of the company and clearly in the interest of the employees that have a viable, vibrant spirit. So, I think we've approached that whole partnership from day one, as something that we need to keep in front of us all the time.	
	<u>Carter Copeland (Barclays Capital):</u> Okay. And one more on the 787, the inventory build in the quarter, how much of that was related to excess over average, relative to other?	
	<u>Rick Schmidt:</u> I don't have that in front of me Carter. But certainly, continuing to complete the units that are here, attracts costs. So, I would say the deferred costs certainly is a large component of the increase in the quarter.	
	Well certainly, as we start to get a more normal drumbeat of production, starting back up here on the 787 program, you're going to see the average cost per unit is going to come down dramatically. And then the units that we have in inventory today, both those that are nearing completion and those that are further back behind in our manufacturing process is been these units have been there now for a couple of years. Things continues to be build up, they continue to attract costs which makes the early units much more expensive than what we'll see going forward.	
	<u>Carter Copeland (Barclays Capital)</u> : But presumably, the benefits come from the units that are produced once you restart production, because all of the ones that are sitting there now are shouldering a lot of that cost over the past couple of years. So, you'll need to get through those units before you start seeing better excess over average performance.	
	<u>Rick Schmidt:</u> That that's absolutely right. But as you look at that graph though, the breakpoint, happens probably quicker than those people realize is. Again, this program has been in the stop and start mode for an extended period of time now . Now, once we really get going, I think you'll see that the play at which we hit the average. So right now, obviously our actual costs are over the average. But, the play that which we hit the average and start in effect eating into that deferred, I think will happen fairly quickly. It will	

happen within the first, 100 to 125 units.
happen within the mot, too to 125 units.
Robert Spingarn (Credit Suisse):
Rick, your guidance range is \$0.20. Could you talk about
some of the major swing variables that are in there?
Rick Schmidt:
Well I'm sure. Probably one big one that we've talked
about in the past is in the R&D area that the one
variable that we still have in R&D are the 787 derivatives. We have factored into our guidance some
spending, R&D spending for the derivatives. Now, how
much we actually spend this year is going to be based on
the schedule for Boeing schedule basically, for us
supporting them and bringing those derivatives to markets.
So, that is somewhat of an unknown yet, as to how much
will fall into this calendar year. I think at this point, we have been probably on the conservative side for how much
we think we'll spend this year. So, I think that's a variable
yeah certainly, revenues are always a variable. Right now I
think we have got a pretty good line of sight on what we
think revenues are going to be the rest of the year. And there is, the big variables would be how many 787 units do
we actually ship this year, how much revenue do we
generate from some of our new programs. And some of
those aren't based on shipping units. They are based on
completing engineering work and on milestones. So, I
would say those are the big ones. Gross profit obviously
follows the revenue. So, I think the gross profit absent some surprise that we can't foresee at this point, gross
profit will be in the range that we saw in the first quarter.
SG&A tends to be fairly predictable. We seen a fairly
constant level of SG&A over the course of the last year,
year and a half. So, I don't expect that to change much.
But I think its revenues R&D expense maybe a little bit in interest expense, obviously, with the draws on our revolver
that we've experienced in the first quarter, it carries some
interest expense with it. So, the timing when we are going
to be able repay those will have some influence. But I'd
say those are the big factors.
Robert Spingarn (Credit Suisse):
Okay. And then the other thing I wanted to ask about you
may have touched on this earlier, but how should we think
about 787 cash flow , as you start to ramp up deliveries.
And I am asking this in context of the advances that you've gotten from <i>Boeing</i> . So, can you walk us through how
those dynamics will evolve and then ultimately change?
Jeff Turner:
Well, what will happen is you might recall, we signed an
MoA last year, first quarter of last year. That provided additional advances in 2008. And the repayment
obligations for those units were that for those advances,
were that they basically, those advances basically
covered the first 45 to 50 units that we would deliver.

So, in effect, Boeing has already paid us for the first 45 to 50 units that we will deliver. So, as we deliver those units, that will -- that value of that delivery will apply a 100% to liquidate the advanced payment. So, the 396 million that we got in 2008 that will be repaid fairly quickly over the rest of 2009. And then we'll start to ramp up in 2010 and 2011. But once we have that behind us then we're back to the old schedule which was the original 700 million that we got, that was repaid 1.4 million a unit. So, once we get past this initial block of units, then we'll kind of revert to the schedule that we have before. Carter Leake (Davenport & Company Llc): And then any update on North Carolina facility. Is that still as far as timing, is that still on track as you mentioned on the last call? Jeff Turner: Yeah, it is still on track. Progress being made if you stop by Kingston, you will facility come in up out of the ground as it should, as you would expect and appreciate, we are being very prudent. It's frankly a good time in the environment to build. So, we are watching those contracts closely. And clearly being prudent as we know how to be the timing of those expenditures. That project is coming along very well. Joseph Nadol (J.P. Morgan): On the 787, can you update us on where you are in terms of your margin accruals there? And you noted in your slides mentioned that you are trying to get the perspective profits up there, what exactly are you doing? Jeff Turner: Well right now Joe, we are doing is preparing to speed up production. We have done a lot of work, if you will, analyzing the processes, and looking for a list of improvement options and opportunities, ones we get it running. The real key here for us to make improvements is get some production momentum. Once we do that then it comes off the drawing board to the reality of what's happening in the processes. And that's when we can really go to work, make any real improvements. So the most important thing for us is to get too drumbeat on that program and then make the in place improvements. Joseph Nadol (J.P. Morgan): And so we're still in a positive margin situation here in sort of a low single-digits, is that accurate? Jeff Turner: We are. We're in a small positive net margin for the three packages that we have on the 787.

<u>Cai Rumohr (Cowen & Company):</u> Yes, thank you gentlemen. On its call, <i>Boeing</i> described the pressures they're having from lower inflation escalations which they are unable to pass on to their suppliers and intimated they might make efforts to pass some of that pressure on. How are you positioned regarding inflation escalation and how far do your contracts are your contracts priced looking out on the legacy <i>Boeing</i> programs?
Jeff Turner: Legacy <i>Boeing</i> programs are priced through 2012. And I would just say parenthetically that all customers have price pressure on suppliers all the time.
Robert Stallard (<i>Macquarie Research Equities</i>): First on the 787, Jeff is there anything you could tell us in which month you expect to start delivering again and whether the monthly rate will be ramping up for a fairly consistent rate per month?
Jeff Turner: Well, a couple of volumes Rob, one is that we are delivering, now in fact we delivered unit number six in the first quarter. We have unit number seven in the final installation systems installation area and it will soon be ready for it poll. So, clearly the numbers that Rick gave, we're going to have to speed up production deliveries if you will to meet the demand for the rest of the year. The point that I made is that we have had the winding on the barrels the fabrication process shut down for quiet a while now and we will resume that later this year. The exact I did not mention and don't at this point intend to give the specific time when we start that back up. It will be very much dependant on the post signals that we get for the product. But we will be ramping up that airplane per the plan later on this year.
So if you look at the forward fuselage, it's still a little bit (inaudible) when exactly it's going to start and just something it sounds like its also a little bit time (ph) for what the exact rate will be per month as well?
Jeff Turner: But again, we've got a number of units in the process now. We've shipped through line unit six. I think we've told you before we wound through line unit 22. So, it's just a question of timing of as those pulls start and that pulls us back through our line when we fire up the winding process again.
<u>Rick Schmidt:</u> So I mean those are we were still on short work week for part of the quarter. Its when you have that kind of environment in your manufacturing facilities I mean

r						
					that always creates certain amounts of inefficiencies	
		(which end up showing up in deferred cost. So, I mean those will be unwound over the remainder of the contract	
13 May 2009	Seattle Post- Intelige ncer, "Boeing Worker Sues over Violate d Ethics, Wrongf ul Termina tion." (Andrea James)		Firm	α	lock." "An attorney who worked in <i>Boeing's</i> ethics policing division says that he was demoted to being an administrative assistant and then fired after raising concerns about violation of government regulations. Joseph Sicilia, who lives in Spokane, filed a lawsuit against <i>The Boeing Co.</i> with the King County Superior Court in April. A <i>Boeing</i> spokesman said Wednesday that the case has no merit. Sicilia worked for <i>Boeing</i> from 2001 until his firing in November 2007. For most of his time at <i>Boeing</i> , Sicilia worked in the Office of Internal Governance, which is the company's ethics department based at Chicago headquarters. He reported to supervisors in Seattle, the complaint says. One of Sicilia's responsibilities was to ensure that <i>Boeing</i> complied with promises it had made to the federal government to maintain its ability to bid on government contracts. In 2005, Sicilia perceived that certain policies enacted by his supervisor 'would result in the misrepresentation of compliance, thus equating to fraud,' the complaint says. Later on, other program changes made within <i>Boeing</i>	On allegati ons of a modular enterpri se architec ture's central trust mechani sms.
					further reduced corporate compliance with federal acquisition regulations, Sicilia believed. He reported his concerns up the management chain several times, but the lawsuit states that his complaints were never investigated. "Boeing's got a strong compliance monitoring system and effective mechanisms for reporting potential wrongdoing," Boeing spokesman Chaz Bickers said.	
					"The suit is clearly without merit and <i>Boeing</i> will defend it accordingly."	
					Sicilia's lawyer, reached by phone on Wednesday, says she intends to seek a jury trial. 'Boeing takes a scorched Earth litigation philosophy,' Spokane trial attorney Mary Schultz said. 'Never admit. Never acknowledge. Never say you're sorry.' 'This is one of these areas that the American public is very concerned about these days,' Schultz said, referring to the government contracting process. 'People like Joe Sicilia are very important for the integrity of the system.'	
					The lawsuit is filed in state court. <i>Boeing</i> faces at least two other wrongful termination suits in federal court."	
14 May 2009	Flight Internat ional, "Airbus	Tom Willia ms, EVP	Firm	β	" <i>Airbus</i> remains resolute that it sees no need for further single-aisle output cuts and could begin ramping up again by the end of next year. A320 family production, running at 36 aircraft a month, will be reduced to 34 a month (at	On an integral enterpri se
	Single- Aisle Output Could	Progra ms, <i>Airbus</i> ; John			the start of final assembly) by October. Despite pressure from some corners for further single-aisle cuts, executive vice-president programmes Tom Williams says <i>Airbus</i> is 'pretty comfortable' with the	architec tur's views on

ReviveLeahy, Nextadjustments it has already made, based 'watchtower process' that monitors each custo delivery two years ahead. 'Our visibility over the months is pretty good, but beyond that it g	omer and on
Year" Airbus delivery two years ahead. 'Our visibility over the	
Kingsle tougher,' he says. 'Into next year, we've l	
y-Jones) cushion with overbooking [of slots], more in the	
half of the year.'	
Chief salesman John Leahy says Airbus aim	
through the downturn with flat production rat	
than a boom/bust realignment of output. 'W	
through this crisis if airlines just do aircraft retin	
little bit faster during the 2009-10 period,' he add	
says that although single-aisle output is declining	
soon be heading up again. 'We had planned to g	
month, and I think that by late 2010 or 2011, you back at 40 again.' Williams agrees, saying that	
	AIrous Is
15TheTomFirmβ"Airbus chief executive Tom Enders is confident	t the new On an
May Australi Enders Enders Advantage And Australi Enders	an analysis for a carrier of the state of th
2009 an, , CEO experienced by its A380 superjumbo or the Bo	
" <i>Airbus</i> of Dreamliner. The 787 is almost two years late and	
Upbeat Airbus rumours of further delays despite Boeing's ins	
on the will fly by the end of this quarter. 'What m	
A350 confident is that we took as many lessons as	we could relativel
Schedul away from the A380,' Enders told The Austro	alian this y
e" week. 'But a lot still has to happen particularly	
(Steve training skilled workers is concerned.' Enders	
Creedy) two-year delay in the A380 because of wiring	
compatibility problems occurred mainly because	
who were not skilled enough. They	
management and blue-collar workers. 'And I most cases it was more management than bl	
workers,' Enders said. <i>Airbus</i> is planning to lau	
variants of the A350 in quick succession and ha	
483 firm orders from 30 customers since the p	
launch in 2006, a figure it says puts it 100 firm	
ahead of the 787 at the equivalent point in its p	
Enders said the manufacturer had looked to	its most
experienced staff from the 380 program to staf	
project. 'I always say, I readily admit, that less	
is perhaps less than 50 per cent of the equation,	
'The other half is anticipating new problems. This	
we are usually not very good, all of us.' En Airbus had also been looking at the problems exp	
by <i>Boeing</i> , including the huge supply chain prot	
Americans had faced with outside supplier	
extended enterprise. It seemed <i>Boeing</i> had	
lenient with its suppliers and risk-sharing	
Enders said <i>Airbus</i> intended to have close con	
its partners, rather than trust they would be	STREAM THE ADDREAM AND ADDR
and deliver the desired quality to discover p	
close to the delivery date. 'It's one of the th	
doesn't happen automatically,' he said. 'It's	
our extended enterprise concept.' Airbus was	also not

27 Wall May Street 2009 Journ "Boe CEO Confi nt 787 Schee e, Lou Term Succe " (A Keeto	al, ney, ng Chair man de and in CEO, The ul Boeing ng- Compa ny ss nn n)	Firm	α	'It's not a risk-free or challenge-free program,' Evrard said. 'But we are on time, we are progressing along where we are meant to be with the maturity gates (milestones). We met the first important one on time and we are ready for the second one.' He said <i>Airbus</i> was standardising its processes to make sure suppliers used the same tools, the same methods and processes and that it reinforced a collaborative mindset. He pointed to a composites demonstrator program which built fuselage mock-ups as an example. Evrard said it was important to have the designers and manufacturing people working together on the platform from the beginning. Designers are also looking at simple and efficient aircraft systems aimed at improving reliability. These include opting for just three fuel tanks so there are pumps, a two-circuit hydraulic system, simpler air system architecture and design in the landing gear. <i>Airbus</i> estimates maintenance should be a 'base visit' every 36 months, with a structural overhaul required only every 12 years. It says this equates to about a 10 per cent reduction in maintenance costs on an A350-900 compared with the 787-9." " <i>Boeing Co</i> is confident that its new 787 aircraft will hit near-term milestones, including first flight in June and first delivery early next year, but it won't make money for a while, Jim McNerney, <i>Boeing's</i> chairman and chief executive, said Wednesday. 'The good news is that we have what I'm confident will be the best-selling airplane of all time, which gives us time to work on profitability,' McNerney said during the <i>Sanford Bernstein</i> Strategic Decision Conference. It is typical that new aircraft don't make money during the development stage, but the 787 experienced costly and unexpected manufacturing-related delays of nearly two years. Down the road, <i>Boeing</i> can improve profitability of the program by further tweaking the manufacturing process, as well as modifying the plane itself, he said. 'We can streamline supply chain and take more weight out of the airplane,' McNern	On a modular enterpri se architec ture's long- term views.
June sWeel 2009 "Boel				takes wing above Washington State in its first test flight later this month, much will be riding on its sleek, carbon-	non- systemi

			
's	Chair	fiber back. Some 56 buyers, ranging from <i>Etihad Airways</i>	C structure in
Dreamli	ma and	in the United Arab Emirates to Northwest Airlines, have	strategie
ner	CEO,	ordered 866 of the planes—enough to keep <i>Boeing</i> busy	s of a
Nears	The	for more than a decade. This state-of-the-art plane, slated	modular
Takeoff	Boeing	to make its first commercial flights with Japan's All	enterpri
"	Compa	Nippon Airways early next year, will set the Chicago-	se
(Joseph	ny	based manufacturer apart from Airbus and other rivals for	architec
Weber)		years to come. But one thing the plane won't do is give	ture.
		Boeing much of a financial lift—at least not for several	
		years. First, Boeing will need to recover its research-	
		and-development costs, estimated at \$3.5 billion to \$4.5	
		billion. What's more, initial customers are expected to	
		pay a discounted price of \$130 million to \$170 million	
		per plane. That's far less than what Boeing pulls in on	
		such tried-and-true models as the 747, a bigger plane that	
		can retail for more than \$300 million. At first, a Boeing	
		spokesman says, the new plane will be a "zero-margin"	
		affair.	
		The air travel slowdown, which is punishing carriers	
		around the world, looks likely to keep the number of new	
		planes in the skies down for a while. 'This looks like a	
		three-year downturn,' says Richard Aboulafia, a vice-	
		president at aerospace consultant the <i>Teal Group</i> . Boeing	
		reported on June 4 that it received just 20 orders for all of	
	I	its commercial jets in May, down from 67 in May 2008.	
		Commercial plane sales are likely to account for as	
		much as \$33.7 billion out of <i>Boeing's</i> expected \$68.2	
		billion sales in 2009, BernsteinResearch analysts	
		estimate. But next year the commercial unit's sales will	
		probably slip to \$29.7 billion, they add, dragging down	
		Boeing's overall tally to \$64.6 billion. And net income	
		could slide from an expected \$3.3 billion this year to \$3	
		billion in 2010. Nonetheless, investors appear to be	
		excited about the Dreamliner's prospects—as well as by	
		reports that United Airlines may order as many as 150	
		planes from either Boeing or Airbus this fall. Investors	
1		have bid Boeing's share price up to about 50, the	
		highest it has traded since last fall and up sharply from	
		about 29 in March. Of course, Boeing shares fetched more	
		than 107 in the fall of 2007.	
		The company expects to roll out just a half-dozen of the	
		Dreamliners this year for testing. Then, once it is cleared	
		to fly commercially, Boeing is expected to deliver about	
		15 to carriers next year. The company says it will ramp up	
		manufacturing to produce as many as 10 planes a month	
		by the end of 2012, though analysts are skeptical of that	
		aggressive timetable. <i>Bernstein</i> analyst Douglas Harned	
		suggests the 10-per-month rate is more likely by mid-	
		2013; he expects only about 60 of the planes to leave	
		factories in 2012. Says Harned: 'The manufacturing	
		processes used to produce these aircraft are new, and the	
		ability to reach 2012 production rates has not yet been	
		demonstrated.' Boeing management contends it can	
		meet the production time lines. Even though the plane	

7 June 2009	The Washin gton Post, "Behind GM's Attempt to Change its Image is Ambiva lence about its Car of the Future" (Michae I Leahy)	Bob Lutz, Vice Chair man, <i>Gener</i> al <i>Motors</i>	Firm	α	is already two years late and still must convince regulators that it will be airworthy for the decades of service each is likely to see, executives argue that they have solved the supply-chain problems that dogged the program. 'The airplane will fly in June, and we will embark on the flight-test program,' Chief Executive Officer James McNerney Jr. said at a recent investor conference. Afterward the company will increase production to the 10-per-month rate. Says McNerney: 'We think that's manageable.' With airlines struggling with overcapacity and tight credit, <i>Boeing</i> will be hard-pressed to move more planes of any kind. The company has trimmed production plans for this year and is cutting its workforce by some 10,000 jobs, largely because of lackluster demand. <i>BernsteinResearch</i> figures the company will deliver just 386 planes of all sorts next year, down from an expected 456 this year. The firm estimates that <i>Boeing</i> will deliver only 301 models of its most popular plane, the 737, compared with an expected 358 this year. 'The real issue is: Do the airlines need the airplanes? In 2010 we believe they do not,' says Harned. Of course, analysts may have to rework their projections if orders such as the expected one by United come through.'' "Even now, as <i>General Motors</i> fights for survival, there is something ambivalent about its prescription for saving itself, a conflict implicit in a bit of symbolism that recently greeted arrivals to the Detroit Metropolitan Airport even before they reached baggage claim. One of <i>GM's</i> touted new automobiles sat on display in the center of the automaker's airport gift shop. It was not the coming electric car, the 2011 Chevrolet Volt, championed by Bob Lutz, the <i>GM</i> executive most identified with the Hail Mary that the vehicle represents for the bankrupt company, which faces the immediate future as a ward of the federal government. It was not even a mid-level sedan called the Chevy Malibu, which has received flattering reviews and awards, in part for its better-than-average	On a modular enterpri se architec ture's view of its integral competi tor
					efficient vehicles, the glory days can somehow be	

	the nucleus of the company's research and development	
	efforts. It is the kind of Detroit-speak he favors. 'Some	
	people don't care for those kinds of descriptions today	
	it's a different time,' says Lutz, who drives a gas-thirsty	
	2009 Corvette, a dream car of muscle lovers. 'But we	
	have new vehicles, too. We have the Volt. We are	
	committed to the electrification of the automobile. We	
	know this is the time.' If you were to believe that Lutz	1
	commissioned the Volt because he thinks the environment	
	needs to be saved from carbon dioxide emissions, or that	
	the United States has a moral obligation to lead a greening	
	of the planet, you would be wrong. 'If you look at most of	1
	the mainstream media, you get the impression that 95	
	percent of Americans today want a vehicle like the	
	Chevrolet Volt or a [hybrid such as the] <i>Toyota</i> Prius,'	
	says Lutz, until recently the former head of GM 's	
	global product development and nowadays the	
	company's vice chairman and senior adviser. 'And	
	that, by God, the reason General Motors is in trouble, is	
	that we have not offered a vehicle like that. But when	
	you look at the reality, at today's fuel prices, most	
	Americans still want a conventional car.' Why the Volt	
	then? 'Because it is an important symbol. We need it. It	
	has a chance to change our image,' he says. As GM's	
	situation has become increasingly dire, and interested	
	parties from President Obama to shareholders have	
	demanded that the company start making more fuel-	
	efficient cars, GM has pointed to the Volt as evidence of	
	its changing ways. But the values that have long shaped	
	this iconic company are deeply held, especially the	
	passion for pushing the envelope of automobile	
	performance and power. In many ways, the Volt, and	
	<i>GM's</i> subtle shift from old design priorities, represent a	
	contradiction of those values. Meanwhile, some	
	industry observers are unconvinced that the Volt, even	
	if it runs flawlessly, can be the company's savior, and	
	view it as a miscalculated effort to woo back customers	
	by awkwardly trying to demonstrate a new cutting-	
	edge bent. 'I just think GM is focusing on the wrong	
	thing,' says Daniel Roos, an engineering professor at the	
	Massachusetts Institute of Technology who studies the	
	automobile industry. 'The quality of its cars was horrible	
	in the '70s and '80s, but it's much better now. It has world-	
	class vehicles: the Malibu and the Cadillac CTS. They	
	should be [promoting] those and capitalizing on their	
	strengths.' While regarding the Volt as a sign of modest	
	progress within GM , some critics see the car as	
	basically another half-step in a company prone to half-	
	steps. They point to the Volt's internal-combustion	
	gasoline engine dubbed by GM as a 'range extender,'	
	meant to supply electricity to the motor after the vehicle	
	has exhausted its 40-mile range on battery power alone	
	as an indication that the plug-in electric car is not quite	
	what it purports to be. To these critics, the Volt neatly	
	reflects long-standing problems in GM's corporate	
	culture: a propensity for knee-jerk responses, an	

inbred caution even in the midst of reform and a
lingering preference for comfort over efficiency. Lutz
vociferously rejects such characterizations. Not only does
the Volt demonstrate GM's 'commitment to changing,'
he says, but also the car is simply 'the first generation of
an electric vehicle from GM' that will produce successive
generations of enhanced Volts, ultimately leading to a car
running entirely on electric power in excess of 150 miles.
Producing a car that does not scare away the customer
with its technology or cost must be GM's mission for
now, he says. The Volt has staunch supporters, too. A
school of automotive analysts thinks that the car represents
one of the last opportunities for GM to distinguish itself, to
lure environmentally conscious buyers, in particular.
Admirers and detractors alike largely agree on one point:
that, if GM is to recover, the Volt must be part of a broader
effort to reform the company's culture and push it toward
acquiring new automotive passions. The question
remains how GM executives, so proud of their
company's history, so in love with the cars of an earlier
generation, will cope with their own ambivalence to
change. And no one in the corporation embodies that
ambivalence more than Bob Lutz. Lutz strikes some
observers as an unlikely figure for launching an electric-
car program. The 77-year-old silver-haired, tanned and
gregarious former Marine aviator rides motorcycles, pilots
a helicopter that his <i>GM</i> colleagues say he lands on his
driveway, once called global warming 'a crock,' and
appeared on David Letterman's and Stephen Colbert's
shows to banter about <i>GM</i> 's hopes for the Volt. Just the
new language associated with environmentalism irks
him. He momentarily looks bewildered when asked
whether the place of the modern vehicle is undergoing
a change in the culture, whether in time Americans
might chiefly appreciate a GM car simply for its
'utilitarian' value, a reliable conveyor of riders from
point A to B. Lutz raises his eyebrows.'Utilitarian?' A
car is not an appliance, he says. A car is not a washing
machine the proof of which is that people do not lust
after their washing machines. They lust after a
beautiful car, he says. If you want reliable, go get
yourself a refrigerator. A gorgeous car, he says, is an
expression of power and yearning, especially for
owners who hope the vehicles will inject excitement
and romance into their otherwise mundane lives.
'Show me a washing machine that can do that,' he says.
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For years, Lutz worked under GM chief executive Rick
Wagoner, a longtime company finance chieftain who
green-lighted the Volt but was preoccupied in the last
years of his tenure with issues of GM 's crushing debt and
how to keep the company from collapsing. Last
November, when Wagoner made the public relations
mistake of flying to Washington on a corporate jet to ask
congressional officials for government bailout loans, his
image was irrevocably damaged. A month later, in one of
inage was interocating damaged. A monur later, in one of

his last high-profile appearances, Wagoner rode in a Volt	
prototype along Washington streets before the second	
round of hearings on the nation's crippled auto industry,	
part of his effort to trumpet GM's evolving environmental	
focus. But by then the executive's fate was sealed, a	
consequence of the belief that he was linked with an out-	
of-touch company. Pushed out by the Obama	
administration, Wagoner gave way to new chief executive	
Fritz Henderson, who quickly reaffirmed the company's	
commitment to the Volt. During the tumult, Lutz went on	
working, a self-described car man ensconced at a safe	
remove from the finance men's woes and budget-slashing,	
and happiest when he is talking about horsepower,	
speed and performance. His office at the Technical	8
Center here in Warren sits amid a research-and-	
development behemoth. Security is tight; visitors are	
screened for camera equipment and anything else that	
might procure trade secrets about prospective vehicles.	
Near Lutz's office is a reflecting pool immense enough	
to be a large pond. Farther down is a building called	
Design North, where for decades, in a special showroom,	
executives unveiled new GM automobiles for the brand's	
dealers and other VIPs in a venue that once doubled as a	
theater of sorts for entertainment luminaries flown to	
Detroit to perform for the dealers, a roster that included	
Lucille Ball and the Beach Boys. GM's only real	
competition at the time came from Ford Motor Co. and	
Chrysler Corp., backyard rivals with nearly identical	
union-negotiated labor costs and roughly similar	
product lines. It was an era of near absolute power for	
the Big Three in the American auto market: They	
could set a car's retail price at virtually any amount,	
certain that consumers somewhere would buy it.	
Prodigious profits led in time to prodigious costs.	
Pressure and the threat of strikes from the United Auto	
Workers union, wanting its share of the Big Three's	
bounty, guaranteed not only rising wages that served	
as workers' ladder to the middle class but also lifetime	
health care and growing pensions. In time, GM was	
responsible for funding more than 1 percent of all the	
health-care costs in the United States. While smaller	
and fledgling auto companies in Japan and Europe	
were disciples of lean operations during the 1960s, in	
preparation for one day becoming viable competitors,	
GM preached expansion in the name of more product	
brands and winning vehicles, shying away from no	
expense if it might mean producing a more artful,	
powerful and extravagantly appointed car. 'A lot of	
waste in the glory days,' observes Lutz, who	
remembers former GM design chief Bill Mitchell	
authorizing the purchase of a new Ferrari V-12 engine	
just so he could demonstrate to subordinate engineers	
what he wanted the engine of another GM car, the 12-	
cylinder Pontiac Firebird, to sound like. 'He spent	
what today would be like \$75,000 to get the engine,' a	
laughing Lutz says. 'He could have done the same	
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things with a recording or he could have rented a	
Ferrari for a day. It's hysterical when you think about	
it, crazy. It was a flamboyant era.' That is all gone	
now. GM long ago stopped bringing famous entertainers	
to Design North. In late March, the car being shown off	
there is the four-door Volt, its metallic aquamarine paint	
job twinkling preternaturally under track lighting. Powered	
by lithium-ion batteries and scheduled for sale in	
November 2010, the Volt will be able to transport a driver	
as many as 40 miles on battery power alone before it needs	
to be recharged, a task as simple as plugging into an	
available outlet. The Volt was Lutz's idea, part of his	
goal to remake GM's image from that of a corporate	
dinosaur mocked for creating the kind of gas guzzlers	
he tends to favor personally into a cutting-edge 21st-	
century technological force capable of besting any of its	
Japanese competitors. No rival occupies so much of his	
attention as the company that has supplanted GM as	
the world's chief auto seller, Toyota. Lutz sees several	
reasons for Toyota's ascendancy, none more important	
than becoming the darling of media analysts and	
environmentalists in the wake of its seminal hybrid, the	
Prius. By early this decade, the Prius had become a	
genuine phenomenon, envied by competing auto	
executives less for its sometimes pallid sales numbers than	
for how the hybrid with the funny-looking sloped roof had	
stamped Toyota in consumers' minds as the industry's	
leader in technology, fuel-efficiency, reliability and	
forward-thinking environmentalism. In early 2006 -	
'much too late,' he acknowledges now a troubled Lutz	
saw that driving a Prius constituted nothing less than a	
values statement for many of its owners, a means to bask	
in the perception of their own enlightenment. Even more	
alarming, thought Lutz, was that some consumers not	
enamored of the Prius itself nonetheless saw its existence	
as proof of Toyota's wisdom. The Prius's presence alone	
was drawing people to Toyota lots, where the curious	
bought everything from bigger sedans to sport-utility	
vehicles and trucks with about the same gas mileage as	
their GM counterparts, groused Lutz. Part of what he	
called the 'halo effect.' One sporadically selling hybrid,	
he realized, had greened an entire company and	
catapulted nearly every vehicle in its product line. It	
was a disturbing sea change for GM executives. What	
the 1920s Model-T had been for Ford a transformational	
vehicle cementing the impression of the company's	
dynamism the Prius was proving to be for <i>Toyota</i> .	
Meanwhile, American automakers, including <i>GM</i> , suffered	
under the perception that they were stuck in yesteryear and	
saddled with cars of inferior quality. Personally, Lutz	
was scornful of much about the Prius. He thought it	
'pretty ugly,' he says, and technologically unexceptional. But he could not deny the shrewdness of	
Toyota's long-range strategy. He came to see a benefit in	
what he regarded as the Prius's homely features,	
particularly the sloped roof. 'That's where Toyota did a	

very clever thing: The Prius had its own unique
appearance,' he says. 'Just like the Volkswagen Beetle was
ugly in the '50s, the Prius had a certain ugly chic about it
that appealed to a lot of people, the same kind of
trendsetters who'd bought the Beetles long ago because to
do it was cool and showed you were not part of a
materialistic society.' If any moment presented GM
executives with an opportunity to overcome the
unfavorable perception of the corporation, Lutz thinks, it
came on the eve of the Prius's arrival in the American
marketplace. The Prius was already a moderate success in
Japan, where Toyota had introduced it in 1997, and GM
executives had to decide how, if at all, to respond to a
competitor's hybrid in the United States: Should they
enter the hybrid competition, too? Lutz and other GM
executives met at the company headquarters in Detroit
to ponder the matter. 'Somebody said, 'Do we have
[hybrid] technology?' ' Lutz remembers. " 'Oh, yeah,'
was the answer. 'Oh, yeah, we got the technology.
We've been building hybrid prototypes since the late
'60s.' Another executive asked what the cost of the
hybrid investment would be." 'Well, we're probably
talking about \$600 [million] to \$700 million,' "
someone answered, as Lutz recalls. Finally an
executive asked, 'What would we sell this thing for?'
Well, the answer was: No matter how we twist the
numbers, we were going to lose a couple of hundred
million dollars a year,' Lutz recalls. 'And Rick
Wagoner quite rightly, along with the finance people,
said, 'We can't do that. We can't go to the board of
directors and come up with a program [for hybrids]
costing the bigger portion of a billion dollars and when
the board of directors [asks] why are we doing this, we
say, 'Well, we're going to lose money on it, but, well,
we're doing it to show that General Motors is
technologically advanced and environmentally aware.'
You know, back then, that wasn't going to receive a
very warm welcome.' The decision was made not to go
forward with a hybrid program. For a while, nothing
that Lutz and other GM executives saw in the Prius's sales
number made them think they had made the wrong
decision, Lutz says. But within a couple of years of the
Prius's release into the American market, he began
wondering whether GM had made a serious mistake.
The halo effect had created the perception that all
Toyota cars and trucks, regardless of size, were imbued
with the company's famed fuel efficiency. Meanwhile,
Lutz noticed that the attention paid the Prius had not
diminished Toyota's eagerness to produce big
profitable trucks and SUVs. The rival was climbing in
every category. In early 2006, Lutz decided that GM
could no longer afford to be without a dramatic response
to the Prius and other competitors' models. He walked into
the office of Jon Lauckner, vice president of global
program management and director of the corporation's
advance design, and said he wanted a 'game-changing
auturio design, and said ne wanted a game-changing

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	car' capable of reestablishing GM as the worldwide	
	technological leader. Determined to leapfrog the Prius	
	and all other hybrids, Lutz proposed a purely electric	
	car, powered by lithium-ion batteries, which would	
	have a range of 150 miles or so before needing to be	
	recharged. He was an ardent believer in battery	
	technology, following a three-year stint as the chief	
	executive of a battery company during the 1990s. It was	
	not the first time someone at <i>GM</i> had said he wanted an	
	electric car. The last such effort at the Technical Center	
	had not ended well: During the '90s, the automaker spent	
	more than \$1 billion developing a small two-seat electric	
	vehicle known as the EV1, using heavy nickel-lead batteries before concluding that it was cost-prohibitive for	
	consumers and scrapping it to the disgust of fervent EV1	
	fans and environmentalists. Lauckner, who had carefully	
	studied the EV1 and thought that the car would have been	
	wholly impractical with nickel-lead batteries, saw similar	
	problems with Lutz's vision of a car intended to go far on	
	lithium-ion batteries. 'Too expensive,' said Lauckner, who	
	made clear that with all the batteries needed for a vehicle	
	to travel about 150 miles, Lutz would merely be making	
	another battery-heavy, cost-prohibitive car. Known in GM	
	corridors as 'The Wizard,' Lauckner immediately had two	
	suggestions: a smaller battery pack that would at once	
	make the car affordable while guaranteeing the typical	
	American worker a ride long enough for a round-trip	
	commute each day; and a modest gasoline engine that	
	would kick in only if and when a driver ran down the	
	battery power. The engine would have an entirely different	
	use from the standard internal-combustion engine,	
	generating electricity to power the electric motor and, in	
	the process, extending the vehicle's range. Then Lauckner	
	removed a fountain pen from his pocket and started	
	furiously scribbling calculations that in time proved	
	prescient about everything from the necessary battery size	
	to the dimensions of the little gasoline engine. Later, with	
	<i>GM</i> surveys indicating that 78 percent of U.S. workers had	
	daily round-trip commutes of 40 miles or fewer, Lutz	
	posited that the vast majority of Americans who drove their electric cars would ordinarily never need a drop of	
	gas. Forty miles became what Lutz and Lauckner called	
	the 'sweet spot' for their new battery's range, the distance	
	at which they surmised that most buyers would feel	
	comfortable with their electric car's capabilities, knowing	
	they had the backup of a gasoline engine capable of taking	
	them more than 300 miles. What made the 40-mile battery	
	range so ideal, Lauckner said, was that the distance did not	
	necessitate a mammoth-sized battery pack that would put	
	the car out of the financial reach of all but the rich. For	
	the first time, Lutz thought he saw a viable plan. And	
	while the presence of a gasoline engine meant that GM	
	could not call it a purely electric vehicle, Lutz and the	
	marketing people finally settled on an alternative	
	description that struck Lauckner as just right: 'extended-	
	range electric vehicle.' Not every GM official has always	

shared the Volt team's confidence or agreed with the	
timetables of Lutz, who by early 2008 openly talked about	
the Volt coming out on the market in late 2010. Noting the	
ongoing questions about battery issues, Wagoner publicly	
indicated then that he was not so sure, saying only that a	
release date for the electric vehicle was 'fluid.' But in the	
summer of 2008, at a forum attended by other auto	
executives and then-presidential candidate Barack Obama,	
Wagoner recalibrated his position. Under increasing	
pressure from government officials to demonstrate $GM's$	
broad commitment to more fuel-efficient vehicles, the	
beleaguered chief executive confidently restated GM's	
goal to bring out the Volt in 2010. After Wagoner's	
resignation this year, the newly installed Henderson and	
his lieutenants reiterated the company's support of the	
Volt, despite indications, he said, that the car would lose	
money in its early years. For all the bold talk, the Volt	
project exudes caution. Only about 10,000 of the vehicles	
will be built in the first year, a limited production run that,	
with the considerable cost of the lithium-ion batteries,	
virtually guarantees a high market price, probably about	
\$40,000. Lutz is not worried: He expects the 10,000 cars	
to be purchased quickly by well-heeled electric-vehicle	
diehards who will receive a federal tax credit of \$7,500.	
While acknowledging that the price is a lot to ask of	
middle-income consumers, Lutz stresses that he sees the	
Volt falling to \$25,000 or \$30,000 in future generations as	
technological advances and economies of scale cut the cost	
of batteries. But no matter the vehicle's cost or loss in the	
early years, he thinks the Volt must be built for his	
desperate company to have any chance of displaying its	
competence and new attitude. Failure now would be a	
public relations disaster, he insists. 'We're talking about	
our image here $$ about remaking GM ; it is essential to get	
this done,' he says. Just the same, he would like to see	
more help from the federal government, perhaps a boost of	8
the \$7,500 consumer tax credit for the Volt, arguing that	
with the considerable support that Asian and European	
auto companies have received from their governments that	
such a subsidy is richly warranted. The Obama	
administration, however, has projected its own concern at	
times about the Volt, an ambivalence that in moments has	
resembled that of skeptics. While administration officials	
have offered flattering descriptions of the Volt's potential,	
Obama's auto task force noted the persistent questions	
about the car's expected losses and whether its high price	
tag might limit its appeal. Lutz senses the government's	
surprise over how much it will cost to realize its vision of	
a remade auto industry. Recalling a visit to the Technical	
Center by Obama task force leaders Steven Rattner and	
Ron Bloom, he says, 'We took them through a lot of our	
advanced technology plants. And I will tell you that when	
they saw the cost of some of these solutions' and	
technologies such as batteries and hydrogen fuel cells	
'they were stunned. These are very intelligent and well-	
informed people, but they, Bloom and Rattner, were just	

amazed about what a lot of this stuff is going to cost.'	
Despite the seeming worries, Lutz sees important social	
forces working in the Volt's favor, notably the passionate	
desire of influential environmentalists and the intellectual	
establishment to have electric cars succeed, he says, a	
movement that strikes him as already creating an artificial	
marketplace, a rigged game of sorts. His cynicism seeps	
out when he ponders whether a single vehicle can restore	
GM's charisma and consumers' confidence. 'Yes, it can,	
because sex and charisma are to a certain extent	
redefined today, especially by the media and especially	
by the government,' he says. 'The focus now is on	
conservation, the lowering of CO2s, sustainable energy	
and so forth. So today, to be frank, we've got two	
markets.' Lutz thinks something else is working on his	
side and that of the Volt: 'Obama has said that he	
wants a million plug-in vehicles on the market by	
2015." The federal government, which will effectively	
own about 70 percent of GM , must be heeded now, he	
realizes. For now, Lutz views the Volt as nothing less	0
than the vehicle that helped deliver a government life	
preserver to a drowning corporation. 'Think where GM	
would be now if we had not made the decision to	
productionize the Volt, a year and a half ago,' he says and	
leans back in his chair. 'That is the real question. You	
could argue that we were late but that the Volt has now	
become the focal point, the rallying point for the pro-GM	
forces. We can say, 'See, we can transform the automobile;	
we can be the company that electrifies the automobile.' We	
can say, 'Yes, we can.' " Lutz grins. Not everyone shares	
his view that it is the right car at the right time. Barry	
Bluestone, a political economy professor at Northeastern	
University whose late father spent years as a United Auto	
Workers vice president dealing primarily with <i>General</i>	
Motors, fears that the Volt will look far less attractive to	
consumers than an array of new and established hybrids	
selling for much less. 'The car isn't coming out for	
another year, and it has an extraordinarily high price,' he	
says. 'I don't see how many people are going to get excited	
about a \$40,000 car, even with a tax credit, when they can	
spend about half of that in some cases to get a hybrid. The	
Volt might be the car of the future, but it certainly isn't	
the car of the present.' The vehicle will face an array of	
competitors. Tesla Motors, a Silicon Valley company,	
already has produced and sold a small number of all-	
electric cars priced at about \$100,000, with reported plans	
to sell an estimated 1,500 cars this year. The Mitsubishi	
Corp. is launching its own electric car, MiEV, this summer	
in Japan. And China will soon present an electric vehicle	
that it eventually hopes to put on the foreign market.	
'There's already an enormous amount of competition and	
perhaps a global overcapacity,' MIT's Roos contends. But	
GM's greatest hurdle remains its own image. Lutz and	
other company executives are looking at what might be	
a Gordian knot. How do you continue promoting and	
selling the big powerful glory cars while arguing that	

you are a new GM? 'You do it with a car like the Volt,'	
Lutz says. 'But we can't make any mistakes with the Volt.	
We know we're facing a perceptual problem.' He frowns	
and encapsulates what the modern view of the company	
has become: 'It's that we make all our money off sport-	
utility vehicles and large pickup trucks and V-8	
engines, that we don't care about the environment, that	
we pooh-poohed the <i>Toyota</i> Prius as being	
economically unsound' he pauses and plunges ahead –	
'which, at today's fuel prices [about \$2.40 a gallon at that	
moment], it still is, by the way.' He knows how impolitic	
that will sound to some people. He smiles ruefully, not	
backing down. 'The customer will never recover the	
premium paid for the [Prius] hybrid system in fuel	
economy,' he adds. Lutz is of two minds when talking	
about the auto industry's evolution. The executive in	
him trumpets the Volt as a key to the company's	
future. The romantic in him wishes the government,	
the media and the critics would leave the big, powerful	
cars alone. He is already mourning what he sees as an	
inevitability: the slow, painful death of the dazzling	
machines. 'In time, the government is going to legislate	
out of existence cars like the Camaro, the Corvette, the	
Cadillac CTS all these acclaimed vehicles that have	
lately gotten rave reviews from the automotive press	
around the world,' he predicts. 'So, ultimately, we are	
driven by legislation into the kind of excitement provided	
by the Volt.' He says this without a scintilla of sarcasm.	
At his core, as he frequently tells people, he is a car guy,	
drawn to the technological challenge the Volt presents,	
fascinated by the potential of batteries, understanding that	
whoever prevails in the electric-vehicle competition may	
be immortalized along with his car. It is just that he	
cannot shake his conviction that, in the name of	
change, Americans are being asked to give up	0
something that defines them and their culture, a beauty	
and roar to which no monetary value can be attached.	
Few things in his existence give him more pleasure	
than driving his Corvette for the hour it takes him to	
get to his home in Ann Arbor. He smiles while talking	
about the 2010 Camaro, the car still sitting at that moment	
in the GM airport gift shop. 'Given the tough economic	
times and the high priority of fuel economy, we were	
almost wishing we hadn't done the Camaro,' he says. 'We	
looked at it as something radically mistimed.' But he says	
the high number of advance orders for the car has justified	
his skepticism about just how deep the public's love for	Č.
green cars will ever be. 'When you get out into the	8
marketplace, it's probably just 5 percent of the public	
that desperately wants something environmentally	8
sound and is willing to pay a premium for it,' he says.	
'I would say the East and West Coast intellectual	
establishment kind of lives in its own world. When you	
get to the broad American marketplace, excitement is	
still kind of defined in the way it used to be.' He is	ĥ
finished for the day. His career is winding down, he	

Evolution's Cunningham is advising investors to bet
against planemaker stocks now, rather than a few days
into the Paris show, when short-selling after the hoopla
of order announcements has been a common strategy.
The collapse in orders will be followed by a 'deep
decline' in deliveries spread over three to four years,
the analyst said. He favors selling shares of European
Aeronautic, Defence & Space Co., the parent of Airbus,
and also shuns engine manufacturer Rolls-Royce Group
Plc. John Leahy, Airbus's chief operating officer,
predicts that output won't change much in 2010.
Boeing hasn't given a forecast. The manufacturers plan
limited production cuts, even as airline traffic falls.
Singapore Airlines Ltd. says it will mothball planes if it
can't sell or lease them. British Airways Plc is
grounding aircraft and cutting winter seating by 4
percent. Southwest Airlines Co., the world's largest
discount carrier, will reduce capacity by 6 percent this
year. Global airline losses may total \$9 billion in 2009
as revenue drops 15 percent, the International Air
Transport Association said June 8, doubling a three-
month-old forecast. IATA Chief Executive Officer
Giovanni Bisignani said planemakers may deliver 30
percent fewer planes in 2010 and must trim production
accordingly. The forecast is close to that made in
February by the biggest Boeing and Airbus customer,
Steven Udvar-Hazy, CEO of International Lease Finance
Corp. He predicted that planemakers will cut as much
as 35 percent, starting in the fourth quarter. The
manufacturers reject that contention, yet a number of
suppliers are making contingency plans for drastic rate
changes. 'There's considerable skepticism in the
supply base that <i>Boeing</i> will be able to hold production
rates level on the narrowbody line, in spite of their
insistence that they've overbooked production slots
enough,' said JB Groh, an analyst at D.A. Davidson & Co.
in Lake Oswego, Oregon. GKN Plc, Britain's biggest
maker of airliner parts, predicted in January that
demand for single-aisle planes would plummet by
midyear. Narrowbody planes include <i>Boeing's</i> 737 and
Airbus's A320 series, and represent two-thirds of
deliveries. 'Narrowbodies is probably an area that will get
hit,' with reductions of as much as 25 percent in 2010 and
2011, said Zafar Kahn, an analyst at Societe Generale in
London. <i>Airbus</i> intends to reduce monthly output of
A320-series planes to 34 from 36, starting in October. It
also will freeze output of widebody A330s and A340s.
Boeing is slashing production of the 777 by 29 percent to
five a month, starting midyear 2010, and postponing rate
increases on 767s and 747s. The U.S. company said in a
May 21 meeting with investors that it won't need to
revise narrowbody plans. Analysts say otherwise, with
at least five predicting the next day that <i>Boeing</i> will
announce a 737 rate cut this year. Boeing reduced its
20-year growth forecast for commercial- jet deliveries
yesterday, saying there will be a market for 29,000 new

					planes, or 1.4 percent less than the number predicted a year ago. The company had increased the forecast by a cumulative 14 percent the previous three years. 'I'm not changing our forecast, and I'm not saying we're going to surprise ourselves, but we always do,' marketing chief Tinseth said in an interview. The state of plane sales is tempting some airlines back into the market with the hope they can squeeze manufacturers for discounts. <i>ILFC's</i> Hazy said June 8 that he will increase orders in anticipation of greater demand from carriers to replace older models. Hazy had planned 150 purchases through 2019 and may raise the number by 30 percent in the next 12 to 18 months."	
14 June 2009	Telegra ph, "Aviati on Industry Faces Year of Gloom, Warns Boeing Head" (Amy Wilson)	Scott Carson , CEO Boeing Comm ercial Airpla nes; Tom Enders , CEO Airbus	Firm	α & β	"Speaking ahead of the opening of the Paris Air Show on Monday, Scott Carson admitted he was 'a little more pessimistic' than the plane maker's in-house economists, but said he sees no sign of a recovery in the industry until the second half of 2010. The market is now at the bottom, he said. Mr Carson also dashed hopes that <i>Boeing's</i> much-delayed 787 'Dreamliner' would make its test flight this week to coincide with the air show, which celebrates its centenary this year. The 787 is still on course to make a test flight in June, as <i>Boeing</i> had forecast, but it will be later in the month. Tom Enders, chief executive of European rival <i>Airbus</i> , said this weekend it could withstand as many as 1,000 cancellations because it has an order book of 3,500 planes, which will ensure it can keep going at	On modular and integral enterpri se architec ts' vies on growth.
14 June 2009	New York Times "Airbus Warns Output could Drop as Much as 25% in 2010 and 2011." (Nicola Clark)	Louis Gallois , <i>EADS</i> CEO; Thoma s Enders , <i>Airbus</i> CEO	Firm- Labor	α & β	'maximum production' for the next five years." <i>"Airbus</i> executives warned over the weekend that output at their European factories could fall by as much as one-fourth over the next two years as the aircraft maker and its suppliers adjust to the sharp drop in air traffic and widening losses at the world's airlines. But the company insisted that it could absorb those cuts without resorting to large-scale layoffs — at least for now. Earlier this year, <i>Airbus</i> said that it planned to slow production of its A320 single-aisle passenger planes to 34 per month from a previous plan of 40, while output of its wide-body A330 was frozen at a rate of 8.5 per month, down from 10 per month. Deliveries of the double-decker A380 are being limited to 14, compared with an initial target of 18 per month. But those cuts, which amount to a slowdown of about 15 percent, may not be sufficient to meet the slide in demand from airlines, Louis Gallois, chief executive of <i>EADS</i> , the parent of <i>Airbus</i> , said Saturday. 'We have the flexibility to go further if needed ,' Mr. Gallois said. 'We are very sensitive to what will happen in the second half of the year, to see if we reach the bottom of the swimming pool,' Mr. Gallois said. 'We have no capacity now to see what will be the depth of the crisis.' Thomas O. Enders, the <i>Airbus</i> chief executive, said management could envisage production cuts 'somewhere in the range of between 15 and 25 percent' in	On integral and modular enterpri se arhitect ures' views on managi ng negative growth.

	1			1	the years 2010 and 2011 if the slump in air travel	
					continues.	
					Boeing has said it planned to keep production steady in	
					2009 while laying off 4,500 workers. So far, <i>Boeing</i>	
					foresees slowing output on one of its assembly lines — for the long-range, widebody 777 — by 28 percent in 2010.	
					Both Airbus and Boeing say they expect to deliver about	
					the same number of planes to customers this year as in	
					2008. 'There's a little bit of unreality,' said Nick	
					Cunningham, an aerospace analyst at Evolution Securities	
					in London. 'Things are very, very bad. It's just that	
					some people aren't feeling it yet.' Mr. Gallois and Mr.	
					Enders said Airbus expected to be able to manage its	
					production slowdown without any job cuts. 'But of	
					course this has a limit,' Mr. Gallois said. 'We need to	
					be careful in the way we manage our manpower,' Mr.	
					Gallois said. 'We have to be able to increase production	
1					again when it is needed.' <i>Airbus</i> is eager to avoid fresh layoffs in the current economic environment and after	
					eliminating 10,000 jobs in 2007 and 2008 as part of a	
					painful restructuring aimed at reducing its euro-	
					denominated cost base. 'Airbus will not countenance	
					any large-scale layoffs for social and political reasons,'	
					said Doug McVitie, managing director of Arran Aerospace	
					in Dinan, France. During the last downturn for the	
					aviation industry, after the terrorist attacks in 2001, Airbus	
					avoided layoffs and instead eliminated 6,000 jobs	
					through early retirements and termination of	
					temporary work contracts. Boeing cut its work force	
					by 30,000 and drastically cut back production rates.	
					<i>'Boeing</i> and <i>Airbus</i> do exactly the same thing commercially — they build airplanes,' Mr. McVitie	
					said. 'It's just easier to hire and fire in the U.S.'"	
15		Scott	Firm	α	"If you were expecting the 787 to fly during Paris you're	On a
June		Carson	1		going to be disappointed, but it will fly within the next	modular
2009		, CEO			two weeks. We forecast it would fly before the end of	enterpri
		Boeing			the second quarter 2009 and if you count the way I do	se
		Comm			that means two weeks. It will fly when it's ready and it	architec
		ercial			will be ready by the end of this month."	t's
		Airpla				knowle
		nes				dge of
						(transpa
						rency about)
						his
						system.
16	Wall	Tom	Firm-	α	"Aircraft maker Airbus needs state loans to help	On an
June	Street	Enders	Suppli	&	finance development of its future A350 airliner in	integral
2009	Journal,	, CEO	er-	β	order to compete on even terms with rival Boeing Co.'s	and
	"Airbus	Airbus	Gover		787 Dreamliner, Airbus Chief Executive Tom Enders	modular
	Needs		nment		said Tuesday. Speaking at a press conference at the Paris	enterpri
	State				Air Show, Enders said: 'We have a competitor which	se
	Aid To				has the most highly subsidized commercial airplane.	artchite
	Compe				We want to level the playing field; this is what the	ctur's
	te					

—	Farris-		1	T	windoweable aids are should be antiqued with the	vious -f
	Equita				reimbursable aids are about,' he continued. Airbus has	views of
	bly Vs				long complained that <i>Boeing</i> receives indirect subsidies	govern
	Boeing "				to fund new product development from U.S.	ment
	, (Stefani				government contracts and from its suppliers.	support.
	•					
	a D' 1'				On Monday, France and Germany said they are prepared	
	Bianchi,				to contribute up to EUR2.5 billion in repayable loans	
	Nathalie				toward the EUR11 billion cost of developing the A350.	
	Boschat				Spain and the U.K., which historically have industrial	
	and				interests in Airbus, are expected to advance smaller	
	David				amounts of cash in the coming weeks. Boeing has	
	Pearson				complained that fresh European state aid to Airbus would	
)				violate a long-standing 1992 bilateral agreement limiting	
					the amount of state aid that each company can receive to	
					develop new products. It also complains that the loans	
					Airbus receives are at below-market rates, something that	
					Airbus denies. 'Such financing would violate the member	
					states' international obligations to abide by the rules of the	
					World Trade Organization,' Boeing said in a statement e-	
					mailed to news agencies. 'We are disappointed by	
					reports that the Airbus member states intend to	
					provide - and Airbus to accept - billions of dollars of	
					launch aid for the A350 just as the WTO is to rule on	
					the WTO consistency of such financing,' Boeing said.	
					'I'm not surprised that Boeing has complained. What	
					else could you expect? If I were them, I would want to	
					keep my advantage,' Enders commented Tuesday. 'So	
					far we have repaid governments 40% more than what	
					we have received. The U.K. government has been on	
					the record saying it's good business,' he added. Airbus	
					and ministers from France, Germany and the U.K. met	
					Monday but couldn't agree on funding of the A350	
					development. Ministers pointed to the absence of the	
					Spanish minister for transport as the main reason for a lack	
					of agreement. That led to speculation that Spain is	
					unhappy with its share of the A350 project. However,	
					Enders stated that <i>Airbus</i> has no conflict with the Spanish	
					government over the A350. In relative terms, he said,	
					Spain has benefited more than the other <i>Airbus</i> partners."	
17	Seattle	Pat	Firm-	α	"Chicago-based <i>The Boeing Co.</i> says that when it decides	On a
	Post	Shanah	Labor	~	where to put a second 787 line, it will do so without	modular
	Intellige	an, VP	Labor		emotion and will take labor stability into account. This	enterpri
	ncer,	Airpla			isn't exactly a surprise. A 57-day machinist strike last fall	se
	"Emotio	ne			reportedly cost the company more than \$2 billion in lost	architec
	nless	Progra			revenue. <i>Boeing</i> had searched the entire country for	ture's
	Boeing	ms,			possible sites to build its first 787 assembly line.	need
	Conside	Boeing			Ultimately, the company settled on its existing aircraft	/decisio
	ring	Comm			factory in Everett. But analysts have predicted and state	
	Labor	ercial				n to
		And the second sec			officials are worrying that future 787 production will not	grow
	Stability for 2 nd	Airpla			occur in Washington. A new report by FlightBlogger Jon	producti
		nes			Ostrower sheds some light on <i>Boeing's</i> thinking and	on .
	787				process for ramping up 787 production. Boeing's vice	capacity
	Line"				president of airplane programs, Pat Shanahan, said that the	and
a 18	(Andrea				decision on where to put a second 787 assembly line	resultin
		1				. coultin
	James)				will not take a long time.	g means

Г						'The sooner you make a decision, the better. We won't	of
						be pressed into making a decision. [It will be] very	ensurin
						measured. It won't be emotionally based,' said Shanahan. Shanahan declined to specify what locations	g labor stability
						were on the "short list" for a second 787 production line,	, which
						but said there are 'lots of geographical optionsthe real	is
						options are around 'how do you secure assurance of	orthogo
						delivery?' And I think that's been a discussion topic	nal to
						around some of the disruption we've realizedat	an
						Boeing.' 'There are opportunities that we need to assess and I've worked there for 24 years, I like the	integral enterpri
						people in Seattle, I grew up in Seattle, It's a great	se
						community, but when you have the customer telling	architec
						you you're making it really hard to choose your	ture.
						product because when we buy it you can't give it to us,'	
						said Shanahan."	
17		Seattle	Kiyota	Firm-	α	"Executives with two of <i>Boeing's</i> major partners on the	On a
	ne	<i>Times,</i> "787	ka Ichima	Suppli		787 Dreamliner said Wednesday that ramping up the current snail's pace production of the hot-selling plane will	modular
20	009	Ramp-	ru,	ers		cost big money and involve tricky contract negotiations	enterpri se
		up	executi			with <i>Boeing</i> . <i>Boeing</i> has an ambitious target of rolling	architec
		Won't	ve at			out 10 Dreamliners per month by the end of 2012, which	ture's
		Be Easy	Mitsub			would likely require a second Dreamliner production line.	need
		Boeing	ishi			Even as <i>Boeing</i> dropped a hint such a line wouldn't	/decisio
		Partners	Heavy			necessarily be in Everett, the partner executives made	n to
		Say" (Domini	Industr ies;			clear at the Paris Air Show that getting the supply chain up to that speed will be difficult . Kiyotaka Ichimaru, an	grow producti
		c Gates)	Jeff			executive at <i>Mitsubishi Heavy Industries</i> (MHI), which	on
		e Gutes)	Turner			makes the 787's plastic-composite wings in Japan, said	capacity
			, CEO			reaching 10 Dreamliners a month will require substantial	
			of			new investment as well as a revamp of the assembly	
			Spirit			methods at the MHI wing plant in Nagoya. 'Just a	
			AeroSy stems			speeding up of what we are doing' won't be sufficient, said Ichimaru, general manager of the civil aircraft	
			siems			and aero-engine department. 'We need a drastic	
						change in how we make some portions' of the wings.	
						Jeff Turner, CEO of Boeing partner Spirit AeroSystems,	
						said there's space in his plant to make 10 a month, but the	
						existing equipment and tooling can make only seven a	
						month. So he, too, has to make investment decisions and reach a contract extension with <i>Boeing</i> . 'We think	
						we understand the demands of that buildup,' said Turner.	
						'We have to negotiate what that higher level of production	
						would be.' Spirit, which makes the 40-foot-long front	
						end of the Dreamliner fuselage in Wichita, Kan., is	
						regarded as the most successful of the 787's first-tier partners. <i>MHI</i> and <i>Spirit</i> would have to ramp up	
						partners. <i>MHI</i> and <i>Spirit</i> would have to ramp up production correspondingly if <i>Boeing</i> built a second	
						assembly line. The first line in Everett was designed to	
						roll out only seven Dreamliners a month, and that's the	
						production rate all the partners originally signed on for	
						when they joined the jet program. In an interview	
						published on <i>Flight International</i> magazine's	
L						Flightblogger Web site, Pat Shanahan, <i>Boeing's</i> chief of airplane production, said in Paris that management is	
						studying possible locations for a second 787 assembly	
<u> </u>						studying possible locations for a second 707 assentibly	

	line. There are 'lots of geographical options,' he said. Ominously for the Puget Sound region, he implied that the Machinist strike at Boeing last fall will weigh against the Everett site. The real options are around 'How do you secure assurance of delivery?' " he told <i>Flightblogger</i> . 'That's been a discussion topic around some of the disruption we've realized at Boeing.' But Boeing spokeswoman Mary Hanson said there's no time frame yet for making a second 787 line decision and a decision is not imminent. The comments of the two top 787 supplier executives suggest it may take awhile. <i>MHI's</i> Ichimaru said he expects serious discussion with Boeing 'in the very near future' of the full cost of substantially raising production rates. Complicating the situation, he said, <i>MHI</i> has started detailed design on the wing for a second, bigger Dreamliner variant, the 787-9, with significant changes from the first 787-8 wing. And even though the final 787-8 design was set long ago, Ichimaru said, Boeing still sends in changes. The major cause for that was Boeing's effort to win Federal Aviation Administration certification of the wing's lightning protection. To avoid electrical sparks inside the wing fuel tanks, fasteners had to be removed and turned around, and seals had to be applied. On the production line, work that had been completed had to be undone. The lightning protection changes, the new 787-9 design, the plan to increase the rate — all of this is expensive even as little money comes in because <i>MHI</i> has made so few deliveries. Expanding production would mean 'we have to accumulate more investment on top of the investment we have already done,' Ichimaru said. 'We need to think of some way to recover that.' He said <i>Boeing</i> is being 'creative' in interpreting the contract and trying to help. <i>MHI</i> could produce two wings sets a month right now, but <i>Boeing</i> Everett is not ready for that pace and the current requirement is much less. With the bottleneck at the final-assembly plant in Everett, <i>MHII</i> has so far	
	arrived in May 2007. The next ship set is likely to go in August. Ichimaru said <i>MHI</i> plans to bump up its rate to between five and seven a month in gradual steps, each time adding one extra set of wings per month. For increases beyond that, improvements are needed, including a revamp of the wing-assembly process, which is much less efficient than the heavily automated production of the giant wing panels. Higher rates could also require a big cash outlay to buy a giant new autoclave, or high-pressure oven, or even to build a	
	new facility. In Wichita, <i>Spirit AeroSystems</i> produces its plastic fuselage sections by winding carbon-fiber tape infused with epoxy resin around enormous cylindrical molds, then baking them in an autoclave. <i>Spirit</i> shut down its fuselage winding and autoclave operation for most of the past year after the Everett assembly line choked up	

		I			on Dreamliner No. 1. It is still idle today. 'It's cost us,'	
					Turner said. 'We've a factory ready to produce and it	
					went to a standstill.' He'd like to see the added revenue	
					from pumping out more 787 fuselages, but it has to be	
					'profitable revenue,' he said. That means managing	
					costs, investing wisely and negotiating a realistic	
					contract with Boeing for the extra production. That	
					approach has left Spirit financially well positioned in the	
					economic downturn. The company avoided layoffs	
					through the 787 delays, moving workers to the 777 and 737 lines, which were ramping up. When the	1
					Machinists strike at <i>Boeing</i> put those lines out of action	
	-				for two months last fall, Turner put the workers on	
1					shortened weeks to avoid layoffs. Now in the economic	
					downturn, he faces further strain: a planned 29	
					percent cut in Boeing's 777 production rate in mid-	
					2010 that will begin affecting his plant in the fourth	
I					quarter and hit it hard early next year. Turner hopes	
					Boeing can stick to its plan not to cut the 737 rate too.	
					But he said he's prepared contingency plans in case it	
					does. He hopes more 787s rolling out will compensate at	
					least a little for the 777 cuts. Yet he knows a Dreamliner	
					ramp-up can't happen fast enough to make a big difference	
					soon."	
17	Wall	Akbar	Firm-	α	"Qatar Airways may become an exclusive Airbus	On a
June	Street	Al	Custo		customer and may pull its Boeing Co. 787 Dreamliner	modular
2009	Journal	Baker,	mer		and 777 orders after the U.S. plane maker has failed to	enterpri
	"Qatar	CEO,			deliver on the long-delayed program, the carrier's chief	se
	Air May	Qatar			executive told Dow Jones Newswires Wednesday. 'The writing is in the wall for <i>Boeing</i> and they don't care,'	architec ture's
	Become Exclusi	Airway s			Akbar Al Baker said in an interview on the sidelines of the	lack of
	ve	3			Paris Air Show. 'They're too busy having lunches and	transpar
	Airbus				dinners.' Qatar Airways, based in the gas-rich Gulf	cency
	Custom				state of Qatar, previously said it was seeking	with its
	er -				compensation for delays in the delivery of the	custome
	CEO"				Dreamliners, but Al Baker said the issue 'has gone way	rs.
	(Stefani				beyond that' because the delivery delay is starting to	
	a				affect the carrier's aggressive expansion drive. 'Boeing	
	Bianchi				doesn't realize how much they're hurting their	
)				customers' plans,' he said. 'They're very much	
					mistaken if they think we're going to give them much	
					more time on the issue.' Qatar currently has 60 Boeing	
1					787 aircraft on order, including options, and 24 777 jets, including freighters and options. Al Baker said Qatar	
1					Airways is also considering pulling its order of 777	
1					aircraft, which the airline had planned to bring forward.	
1					'Then <i>Boeing</i> will be left with a load of parked planes,'	
1		<i>2</i>			he said. Al Baker said he will have to 'seriously think'	
1					before doing any further business with Boeing and said	
1					that the lack of communication on the issue has eroded	
1		1			his confidence in the manufacturer. 'It may be that we	
1					become an exclusive Airbus customer,' he said. Boeing	
					become an exclusive Airbus customer,' he said. Boeing said it is aware of the issues raised by Qatar Airways and	
					become an exclusive Airbus customer,' he said. Boeing said it is aware of the issues raised by Qatar Airways and is working with the airline to resolve the problem. 'We	
					become an exclusive Airbus customer,' he said. Boeing said it is aware of the issues raised by Qatar Airways and	

			787-10, it would be the second or third 787 derivative after the stretched -9 or the short range -3."	
Airbus Racks up A350 Orders" (Andrea Rothma	g, Carson Custo looeing , CEO mers Boeing 5 Comm 5 S Comm 6 S Comm 6 Comm 6 S Comm 7 S Comm 7 S Comm 7 S Comm 7 S Comm 7 S C	β	"Boeing Co.'s 787 Dreamliner, absent from the Paris Air "Show this week after two years of delays, may not be the jetmaker's biggest problem. <i>Airbus SAS's</i> bigger A350 has won almost 500 orders, 10 of them at the show, forcing <i>Boeing</i> to turn its attention to the market for bigger planes with more than 300 seats. The Chicago- based company is considering an upgrade of its 15-year- old 777. Airlines say it should spend billions on a new aircraft instead. 'What <i>Boeing</i> makes next is the big question,' said Doug Runte, a New York-based analyst at <i>Piper Jaffray & Co.</i> who estimates the U.S. company would need to spend \$15 billion to develop a new model. 'Airplanes require a huge investment of money and effort. If you get it wrong, the consequences are enormous and you have to live with it for a very long time.' <i>Boeing</i> , which said it had 'bet the company' in the 1960s when spending twice its market value on the 747 jumbo jet, faces a conundrum after adopting a rival strategy to Toulouse, France-based for the long-haul plane market. <i>Airbus</i> opted to build its 555-seat A380 superjumbo on the basis that surging economic growth would spur demand for bigger planes. <i>Boeing</i> argued that the increasing complexity of global business travel required smaller aircraft flying direct to a greater number of cities. It came up with the 260-seat 787, which is due to make its first flight this month. While both planes have proved popular, the Dreamliner has the edge in sales, ranking as the world's fastest-selling aircraft with 865 contracts worth about \$138 billion at list price compared with the A380's 200 valued at \$65.4 billion. <i>Boeing</i> , though, may become a victim of its own success. The Dreamliner proved so popular that when <i>Airbus</i> offered a similar plane its airline customers said they didn't need one and lobbied for a bigger aircraft altogether. That resulted in the A350, a model that has attracted 483 orders worth \$115 billion. 'The 787 had considerable early sales success, which forced <i>Airbus</i> to respond, Raymon	On modula and integra approa hes produce develo ment, a well a the modula media' covera e.

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Airbus Chief Operating Officer John Leahy said Boeing has been forced to review its strategy because the A350 will be 25 percent cheaper to fly than the older 777. He spoke after the company announced 58 firm orders at the Paris show, including an A350 contract from AirAsia X of Malaysia. Boeing won two orders. 'Scott didn't just wake up one morning at the air show and decide that he had \$5 billion burning a hole in his pocket, so let's just rewing the 777,' Leahy said today in an interview in Paris. 'It's only when being faced with a threat that you want to spend money like that. He's going to lose the market if he doesn't do something.' Boeing will evaluate additions to its aircraft lineup for the next decade in terms of customer demand, competing products, available technology and the resources available, Seattle-based spokesman Jim Proulx said by e-mail. Tim Clark, CEO of Gulf carrier Emirates, which will become the biggest 777 operator later this year, has little interest in a larger-winged version of a plane with a fuselage made from metal rather than the light-weight composites used in modern designs, he said June 16 at the air show. Clark, who has also dismissed Boeing's proposed 310seat 787-10 as likely to be underpowered, said in Paris that a clean-paper design is the only way for the U.S. company to go. Even then, Boeing needs to act before Airbus offers a stretched A350 to narrow the capacity gap with the A380, a move that would leave Boeing with little room for maneuver. 'Given the challenging economic environment, the sector will be forced to set priorities and make difficult trade-offs about what programs they can really afford,' David Raistrick, a manufacturing specialist at Deloitte LLP, said in a note. Standing in the way of a new widebody is the multibillion dollar bill that could harm the company if the plane doesn't sell. Boeing must also decide whether pouring its energies into building a successor to the 777 will diminish its ability to compete with Airbus when the pair come to design a new generation of single-aisle planes. Both companies say they plan to replace their A320 and 737 short-haul jetliners in a little over 10 years, suggesting they will need to ramp up spending on research and development from the middle of the next decade. That may overlap with construction of a new Boeing widebody. 'That's part of the problem,' said Airbus's Leahy. 'That's the tough call they've got and I guess it's why a 777 derivative is tempting. You've got all these other things you need to do and you say, if I could just get away with five or six billion and come up with a good derivative that would hold my place against the A350, that would be the ideal solution. But history has shown that rarely ever works." Should Boeing opt for a rewinged 777 it could be first to the market with a singleaisle replacement, though any new plane will require a 'vast improvement' in fuel efficiency based around new engine technology, Morgan Stanley analyst Rupinder Vig

	1				said. 'If Boeing suddenly decides to come out with	
1					said. 'If <i>Boeing</i> suddenly decides to come out with something earlier, in around 2015, <i>Airbus</i> has told us	
					they'd have to do something very quickly,' he said. 'But I	
					think both of them now are comfortable with a later date	
					as they're grappling with their own problems in the	
					bigger-plane category."	
10		01	D '	~		0
19	Bloomb	Clay	Firm-	α	"Airbus SAS and Boeing Co. spent much of this week's	On
June	erg,	Jones,	Suppli	&	Paris Air Show urging suppliers to keep their assembly	modular
2009	"Airbus	CEO	ers	β	lines ready to respond quickly when the recession ends	and
	, Boeing	Rockw			and orders pick up. Partsmakers aren't yet convinced.	integral
	Battle	ell			'There is raging skepticism because there is no	enterpri
	'Raging	Collins			historical precedent for the ability to do what they're	se's
	Skeptici	;			suggesting to do,' Rockwell Collins Inc. Chief Executive	view of
	sm'	Fabric			Officer Clay Jones said in an interview in Paris. His Cedar	downtur
	Over	e			Rapids, Iowa-based company builds avionics and parts for	n.
1	Output"	Bregie			most Boeing and Airbus models. The world's two biggest	
	(Andrea	r,			commercial-plane builders together expect to deliver about	
1	Rothma	CO0			960 aircraft this year, unchanged from earlier projections.	
1	n and	Airbus			And neither Boeing nor Airbus has made a big cut to its	
1	Susanna	; Jeff			production plan for next year, insisting that suppliers	
1	Ray)	Turner			can trust the strength of their backlogs and shouldn't	
1		, CEO			make rogue decisions to scale back. Carriers continue to	
1		Spirit			drop and push back deliveries because of the recession,	
		AeroSy			and orders for planes have plummeted. Chicago- based	
		stems			Boeing announced just one order for two narrowbody 737s	
		Holdin			at the Paris event, and Airbus, based in Toulouse, France,	
		gs			has sold 60 jets. The value of the transactions for the big	
		Inc.;			two is expected to be far less than the \$64 billion in orders	
		John			at last year's show in Farnborough, England. That's led	
		Leahy,			partsmakers to speculate that demand for their products is	
		COO			bound to decrease. The world's airlines lost \$10.4 billion	
		Airbus;			last year, and the industry will lose another \$9 billion this	
		Scott			year as traffic plunges, according to the International Air	
		Carson			Transport Association. In the last slump, deliveries at	
		, CEO,			Boeing and Airbus dropped 31 percent from 2001 to	
		Boeing			2003. 'The retention of the narrowbody rates appears	
1		Comm			to be inconsistent with historical perspective,' Jones	
1		ercial			said of <i>Airbus</i> ' and <i>Boeing</i> 's intentions not to lop output in the largest segment of the market 'That's the nature of the	
1		Airpla			the largest segment of the market. 'That's the nature of the conundrum we're in. So now we have to use our	
1		nes; Rob			judgment.'	
1		Gillett			Judgmont.	
1		e.,			Airbus 'can't blame' its suppliers for mistrusting the	
1		CEO,			company's forecasts, said Chief Operating Officer	
1		Honey			Fabrice Bregier. After all, he said, they've been burned	
1		well			by big, sudden cutbacks in the past eight months at	
		Aerosp			regional-jet builders such as Embraer and Bombardier	
1		ace;			Inc., and business-jet makers Cessna and Gulfstream.	
1		Alain			Many also make parts for the automotive industry, where	
1		Bellem			sales tumbled 18 percent last year and 37 percent this year	
		are,			through May. <i>Boeing</i> has said it will hold steady on its	
		Preside			expected monthly manufacturing rate of 31.5 of the	
		nt			world's best-selling plane, the 737. <i>Airbus</i> is only scaling	
		Hamilt			back production of the A320 by two a month to 34. 'For	
		on			Airbus so far, the situation is stabilized,' Bregier said.	
		Sundst			'We're taking every opportunity to explain to them	
		Sundat			many opportunity to explain to them	

		
	rand	that when we say we'll deliver in 2009 as many aircraft
		as in 2008, we have that not only in the order book but
		airline by airline, we have the customers, we have the
		financing and we know we'll do it.' Boeing and Airbus
		were cautious in ramping up output amid a record three
		years of orders through 2007 that produced a combined
		backlog of more than 7,000 planes, or more than seven
		years worth of work. That means that now they don't have
		to scale back as much as they did in previous down-cycles,
		the companies said. The suppliers say they don't get much
		advance warning when planemakers decide to slow down,
		and lead times for some parts, such as landing gear, can be
		up to 18 months. Some companies don't get paid until the
		planes are delivered. To protect themselves, the
		partsmakers say they are doing their own research to
		forecast demand. 'I've seen at this show a great deal of
		energy by both Boeing and Airbus to assure the supply-
		base community that their forecast, particularly for
		single-aisle product, is robust,' said Jeff Turner, CEO
		of Spirit AeroSystems Holdings Inc., Boeing's biggest
		supplier. The Wichita, Kansas-based company builds the
		aluminum fuselage for the 737. 'It's my job as head of
		Spirit to forecast what I think will happen in the
		market.' Turner didn't say what his latest predictions are.
		Airbus tries to supply accurate forecasts to help
		suppliers keep production steady and to ensure the
		planemaker has parts when it needs them, John Leahy,
		chief operating officer of Airbus, said today in an
		interview. 'You can only make changes at a gradual
		rate,' Leahy said. 'The longest lead time item is
		somewhere around two years. It's not just that you call
		up today and they instantly have it. If you're trying to
		ramp up or ramp down, you want to have some lead
		time up to your deadline to smoothly do it.' Companies
		such as Spirit and Rockwell Collins have said they will
		hold to their contracts and deliver the parts Airbus and
		Boeing order. The question is whether they will be
		ready to ramp up again quickly when the planemakers
		want. Many of the big suppliers have already cut jobs
		or reduced hours. Scott Carson, the head of <i>Boeing</i>
		Commercial Airplanes, said in an interview this week
		that he's telling suppliers they need to be ready for a 10
		percent production swing in either direction, depending
		on the economy and the status of active order campaigns.
		Ryanair Holdings Plc and UAL Corp.'s United Airlines
		have said they want to take advantage of the recession
		to seek discounts on hundreds of new planes, which
		could compel a higher output rate, Carson said. Some
		suppliers hope to hold steady through aftermarket
		business. 'You're still flying airplanes, you have to do
	I	repairs,' and those will pick up in the second half after the
		busy summer season of air travel, said <i>Honeywell</i>
		Aerospace CEO Rob Gillette. Still, the work won't be as
		much as it was before because airlines have canceled
		routes and grounded planes amid the slump. 'Obviously
		the aftermarket has been impacted by much lower revenue

 _					necesarian miles than we were working with when we did	
					passenger miles than we were working with when we did our planning,' said Alain Bellemare, president of <i>Hamilton</i> <i>Sundstrand, United Technologies Corp.'s</i> aerospace systems unit. 'We took some very aggressive cost actions and right now we are waiting to see what could be the outcome.'"	
2009	Wall Street Journal, "Dream liner Still Far From Reality " (Peter Sanders)	Scott Carson , CEO Boeing Comm ercial Airpla nes	Firm	α	"Boeing Co., attempting to maneuver its 787 Dreamliner through the turbulence it has encountered so far, is expected to conduct the plane's maiden flight in coming days. But even after the plane is airborne, the aerospace company will still be under pressure to complete an ambitious schedule of test flights and government certifications. Any additional glitches could force it to again delay delivery to its launch customer, <i>All</i> <i>Nippon Airways Co.</i> , set for March 2010. 'We've got to get it up and flying, [and] we'll all take a deep sigh,' said Marlin Dailey, vice president of sales for <i>Boeing</i> <i>Commercial Airplanes.</i> 'We're looking forward to that milestone, but it's just another step in the journey.' The test flight, which <i>Boeing</i> has said will occur by June 30, will open a new chapter for the Chicago-based company. The Dreamliner, which was supposed to enter service in May 2008, is considered the most technologically sophisticated commercial aircraft ever built, but its complexity has led to production problems and postponed launch and delivery dates. <i>Boeing</i> has had to provide concessions to its airline customers because it has missed promised deadlines. The company has seen a spate of cancellations, while its credibility with investors also has suffered. <i>Boeing's</i> shares have risen about 45% since mid-March. According to a research note last month from <i>Morgan Stanley</i> aerospace analyst Heidi Wood, customers' financing concerns have eased and investors are confident in the company's order backlog. The shares could get a further boost once the Dreamliner makes its first flight but could suffer if the program hits new snags. After the plane's inaugural flight, <i>Boeing</i> test-flight programs usually have taken about a year to receive the necessary certifications from the Federal Aviation Administration. Scott Carson, president and chief executive of <i>Boeing Commercial</i> <i>Airplanes</i> , in an interview this week said 'one concern is the sheer volume of reports we'll be giving the FAA and their ability to proces	On a modular enterpri se architec ture's product / producti on system strategy.
					ing a gar and prepare for the next day's tests.	

a Blowou t, But AirbusAirbus snagged a deal for 50 of its A320 narrowbody planes, worth \$3.8 billion, from Hungarian discount carrier Wizz Air. A Hungarian discount airline? Don't snicker. Wizz, founded by a former CEO of Hungarian flag carrier Malev, is thriving by attracting budget-conscious travelers during the economic crisis. Its traffic was up 30% from January through May. It already has an all- s in. Airbus fleet, so buying from the same source makes sense – especially now, when Airbus is doubtless offering great deals to win scarce orders. In fact, many of Airbus's reportin airlines looking to take advantage of a buyer's market to build their fleets. Others included Malaysian carrier Air Asia, which ordered 10 of Airbus's new A350 widebody jets, and Cebu Pacific of the Philippines, which is taking at least 15 narrowbody planes. 'There are some architec ture ("It Wasn't a Blow-out",	19 June 2009	Busines sWeek "It Wasn't	Tom Enders , CEO Airbus	Firm- Custo mers	α & β	The last time <i>Boeing</i> launched a brand-new commercial aircraft, the 777 in 1994, the 11-month testing phase included nine planes that flew a combined 70 to 80 flight hours a month. The 787 testing phase could be three months shorter, and the six planes are expected to fly about 120 hours a month. In manufacturing the 787, <i>Boeing</i> essentially invented a new way to assemble a commercial airplane. Unlike the company's previous widebody aircraft, which are largely assembled at the <i>Boeing</i> factory in Everett, Wash., major portions of the 787 are fabricated by contractors as far away as Italy and Japan, and then shipped to the factory for final assembly. While <i>Boeing</i> initially believed the process would reduce costs and streamline manufacturing, the complexities. The program was further plagued by a two-month walkout by <i>Boeing</i> machinists last fall and bugs in the plane's software. The 787's problems, and the global recession, have rippled through other commercial-airplane programs at <i>Boeing</i> . The new 747-8, an update to the venerable two-deck jumbo jet that competes with <i>Airbus's</i> double-decker A380 aircraft, also has been delayed. Beyond the test flight, questions remain about how quickly <i>Boeing</i> can accelerate production of the Dreamliner to its goal of 10 airplanes a month by 2012. The company and its suppliers have cautioned that there remain potentially significant kinks in the manufacturing system that must be worked out before the plane's production rate can increase significantly."	On proof which niche an
19Busines sWeekTom EndersFirm- Custo mersα Custo β"Even if the Boeing guys shrugged it off, you have to admit Airbus pulled off quite a feat by logging 112 aircraft orders worth \$11.8 billion, during the most- downbeat Paris Air Show in many years. On June 18, Airbus snagged a deal for 50 of its A320 narrowbody planes, worth \$3.8 billion, from Hungarian discount carrier Wizz Air. A Hungarian discount airline? Don't snicker. Wizz Air. A Hungarian discount airline? Don't snicker. Wizz Air. A Hungarian discount airline? Don't snicker. Wizz Air. A Hungarian group May. It already has an all- Airbus faet, so buying from the same source makes sense - especially now, when Airbus is doubtless offering great deals to win scarce orders. In fact, many of Airbus's sales this week were to ambitious discount or regional airlines looking to take advantage of a buyer's market to build their fleets. Others included Malaysian carrier Airbus's new A350 widebody jets, and Cebu Pacific of the Philippines, which is taking at least 15 narrowbody planes. 'There are some rays of sunshine in the market, especially in the low- cost sector,' Airbus CEO Tom Enders said at a signing ceremony for the Air Asia deal.On out'', metsion						software. The 787's problems, and the global recession, have rippled through other commercial-airplane programs at <i>Boeing</i> . The new 747-8, an update to the venerable two-deck jumbo jet that competes with <i>Airbus's</i> double-decker A380 aircraft, also has been delayed. Beyond the test flight, questions remain about how quickly <i>Boeing</i> can accelerate production of the Dreamliner to its goal of 10 airplanes a month by 2012. The company and its suppliers have cautioned that there remain potentially	
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Boeing sought to downplay competition for orders at referrin	June	sWeek "It Wasn't a Blowou t, But Airbus Beat Boeing" (Carol	Enders , CEO	Custo	&	"Even if the <i>Boeing</i> guys shrugged it off, you have to admit <i>Airbus</i> pulled off quite a feat by logging 112 aircraft orders worth \$11.8 billion, during the most- downbeat Paris Air Show in many years. On June 18, <i>Airbus</i> snagged a deal for 50 of its A320 narrowbody planes, worth \$3.8 billion, from Hungarian discount carrier <i>Wizz Air.</i> A Hungarian discount airline? Don't snicker. <i>Wizz</i> , founded by a former CEO of Hungarian flag carrier <i>Malev</i> , is thriving by attracting budget-conscious travelers during the economic crisis. Its traffic was up 30% from January through May. It already has an all- <i>Airbus</i> fleet, so buying from the same source makes sense – especially now, when <i>Airbus</i> is doubtless offering great deals to win scarce orders. In fact, many of <i>Airbus's</i> sales this week were to ambitious discount or regional airlines looking to take advantage of a buyer's market to build their fleets. Others included Malaysian carrier <i>Air Asia</i> , which ordered 10 of Airbus's new A350 widebody jets, and <i>Cebu Pacific</i> of the Philippines, which is taking at least 15 narrowbody planes. 'There are some rays of sunshine in the market, especially in the low- cost sector,' <i>Airbus</i> CEO Tom Enders said at a signing ceremony for the <i>Air Asia</i> deal.	proof which niche an integral enterpri se architec ture compete s in. And a modular media's reportin g of modular enterpri se architec ture ("It Wasn't a Blow- out",

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ImageInd decided several years ago to disclose orders as soon is they were placed, rather than saving up big deals to announce at air shows. Trouble is, Boeing this year has had almost as mary cancellations as sales. It has logged 50 orders, including 53 for the 737. 10 for its 777 widebody and 13 for its forthcoming 787 Dreamliner. But airlines have cancelled 66 previous orders, including 58 for the 787, leaving Boeing with a net order tally of only 10. At/bus has had cancellations, too, though not as many as Boeing. As the air show opened, its net order tally sood at 11, including 21 cancellations. Orders booked during the show should boost the net tally to more than 100. True, there doesn't seem to be much chance that At/bus will meet its goal of 300 orders to bis year. But so far no customers have cancelled orders for its A380 mega jet - a fact that CEO Enders told me is 'quite a miracle, considering what that program has gone through.' (On the other hand, several airings have delayed taking delivery of their A380s.) And the order tally for the A350 now stands at a solid 493, well behind the 866 logged by the Boeing 787, but enough to get Boeing's streation. In fact, Boeing mit A 100 context and competes directly against the 777. Since July 2006, when At/bus began selling the A350 as currently configured, the two models in the same size range as the 777 have racked up 311 orders, while the 771 have racked up 311 orders, while the 771 have site som site on more reason to smile than their U.S. rivals do"On a modular one could all this air show a stuning commercial success for either Airbus or Boeing, But as they head back to Toulouse, the guys from Airbus will be one could all this ari how a struning commercial success for either Airbus or Boeing, But as they head back to roulouse, the guys from Airbus will be more reason to smile than		-					the second se
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19 24/7 June Wall St., 2009 "Paris Air Show: Boeing Loses, Loses, Airbus Wins" (Douglass A McIntyre) e) Image: Signal St. Signal	good mood. His company succeeded in picking up a relatively large number of new orders, although none of them was a blockbuster. According to <i>The New York</i> <i>Times, 'Airbus</i> was expected to walk away from the air show with about 110 orders and commitments worth about \$6.5 billion.' At <i>Airbus</i> rival <i>Boeing</i> , things are a little tougher. The company is still a long way off from being able to actually deliver its Dreamliner to clients. According to <i>The Wall Street Journal, 'Boeing</i> has had to	On probabl e causes of modular enterpri se architec ture's underpe rforman ce
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					troubled company will be blamed on the executives running the company in 2006, 2007, and 2008 and it should be.'	
20 June 2009	The Econom ist, "Hard Poundin g"	Jim McNer ney, CEO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny;</i> Louis Gallois , CEO <i>EADS</i> , Tom Enders , CEO <i>Airbus</i>	Firm- Gover nment	α & β	"The two aviation giants agree on one other thing: the industry will not get a successor to its ubiquitous short- haul workhorses, the 737 and the A320, for more than a decade. That is partly because the 15-20% efficiency gain that airlines say they want from the next generation is, says Mr McNerney, 'a bar that keeps moving north' thanks to the continuous improvements of 1-2% a year that the manufacturers are making to existing planes. Louis Gallois, the chief executive of <i>EADS</i> , the parent company of <i>Airbus</i> , denied there was anything odd about the timing: 'We do not plead guilty,' he said. 'Our support is much more transparent than <i>Boeing's</i> . We have fully repaid with interest the support we received for the A320 and A330 and we are already paying back on the A380 [super-jumbo].' Tom Enders, the chief executive of <i>Airbus</i> , added that the aid was aimed only at 'levelling the playing field' and that the European Union had described the 787 as the most subsidised commercial aircraft in history."	On the differen ce between modular and integral enterpri se architec tures approac h toward the stakehol der of govern ment
22 June 2009	Bloomb erg, "Toyod a Asks How Many Times <i>Toyota</i> Errs Emulati ng <i>GM</i> Failures " (John Lippert, Alan Ohnsma n and Kae Inoue)	Shoich iro Toyod a, Honor ary Chair man <i>Toyota</i> <i>Motor</i> <i>Corpor</i> <i>ation;</i> Takeo Fukui, CEO <i>Honda</i>	Firm	β	"On a mild day in February, <i>Toyota Motor Corp.'s</i> honorary chairman, Shoichiro Toyoda, summoned 400 executives to the redbrick factory in Nagoya, Japan, where his grandfather had built weaving looms a century ago. The managers filed in for one of the customary updates from <i>Toyota's</i> gray-haired, 84-year-old patriarch. What they got was anything but ordinary. Two months earlier, <i>Toyota</i> had forecast its first operating loss since Shoichiro's father began making cars in the same factory, now turned museum, in 1937. Then in January, about three months earlier than planned, the company announced that Shoichiro's son, Akio, would replace Katsuaki Watanabe as president. Akio is scheduled to assume his new job at a shareholder meeting Tuesday in Toyota City. Even with these signals, the managers were ill prepared for the normally reserved Shoichiro's litany of the carmaker's missteps and his dressing-down of Watanabe. 'How many times have you made a mistake?' Shoichiro grilled Watanabe, who sat silently among stunned audience members, according to a person familiar with the meeting. Shoichiro scolded the president for being so anxious to boost sales and profits that he'd let <i>Toyota</i> emulate now bankrupt <i>General Motors</i> <i>Corp.</i> and <i>Chrysler LLC. Toyota</i> had become addicted to big, expensive cars and trucks and had forgotten the customers' need to save money, Shoichiro said, according to the person's account. Shoichiro wasn't just lashing out at Watanabe. He was railing against the threat to everything his family had struggled to create. The Toyodas built their first car when Henry Ford was turning out almost 1 million a year in the U.S. During World War II, the family opened dry cleaning stores to get by. They adopted kaizen, the making of small and	On an integral enterpri se architec ture' quest to maintai n its integrali ty.

continuous improvements, to fine-tune manufacturing.	
They enhanced quality and squeezed costs to become one	
of the world's most admired companies. Across the	
Pacific, Ford Motor Co., Chrysler and GM were gorging	
on Americans' car lust. They failed to heed sky rocketing	
gasoline prices, declining workmanship and escalating	
pay. Last year, with help from its gas-electric Prius hybrid,	
Toyota pushed General Motors from its perch as the	
planet's biggest carmaker. In its June 1 bankruptcy	
filing, GM reported \$172.81 billion of debt, more proof	
of the U.S. industry's descent. Toyota's work isn't	
done. To avoid the four-decade decline that humbled	
GM, the Japanese company must fend off rising	
competitors and adapt to the global reality of slowing	
sales growth and shrinking profits, says John Casesa,	
managing partner of auto industry consulting firm Casesa	
Shapiro Group LLC in New York. 'If Toyota is unable to	
react to a changing world, it will risk its very existence	
over time,' says Casesa, who's covered the industry for	
two decades. 'If the company internalizes the <i>GM</i> lessons,	
it can maintain its leadership.' Akio's challenge is to cut	
Toyota's dependence on luxury cars and branch out	
from U.S. markets destabilized by easy credit. In its	
race to top GM, Toyota splurged on enough new factories	
to make 2 million additional cars a year. South Korea's	
Hyundai Motor Co. targeted small-car buyers in China,	
India and other emerging countries, where it sold 55	
percent of its vehicles last year compared with 31 percent	
for Toyota. 'Toyota went from being a scrappy	
newcomer to becoming convinced the market was just	
there for them to take,' says Maryann Keller, an auto	
analyst and president of Maryann Keller & Associates in	
Stamford, Connecticut. 'Toyota wrote the playbook and	
Hyundai read it: Build great cars with great value, and	
people will come.' Toyota investors won't see a quick	
revival, says Christian Takushi, a portfolio manager in	
Zurich for Swisscanto Asset Management AG, which owns	
1.7 million Toyota shares. After reporting record net	
income of \$17.7 billion for the fiscal year ended on March	
31, 2008, earnings took a \$22.2 billion nose dive. <i>Toyota</i>	
ended fiscal 2009 with a \$4.5 billion net loss and the	
company says it expects to lose \$5.7 billion more in	
fiscal 2010 . Earnings won't recover for three years, even	
if sales rebound, since <i>Toyota</i> is still paying for its	
expansion, Takushi says. 'Toyota has overdone itself	
with capital spending because they really wanted to be	
No. 1,' he says. 'They're paying a high price.' Not all	
investors are so pessimistic. 'Toyota is among the best,'	
says Wendy Trevisani, fund manager for Santa Fe, New	
Mexico-based Thornburg Investment Management Inc.,	
which held 17 million Toyota shares in March. 'They	
make every effort to address problems as seen by	
current initiatives including management shifts. Their	
balance sheet remains strong.' Toyota's \$52 billion in	
cash and marketable securities give it a comfortable	
cushion, according to Moody's Investors Service. And it	

		
	will get some relief in the U.S. from the misfortunes of	
	bankrupt rivals, says Kota Yuzawa, a Goldman Sachs	
	Group Inc. analyst in Tokyo. The Japanese automaker	
	may be able to boost American market share by a third	
	to 21.3 percent by 2011 as GM and Chrysler shut plants	
	and dealerships. This prospect, which would make	
	Toyota the top-selling carmaker in the U.S., helped	
	send Toyota's shares up 29 percent this year, to 3,690	
	yen on June 19. That's still 56 percent below their 2007	
	peak of 8,390 yen. ' <i>Toyota</i> should emerge from the	
	downturn in an even stronger position relative to	
	competitors,' says James Hunt, who helps oversee \$6	
	billion at Tocqueville Asset Management LP in New York,	
	including 37,000 Toyota shares. Hyundai's shares surged	
	84 percent this year to 72,500 won on June 19. Inside	
	Toyota, some chalk up the recent stumble to the	
	recession that's sent global car sales down 20 percent	
	since 2007. Shoichiro wasn't buying that excuse. He	
	told employees at the February meeting that Toyota fell	
	victim to hubris, according to the person familiar with the	
	gathering. Beginning in 2003, Toyota pushed to expand	
	manufacturing capacity by 25 percent to build 10	
	million cars a year. When Watanabe became president in	
	2005, he backed the growth plans and championed a \$1.3	
	billion pickup truck plant in San Antonio, Texas, calling it	
	'a dynamic symbol of our bright future.' Watanabe, 67,	
	sealed his fate by failing to predict that sales would	
	plunge last year and not acting fast enough to recover,	
	people familiar with the situation say. In October, $2 \frac{1}{2}$	
	weeks after Lehman Brothers Holdings Inc.'s bankruptcy	
	deepened the global credit freeze, a key <i>Toyota</i> lieutenant,	
	Executive Vice President Mitsuo Kinoshita, said sales	
	could rise to 9.7 million vehicles this year. In May, the	
	company predicted it will sell just 6.5 million vehicles in	
	the fiscal year ending in March 2010. 'If Toyota can't	
	adjust to a market that will be smaller, with less-	
	expensive cars, then somebody else will be heralded as	
	the next great automaker,' Keller says. It's up to Akio	
	Toyoda, 53, the first Toyoda in 14 years to run the	
	company, to ensure that that prediction doesn't come true.	
	First, he'll have to guide Toyota through unfamiliar times.	
	'We're facing a once-in-a-century crisis,' Akio said,	
	referring to the recession, in a January press conference	
	after his appointment as president. In a nod to Toyota's	
	new austerity, Akio, wearing a dark- gray suit with a pale-	
	pink tie, spoke in the lobby of the company's Tokyo office	
	instead of at the Palace Hotel or one of the other upscale	
	venues of previous years. 'I'll try to make changes	
	without being tied down by the past,' he said, reading	
	carefully from a script. 'I will consider measures	
	department heads to discuss ways to slow Toyota's	
	expansion without completely killing it, people familiar	
	with the meetings say. He's planning to appoint five	
	executive vice presidents in key regions such as North	
	America. They'll handle product development,	

 	-	
	manufacturing and sales locally. The heads of these	
	departments currently report to executives in Japan,	
	which slows decision making. 'Toyota has been	
	addicted to U.S. profits these last five years,' says John	
	Shook, a University of Michigan management instructor	
	and former Toyota engineer. 'They've been slow	
	everywhere else, particularly in China, where the growth	
	is. <i>Hyundai</i> could be the big winner.' The reorganization	
	is just part of Akio's makeover attempt. On May 18, he	
	unveiled the latest Prius to the Tokyo media. The newest	
	version of the hybrid boosts fuel economy by 8.6 percent,	
	to 50 miles (80 kilometers) per gallon. Akio said he hopes	
	to quadruple hybrid sales to 1 million annually during the	
	decade starting next year. 'Our answer to how a car	
	should be in the future is the new Prius,' he said. Then on	
	May 23, he traveled to Germany to drive a 500-	
	horsepower black-and-white Lexus sports car in a 24-hour	
	endurance race, finishing 87th in the 170-car field. Two	
	years earlier, in a blog he writes for Toyota's racing unit,	
	Akio said he admired Ulrich Bez, chief executive officer	
	of Aston Martin Lagonda Ltd., maker of fictional spy	
	James Bond's preferred car. He praised Bez for competing	
	in contests that underlings called too dangerous. 'Because	
	such a CEO leads the company, Aston Martin is able to	
	offer an emotional sports car,' he wrote. After another	
	race, Akio described a beer party with fans. 'We were	
	shaking hands, waving hands as if our arms would be	
	torn apart,' he wrote. 'It felt like it was the best	
	moment of my life!' Cliff Cummings, who owns two	
	Toyota dealerships in the foothills of the San Gabriel	
	Mountains near San Bernardino, California, says Akio is	
	starting to shake things up inside Toyota. He credits the	
	incoming president with pricing a no- frills Prius at what	
	Cummings considers a reasonable \$21,000, almost	
	\$11,000 less than fully equipped models. At \$19,800,	
	Honda Motor Co.'s Insight helped force Toyota's price	
	down, Cummings says. 'Akio is taking Toyota back to	
	its fundamental values of dependability and economy,'	
	he says. Akio, who is fluent in English, learned Toyota's	
	ways from the ground up. On Oct. 30 of each year, he	
	visits the Kosai, Japan, birthplace of his great-grandfather	
	Sakichi, who received the family's first loom patent in	
	1891. During his freshman year in 1973 at Tokyo's Keio	
	University, Akio spent six weeks at the Punahou School in	
	Honolulu, where U.S. President Barack Obama was a	
	seventh-grader. Akio graduated from Keio with a law	
	degree in 1979. Three years later, he got a Master of	
	Business Administration from Babson College in	
	Babson Park, Massachusetts. Akio joined <i>Toyota</i> in 1984.	
	After factory and finance jobs, Shoichiro, then <i>Toyota's</i>	
	president, tapped Akio to make the Japanese sales office	
	more efficient by cutting inventories of unsold vehicles. In	
	1996, Akio spearheaded a service called G- Book that uses	
	mobile phones and Web browsers to provide traffic	
	updates to drivers. Two years later, he left Japan to	
	become vice president of a Fremont, California,	

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	manufacturing operation. Toyota, feeling the stirrings of	
	international ambitions, had begun the venture 14 years	
	earlier to gain experience in the U.S. By 2002, Akio was	
	running Toyota's China unit. He headed purchasing in	
	2005 and moved to global sales in 2008. Some suppliers	
	and dealers resisted Akio's ascension to president, saying	
	he'll have a hard time breaking from Watanabe, people	
	familiar with the situation say. For one thing, managers	
	Akio is promoting supported Watanabe's expansion,	
	including Yoshimi Inaba, 63, who'll head North American	
	operations, and Yukitoshi Funo, 62, who'll run global	
	sales. During Watanabe's tenure as president, both Akio	
	and Shoichiro backed major decisions such as building	
	new factories, the people say. 'I don't think anybody	
	sees Akio as a highly original kind of guy, but he's	
	really earnest," says James Womack, chairman of the	
	Lean Enterprise Institute in Cambridge, Massachusetts,	
	which trains companies on the automaker's methods for	
	cutting production costs. 'He's been in the Toyota system	
	all his life. He doesn't know anything else but to go	
	back to the basics.' Watanabe, a Keio graduate like	
	Akio, joined Toyota in 1964. He rose through the	
	purchasing staff with a reputation as a cost cutter. From	
	2000 to 2005, he achieved 1 trillion yen (\$10.3 billion) in	
	savings by streamlining Toyota's use of 173 components,	
	from headlights to horns to steering wheels. The savings	
	helped pay for Toyota's new plants. By 2005, he was	
	running the company as president. Watanabe opened the	
	newest factory in Woodstock, Ontario, on Dec. 4. Three	
	weeks later, he delivered Toyota's second major profit	
	warning and even then avoided acknowledging that he'd	
	made a strategic mistake. 'We should have arranged a	
	little bit more kaizen when we were on a growth path,'	
	he told reporters. 'On the other hand, many customers	
	bought our cars, so it's really a difficult judgment.' Akio's	
	quest to fix Toyota will take him to the scene of one of its	
	biggest setbacks: a former cattle ranch in San Antonio	
	where 600-pound (270-kilogram) wild pigs roam the	
	underbrush. Back in 2003, Toyota announced the factory	
	in an effort to undermine Detroit's last great profit bastion:	
	pickup trucks. The Texas plant opened in November 2006,	
	just months before cracks emerged in the U.S. subprime	
	mortgage market and gasoline prices began their rise.	
	Timing was just one issue. 'There was a lot of non-	
	Toyota thinking,' says Shook, the former Toyota	
	engineer. 'San Antonio seemed kind of crazy.' Starting with its first U.S. factory in 1989. Toucta will the Commu	
	with its first U.S. factory in 1988, <i>Toyota</i> built the Camry midsize sedan and others that had first proved their	
	midsize sedan and others that had first proved their	
	popularity in Japan, Shook says. It designed each assembly	
	line to accommodate many models. In Texas, <i>Toyota</i>	
	broke these rules by dedicating a whole plant to the	
	largest pickup the company had ever conceived, the	
	Tundra. <i>Toyota</i> wanted to attract new buyers on their home turf. Shock says Watanaba authorized \$2 billion	
	home turf, Shook says. Watanabe authorized \$3 billion	
	for the effort, a person familiar with the situation says. He	
	planned to turn out 250,000 Tundras a year in San Antonio	

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	and Princeton, Indiana. Today, Toyota builds 100,000
	annually, only in Texas. Toyota was challenging Detroit
	where it was strongest, says Eric Noble, president of
	research firm Car Lab in Orange, California. As Toyota
	was learning the truck-building ropes, Ford redesigned its
	F-150 pickup. The new regular-cab F-150, with its 3,030-
	pound payload and 20 highway miles per gallon for the
	midsize engine, was an exemplary achievement in the
	same way that the Prius is <i>Toyota's</i> best, Noble says. By
	comparison, the Tundra had a 1,990-pound payload and
	got 17 mpg. Even better for <i>Ford</i> , the F-150 won a five-
	star safety rating from the National Highway Traffic Safety
	Administration compared with Tundra's four stars. U.S.
	carmakers are catching up in quality too. Chevrolet
	customers reported 113 quality complaints per 100
	vehicles in 2008, compared with 104 for Toyota, according
	to J.D. Power & Associates, which tracks consumer
	satisfaction. In 1981, GM had seven times the
	complaints of Toyota. On the luxury end, Hyundai is
	chasing Toyota's Lexus GS with its Genesis, a premium
	sedan that sells for \$10,000 less. Hyundai also is preparing
	to bring its top-end Equus to the U.S. For the Tundra
	pickup, the killer was price, dealer Cummings says.
	Toyota charged \$29,568 for a typical Tundra in 2007.
	That was \$4,000 too much based on what potential
	buyers told him, Cummings says. 'By charging too
	much, we forced customers to look elsewhere,' he says.
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	When Honda's retiring CEO Takeo Fukui looks at San
	Antonio, he says he sees a clear difference between <i>Toyota</i>
	and Japan's No. 2 automaker. <i>Honda</i> builds factories in
	stages, adding the capacity to make 50,000 vehicles at a
	time, instead of 250,000 at once. ' <i>Toyota</i> makes big
	investments,' Fukui, 64, said in Detroit, where he was
	attending an April engineering conference. 'Our idea is to
	start small and grow. We consider ourselves a small
	company, and the idea of having extra capacity is very
	scary.' A foggy March Tuesday in San Antonio proves
	Fukui's point about idle space and shows <i>Toyota's</i>
	determination to learn from its miscues. Dozens of <i>Toyota</i>
	workers, wearing green or orange vests that signify they're
	on temporary assignment, inspect unfinished trucks. These
	same workers cleaned parks and enjoyed yoga and Pilates
	on company time when a 15.6 percent sales drop forced
	Toyota to shut the plant for three months starting in
	August and then cut a second shift. Ray Tanguay,
	executive vice president for manufacturing in North
	America, sees a silver lining in the downtime. The
	company is using its kaizen process to build vehicles
	with fewer workers, aiming for more profit when sales
	pick up. 'We have to go back to our core values,' he
	says. 'This might well make us stronger.' Kaizen-
	sparked improvements are taking root in San Antonio.
	Production manager Dan Antis says employees studied
	everything from workplace diversity to how to hold a
	screwdriver. 'When you're chasing volume, you don't
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have time to teach people,' Antis says. 'The kaizen we're capable of doing after the shutdown is endless.' Standing near the assembly line's end, team leader William Steubing says he wanted a better way to handle a 20-pound plastic box that carries parts alongside unfinished trucks. Initially, Steubing's team attached the box to metal frames holding the trucks. As the Tundras moved along the line, workers reached into the box for headlights and other parts. When they emptide the box, they'd lift it off the carrier and carry it back for refilling. During the shutdown, workers designed a conveyor to do that job. Now, as a truck moves forward, the conveyor tilts up a corner of the empty box and snaps it off the carrier. The box falls onto the conveyor and rolls back for refilling. The change saves 11 seconds of walking per truck. Steubing and his co-workers also got training in welding and metal cutting. Then they recycled old conveyors, spending \$2,000 compared with \$90,000 that <i>Topota</i> engineers had planned for a motorized conveyor. These and more than 400 kaizen projects are making an impact. Defects that workers reported in an internal audit fell to 0.2 per truck from 1.2, comparable with <i>Topota's</i> best word/wide. Productivity measured by trucks made per worker per day, not including temporary labores, nose to 0.91 from 0.73. <i>Topota's</i> North American factories need to run at 70 percent to 75 percent of capacity to break even, fraugua says. They were at 60 percent in March. He says he's cutting hundreds of millions of dollars per year in costs. Starting in September, the North American factories will break even, he says. 'If the market comes back, we're going to be in a very good position,'' Tanguay says. Unlie money-saving kaizen improvements may help Akio on the factory floor, he recession has made strategic planning harder, U.S. sales chief Jim Lentz says. In his office in Torrance, California, adjacent to hel - 405 freeway and its crush of thousands of cars. Lentz says he can't predict with certainty how			
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					whether the public will adopt very different forms of transportation.' Amid the upheaval, <i>Toyota</i> is making concrete strategic shifts. It's building more compact cars and setting up factories in emerging markets and countries with large reserves of resources like oil, Watanabe told reporters in May. It doesn't have much choice. Sales at the Lexus luxury unit had generated more than half of U.S. earnings, with 12 percent of sales, in the middle of the decade. Consumers' lust cooled when the average U.S. price for regular gasoline topped \$4 a gallon in July 2008. During the first quarter of 2009, <i>Toyota's</i> U.S. pickup, minivan and SUV sales plunged 40 percent. Lexus sales dropped 37 percent. The danger is that <i>Toyota's</i> moves toward smaller vehicles may cut earnings in half, even after the recession ends, says Koji Endo, an analyst at <i>Credit Suisse Group AG</i> in Tokyo. And nobody's sure how the price of gas, which has fluctuated by more than \$2 a gallon in the past year, will affect consumer desires. Even so, <i>Toyota</i> is banking on such cars as the iQ. At the New York Auto Show in April, a lime-green model of the micro- compact descended from the ceiling amid strobe lights and techno music. The iQ fits sideways in a normal parking spot, travels 65 miles per gallon and has nine air bags. <i>Toyota</i> is targeting with smaller cars. Along with affiliate <i>Kia Motors Corp., Hyundai</i> sold 4.2 million vehicles last year, more than half of them in emerging markets. <i>Hyundai</i> and <i>Kia's</i> combined profit dropped 7.9 percent to 1.56 trillion won (\$1.2 billion) in 2008, partly because the South Korean currency fell 26 percent against the dollar. Combined sales rose 0.5 percent in the U.S. during the January-March quarter and 50 percent in the u.S. during the January-March quarter and 50 percent in the u.S. during the January-March quarter and 50 percent in the u.S. during the January-March quarter and 50 percent in the u.S. during the January-March quarter and 50 percent in the u.S. during the January-March quarter and 50 pe	
23 June 2009	Internal Boeing Memo., posted on forums.j etphotos .net	Scott Carson , CEO Boeing Comm ercial Airpla nes	Firm	α	"***This message is being sent by Scott Carson, president and CEO of Commercial Airplanes, to all Commercial Airplanes employees.*** Postponing 787 flight testing There are times when making the prudent and right choice is the only choice. That's what we have done today with our announcement that we will take the time to reinforce an area within the side-of-body section of the 787 before we begin flight testing.	On a modular enterpri se architec t's views on choice.
L					Based on our preliminary analysis, and as recently as last	

					 week, we believed we could work through this issue and still begin flight test this month. Subsequent analysis over the last few days led us to conclude that a modification must be made before flight test. As we have stated in the past, we will fly only when our team is convinced that we are ready to fly and can conduct a productive flight test program. Our testing process is designed to identify these issues, and experience tells us that structural modifications are not uncommon for development programs. We gave consideration to a temporary solution that would allow us to fly as scheduled, but we ultimately concluded that the right thing was to develop, design, test and incorporate a permanent modification to the localized area requiring reinforcement. Now, it is important that our team has the time and resources to develop a solution, conduct the appropriate testing to validate the solution and incorporate the modification prior to first flight. First flight and first delivery will be rescheduled after we determine the required modification and testing plan. The emotions we feel today should not take away from the 787 team's incredible progress in recent months. We have had strong results from our engine tests, our systems tests and, with this exception, our structural tests. We believe in the technologies, the design and the systems that will make the 787 a revolutionary airplane for our customers and their passengers. As a team, we have worked through many challenges in bringing this breakthrough airplane to life. I am confident that as a team, we will work through this issue as well. We will stay focused on executing the best solution as quickly as possible, while keeping up the progress on the other areas of the program. 	
					I thank everyone on the team and everyone at Commercial Airplanes for the hard work, dedication and perseverance as we continue on this journey together.	
23 June 2009	Wall Street Journal, "Boeing Delays First Flight of 787" (Ann Keeton)	Scott Carson , CEO Boeing Comm ercial Airpla nes	Firm	α	Scott" "Boeing Co. delayed the first flight and initial delivery of its new 787 Dreamliner, saying wing-bending tests showed a structural weakness where the wings join the body of the aircraft. The Chicago company indicated Tuesday it plans to take some second-quarter charges related to the delay. It will be several weeks before the plane maker releases a new flight and delivery schedule, Scott Carson, head of Boeing's commercial airplanes unit, said during a conference call Tuesday. Financial impact to Boeing's second-quarter results will be disclosed when the company releases earnings data next month, the company said. Carson said it was premature	On a modular enterpri se architec tur's continu ed, systema tic and accelera ting

	to discuss the dollar impact of the delay, but that the	over-
	cost of small parts to reinforce the aircraft structure	promise
	would be 'immaterial' to the program. Boeing shares	and
	recently fell \$4.17, or 8.9%, to \$42.70 Tuesday as	under-
	investors expressed disappointment over trouble with the	delivery
	787, which is expected to help fuel Boeing's earnings in	
	coming decades. Carson said fixing the aircraft won't	
	slow the 787 production line, as already-assembled	
	aircraft can be modified with a number of small 'hand-	
	A REPORT A REPORT A REPORT OF A REPORT AND A REPORT AND A REPORT OF A REPORT AND A REPORT	
	sized' parts that can be added wherever the planes are	
	now in the assembly process. With more than 800 orders	
	for the 787, Boeing expects in its initial production plan to	
	finish two planes per month, and has said it may add a	
	second production line to ramp up production in 2012.	
	The news Tuesday is another blow to Boeing, which had	
	steadfastly maintained the first flight would take place	
	by the end of June. The 787 is already two years behind	
	schedule, suffering a total of five delays on	
	manufacturing glitches. First customer All Nippon	
	Airways had expected to receive the first 787 aircraft in the	
	first quarter of 2010. Carson said Boeing began talking to	
	customers about the latest delay late Monday evening. It's	
	not clear yet whether the delivery delay will match 'day	
	for day' the holdup at the factory since Boeing will	
	continue with other tests as it reinforces the wing joints.	
	Boeing said Tuesday the problem was discovered during	
	recent, regularly scheduled tests on the first test aircraft.	
	While preliminary analysis indicated that flight test could	
	proceed this month as planned, <i>Boeing</i> decided late last	
	week to delay the first flight, a key milestone in any new	
	aircraft development. Scott Fancher, head of 787	
	production, said Boeing found unexpected stress points	
	about one-to-two square inches in size, at 18 locations	
	on the joint between the upper side of each wing and	
	the body of the aircraft. He said a computer model	
	didn't show that stress, and the model will need to be	
	changed to reflect results from physical tests that	
	sharply bent the wing of the aircraft. 'Consideration	
	was given to a temporary solution that would allow us	
	to fly as scheduled,' Carson said, 'but we ultimately	
	concluded that the right thing was to make a	
	5 S	
	permanent change. Boeing will work on structure	
	reinforcement with parts suppliers Fuji and Mitsubishi.	
	'Structural modifications like these are not uncommon in	
	the development of new airplanes, and this is not an issue	
	related to our choice of materials or the assembly and	
	installation work of our team,' he added. He said the	
	structural weakness occurred where materials including	
	titanium and aluminum were used, along with new	
*	composite materials that have made the 787's design a	
	game-changer for the industry. The lighter weight of the	
	aircraft is expected to save some 20% on fuel and harmful	
	emissions. Early last week, Carson addressed reporters	
	at the Paris Air Show, assuring them the first flight	
	was on schedule for as early as Wednesday of this	
	week. He said Tuesday the first flight could have occurred	
	in the bala raceady the mornight could have occurred	

		I	1	1	as scheduled, but Passing thought it anudant to delay the	
22	Flight		Firm	G		On
23 June 2009	Flightbl ogger.c om "BREA KING: Boeing Postpon es 787 First Flight" (Jon Ostrowe r)		Firm- Media	α	as scheduled, but <i>Boeing</i> thought it prudent to delay the 787 schedule, which had become extremely tight." By Raoul on June 23, 2009 10:05 AM "John, I enjoy your blog but I hope you and all the other writers (I consider you better than a mere blogger) will learn something from this. Especiall the so called 'Aviation industry analysts' Don't become so starstruck by <i>Boeing</i> and it's handlers that it impairs the facts. <i>Boing</i> mught give you data, it might toss out some swag and some shiney, but facts? You have to get those for yourself. Yes, I know, 'WTH is this guy talking about?'. Think about it John, you have been expertly stroked and groomed by one of the best PR machines in the world. You aren't writing about the hype, you have become part of it. <i>Boeing</i> is a very troubled company, and has been for a dozen years now. As shareholders lick their wounds over the past few days of sell-down, incurring massive losses(again) we again wonder where the truth begins and ends with <i>Boeing</i> , and particularly where managerial and executive competance is or is not present. It's our fault too. If we didn't choose to believe them we thought maybe, just maybe they couldn't blow it again at this late stage. Yes, I know, the focus of this blog is on the technical/commercial aspects of aerospace, it's not an investors symposium. But real damage has and is being done, not just to us, but to the company. This is not just another routine development difficulty. This smacks of a deep, deep flaw in <i>Boeing</i> 's current methodologies and philosopy of doing business. The sort of 'Go Fever' exhibited and egged on by <i>Boeing</i> itself is bad mode of thinking to be in. It cannot turn out well. I'm sorry, but it just cannot. Focusing on every minute detail right down to every engine start or the most meaningless movement of the aircraft on the ramp misses the point entirely. The bloggers, the aerospace press, et-al, just consistently give <i>Boeing</i> a pass. Nobody is digging, nobody is asking tough questions. It's my opinion that <i>Boeing</i> ne	On question ing data fidelity and rival hypothe ses for underde livery in a modular enterpri se architec tue's product s.
					with GO FEVER. And that is a very, very dangerous thing to have." By Roger Fields on June 23, 2009 11:49 AM "Boeing says that they delayed first flight because the flight envelope would be to small for productive flight testing. Sorry, don't buy that. Why getting all this	
					negative publicity if a first flight would have been possible? Why not performing first flight by June 30 while they were thinking about a fix? Believe me, the problem is bigger then <i>Boeing</i> admids, otherwise, they would have gone for first flight by June 30 regardless of the smaller flight envelope."	
23 June	New York	Scott Carson	Firm	α	<i>"The Boeing Company</i> said on Tuesday that it would again delay the first flight of its new jet, the 787, the latest	On a modular
2009	Times,	, CEO			setback in a program that is considered crucial to the	enterpri

	"Pooing	Roaina	r	T	plane maker's future . Desing executives said that they	50
1	"Boeing Delays	Boeing Comm			plane maker's future. Boeing executives said that they had found additional stress where the wings attach to the	se architec
	1 st	ercial			sides of the plane. Minor modifications should fix the	ture's
1	50	Airpla			problem, they said. But they also said it could be weeks	over-
1	Flight of	nes			before the flight testing could resume. And stock analysts	promise
	Dreamli	nes				and
					said that it would mean a delay in the delivery schedule, a	
	ner"				concern that caused the company's stock to drop as much	under-
	(Christo				as 9 percent Tuesday morning. The problems were the	delivery
	pher				latest in a series of delays for what promises to be the	
	Drew)				world's most sophisticated passenger plane and a key to	
					Boeing's future. The company has more than 850 orders	
					for the plane, which is known as the Dreamliner and is	
					supposed to be lighter and more fuel-efficient than other	
					commercial aircraft. Analysts said the company's flight	
					test schedule was so tight that the delay of several	
					weeks would clearly push back plans to deliver the first	
					787 by next March. "'There's no way that will hold,'	
1					Richard Aboulafia, an analyst at the Teal Group, said.	
1					'This is a pretty late stage in the preflight test schedule	
1					to be finding structural showstoppers.' And that only	
					heightens concerns that Boeing could find more problems	
1					once the test flights begin. 'This removes any hope that	
					they'd gotten a handle around the likely risks of things	
					they could find during the flight test program,' Mr.	
1					Aboulafia said. 'It doesn't help the company's	
					credibility,' said Howard Rubel, an analyst at Jefferies &	
					Company. 'There's a sense of frustration that they were 90	
					percent at the finish line, and they're still at 90 percent of	
					the finish line.' Company executives said they	
		6			discovered the structural weakness last month. They	
					said they initially thought that it would not delay	
					having the first flight by June 30, an idea that they	
					continued to promote at the Paris Air Show last week.	
					But in a conference call with reporters and investment	
					analysts on Tuesday, Scott Carson, the chief executive of	
					Boeing's commercial airplane operations, said 'it became	
					apparent by Friday that the problem would limit how	
					rigorous the flight could be.""	
23	Forbes,		Firm	α	"The delay of the first flight test of the best-selling,	On the
June	"Histor				new-technology 787 announced Tuesday by Boeing Co.	chronic
2009	y of the				executives is the fifth in years of setbacks for the	alling of
	Boeing				program. Here is a summary of the effort to build the	the
	787"				first passenger plane made from lightweight carbon	under
					composite parts rather than metal:	delivery
						of a
					ORIGINS - On Dec. 20, 2002, Boeing officially drops	modular
					plans for the Sonic Cruiser, which would have traveled	enterpri
					near the speed of sound, and on Jan. 29, 2003, the	se
					company establishes a leadership team for the 7E7, its first	architec
					all-new airplane since the 777 in 1990. Composites are	ture.
					chosen as the primary material the next June.	
			10		STARTUP - All Nippon Airways of Japan orders 50 of the	
					planes, and <i>Boeing's</i> board of directors approves the	
					launch of the 7E7 program on April 26, 2004. In January	
					2005 the model name is changed to the 787, and at the end	

of the year the first deliveries are set for early summer 2008.	
FIRST GLITCHES - Boeing announces on June 9, 2006, that bubbles have been found in the composites used in a 33-foot prototype of a section of the fuselage. On Nov. 6, 2006, Boeing says it's confident the plane can be lightened by about 2.5 tons, enough to make it the most fuel efficient commercial jet in the air.	
<u>SALES</u> - Sales exceed 500 planes by April 3, 2007 , and <i>Boeing</i> begins looking for ways to accelerate production.	
<u>MORE GLITCHES</u> - <i>Boeing</i> reveals production snags on June 12, 2007 , including a gap where the left side of the nose-and-cockpit section is out of alignment with the fuselage. Another problem is an industrywide shortage of fasteners that hold the plane together.	
<u>FIRST DELAYS</u> - On Sept. 5, 2007 , <i>Boeing</i> says the 787 will begin flight testing in mid-November or mid-December, months later than originally planned. On Oct. 10, 2007 , <i>Boeing</i> delays first deliveries by six months.	
PERSONNEL CHANGE - Boeing announces on Oct. 16, 2007, that Michael B. Bair, vice president and general manager of the 787 program for the past three years, has been replaced by Patrick M. Shanahan, previously head of <i>Boeing's</i> missile defense systems in Wichita, Kan. Bair is named vice president of business strategy and marketing and, on Oct. 31, 2007, says some suppliers of major components for the 787 have fallen short of <i>Boeing's</i> expectations.	
<u>PROMISES, PROMISES</u> - On Dec. 11, 2007, <i>Boeing</i> <i>Commercial Airplanes</i> CEO Scott E. Carson says there will be no further delay in 787 development, but a three-month delay is announced on Jan. 16, 2008, and an additional six-month stall is announced on April 9, 2008, postponing the projected debut of commercial service to the third quarter of 2009 - the third revision to the delivery schedule and the fourth change in plans for first test flight.	
<u>LABOR DISPUTE</u> - An eight-week strike by the Machinists union that began Sept. 6, 2008 , and lingering production problems, including installation of improper fasteners, pushes the first test flight into the second quarter of 2009 and first deliveries into the first quarter of 2010 - the fourth schedule shift, making the first 787 nearly two years late. The top issue in the strike is job security as union members maintain that if more of the key production had been in-house instead of by subcontractors, the 787 would have been completed before the walkout.	
LATEST HANGUP - On June 23, 2009, Boeing	

					announces that flight tests will be delayed an	
					undetermined number of weeks for the design and	
					installation of reinforcements along the upper part of the	
					place where the wings join the fuselage. Carson says	
		101			deliveries also will be pushed back."	0
23	The	Mike	Firm	α	"On a sunny day in July 2007, the <i>Boeing Co.</i> welcomed	On a
June 2009	Hearald .net	Bair, VP			its 787 Dreamliner into the aviation world with a lavish	modular
2009	"What	Strateg			rollout party in Everett. <i>Boeing's</i> Mike Bair, then the 787 program vice president, stood outside the factory's	enterpri se
	Boeing	y,			immense doors smiling like a proud papa alongside retired	architec
	did	boeing			'NBC Nightly News' anchor Tom Brokaw, who emceed	ture's
	Right –	Comm			the event. Bair had told the thousands of workers,	focus on
	and	ercial			customers and suppliers who watched the rollout either in	product
	Wrong	Airpla			person or on satellite about the importance of	innovati
	on the	nes		2	incorporating the latest technology when bringing a	on.
	787"				new aircraft to market. 'You've got to get it right,' Bair	
	(Michel				said. From a technology perspective, Boeing got its	
	le				new 787 right. From a preliminary execution	
	Dunlop)				standpoint, Boeing got its 787 wrong. Standing there	
					next to their Dreamliner on 07-08-07, Boeing executives	
					surely had concerns about the aggressive schedule in front	
					of them. Even then, Bair and other company leaders	
					knew their first 787 was filled with temporary parts and lacked the wiring and systems it needed for first	
					flight, scheduled for late August 2007. But no one	
					imagined it would take <i>Boeing</i> not two months, but nearly	
					two years to put its 787 Dreamliner into flight. Within two	
					weeks of that day in July 2007, a series of schedule slides	
					began for the mostly composite jet. By early September,	
					the company had pushed the 787's first flight to December	
					but maintained the original May 2008 delivery date.	
					'Right now we don't see this translating into delays,'	
					Bair said. 'The most important thing is to deliver the	
					airplane on time.' In early October, <i>Boeing</i> marketing guru Randy Tinseth gave assurances the 787 was on	
					track. Less than 24 hours later, Scott Carson, president	
					of commercial airplanes, admitted that <i>Boeing</i> would	
					not deliver the first 787 on time. Over the next 14	
					months, the delays dribbled in, soiling Boeing's reputation	
					and spoiling a potentially wide lead Boeing could have	
					held over rival Airbus. Analysts and bloggers often	
					broke news of 787 setbacks before Boeing. And	
					problems underperforming partners, incorrectly installed	
					parts piled up, pouring over into other jet programs. After the Machinists strike last fall, <i>Boeing</i> announced	
					delays to its 777 Freighter and 747-8 programs, blaming	
					the 57-day work stoppage, design changes and a shortage	
					of engineering resources for the setbacks. The problems	
					on the 787 forced Boeing to keep engineers on the	
					Dreamliner longer than anticipated, the company said.	
					Therefore, the engineers were late transferring over to	
					the other programs. Meanwhile, as Boeing pushed the	
					787's first delivery date further, its rival Airbus picked	I
					up more orders for its A330. The European jet maker	
					saw a surge in orders for its A330 since <i>Boeing</i> first	
					announced delays to its 787 in 2007. Airbus received	

June Pec 2009 In: nc "F 78 Fl: De al De al De an Qe Tr pt (A	ost- atellige cer Boeing 87 light elay: echnic etails ad &A ranscri 	Scott Carson , CEO Boeing Comm ercial Aiprla nes; Pat Shanah an, VP and GM Airpla ne Progra ms Boeing Comm ercial Aiprla ne Progra ms Scott Fanche r, VP	Firm- Investo r	α	 198 net A330 orders in 2007 and another 142 in 2008. Boeing's gift to Airbus also meant the European jet maker's new A350 jet, also made mostly of composite materials, won't be far behind the 787 into service. The A350 is sized more to compete with Boeing's 777. Still, the Dreamliner will be delivered just three years before the A350. The 787's delays and extra costs give Boeing less time and cash to dream up a competitor to the A350. But Boeing's chief executive, Jim McNerney, sees some silver lining in the 787's delays and is confident in the Dreamliner's future, he said at the Sanford C. Bernstein strategic decisions conference in late May. The technology that Boeing is using on the Dreamliner will be used on aircraft for decades, he said. 'We've figured out how to build airplanes for the next 75 years,' McNerney said. Boeing is using a spun composite barrel for its 787. Airbus plans to use composite panels instead. McNerney isn't sure Airbus' strategy will pay off. Although Boeing's suppliers have struggled on the 787, the delays have allowed them to smooth out the process an advantage in the long run, McNerney said. 'I think that's a huge advantage,' he said of the 787's technology. 'Innovation is the key to us getting the lion's share of the market.''' Question: Joseph Campbell - Barclays Capital - Analyst "Just again back on the nature of the problem and where it is, can you is this problem isolated to a single structure?' So like is it I mean is it the Alenia piece? Is it the wing box from Fuji? Or does it involve stresses on several supplier components? Is it both starboard and port so that this is something that's symmetrical around the aircraft? Or is it a single sided kind of issue?'' Pat Shanahan - The Boeing Company - Airplane Programs VP and General Manager "I will jump in first and Scott can provide additional color.'So it's both the wing out of Mitsubishi, and Boeing, in developing a comprehensive long-term answer. Scott?'' <	On a modular enterpri se architec ture's explanat ion for under- perform ance
		<i>Airpla</i> nes; Scott Fanche			developing a comprehensive long-term answer. Scott?" Joseph Campbell - Barclays Capital - Analyst	

"So just to not hopefully this can be the end of this. Somebody asks before it was along the entire wing, so it's if you were to describe from the aft to tail or under the belly or wherever these are located, is it possible to take the multiple several inch one or two square inch places and identify how many of them are there and from the furthest point away, how big is the section affected?"
Scott Fancher - The Boeing Company - 787 Vice President and General Manager "This is Scott Fancher. Let me try and take a crack at that. As we mentioned earlier, we are talking on a one or two square inch area. It is along the side-of-body join between the wing and the side-of-body and particularly and specifically limited to the upper portion of where the wing and side-of-body join. And about 18 locations on either side of the aircraft for a total of 36 locations. The exact number may change a little bit as we analyze it, but that's approximately the number. And I really want to emphasize we are talking about a one or two square inch area along that upper wing join area in multiple locations. This is not a problem that extends out the wings or down into it is into the aircraft. It's a very limited area that needs structural reinforcement. The modifications, again to emphasize, we are talking about a handful of parts at each location and each one of those parts you could literally hold in your hand. They will be about the size of your hand or smaller. So not complicated by any means."
Paul Merrion - Crain's Capital Business - Media "Hi. I just wanted to go to the issue of the credibility in the company's schedule and predictions of schedule. You knew about this as of late last month, you said. Why wait until now to say anything at all about it? Including when the world's attention was on Boeing last week at the Paris Air Show."
Scott Carson - The Boeing Company - President and CEO "Paul, this is Scott Carson. When we were at Paris last week we had been through the preliminary analysis of the data and were of a mind that the airplane could enter flight test with a credible flight test envelope as we worked relatively minor modifications. The work done by the team through the week last week narrowed the envelope to the point where on Friday we determined that to fly would be such a small envelope for us that it would be an interesting exercise in having the airplane in the air but not particularly useful in terms of preparing the airplane for certification. So at that point is when we made the call to delay the process, identify the fix, test the fix, install the fix, and then enter a flight test program that is fully robust."
Paul Merrion - Crain's Chicago Business - Media

	"So what would have been the worst case if you had flown? Are we talking about cracks in the fuselage or the wings falling off or what if you hadn't made this fix before flying?"	
	Scott Fancher - The Boeing Company - 787 Vice	
	<u>President and General Manager</u> "The answer is our assessment is likely nothing would	
	have happened. This is an issue where stress concentrations departed from the model. Absent being able to anchor those two pieces of data together with confidence based upon our design process, we would have had to reduce the flight envelope we were willing to fly and that gets you into the line of logic that Scott just	
	outlined for you. So it really isn't a matter of yes and no. It is gee, because we've seen this departure and haven't been able to anchor the data back to the model with sufficient confidence, we need to narrow our margins and	
	that led us down the path that Scott described."	
	<u>Pat Shanahan - The Boeing Company - Airplane</u> <u>Programs VP and General Manager</u>	
	"And we are always staying in process. And when the process says stop, we stop."	
	Scott Carson - <i>The Boeing Company</i> - President and CEO "Absolutely, absolutely."	
	Howard Rubel - Jefferies & Co Analyst "Thank you very much. I mean you are talking about a number of parts that sound like you could put them in a grocery bag but maybe 50 pounds, 60 pounds. But can you talk a little bit about the dollar outcome, Scott, that we are seeing here? Are we talking hundreds of millions of dollars or are we talking just a few million to get this started and fixed?	
	Scott Carson - The Boeing Company - President and CEO "Howard, I think it is premature to forecast where we are in dollars. We understand the nature of the fix and I would say the nature, not the specifics of the fix yet, because we have to complete the models, run those models, and then test the solution. As we get through those steps, I think we will be in a better place to talk about the magnitude of the dollars. The fix itself does not appear to be a big dollar item. Obviously we need to understand the implications of the flight test program and first deliveries to assess that."	
	Howard Rubel - Jefferies & Co Analyst "Are we going to see though a day-for-day delay with this and the whole schedule or are there some other items that you might want to also incorporate to increase the margin for discovering additional unknowns?"	

—	1	1	1	1	Scott Carson - The Regine Commany Desident and	
					Scott Carson - The Boeing Company - President and CEO "We are going to continue to exercise the test program as Scott Fancher described in his comments. So whether it is day-for-day, I think again hard for us to call at this moment. We do believe we will be using the time productively however."	
					Howard Rubel - Jefferies & Co Analyst "So I just want to go back though the dollar amount. The fix itself just the titanium parts that you are talking about, is immaterial to the price of the airplane."	
					<u>Scott Carson - The Boeing Company - President and</u> <u>CEO</u> "Correct."	
					Posted by unregistered user at 6/24/09 1:45 a.m.	
					"Can you smell the BS in that conference call or what? They kept emphasizing that the mods would be insignificant as both planes 001 and 002 would not have to go back to the floor, yet they will require weeks to provide a fix and more weeks to provide new time table. I wish I was on that call and called them out on it. But then again, these media types have no spine. I hate to say this, but I believe <i>Boeing</i> is crunching the numbers as to how much it would set them back to pay penalties and loss of future revenue to just scrap this 7 Late 7 program. Mark my words. This is the end of <i>Boeing.</i> "	
					osted by fisquid at 6/24/09 9:34 a.m.	
					"The dollar amount is immaterial?? Customers are fuming to the point that they're canceling their orders, net 787 orders for the year is less than zero (!), and for the last two years they were supposed to be producing a plane a week or more, at \$150 million each, and the dollar amount of the delay is immaterial? Make no mistake. This delay is phenomenally expensive. No one is willing to admit it, but massive amounts of money are lost when you've got a product you can't sell. There's only a small window of time before the competition has similar planes to sell. The delay means MANY lost sales. Profits should have been in the millions on each plane. Instead, they sit on their hands through a time they should have been selling lots of planes at \$150M a pop. And Scott Carson is talking about the price of the bolts, like that's the cost of the delay! Sheesh! It's astonishing that the shareholders are willing to tolerate this level of incompetence. Immaterial, my foot."	
24	Forbes.		Firm-	α	"Boeing Co.'s most recent delay of its first test flight of	On the
June 2009	<i>com</i> "Ahead of the Bell:		Investo r		its long-awaited 787 jetliner prompted at least two analysts Wednesday to cut their earnings estimates and ratings for the aerospace manufacturer. Deliveries of the long-range widebody have been delayed repeatedly.	investor 's evaluati on of a

	<i>Boeing</i> Downgr			Analyst Myles Walton of Oppenheimer & Co. said in a	modular enterpri
	aded " ()		r c v c c c c r r F F S	analyst highes watch of <i>Oppenneumer</i> at co. said in a note to investors that he is concerned about 'the likely downward pressure in new aircraft deliveries coupled with product development risk continuing for the next couple of years.' He reduced his rating on the stock to 'Underperform' from 'Perform.' He cut his cut his estimate for 787 deliveries next year to 18 from 30, and reduced his 2009 estimate to \$4.35 per share from \$4.54. He reduced his 2010 profit forecast for the company to \$4 per share from \$4.08 per share and cut his price target to \$40 from \$42.	se archhite cture's over- promise and under- delivery
			e s f f r t r	estimate for <i>Boeing</i> to \$4.75 per share from \$4.86 per share and reduced her 2010 estimate to \$4.50 per share from \$5.25 per share. She cut her rating to 'Equal Weight' from 'Overweight.' 'Based on the program's track record for continual negative discovery, we don't see the wisdom in assuming yesterday's revelation represents the very last setback,' she said in a note to nvestors."	
June 2009	24/7 Wall St. "Boeing : Proof That Manage ment Incomp etence Needs Regulati on" (Dougla s McIntyr e)	Firm- Investo rs	$ \alpha $ $ i t $ $ i t $ $ a $ $ s $ $ s $ $ s $ $ s $ $ s $ $ r $	The federal government has set up a number of systems o effectively control the financial and credit systems along with most of the major firms that operate in the sector. The most aggressive, and perhaps most prudent step, the Administration has taken is to force the most poorly managed banks to restructure their boards. The Treasury put proposals before Congress to substantially increase the power of the Fed, in essence giving it life or death power over banks that become, in its judgment, rreparably crippled. The auto industry has fallen under the same government thumb. <i>Ford</i> may have dodged the imprecedented interference that comes with bailout dollars. <i>GM</i> and <i>Chrysler</i> are essentially wards of the state. The auto parts companies could end up in the same position if the government is forced to nationalize some of them to keep the car industry from running low on parts. What the government has failed to do is mandate that stupidity be pushed out of the executive suites of America's largest companies. Incompetence has always been the enemy of employees, shareholders, and customers. Each of these is much more evident in a eccession when the margin for error for creating profits often falls to zero. <i>Boeing</i> delayed the launch of its 787 Dreamliner again today, for the fifth time. This disaster will cost the company sales in upcoming quarters and will orce airlines which are flying old and inefficient planes to bay more to operate them than they would have if the new dircraft were delivered on time. The pressure on <i>Boeing's</i> margins may well lead to layoffs. Shareholders watched he value of the company's shares drop 6% yesterday. The first of the five product setbacks came in October 2007. <i>Boeing's</i> stock traded at just above \$100 then. It thanges hands at \$44 now. <i>Boeing</i> management made a number of mistakes that contributed to the delays. It	On a systemi c analysis of a modular enterpri se architec ture.

					did a poor job of managing the construction of the 787. Sets of fasteners were installed incorrectly. The company announced it would have to replace some of them last November. <i>Boeing</i> was greedy with labor, particularly when labor was critical to company	
					product release timetables. The International Association of Machinists and Aerospace Workers walked out on the company last fall. According to MSNBC, ' <i>Boeing</i> lost about \$100 million in revenue a day from the Machinists strike.'	
					The most stunning aspect of the 787 delays is that they have all happened under James McNerney, a losing contender for the GE CEO job, and the aircraft company's chief since 2005. This is almost as amazing as the fact that all of <i>Boeing's</i> board members have	
					served since before the first delay of the Dreamliner. No one has been held accountable. The board has not even had the good sense to replace McNerney with a more competent manager. McNerney is as much to blame if not more so than bank executives such as Vikram Pandit of <i>Citigroup</i> and Ken Lewis at <i>Bank of</i>	
					America are for the trouble at their companies. Pandit can argue that most of the collapse of <i>Citi</i> was underway when he moved to the corner office. Lewis can blame Henry Paulson and Ben Bernanke for shoving the <i>Merrill</i> <i>Lynch</i> acquisition down his bank's throat and undermining	
					its balance sheet. The best McNerney can claim is that he has been unlucky. Unlucky CEOs are even more dangerous than incompetent ones. Luck lacks the logical pattern that poor management has. The Administration is leaning toward giving shareholders more say in the selection and compensation of executives at	
					public companies. It is too early to tell how this will turn out. Corporations may effectively lobby that their boards are competent to handle the matter of hiring and paying senior managers. <i>Boeing</i> is proof that the case for an entrenched board is hardly compelling. A sixth delay	
24 June 2009	Flightbl ogger.c om, "Under standin g the 787 Structur al Reinfor cement" (Jon	Scott, Carson , CEO Boeing Comm ercial Airpla nes; Scott Fanche r, VP/G	Firm	α	of the 787 launch may even earn McNerney a raise." "Boeing yesterday announced it was postponing first flight of the 787 citing the need to reinforce structure where the wing box meets the center wing box at the side of body of the aircraft. FlightBlogger takes a closer look at exactly what the problem is and how Boeing came to yesterday's announcement. Because of the need to go back into the detailed design phase for this fix, combined with the need to fabricate, install and test at component and at full scale levels, several sources with a direct familiarity to the situation estimate that the fix will take 'months not weeks.'	On a modular enterpri se architec ture's potentia l understa tement of its problem
	Ostrowe r)	M Boeing Comm ercial Airpla			<i>Boeing</i> confirms that the stringer cap separated or 'disbonded' from the wing skin. Sources directly familiar with the situation say the shifting tension load from the stringer to fastener head also caused damage on the structure.	s.

	<i>nes</i> 787 Progra m		It took 63 days for <i>Boeing</i> to decide to postpone first flight of 787. <u>April 21:</u> <u>Boeing</u> experiences the first signs of trouble on the	
			static airframe. During that test, the wings of ZY997 were flexed to a deflection of over 17-feet and an equivalent of 120-130% of maximum load. During this test, which was the limit load test, the strain measurements on the stringer caps were reading higher than predicted. <i>Boeing's</i> official announcement yesterday said the company first discovered the problems in late May, but several sources indicate it occurred during testing on the static airframe in late April. 'We went in and did some inspections and saw a number of things indicative of what the strain gauges were saying,' said Scott Fancher, vice president and general manager of the 787 program, said on yesterday's teleconference, implying that the test had left visible damage to the structure.	
			[Real-time revision (30 minutes later) to above statement:]	
			Late May: Boeing experiences the first signs of trouble on the static airframe. During that test, the wings of ZY997 were flexed and the strain measurements on the stringer caps were reading higher than predicted.	
			Previously, on April 21st, <i>Boeing</i> conducted the limit load test which saw the wings deflected over 17-feet and an equivalent of 120-130% of maximum load.	
			Early June: Preliminary analysis showed that the aircraft was still cleared for first flight, though with a reduced flight envelope. Sources indicate that the original plan was to fly ZA001 and ZA002 on their respective maiden flights to BFI as planned then park the aircraft while a fix was developed that would allow an expanded flight test envelope. Scott Carson, CEO of <i>Boeing Commercial Airplanes</i> , confirmed this plan saying that 'the airplane could enter flight test with a credible flight test envelope as we worked relatively minor modifications.'	
			June 23: Boeing makes a formal announcement of the first flight postponement. The change in first flight was unknown to many of those closest to the airplane. As late as the evening of Monday, June 22, internal schedules indicated first flight had shifted to July 2nd at 10 am after holding at June 30th for more than a week before and during the Paris Air Show.	

				<u>By Gorbi on June 24, 2009 6:38 PM</u>	
				"Well, I don't know what to say. First off, THANK YOU	
				Jon for the extremely detailed analysis of the situation.	
				Coming from a former structural design engineer here	
				in the San Diego area, and having designed aircraft	
				structures from traditional aluminum materials, I can	
				appreciate the complexity of the problem. Although it	2
				sounds like a simple fix in layman's terms, it never is. The	
				reason it is more complicated is because we're dealing	
				with composites (plastics), and it's a much more difficult	
				material to predict than that of aluminum. I'm not so sure	
				that I would have gone with composite wing structures,	
				at least at the critical junctions such as the center wing	
				box/wing interface. Just like you're not going to build	
			ų – 1	composite landing gear structures, you might compromise	
				weight factors slightly, but you are assured of functional	
1				reliability which gives you proven confidence. Hopefully	
1				I am wrong, and overly alarmed, but I think this plane	
				may be overly 'plastic' in some areas, and I do believe	
I				Boeing may have been overly ambitious in their scheme	
				to build the 787 in such a manner."	
1				to build the /o/ in such a mannel.	
				By CBI on June 24, 2009 7:08 PM	
				"Congratulations for this post. If this is true the fix will	
				be far from being trivial. This is a major problem if it	
				did happen at less than 130% weight load! I would not	
				be surprised that the first flight not takes place before	
				Q2 2010, at the earliest."	
				Q2 2010, at the carnest.	
				By Wes on June 25, 2009 9:13 AM	
				"This airplane has been consistently plagued with	
				problems since inception. The timeline in this indicates	
				to me that the people at <i>Boeing</i> have been hiding a few	
				things from the general public, shareholders, and the	
				airlines. This story reveals, more than anything else,	
				that they knew they had a problem with the wing more	
				than 2 months ago. How big of a problem perhaps	
				required a little more time to understand, but the problem	
				was concealed none the less. I recall the frequent, public,	
				'It will fly in June' comments from Boeings top	
				leadership. Boeing has damaged it's credibility and it is	
				going to take a long time to fix it. I believe there will be	
				a severe and lasting backlash from the customer base to	
				the tune of several hundred cancellations, perhaps as high	
				as 50%. Airbus will reap a huge benefit from this with an	
				increase in A-330 sales. In short, Boeing blew it	
				bigtime. As of today, I will no longer be a shareholder	
· · · · ·				in Boeing."	
24	Motley	Firm-	α	"Enough is enough, Boeing. Two years ago, when its	On the
June	Fool.co	Investo		maiden flight was supposed to usher in a new era of high-	investor
2009	m	rs-		speed, low fuel-consumption aircraft for the world's	commu
	"Beeing	Suppli		airlines and a new era of profits for Boeing	nity's
	's	ers-		shareholders the 'Boeing Dreamliner' name was	assessm
	Nightm	Custo		apropos. But now you need to make it official: The 787	ent of a
	are	mers		is now and forevermore to be designated the Boeing	modular
	Liner"			Nightmare Liner. Yesterday, <i>Boeing</i> announced its latest	enterpri
				anito ano a to fato a for a fo	June- pri

(D' 1	delay in the melder second of \$74,001,2 p. 1, 1, 0	
(Rich Smith)	delay in the maiden voyage of 'ZA001,' <i>Boeing's</i> code for the first prototype 787. The stock promptly crashed down 6.5% on the day and has continued to burn today - down another 6% as of this writing. Which brings <i>Boeing</i> to a total of over 60% worth of market cap destroyed since the company first began announcing delays in the project. <u>Misery loves company</u>	se architec ture's overpro mise and underde livery.
	Nor does the damage end there. A whole string of suppliers from <i>Honeywell</i> to <i>United Tech</i> to <i>Spirit Aerosystems</i> depend on <i>Boeing</i> getting its act together so that they can bring parts operations up to speed. Meanwhile, customers such as <i>Continental</i> and <i>AMR</i> , parent company of <i>American Airlines</i> , who have ordered large batches of 787s, need the plane desperately in order to cut their fuel costs.	
	The 'SODDI' defense: Some other dude did it Boeing blames its woes on a series of unfortunate coincidences that have slowed development: parts shortages and assembly issues with its suppliers, redesigns, and of course, the crippling IAM labor strike late last year. But the truth is that this is a disaster of Boeing's own doing.	
	Once upon a time, I urged <i>Boeing</i> not to make promises it could not fulfill ('underpromise, overdeliver,' I believe is how the saying goes). Yet, since that April 2008 delay (according to <i>The Wall Street Journal</i> , the fourth in what is now a series of six and counting), <i>Boeing</i> pushed back the 787's arrival date in December in addition to the newest delay.	
	Worse still, <i>Boeing</i> admits that it was aware of the 787's structural defect the weakness in the plane's side- of-body near where the wings attach as far back as last month. Yet as recently as last week, <i>Commercial</i> <i>Airplanes</i> CEO Scott Carson was still telling investors that his bird 'could fly today.' A <i>Boeing</i> spokesperson averred by saying <i>Boeing</i> 'truly believed' that ZA001 would fly in June, but that after failing to fix the defect in time, Carson became convinced that canceling the test flight was 'while difficult, the prudent step for us to take.'	
	<u>Red ink, and red herrings</u> No one's disputing that, Mr. Carson. Certainly, your stock would have suffered far worse had you proceeded with the test only to have the ZA001's wings fall off in midair. I shudder to think of the legal liabilities, even lengthier delays in production, and lost sales that such a disaster would have caused. But that's not the point. Nor is the exact severity of the problem.	
	The <i>real</i> point is that you should never have promised us that the plane would be ready by X date in the first	

25Forbes.AkioFirmβ"The new president of Toyota Motor on Thursday warnedOn	
June 2009com "New Toyota Preside nt t t t mtToyod a, Preside nt, nt Expects Challen e"Toyota Preside nt, t t t t t expectsToyota Preside nt, t t t t expectsthat the auto industry faced two more tough years, as he integrate sketched out a roadmap to return the carmaker to profit. t The new Toyota sets sail in very stormy waters,' se arch working at full speed to cut costs and jump-start sales t's p with the support of various government incentives to being rolled out.' 'We want to do everything possible to avoid a third consecutive year of losses,' he said, adding he would take a 30 percent pay cut for the first a chall ing	iune 2009 "
25 Seattle Firm- α "Well, you've got to hand it to Boeing management for On	25 5

June	Post-	Investo	being consistent. Two J.P. Morgan analysts said in a	modular
2009	Intellige	r	research note that multiple members of <i>Boeing</i>	enterpri
2009	ncer	•	management assured them in private conversations	se
	"Fallout		that 787 Dreamliner would meet its first flight	architec
	: Boeing		deadline. So when Boeing said on Tuesday that first	ture's
	787		flight would slip again because the plane's body needs	low
	Flight		reinforcement at the wing, the analysts were surprised.	clarity
	Delay		'We consider ourselves relatively steeled to	of
	Not		disappointments on this program, but given everything	commu
	Even		we had heard recently, including in private	nication
	Disclos		conversations with multiple members of management	
	ed		just last week, we were shocked by this news,' wrote	
	Privatel		analysts Joseph Nadol and Seth Seifman in a research note	
	У		dated June 23. They titled the note, 'Oh no, not again' and	
	"(Andre		concluded that information dissemination is a 'major	
	a		problem' at Boeing. 'The structural issue that has	
	James)		caused the latest delay cropped up several weeks ago,	
			but there was not a hint of concern about it as	
1			management continually highlighted the impending	
			first flight, including last week at the Paris Air Show	
			both in public and in private,' they wrote.	
			'Management acknowledged on the conference call	
			that it discovered this issue last month but noted it only determined last Friday that it would cause a delay to	
			first flight. We believe that had management been	
			more up-front about this situation, perhaps the modest	
			level of credibility on this topic it had started to re-	
			establish over the past several months could have been	
			sustained.' Later, they add, 'We had expected further	
			problems with the 787 to materialize, but we were	
			thinking about Q4, and this press release came as quite	
			a shock.' They also mention that 'Boeing's need to	
			cancel first flight so close to the deadline also raises	
			questions about what other issues might crop up,	
			particularly since static testing is not yet complete.'	
			Dreamliner issues aside, the analysts also predict that	
			Boeing's 2009 and 2010 earnings should take a hit. Boeing	
			has said that the cost of reinforcing the 787 is negligible.	
			But the analysts expect further costs related to Boeing's	
			money losing 747-8 program and slimmer margins on	
			Boeing's other airplane programs. The J.P. Morgan report prompted a story in The Wall Street Journal about	
			Boeing's 'communications woes. ' The delay 'exposed	
			flaws not only in the plane's design, but also in the	
			company's lines of communication internally and with	
			business partners, investors and the public,' Peter Sanders,	
			of the Wall Street Journal, said. Doug Harned, aerospace	
			analyst at Bernstein Research, is quoted in the story as	
			saying, 'During the last two years some investors	
			described optimistic statements by management as	
			misleading. On the contrary, we saw the answers as	
			honest, which is the heart of the problem. Management	
			appears to have been operating without adequate	
			visibility into the details of program performance in	
			the 787 organization and at suppliers.'	

				Stock fallout J.P. Morgan did not downgrade its evaluation of Boeing's stock, instead it kept it at 'neutral.' But two other firms downgraded their expectations for Boeing shares. Analyst Myles Walton of Oppenheimer & Co. downgraded the stock to 'underperform.' He said in an investor note that he is concerned about falling demand for new aircraft and product development risk. And Morgan Stanley analyst Heidi Wood reduced her profit estimate for Boeing and cut her rating on Boeing's stock to 'equal weight' from 'overweight.' 'We believe first flight is three to six months further out which at a minimum pushes out a 787 relief rally we thought possible by the same time frame," Morgan Stanley said in a research note. Morgan Stanley expects 787 first delivery to be pushed to 2011."	
25 June 2009	The Guardia n, "Dream liner Delay adds to Boeing' s Long- term Woes" (Kyle Peterso n)	Firm	α	"Boeing Co has been pummeled this year by economic weakness and Pentagon budget cuts factors well outside the company's control but Boeing has no one to blame but itself for the biggest threat to its long- term outlook. The world's No. 2 planemaker this week said it would delay the first test flight of its 787 Dreamliner, the carbon-composite plane that promises to usher in an era of lighter, more fuel-efficient planes. Unlike previous delays that put the aircraft two years behind its original schedule, this one results from a structural flaw and not from supply-chain or labor problems. 'There's a whole bunch of setbacks, concerns and unfortunate events, and then one very big area of focus that kind of puts the others in the shadows,' said Richard Aboulafia, an aerospace expert at the <i>Teal Group</i> . 'It really is about the 787,' he said. 'This is something they're doing, and not something that's being done to them.' Customers with Dreamliner orders were disappointed by the latest delay. And experts wondered if cancellations might follow. Such a turn of events could take a toll on the company, which already has suffered its share of bad luck. 'We have been anticipating the 787 delivery, so it really is disappointing if our delivery schedule will be pushed back,' said a spokesman for <i>Japan Airlines Corp</i> on Tuesday. 'Someone could definitely make the argument that we're at the trough,' said Alex Hamilton, aerospace analyst at <i>Jesup & Lamont Securities</i> . 'The orders were so abysmal (this year) it's going to be pretty hard for them to get worse.' Boeing shares have fallen 5 percent since Tuesday, when Boeing announced the 787 delay. But the stock has dropped some 60 percent since October 2007, the year in which Boeing saw a record number of net orders 1,413. The number fell to 662 in 2008. Hamilton said that because the stock tends to track aircraft orders, investors are looking for signs of improvement in the financing markets and signs of stability in the order book.	On the media's percepti on of endogen ous vs. exogeno us factors in the perform ance in a modular enterpri se architec ture.

	,		1		instant The to the instant of	
					investors Tuesday. 'On the contrary, we saw the	
					answers as honest, which is the heart of the problem.	
					Management appears to have been operating without	
					adequate visibility into the details of program	
					performance in the 787 organization and at suppliers."	-
26	The	Frank	Firm-	α	"The latest delay in the launch of Boeing Co.'s 787	On a
June	Wall	Pray,	Custo		Dreamliner, which has riled airlines waiting for the new	modular
2009	Street	chief	mer		fuel-efficient jet, is also upending the business plans of	enterpri
	Journal,	executi			aircraft-leasing companies, which are already struggling	se
	"Boeing	ve of			with the global credit crunch. Those companies, which	architec
	Delay	AWAS			offer airlines a way to add to their fleets without the	ture's
	Upends	Aviatio			investment required to buy new planes, own about a third	lack of
	Plans of	1 1825 and 1 1			of the world's 16,000 jetliners and account for a sixth of	integrati
	Leasing	Capita			Boeing's 851 orders for the Dreamliner. They have already	on
	Firms"	l Ltd			landed leasing deals for scores of the new planes. The	between
	(Daniel				leasing firms that were among the first to order the	custome
	Michael				Dreamliner, which lists for around \$175 million, had	r and
	s)				counted on the planes to give them an edge with their	supplier
					airline customers. They now fear that edge is slipping	goals.
					away. Those with later delivery schedules said the latest	
					hold-up, announced Tuesday, has forced them to postpone	
					planning. 'It is a big problem for us,' said Frank Pray,	
					chief executive of AWAS Aviation Capital Ltd., a big	
	÷.				leasing company in Dublin that has six 787s on order and	
					had expected its first deliveries next year. 'As a lessor, we	
					are highly reliant on being able to place the plane.' The	
					Dreamliner-related disruptions, meanwhile, are helping lift	
					the market value of a rival: the Airbus A330. Lessors	
		3			holding A330s, made by European Aeronautic Defence	
					& Space Co.'s Airbus unit, are benefiting from firm	
					demand, even as a slump in air travel has eroded the	
					overall market. Aircraft lessors make their money	
					primarily by buying large numbers of planes at far	
					below list prices, and then renting them out to carriers	
					at profitable rates. Until recently, leasing companies	
					that placed early orders for Dreamliners were	
					positioned to charge airlines premium rents for the	
					sought-after planes. Boeing says the Dreamliner will be	
					20% less expensive to operate than existing models like	
					the Airbus A330. The Dreamliner was originally slated to	
					be delivered in May 2008. As recently as last week,	
					Boeing said that the plane would start test flights by June	
					30, and that the first commercial delivery, to Japan's All	
					Nippon Airways Co., would take place by April 2010. But	
					on Tuesday, <i>Boeing</i> said it wouldn't meet that timetable	
					due to structural problems discovered during ground	
					testing. That marked the sixth delay in the Dreamliner	
					program's six-year history. Boeing said it would	
					announce a new schedule in coming weeks, but the delay	
					has put existing lease contracts for the new jet into	
					question and interrupted lease negotiations with airlines,	
					lessors say. 'It is hurting our planning and talks with	
					potential customers,' said an official at a small leasing	
					company. 'It's all getting terribly complicated.' Another	
					lessor, Aviation Capital Group, a subsidiary of Pacific	
		1			LifeCorp, has five Dreamliners slated for delivery far into	

28 June 2009	Seattle Post- Intellige ncer, "Predict ion: First Deliver y of Boeing 787 will Push Until 2011" (Andrea James)	Heidi Wood, analyst , <i>Morga</i> <i>n</i> <i>Stanley</i>	Firm- Investo r; Firm- Gover nment	α	the production run. Partly due to uncertainty around delivery dates, it has 'deliberately held off any advanced discussions with potential lessees,' said Executive Vice President Richard Cherney. He said ACG will probably keep waiting 'until we have a better understanding of when to expect our aircraft.' Still, Mr. Cherney said, he is 'fully confident there will be solid demand' for 787s when they do arrive. Though <i>Boeing's</i> contracts call for it to compensate buyers of the Dreamliner for delivery delays, the hold-ups are taking some of the shine off the model. This year, buyers have canceled at least 73 Dreamliner orders. Gary Liebowitz, an equity analyst at <i>Wachovia Capital Markets</i> in New York, who tracks the aircraft-leasing industry, said 787 prices and lease rates also are likely to have slipped. 'The 787 was generating a premium price 12 to 18 months ago, but that's probably gone now,' he said. One relatively bright spot for lessors has been the <i>Airbus</i> A330. Lease rates for the A330, which first flew in 1993, have fallen as much as 15% over the past year due to the decline in air travel, said Mr. Liebowitz at <i>Wachovia</i> . Their asset value on lessors' balance sheets has declined as much as 20%. But, said Mr. Liebowitz, 'They would have dropped more if the 787 had been delivered on time.' <i>Virgin Atlantic Airways Ltd.</i> , which ordered 15 Dreamliners in 2007, said Monday that to tide it over until it starts receiving them, it will take 10 A330s for delivery over the next two years. Duch lessor <i>AcrCap</i> <i>Holdings NV</i> will provide financing for the six A330s the airline is buying from <i>Airbus</i> and will lease the other four to the carrier." "Last week, <i>Boeing</i> said that it would push back first flight of the 787 for an unknown amount of time, which shed doubts on whether <i>Boeing</i> would be able deliver the 787 in the second quarter of 2010 as promised. At least one analyst says that the first customers may have to wait yet another year for <i>Boeing's</i> all new 787 Dreamliner, which is already two years late.	On the investor s relativel y late, yet systema tic concern s of a modular enterpri se architec ture's executio n
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	presents real risk the FAA will now insist on more data, slowing certification, hence our assumption for 2011 first delivery."	
	Posted by unregistered user at 6/28/09 5:52 p.m. "Boeing got a free pass from Wall St for a long time. That pass has now been withdrawn under the crushing weight of missteps, misstatements, evasiveness and now, outright lies. No amount of slick PR will overcome the sentimate, though I'm sure Boeing PR will give it herculean effort at McNerney's direction. Boeing can now look forward to a lot of completely justified cynicism from the financial community. A house cleaning is way past due, and shows no sign happening any time soon. The board of directors has utterly failed in it's duties, preferring to leave execution of the business plan to those with a proven track record of failure to perform. If MS is correct, there will be little to no revenues coming in from 787 before the bulk of Boeing's corperate debt comes due, forcing them to re-finance it at soon to be higher interest rates, and most likley having to engage in more bond sales, taking out new credit lines, and eliminating the dividend. The buyback is already gone, after years of Boeing having re-purchased it's own stock at vastly over valued prices. The company need fresh executive talent, and sooner than later."	
	Posted by unregistered user at 6/28/09 5:56 p.m. "It light of yet another snafu by management. I propose an employee buy out of <i>Boeing</i> and sacking of those Bolsevicks that run the company. I have no doubt whatsoever that an ESOP is the only way for <i>Boeing</i> to survive as an independent company."	
	Posted by gimmeabreak at 6/28/09 11:03 p.m. "McNerney is a fraud who is real good at artificially inflating stock values for awhile without adding any value to the underlying company itself (see 3M). Who else but McNerney could have the market handed to them on a silver platter by such an inept competitor as Airbus and STILL manage to screw up so spectacularly?"	
	Posted by unregistered user at 6/29/09 3:50 a.m. "I've said tis before and I will say it again. Boeing's 787 will not fly and will not ever. Boeing will end up scrapping this program which will trigger Boeing's demise."	
	Posted by J3 at 6/29/09 5:49 a.m. "To me the question for historians now and in the future is, How in detail, by what process, did <i>Boeing</i> management actually make its initial 787 decisions that have now proved so disastrous? Those decisions were to	

				make an all-composite plane construced using autoclaves	
				to defeat the A332, with major parts designed and	
				produced by partners around world, without active	
				supervision by Boeing, so that Boeing did not even know	
				in advance that the first fuselage sections it would get	
				would be short about 30,000 parts not the 1200 it	
				anticipated (last according to Mike (where is he now)	
				Bair). It is now clear that this business plan was	
				fundamentally flawed in virtually every way, including	
				perhaps most importantly the unverified assumptions	
				that composites would substantially reduce weight and	
				that new engines would produce fuel savings that GE	
				and RR so far have not achieved. The 787 is now so	
				overweight that it is unlikely that Boeing will ever be	
				able to achieve the weights it promised to customers, so	
				that there may in the end be no advantage to the	
				composite construction after all. Airbus is now	
				beginning to suggest that its new higher MTOW 332	
				(which Turkish Air Lines just bought), will perform	
				about as well as the overweight 787-8. Airbus has wisely	
				kept production rates high to meet the cascading	
				demand to fill the delivery gap for the 787-8, or,	
				increasingly likely, replace it. If the 332 is about as	
				good and the 787-8, airlines will line up to buy it	
				because it is cheaper and they will get it on time.	
				There are real signs the Boeing Comm. 'Planes is	
				collapsing under the pressure of not being able to build	
				the 787. AB got \$6B and \$6B Mous at Paris and Boeing	
				got almost nothing. No new 777 orders, no new 787	
				orders. Just a couple of 737s. Who could have predicted	
				this at Farnborough a year ago? Qantas has cancelled -8s	
				and Branson has excoriated <i>Boeing</i> and its unions for not	
				delivering on time. Flightblogger reports Branson is	
				negociating for 50 A350s. If that happens, <i>Boeing</i> loses its	
				fifteen 787-9s. At Paris, <i>Qatar's</i> chief raged against	
				Boeing. If he dumps his 60 787s, many will follow and the	
	5				
				plane will be the Boeing Com 'Planes because AB will	
				dominate the most lucrative markets, wide body 200-	
				350 seats, with the 332 and 333 and the A350-800-1000,	
				and <i>Boeing</i> will have no money to build a new competitor	
				in the 200-300 seat range or a new plane to replace the the	
				737. Regarding Alan Mullaly, it is way to early to	
				canonize him because he was deeply involved in	
				making the fundamentally flawed decisions that are	
				now destroying the 787, and possilby Boeing as a	
				commercial plane producer. Perhaps he did not leave	
				Boeing because he lost its presidency. Maybe Mullaly	
				forsaw all these problems and used McInterney's	
				appointment as a great chance to get out of Boeing	
				while the getting was good."	
29	Wall	Firm-	α	"The latest delay to hit Boeing Co.'s 787 Dreamliner	On
June	Street	Custo		has complicated an intricate set of negotiations, giving	custome
2009	Journal,	mer		airlines a chance to wrangle concessions from the plane	r-firm
,	"Boeing			maker on delivery dates, installment payments and	relation
	Feels			even the final purchase price. Delivery delays can	ship in a
	New			wreak havoc on an airline's ability to plan its routes	modular
	TICW			mean navor on an annue 5 ability to plan its foules	mouulai

Pressure	and schedules. But they also can provide an opening to	enterpri
to	renegotiate complicated contracts that govern airplane	se
Placate	purchases. <i>Boeing</i> is coming under pressure from its	architec
its 787	customers to offer fresh concessions. Industry officials say	ture.
Buyers"	that Boeing has recently stopped discussing compensation	1.943
(Peter	terms for delays to the 787 and they speculate the	
Sander,	company is waiting until its actual delivery schedule is	
Daniel	clear. 'We want to discuss compensation, but Boeing	
Michael	hasn't opened the books,' said an official at one	
s)	Dreamliner customer. Already, the delays have cost	
	Boeing millions of dollars in penalties and concessions	
	to customers. 'Our focus is always on our customers	
	and as we've done throughout the development	
	program, we will work closely with them regarding the	
	program and the impact of this issue,' says a Boeing	
	spokesman. Even before the recent delays, some airlines	
	were getting frustrated with Boeing's frequent schedule	
	changes. Akbar Al Baker, chief executive of Qatar	
	Airways, threatened to cancel orders for both 787s and	
	larger 777s, which are now in production, because of	
	disruption caused by problems at <i>Boeing</i> . 'Boeing doesn't	
	realize how much they're hurting their customers' plans,' Mr. Al Baker said at the recent Paris Air Show.	
	<i>Qatar Airways</i> has firm orders for 30 787s and options for	
	30 more. The first were due for delivery in 2011 but that	
	arrival date is now uncertain. Actual cancellations are	
	rare, but last week Australia's Qantas Airways Ltd. said	
	it scratched orders for 15 787s and delayed deliveries	
	on 15 others slated to arrive in 2014-15. Qantas	
	which remains the largest Dreamliner airline customer	
	with 50 planes still on the books had some leverage to	
	cancel because of its large number of orders, industry	
	observers say. For Boeing, the cancellations have a	
	silver lining. The jet maker now has a little more	
	breathing room it can use to fill remaining orders more	
	quickly, thereby avoiding some penalties. 'From	
	Boeing's perspective, that's not necessarily bad news	
	when you have a rollout going this poorly,' says Peter	
	Barlow, an aviation attorney with Smith, Gambrell &	
	<i>Russell LLP.</i> 'The way purchase agreements are drafted, a savvy purchaser will obtain daily damages,	
	and if a plane isn't delivered on time, the customer	
	receives a daily penalty [from the manufacturer] that	
	can be a very big number.' Though the 787's list price	
	is roughly \$178 million, customers typically receive	
	discounts. The price negotiated at the time of the order	
	is rarely the price paid when the plane is delivered	
	years later. Typically, customers make 'pre-delivery	
	payments' every six months, beginning about 18	
	months prior to delivery, that amount to around 30%	
	of the total purchase price. Payments often escalate as	
	the delivery date approaches, says Mr. Barlow.	
	Everything in that process is negotiable, Mr. Barlow	
	says.	
	Several carriers, including Air New Zealand Ltd., British	

29 June 2009	Seattle Post- Intellige ncer, "Could Boeing' s 787 Cancell ations be Good News? Actuall y, Yes" (Andrea James)		Firm	α	 Airways PLC and Virgin Atlantic Airways Ltd., are coping with 787 delays by ordering current-model planes from either Boeing or Airbus, a unit of European Aeronautic Defence & Space Co. Virgin, for example, last Monday announced an order for 10 Airbus A330s, which are slightly larger than Dreamliners and not as cutting-edge, but are available next year and in 2011. 'We weren't prepared to have six years of no new aircraft being delivered,' said Virgin spokesman Paul Charles. He said Virgin is still talking to Boeing about compensation. 'We would like to see the compensation reflect the ongoing delays,' Mr. Charles said.'' "Last week, Boeing lost an order for 15 of its 787 Dreamliners an order worth \$3 billion. This is decidedly not good news. And there you have it. Boeing has somehow managed to engineer two pieces of bad news into a sliver of relief with the following equation: (development delays) + (canceled orders) = (reduced penalties)." Posted by unregistered user at 6/29/09 9:42 p.m. "What would be 'more effective' Public Relations and Executives? Hmmmdon't know how Boeing could lie even more, mislead and misrepresent more to the shareholders and the public? Guess they can shoot for BERNIE MADOFF Ponzi scheme, get more investors and the public based on lies while the big shots live the high life? OH WAIT, THEY ARE DOING THAT. SEC Needs to get on top while Boeing is heading to become just another Enron and Worldcom." Posted by unregistered user at 6/30/09 2:45 p.m. "What exactly is the difference between BERNIE MADOFF and BOEING'S EXECUTIVES AND BOARD MEMBERS?" Posted by unregistered user at 6/30/09 4:35 p.m. "What's the difference ? 151 years of jail time, that's the difference" 	On non- systemi c logic of a modular enterpri se architec ture.
7 July 2009	Press Release, The Boeing	Scott Carson , CEO, <i>Boeing</i>	Firm- Suppli er	α	'the bold new frontier of future 'Amerika'?" "Boeing announced today that it has agreed to acquire the business and operations conducted by Vought Aircraft Industries at its South Carolina facility, where Vought builds a key structure for Boeing's 787 Dreamlines aimland. The Vought facility leasted in	On a modular enterpri se
	Compan y	Comm ercial Airpla nes; Elmer Doty, preside			Dreamliner airplane. The <i>Vought</i> facility, located in North Charleston, performs fabrication and assembly of structures and systems installation of 787 aft fuselage sections, which are made primarily of composite materials. After the transaction, <i>Vought</i> will continue its work on many <i>Boeing</i> programs, including other components of the 787, as well as structures and components on the 737, 747,	architec tur's reversal of its modular supply chain

		nt and			767, 777, C-17 and V-22 through operations located	strategy,
		CEO			elsewhere. 'Integrating this facility and its talented	it its
		of			employees into <i>Boeing</i> will strengthen the 787 program	purchas
		Vought			by enabling us to accelerate productivity and efficiency	e of an
		Aircraf			improvements as we move toward production ramp-	underpe
		t Tu duratu			up,' said Scott Carson, president and CEO of Boeing	rformin
		Industr			Commercial Airplanes. 'In addition, it will bolster our	g gunglion
		ies			capability to develop and produce large composite	supplier
					structures that will contribute to the advancement of	
					this critical technology.'	
					'We take great pride knowing that we have been able	
					to satisfy the technological and physical demands of the	
					787 program alongside much larger companies,' said	
					Elmer Doty, president and CEO of Vought Aircraft	
					Industries. 'However, the financial demands of this	
					program are clearly growing beyond what a company	
					our size can support. We are pleased that we will	
1					continue our 787 involvement at a component	
1					manufacturing level, as well as provide ongoing	
					technical capabilities that have helped make	
					Charleston a world-class composite facility.'	
					Through the agreement, Boeing will acquire the North	
					Charleston facility, its assets and inventory and will	
					assume operation of the site, and the parties will resolve	
					all matters related to Vought's prior work on the 787	
					program. The cash consideration to be paid to Vought at	
					closing is approximately \$580 million. In addition,	
					Boeing will release Vought from its obligations to repay	
					amounts previously advanced by Boeing. This	
					transaction is anticipated to close in the third quarter	
					following satisfaction of customary closing conditions,	
					including consent from Vought's lenders. Once acquired,	
					the North Charleston facility will be managed by the 787	
					program. 'We look forward to welcoming the South	
					Carolina team to Boeing and continuing our	
1					relationship with Vought to bring the most value to the	
L	<i>a</i> .				787 and our other programs,' said Carson."	
8 Turka	Chicago		Firm-	α	"Add another \$1 billion to the tab that <i>Boeing Co.</i> must	On a
July	Tribune, "Boong		Suppli		pay to fix production problems with its troubled 787	modular
2009	"Boeng 's		er		Dreamliner jet. That's the cost to Chicago-based Boeing of acquiring a source of the jet's persistent	enterpri
	Dreamli				supply-chain snarls: the South Carolina production	se architec
	ner				facility built for the 787 by Dallas-based Vought	ture's
	Costs				Aircraft Industries Inc. Boeing announced Tuesday	systema
1	Growin				that it was paying \$580 million for <i>Vought's</i> 787	tic
1	g" (Julie				business in North Charleston, which constructs the rear	constrai
1	Johnsso				fuselage and tail-cone sections of the jet from super-	nt in
1	n)				hardened plastics. <i>Boeing</i> also will forgo \$422 million it	achievin
1	,				had advanced to cash-strapped <i>Vought</i> to help cover its	g
1					manufacturing costs, said <i>Boeing</i> spokesman Jim Proulx.	relative
				е 1	'We believe our ability to accelerate production and	cost-
					efficiency at the South Carolina [plant] will generate a	leaderhi
					quicker return on that \$400 million investment than	p over
					staying on the path we were on with Vought,' Proulx	an
					, e i i i i i i i i i i i i i i i i i i	

· · · ·		with The constriction memory for months gives	instance
		said. The acquisition, rumored for months, gives Boeing full control over a weak link in a global supply	inetegra
		chain stretching from Japan to Italy that the aerospace	enterpri
		giant assembled to design and construct the new plane	se
		and to lower its development costs. Once the deal	architec
		closes during the third quarter, <i>Boeing</i> will take over plant	turee.
		operations with an eye to speeding production. It had	turee.
		aimed to churn out 10 Dreamliners per month by 2012.	
		But after a series of delays, most recently for structural	
		problems disclosed in June, <i>Boeing</i> almost certainly has to	
		form a second production line for the 787, which is	
		assembled at its giant plant in Everett, Wash. 'Before, [a	
		second production line would have been nice. Now it's	
		mandatory,' said Paul Nisbet, aerospace analyst with JSA	
		Research. The Vought factory could serve as an	
		assembly line for the 787-9, the next version of the	
		plane, far removed from the Everett plant, where	
		worker-friendly laws and the deep-rooted labor	
		tensions have contributed to a series of strikes, most	
		recently last fall. 'A purchase of the facility could kill three birds with one stone' perospace analyst losenh	
		three birds with one stone,' aerospace analyst Joseph Nadol of <i>JPMorgan</i> said Monday in a research report,	
		'enabling <i>Boeing</i> to reduce 787 supply chain risk,	
		giving it a head start on some of the investment	
		required for a second 787 line, and providing it with	
		the opportunity to diversify its commercial aircraft	
		assembly operations outside of Seattle.' Proulx said	
		Boeing hadn't decided whether it would open a second	
		assembly line. But <i>Boeing appears to have paid a large</i>	
		premium to gain the factory from <i>Vought</i> and its	
		private-equity owner, Carlyle Group, at a time when	
		the planemaker's cash reserves are shrinking. <i>Boeing</i>	()
		held \$4.24 billion in cash as of March 31, down 45	
		percent from year-earlier levels, and faces penalties	
		from angry 787 customers and demands for cash	
		advances from suppliers. In 2008, Boeing paid \$55	
		million to acquire Vought's 50 percent stake in Global	
		Aeronautica LLC, a joint venture that joins fuselage	
		sections on the new jets. And <i>Boeing</i> would have faced	
		pressure to pump more money into Vought had the two	
		remained partners, Securities and Exchange	
		Commission filings show. Like most major Boeing	
		suppliers, Vought wouldn't have fully recouped its	
		costs for materials and production until the 787s are	
		delivered to airlines. The first Dreamliner was	
		supposed to be given to All Nippon Airways in May	
		2008, but may not arrive until 2011, analysts predict.	
		Vought had \$165.4 million in cash as of March 29 and	
		warned in its quarterly financial statement that it	
		anticipated it would need more funding from Boeing or	
		other sources 'to continue our participation in the 787	
		program.' From the outset, Vought had struggled to	
		keep pace with Boeing's aggressive production	
		schedule for the 787 and to meet its exacting standards.	
		Aviation analyst Richard Aboulafia said Vought had	
		the engineering know-how, but lacked the resources of	

					the aerospace conglomerates anchoring Boeing's	
					supply chain to resolve the design and production	
					problems that come with a ground-breaking aircraft.	
					'The chain broke pretty much where you'd expect it to	
					break,' Aboulafia said."	
8	The	Norm	Firm-	α	"Members of the state's congressional delegation said	On a
July	Seattle	Dicks,	Emplo		Tuesday that Boeing is laying down an ultimatum to its	modular
2009	Times,	U.S	yees		biggest union: Unless a long-term agreement barring	enterpri
	"Key	Washi			strikes by the Machinists is reached by this fall, Boeing	se
	Lawma	ngton			will build a second production line for the 787	architec
	kers	State			someplace outside Washington. 'The whole thing	ture's
	Warn of	Repres			comes down to, can they get a long-term agreement	contract
	Boeing	entativ			with the union, with a no-strike clause,' influential U.S.	ual (not
	No-	e; Jay			Rep. Norm Dicks, D-Bremerton, said in an interview	relation
	strike	Inslee,			Tuesday. 'That's what ultimately has to happen here in	al)
	Ultimat	US US			the next two or three or four months — or they are	interacti
	um"	Washi			going to go elsewhere.' 'I think if they get this	ons with
	(Domini	ngton			agreement, they would stay.' In a separate interview,	labor.
	c Gates)	State			Gov. Chris Gregoire said Boeing Commercial Airplanes	10001.
	(Gales)	Repres			CEO Scott Carson told her recently the company is	
		entativ			seeking a long-term no-strike agreement with the	
1		e; Chris			Machinists union. Carson also said <i>Boeing</i> will likely make its decision on the location of a second 787	
		and the second se				
		Gregoi			production line this fall, though Gregoire said he did not	
		re,			specifically link the two elements as an ultimatum. What	
		Washi			the politicians seem to envision is some kind of 'social	
		ngton			contract' with the union in which Boeing would	
		Gover			publicly commit to stay in this region in exchange for	
	l i i i i i i i i i i i i i i i i i i i	nor;			labor peace. Concern about the location of a second 787	
		Scott			line has intensified with news that Boeing is buying the	
		Carson			Charleston, S.C., plant of 787 supplier Vought Aircraft	
		, CEO			Industries. Dicks, the third-ranking member of the	
		Boeing			House Appropriations Committee, is an aggressive	
		Comm			lobbyist for Boeing on issues such as its bid for the Air	
		ercial			Force refueling-tanker contract and is close to the	
		Airpla			company's leadership. He said the ultimatum was laid	
		nes;			out for him and other members of the congressional	
		Jim			delegation by 'high-ranking people in the Boeing	
		McNer			Company' whom he declined to name. Dicks also said	
		ney,			that at a March meeting with Boeing CEO Jim McNerney,	
		Chair			arranged by Gregoire and held in the Washington, D.C.,	
		man			office of Sen. Patty Murray, 'McNerney was very	
		and			candid.' 'The message was that we need to get a	
		CEO,			resolution of this (strike) problem. We can't live with	
		The			this.' Both of Washington's U.S. senators and most of its	
		Boeing			representatives were present, Dicks said, as McNerney laid	
		Compa			out how Boeing plans to do a detailed assessment of where	
		ny;			to put a second 787 assembly line in an open competition,	
		Tom			with Everett as only one option among several. Rep. Jay	
	9	Wrobl			Inslee, D-Bainbridge Island, said McNerney made clear	
		ewski,			that 'the relationship with the labor community,'	
		IAM			particularly the question of strikes, 'was a major	
		district			component of the decision.' The International	
		Preside			Association of Machinists (IAM) has struck the company	
		nt;			four times in seven sets of contract talks over the past 20	
		Tom			years, most recently for two months last fall. Its contract	
		TOM			years, most recently for two months last ran. its contract	

Buffen	expires in 2012. Boeing spokesman Jim Proulx said the	
barger,	company 'can't comment on any conversations our senior	
IAM	executives may or may not have with government	
interna	officials.' Gregoire said the time frame offered by Boeing	
tional	for a decision on a second 787 line has moved around	
preside	somewhat this year. Initially it had been set for the spring,	
nt	then shifted to early 2010, before moving again to	
	'sometime this fall.' Before the decision is made, she	
	intends to go to Chicago to make the case for the Puget	
	Sound region before Boeing's board. Gregoire described	
	Boeing's goal of a no-strike agreement with its union as	
	ambitious, noting that it's something politicians cannot	
	achieve by legislation. It's up to the two sides to	
	negotiate it, she said. 'This is such a huge ask of the	
	Machinists,' Gregoire said. 'The idea of labor giving up	
	the right to strike is a huge issue for them. There has to	
	be something on the other side equally compelling. The	
	magnitude of this is really challenging.' Snohomish	
	County Executive Aaron Reardon said Boeing's legislative	
	agenda and its drive to improve the state's business climate	
	are now secondary to 'a resolution of the differences	
	between the union and the company.' Dicks said any	
	overarching no-strike agreement would have to involve	
	some kind of binding independent arbitration of	
	disputes between management and union. But IAM	
	district President Tom Wroblewski balked at the idea	
	of setting aside the union's strike weapon. 'Take away	
	our only power?' Wroblewski asked rhetorically. 'I	
	can't see ever taking our power away.' There have not	
	yet been any deep discussions on the subject, he said. 'If	
	we were to have these discussions, the company would	
	have to come through with something, guaranteed	
	employment of some sort,' he said. 'The trade-offs	
	would be huge.' Dicks agreed. 'This is a two-way	
	street,' said Dicks. 'I've urged the <i>Boeing</i> leadership	
	that there's got to be give on their side.' Yet Tom	
	Buffenbarger, IAM international president, said if <i>Boeing</i>	
	wants to talk about a social contract, 'the union's ears	
	are always open. Talk to us about it.'	
	How practical is Boeing's threat to build a second 787	
	production line elsewhere? Building one in Charleston	
	would take a big investment by <i>Boeing</i> and other	
	partners. Not only would a new assembly plant have to	
	be built, but also a costly and technically complex paint	
	hangar. And suppliers such as <i>Goodrich</i> , which makes	
	the engine pods, and <i>New Breed</i> , which delivers all the	
	small parts to the line, would also need adjacent	
	facilities. Buffenbarger believes it wouldn't make	
	financial sense. 'Given the country's economic condition,	
	it would be hard for <i>Boeing</i> or any company right now to	
	make the investments needed to put Charleston in the	
	realm of a first-class aircraft-assembly site,' he said. And	
	apart from that infrastructure, he said, 'It takes a trained	
	work force, and one that's developed over years and	
 	not over weeks or months.' The union will have to	

8 Foo July m 2009 "Ba r C 'She igan on <i>Boe.</i> (Ric Smi	nke Calls nan s' <i>ng"</i> 1	Firm- Investo rs- Custo mers- Suppli ers	α	decide whether Boeing's ultimatum is serious or a bluff. 'It's poker,' said John Monroe, a former Boeing executive who now consults for the Snohomish County Economic Development Council. 'It's a hell of a risk. We're talking thousands of jobs and billions of dollars. It's high stakes.'" "Boeing investors are finding it harder and harder to get a good night's sleep which is my clever way of saying that additional delays seem in store for the airplane maker's already-much-delayed 787 Dreamliner. To hear Boeing tell it, multiple complications with getting the new plane airborne will not prevent deliveries beginning in Q1 2010. Such assurance may please customers like AMR (NYSE: AMR), Delta (NYSE: DAL), and Continental (NYSE: CAL), and prevent their cancelling orders as Qantas did earlier this month. It may even incline investors to sigh with relief that the worst is over. It isn't. According to a report just out of Broadpoint AmTech, Boeing's Q1 2010 deadline is a pipe dream. Whereas the aerospace giant believes it can rush its 787 through FAA certification in as little as eight months, Broadpoint believes the FAA will still be poking around the 787's innards a year from now. This, plus	On a systemi c market valuatio n of a non- systemi c modular enterpri se architec ture.
				pipe dream. Whereas the aerospace giant believes it can rush its 787 through FAA certification in as little as eight months, <i>Broadpoint</i> believes the FAA will still be poking	Surger strategy and
9 Fligh		D :		that case, the logical decision for long-term investors is exactly the same: Ditch <i>Boeing</i> ."	
9 Fligh July ogge 2009 om		Firm	α	"On July 9, 2007, ZA001, or what was later to become ZA001 wrapped up one final photo op for the morning television news shows. The aircraft sat at the head of the	On a modular enterpri

			,		
	"Comm	787		747 line gleaming brand new. Once the camera lights	se
	entary:	Progra		dimmed, the 787 was rolled back to Building 40-26 and	architec
	Its Time	m,		the real work to prepare for flight had begun, a task	ture's
	for	Boeing		that continues two years later. White plastic decals	flow of
	Boeing	Comm		were removed from the wings, painted foil covering	low
	to Talk.	ercial		unfilled fastener holes were removed, the full extent of	quality
	То	Airpla		the show N787BA had been prepared for the day prior	informa
	Itself"	nes;		could no longer remain unreconciled against the work	tion
	(Jon	Scott		that would be required to make it fly. Those working	between
	Ostrowe	Carson		directly with the airplane knew full well that the first	stakehol
	r)	, CEO		787 was far from its maiden sortie, but why	der
		Boeing		pronouncements like this from program vice president	"chunks
		Comm		Mike Bair at the Paris Air Show in June 2007? 'The	"; and
		ercial		aircraft will be structurally complete at rollout but will	on the
		Airpla		still have systems, ducting, wiring and similar work to	media's
		nes;		be done before first flight. When those tasks are	assumpt
		John		completed, it will be powered up and proceed to	ion of
		Leahy,		ground test before it flies.' Vought would confirm	the
		COO,		publicly a year later that the first aft fuselage barrel	infallibi
		Airbus		was only 16% structurally complete at the time of	lity of
				shipment to Everett. At the time the roll out festivities	"the
				came to a close, August 27th was the target for first flight,	architec
				one month and 18 days later. What followed is well	t" and
				documented. Almost exactly two years later, Boeing	the
				Commercial Airplanes CEO Scott Carson said	fallibilit
				assuredly to the gathered crowd of reporters at the	y of the
				Paris Air Show: 'We remain absolutely committed to	system
				our forecast that it will fly in the second quarter of this	below
				year. If you count the way I do, that means within the	it.
				next two weeks roughly.' Carson would also later tell	
				CNN at the show, 'The technical issues are largely all	
				behind us.' Just over a week later, Boeing revealed the	
				extent of the weakness in the wing to body join. Yet, in	
				that statement, there lies a question of how it got to	
				that point? How could an executive near the head of a	
				Fortune 50 company make such a statement? Was it	
				just a breakdown in communication? Or something	
				more telling about the state of the program? The	
				information, or the gravity of the information, didn't	
				flow where and when it needed to. Mr. Carson, in	
				responding to questions on the delay announcement said:	
				'When we were at Paris last week we had been through the	
				preliminary analysis of the data and were of a mind that	
				the airplane could enter flight test with a credible flight	
				test envelope as we worked relatively minor modifications.	
				The work done by the team through the week last week	
				narrowed the envelope to the point where on Friday we	
				determined that to fly would be such a small envelope for	
				us that it would be an interesting exercise in having the	
				airplane in the air but not particularly useful in terms of	
				preparing the airplane for certification. So at that point is	
				when we made the call to delay the process, identify the	
				fix, test the fix, install the fix, and then enter a flight test	
				program that is fully robust.' A program built on global	
				transparency did not live up to its own early expectation	
				and the lessons continue to be manifested in changes like	
			1	and the lessens continue to be mannested in changes like	

			the 50% acquisition of Global Aeronautica in March 2008	
			and the establishment of the Production Integration Center,	
			a mission control nervous system for the global supply	
			chain that became operational in December 2008, and	
			most recently this week with the Vought South Carolina	
			buy out. Many program sources have suggested	
			privately that as <i>Boeing</i> has improved its visibility	
			outward, it still struggles with communicating with	
	1 × 1			
			itself. Good news flows freely to the top, yet the bad	
			news is not elevated to an appropriate level. They talk	
			of a 'kill the messenger' culture has established itself	
		1 1	inside the program, where the push to move ahead and	
			show marked progress is often in conflict with	
			requiring the often uncomfortable task of ensuring that	
			'power' has 'truth' in its hands to make good decisions	
			and communicate progress outwardly. During my time	
			in Paris, I received a message from South Carolina on	
			Tuesday morning that told of 'emergent first flight issues'	
			with no other details available. Another message from	
			Washington, just a day later suggested a rumor about	
			possible delamination in the wingbox stringers, but the	
			source added, 'it is just a rumor to my knowledge.' From	
		1 1	the point of view of covering the program, those rumors	
8			were almost impossible to substantiate. Separating the	
			wheat from the chaff, takes a fine tooth comb that appears	
		1 1		
			much more difficult when nine time zones away. Yet, if	
			this outside observer could know of these two hints a	
		1 1	week before the delay announcement, how was this	
		1 1		
			information flowing inside the company? The story is	
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A 2006 speech by Boeing CEO James McNerney given in the wake of the US Air Force tanker scandal tackled this culture head on: 'So then we had to ask ourselves some really tough questions: Were these lapses symptomatic of a larger issue with our corporate culture?...Did our people feel confident enough to speak up about ethical concerns without fear of retaliation?' McNerney discussed the solution to the problem: 'To make sure everyone understands this, I think that you have to create a work environment that encourages people to talk about the tough issues--business- or ethics-related--and to make the right decisions when they find themselves at the crossroads between hitting their numbers for the quarter and stepping forward when there's a problem.' Boeing should ask itself if McNerney's vision has yet to become a reality."

By Trapperpk on July 9, 2009 6:31 PM

"Jon, By the way, 'the emperor has no clothes' is common condition in corporate America. A Corporation's communication flow tends to filter critical data upward to protect programs and its leadership from the appearance of (actual)incompetance. The emperor is last to know about the naked truth and its embarisment. Usually this discovery is accomplished after speaking to large crowds in bold tones. Somebodies gettin wacked! Ouch!"

By Jery1t on July 9, 2009 7:14 PM

an excellent and appropriate "Jon, This is commentary.and It is written with balance and thoughtfulness. I am very pleased that you made these thoughts public as they are expressed in many blogging forums with more anger and criticism. I was outraged at the way Boeing handled this cancellation. These last minute problems may well be a part of the process but Boeing's record has been so blemished from the past that this call just seems to be a continuation of poor communication and credibility. There is something flawed in the reasoning that two days before the call, there was still a possibility of it flying. It indicates a rushed finish, an incomplete total diagnosis and promises that should never have been made.. One wonders whether Scott Carson and Jim McNearny are capable of changing the way this Company communicates and whether they are capable of being the leaders they are hired to be. They are now trapped by their own lack of credibility and have brought another cloud over this Company"

By The Big Question on July 10, 2009 3:05 AM

"I would love for someone to ask Mr. Carson if he is incompetent or a liar. Based on the happenings of the last month, he has to be, in my eyes, either one or the other."

By Pointman on July 10, 2009 3:46 AM

	"My question is' 'What is so different with the 787 as compared with other new technical marvels <i>Boeing</i> has achieved in the past- delivered on time with the 707/737/747/777 models?' From it's creation the 787 program has gone out of it's way to be 180 degrees opposite to every successful <i>Boeing</i> legacy manufacturing process. The 'New Breed' at <i>Boeing</i> expecting to put a revenue aircraft into the air using untested materials, partners, technology, drawings, managers, all at once was fantasy at best. This is the only program I know of where management failure is rewarded by promotion and bonus. Now we are 2 years and countingand the excuses keep coming."	
	By JR on July 10, 2009 10:00 AM "Boeing upper management is still running around in their little glass bubble oblivious to what happens down on the shop floor. Hiding in an office disconnected from 787 reality is nuts! It's time to leave your over stuffed suits in the closet. get down on the floor, out on the flightline and get to know every engineer, inspector, supply clerk, mechanic, truck driver right down to the janitors. It's 'OK' to reach out and put a finger on the pulse and yes it's 'OK' to listen! All the 787 problems just didn't pop up over night Boeing Upper management preaches one type of culture for the employees but yet there is a whole different culture that exists in the upper management structure. I keep hearing upper management running their lips tell the customers, press and the share holders the ship is finally sailing into smooth waters. The truth of the matter (and they know it) is, while they run their lips, the ship is sinking under them! It's time for a changeUN-STUFF THE SUITS!"	
	By eddietsunami on July 10, 2009 1:00 PM "Unfortunately, I have to agree with the poster who said that people in management (if they are indeed that out of the loop), have to be clownishly incompetent or huckster/liars. I am afraid it is the latter. The fact the first plane was a Disney-prop of incompleteness points this out. In my opinion this was un-ethical and stock manipulation to roll-out something so phony and misrepresented. It gave people the false hope that the scattered-all-over-with-no-control supply chain would actually work. With the purchase of <i>Vought</i> it becomes clear now, even from Scott Carson's own mouth, talking about 'efficiencies', that the outsourcing at all cost model is a historic failure. Even if the plane flies tomorrow the billions that have been lost, the lost deliveries, the time and technological advantage over <i>Airbus</i> that has been squandered, will never be able to be replaced. The purchase of suppliers now is damage control. The person who spoke of the 'emperor with no clothes', yes, that is exactly the nick name the moving line has been given. The purchase of <i>Douglas (Boeing</i> lost	

billions), the moving line (no one will speak on the record of the real cost), and now the great albatross of the 787. Sadly, the only way for someone above the level of the hundreds of vice presidents at *Boeing* can lose their job is to screw their secretaries. Simply doing a really, really poor job is not enough to be fired. Incompetence is sometimes transferred and usually covered up, and somehow described as a retroactive success (as buying *Vought* is now). There is no accountability at the top. The only people who truly care about the companies' long term success are those most personally invested in it, the longtime employees. Not the Johnny come latelies like McNerney that have no ties to the community or the company or its grand history."

By iloj on July 10, 2009 1:15 PM

"It comes down to two pssibilities: 1) *Boeing's* leadership is lieing, or 2) *Boeing's* culture does not promote truthful communications to leadership. The bottom line is that the company leadership sets the culture! Either way, the credibility and responsibility belong with *Boeing Commercial Airplanes* CEO, Mr. Scott Carson. Changing 787 program leadership (again) is not the solution - the responsibility is solely Mr. Carsons."

By Mel on July 10, 2009 1:24 PM

"As a supplier to the 787 program. I see a problem that hasn't gotten a lot of press. The partner model is seriously flawed. In the perfect world, each parner performs their tasks in lockstep with the others analogous to a rowing team. The reality is that each partner is lashed to its own suppliers in a sort of three legged race against the other partners. The problem is that no one wants to win - everyone wants to come in second to last. Losing, or being the one holding up the schedule, draws international embarrassment, so no one wants to lose. But, completing the assigned task more than a week or so before the slowest partner means holding very expensive (Smillions) inventory. This has created a stage for all sorts of theatrics. The partners can see, often more easily than Boeing managers, who is going to be holding up the program (keeping in mind that this race is like the Tour de France, where there are dozens of race segments.) But no partner is going to tell Boeing, 'We aren't going to hit our promise dates because we know that the spoilers will be late.' Instead, they brick wall over a 'spec change.' Or, they tacitly conspire to tangle fastener procurement to the point of non-functionality (FUBAR might be better used here.) Or, they find a Boeing selected single source supplier in their ranks and hobble that supplier so that a delay in the partner schedule is traceable back to Boeing. (The way they do it is like a kid tripping his little brother every time mom looks away and then claiming the little brother

	can't walk.) Boeing managers have dismissed the
	theory because they do not believe that the partners
	are sufficiently clever to perpetrate such schemes. But
	the partners had schedules requiring them to build
	hundreds of millions of dollars worth of assemblies yet
	they knew they wouldn't be paid for months, even
	years. The partners had to figure a way out of that
	trap. The partners resorted to all sorts of shinanigans at the level of the minute details with the ultimate effect
	of deliberately misleading <i>Boeing</i> at all levels. The latest side body join problem may be entirely encompassed
	by <i>Boeing's</i> internal communication loop. But, the entire
	program has been rife with deceptions vigorously
	advanced from low levels at the partners to low levels
	at <i>Boeing</i> over small details. This creates context for
	senior partner managers to rationalize delays to senior
	Boeing managers. The delays appear fixable to Boeing
	management because they are presented as
	quantifiable technical or commercial problems. <i>Boeing</i>
	still hasn't realized that those problems were created
	and have been nurtured as the partners means of
	controlling the schedule and thus, their cash flow. The
	problems won't get solved until the partners decide to
	let them be solved (or Boeing decides to take and pay
	for each deliverable on each partner's schedule.) The
	thing about airplanes is that they don't fly until the last
	bolt is torqued down and the last i is dotted. The devil
	really is in the details. Boeing's internal
	communications are based almost exclusively, because
	of the partner model, on communications from the
	partners. Who knows? Boeing may not be able to
	avoid making garbage out of good information. I do
	know that <i>Boeing</i> is not clever enough to make good information of the garbage that is coming in."
	mormation of the garbage that is coming in.
	By Outsider on July 10, 2009 1:27 PM
	Take it from a former Boeing employee, the culture
	does not let 'truth' rise; rather, what those silly ones at
	the top get is what they deserve, crap. Now, are all
	companies in the military-industrial complex of this type (I
	know, the concept ages me)? Well, I have worked for
	several. For some reason, <i>Boeing</i> is different; I could
	never put my finger on it. But, there was a Tech Excel program developed to allow a way to ascend career-wise
	without going into the monkey-ish stuff (yea, you, Scott
	C). That is, it was a double ladder with supposedly those
	higher up on the rungs of the TE ladder having as much
	authority (over matters, not employees) as did those who
	dance that silly dance the managers are so noted for (when
	will they wake up to the fact that raking in 10s of millions
	(Turner, you, too) doesn't make them successful in any but
	a superficial sense?). Too, one would think that a
	motivation for the program was to allow some people
	(who did not feel it an insult to deal with facts and data)
	actually look at things with proper eyes (not that mind-set
	from the back-slapping hordes - yes, so many of them as to

be very heavy organizationally). We have not heard from the TEs on the 787, that I can remember. So, was the program trashed? Anyway, we have something that we can toast to every year, even when the thing flies. We need LeeLaw to coin something new for us. 'potemkin' is old hat."	
By Uwe on July 10, 2009 2:01 PM "But why does this hit <i>Boeing</i> so much harder than <i>Airbus</i> _the_ long time distributed manufacturer Beyond the basic mechanism is it inability to span differnt cultures or the predominance of 'dumb' non engineering types in middle and upper management? What about the potentialy overreaching contract arrangements pressed through by <i>Boeing</i> ?"	
By Ray on July 10, 2009 2:04 PM "Pay attention kids. This comment: 'By Mel on July 10, 2009 1:24 PM' has more truth in it than a decade of statements by Scott Carson or Jim McNerney. Here's a poli-sci view : <i>Boeing's</i> business model for the 787 was based upon colonial logic. The idea was that the partners and vendors would behave mechanicallydoing precisely what <i>Boeing</i> wanted when <i>Boeing</i> wanted it. However, the colonial model only works if you have the ability to project force and impose your will upon the colonists. If you don't, those pesky colonists will start acting in ways that maximize their self-interest rather than the interests of the colonial masters. We've seen that from A to Z in this programand anyone who spoke the truth to <i>Boeign</i> corporate was punished. Now, there is a bureaucratic battle within <i>Boeing</i> between the McNerney camp who argue that their business model is fine but the execution was badand the experienced technical workforce (including those now in management) who believe the business model is fatally flawed."	
By Uwe on July 10, 2009 2:46 PM "For a change reader comments are a fount of insight. Describing <i>Boeing</i> as colonial is an interesting insight that jibes with my (tentative) assumption of overreach by <i>Boeing</i> in partner interaction. Essentially risksharing partners then are limited to taking a share of <i>Boeings</i> risk plus having to bear their own risk as well. This would explain why the japanese partners have been extremly reluctant to expand production capabilities beyond the initial commitments and why others have an unblemished manufacturing relationship with <i>Airbus</i> . Hubris then lies in placing blame on the partners. Does <i>Boeing</i> have a chance to understand this short term and work succesfully with equal partners on top of the engineering problems (systemic and technical) they are encountering (not only) in the 787 project?"	
Dy 1 ann 01 0 11 10, 4007 3.33 I M	

		claims by the partners of changes to the specs or in the	
		scope of work that require a 'reset' in the contract (a	
		price increase.) I would wager that this cost Boeing	
		tens of thousands of management hours, effectively	
		distracting them from issues related to building the	
		airplane. On the cost side, not only would partners	
		make themselves someone's victim to the effect that	
		their deliveries would be delayed and thus preserve	
		their cash, but also they would 'engineer' shortages of	
		something (engineering, materials, tooling, etc.) to the	
		end of becoming a pacing item in the schedule. Of	
		course, it would be made to look like someone else's	
		(preferably Boeing's) fault but the inevitable result was	
		that Boeing would show up with a suitcase full of cash	
		and a bus load of people to resolve the issue. This	
		approach has saved the partners millions on elements	
		of the program that they had budgeted for at the	
		program's outset. And, as stated above, this all made it	
		impossible for Boeing, management and otherwise, to	
		know what actually was going on. Personally, I have	
		never met a dumb Boeing or partner employee. More than	
		other large companies, Boeing people are remarkably	
		bright, honest, forthcoming and diligent. And, while there	
		were cultural challenges, I think Boeing embraced and met	
		the challenges to the effect of creating an important step	
		toward global harmony. (It doesn't make airplanes fly, but	
		they deserve credit for it.)	
		Net, I think the partner model is flawed logically - the	
		only fix would be to scrap it and try something	
		different. That said, given the partner model, I think	
		the program would be farther along if the program	
		had made its first few deliveries with less than 200	
		airplanes sold."	
		By 787 Accountant on July 10, 2009 7:39 PM	
		"I have seen several versions of 'the emperor has no	
		clothes' or the leadership is just incompetent discussion	
		lines. Maybe the best approach would be to ask how	
		could Carson and McNerney not know? Is there any	
		way possible that they could not know? Brand new	
		employees have visited the 787 line one time and have	
		been able to figure it out. Both Scott and Jim visited	
		the lines many times. For a time Carson was visiting	
		the line weekly. They know the problems and have	
		crafted exactly the system of fear needed to keep the	
		problems hidden, not from them but from the	
		shareholders and valued customers. Every morning	
		our emperors look at their naked bodies (one pasty and	
		saggy, the other artificially tanned) in the mirror and	
		go to work trying to convince people they are clothed."	
		Be and the second second and second	
		By Bull-of-the Woods on July 10, 2009 11:19 PM	
		"With 5-1/2 years of exposure to the 787 program,	
		watching all of the leadership changes (which are	
		many), no one is currently accountable for the current	
		state of the program. All of the people who set-up the	
		state of the program. An of the people who set-up the	

failed business plan and program strategy are gone.	
None are still associated with the 787 program and	
most are no longer at Boeing. See the list below:	
Alan Mulally (now at Ford) sold the 787 design and	
business plan when the Sonic Cruiser flopped. Harry	
Stonecipher (now discredited) was CEo who guided	
Mulally's plans and concepts to get board approval. Frank	
Statkus (retired after many senior management roles at	
Boeing) was VP of Tools, Technology, and Processes.	
Walt Gillette (retired after many Senior Engineering	
Management assignments at Boeing) was 7E7 chief	
Engineer and VP of Airplane Development, 787 Program.	
Mike Bair (still with Boeing) was 7E7/787 Program	
Manager then VP and General Manager, 787 Program.	
Scott Strode (still with Boeing) was 787 VP Production.	
Thus, you can't hang any of the current managers/Senior	
Executives with the core problems caused by the fouled-up	
program structure. Now you may be justified accusing any	
of the current management of being unable to make the	
current program structure function successfully. But, as	
others have stated earlier, this form of outsourcing may	
well be flawed-beyond-all-ability-to-recover (FUBAR).	
In regard to the most recent program slide, I can	
assure you that much of the workforce in Everett knew	
about the wing structure problem in general terms	
within a week of the tests being run. The fact that the	
Senior Executives 'didn't know about them' is	
intentional. If they know of matters of material	
information that can affect investment value (stock	
price) they are obliged to make it known to all – to the	
public. Thus, these senior executives don't want to	
know about big problems until they are fully	
understood and what the impacts may be. Thus, this	
information is closely managed and finessed right to its	
disclosure. Incidentally, that's why <i>FlightBlogger</i> is the	
key source of information for <i>Boeing</i> employees. It's a	
rumor until it's confirmed by <i>FlightBlogger</i> . Boeing	
Management doesn't communicate any better to the	
workforce than they do with the Senior Executives – by	
design I assert. Senior Management has known since	
day one that the Partners were in big trouble in late	
2005. I saw their status charts showing every partner	
with problems and no plan to correct them – a red	
'meatball' as overall status. Boeing people were already	
on site at their facilities propping them up to get them	
started on production. This was common knowledge along	
with the lack of cooperation and communication of the	
partners that had been well established by this time. Do	
you suppose that's why everyone that build this business	
model retired before the fat-went-into-the-fire?	
Hummmmmmmmmmmmmmmmm. So, please blame the	
right people for the mess we have. There is plenty of	
blame to go around to those from the past as well those	
that are currently responsible. It seems that today's	
management model, the so called matrix management	
model (you have two or more bosses) along with the	

rotational management concept, means that there is no one
that is responsible for anything. The day of the 'Buck-
stops-here' is long gone - along with real leadership.
And that's the real issue, with Boeing, Jon - no
Leadership."
Louderonip.
By BlueJ on July 12, 2009 4:22 PM
Jon, Great commentary and blog. As an insider I do not
see all the parts of this problem just my immediate
area. The worst is for all those working directly at Boeing
this is extremely depressing and all the cheer leading
does not go very far. We have wasted so much effort
going through panic slides one month at a time over a 2
year period that even the newbys do not trust the
schedule. To all those that have retired, this is a
different environment. And to think we used to joke
about peter principle, and now we are living it. So with the
new management training, where in this country of ours do
we have good technical leadership? I also have
compassion for those I have worked with that have
retired from management for 'health' reasons,
translate that as stress. The 787 will fly and it will be a
great airplane in service, but not out of the box ."
great amplane in service, but not out of the box.
By The Lest Increation on July 12, 2000 0,10 DM
By TheLastInspector on July 12, 2009 9:10 PM
"Jon wrote: ' <i>Boeing</i> should ask itself if McNerney's vision
has yet to become a reality.'
No one answered Jon's last sentence. The answer is
obvious—'McNerney's vision' as stated above never
became reality. But it was never meant toit was just
tanker scandal CYA talk that the company never
intended to walk. And I can personally vouch that
people who speak up about ethical concerns or internal
Boeing corruption are retaliated against severely. My
case is one of many such examples, albeit one of the
more severe. Boeing SOX IT whistleblowers have been
fired for talking to the press about SOX violations.
People in Boeing's OIG have been fired when they
refused to ignore wrongdoing in <i>Boeing's</i> antithetically
named 'compliance organizations.' So, when people
are retaliated against for reporting lawbreaking within
Boeing to Boeing senior management and/or the press,
then it should not be surprising that the same
executives punish those bringing bad news about
program issues to upper management. The 787
program is perhaps the best example of program
mismanagement. The 'program management' used on the
program was obviously fatally flawed. One comment
that rings of truth above is that these announcements
are not made until the last minute and upper managers
given implausible deniability about having known
about them prior to the announcement to protect the
value of those executive's stock options. Why are
private corporations like Boeing seemingly incapable of
reforming incompetent and corrupt management?
Government moves at exponential speed in reform

comparatively. One group of politicians doesn't work
out and they are replaced the next election at the latest.
Where is such accountability with Boeing
mismanagement?"
By Rebecca Vanderbilt on July 13, 2009 1:31 PM
"Both Jim McNerney and Scott Carson need to be
fired. Especially Scott Carson who has lost complete
control over the flight program. Carson didn't have any
understanding on how airplanes are built. Carson did
not get involve in managing the aircraft development.
This is the single worst delay by BCA. Even 747 had
only a few months day and that was a completely game
changing aircraft with new technology and design.
Telling people that the 787 delay was a result of new
tech does not fly. Why were people in the 60s, without
the aid of current technologies, can build an aircraft on
time? Leadership is a huge issue here. It this is not
resolved, Boeing might as well go under."
By waddie on July 14, 2009 2:07 AM
"I was fortunate to work in product development on many
new airplanes during my career at Boeing. During my
time there, it was populated by very strong technical
people and the top program managers were very
strong technical leaders. There was room for
disagreement and it was recognized as necessary to
listen to disenting view points as long as you had your
technical facts straight. Toward the end of my career,
there were some not so subtle changes occuring. We
had a CEO that was enamored by GE's Jack Welch
and Boeing started getting like GE in their internal
thinking i.e. 'this is the GE position and everybody get
behind it or get out.' Some executive engineering
managers started behaving that way and it there was a
'shoot the messenger' mentality that started to be
exhibited. I once heard a guy that is now CEO elswhere
say to his managment team, 'It all right to bring me news
of a problem but you better have the solution!' Let me
tell you, in airplane development that's a near impossible
task because if you had the solution, you wouldn't have
had the problem to begin with. It was the begining of a
'management by fear' culture. It didn't help when the
merger took place and all the Douglas folks showed up
and displaced long time Boeing people who, by the
way, were the ones that helped put Douglas out of
business. Harry Stonecipher was a fear motivation
manager. Even his old colleagues at GE were glad he was
at Boeing and not there. I'm not saying that Boeing was a
utopia to work at. It was anything but. It was extreemly
competitive. But it was populated by people who loved
airplanes and loved to deign and build them. I
remember during my last months at Boeing, being
interviewed by some 'special task force members' and
being presented with the 'new way' of developing
airplanes with 'risk sharing partners' who were to be

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	responsible for major parts of the aircraft. Boeing would not audit their capabilities to do the job or monitor their work as we had in the past, to 'save money'. I thought it was nuts then and I said so. We had some very strong history that led us to do those things. (Santana said that those who ignore history are doomed by it.) They said that would be the 'new way of doing things'. The development schedules were shorter than we knew were reasonable but they would find a way to do everthing quicker. They didn't know how, but they would. You know, 'now a miracle happens' kind of thinking. Well they did it that way and the 787 Program is the result. I hate like hell to watch the venerable company that I worked for look like a bunch of bumbling clowns. It seems like everyday there's more bad news. There nothing wrong changing the way you develop airplanes IF you have the correct planning to get you to the the delivery date for the customer. But it can't come down to 'a miracle happens!' You have to have the facts and data to know you can do it. To get the facts and data, you have to spend the money developing the processes ahead of time. The program looked doomed to me from the start. The program management for the 787 was wrong from the get go. The guy in charge couldn't hit a bull in the butt with a banjo and to put him in charge of the most complex progam that Boeing ever undertook in commercial airplane development was a plum wrong decision. When the Chief Engineer retired in the middle of the development, it was my first tip off from the outside that Program was going South. It seems like it's gone down hill from there. I guess maybe O! Alan took the Ford job to get away from what started on his watch. He sold the plan to the Board probably under a great deal of pressure from Harry Stonecipher who was CEO by then. As I said, I hate to watch all this happen but it seemed so predictable from the start. Boeing needs to get back to what made them the dominant player in commercial airplane business. Eliminate man	
	undertook in commercial airplane development was a plum wrong decision. When the Chief Engineer retired in the middle of the development, it was my first tip off from the outside that Program was going South. It seems like it's gone down hill from there. I guess maybe Ol' Alan took the Ford job to get away from what started on his watch. He sold the plan to the Board probably under a great deal of pressure from Harry Stonecipher who was CEO by then. As I said, I hate to watch all this happen but it seemed so predictable from the start. Boeing needs to get back to what made them the dominant player in commercial airplane development and manufacturing for over 40	
	technically capable people who understand the airplane business. Eliminate management by fear. Tolerate different points of view when it's backed by facts and data. Audit and monitor subcontractors or partners or whatever the buzzword is for those guys that make the major subcomponents. And honor your commitments both internally and to the end user. <i>Boeing</i> was on the right track with the 777 and they got derailed on the 787. I hope they can get the train back on the track and running in the right direction again. They have the working people to do it but their management leaves some thing to be desired. Thanks for letting me	
	ramble." By Insider on July 18, 2009 9:52 PM	

	1	r		1	"The real man overseeing the BCA side of <i>Boeing</i> is	,
					Mike Cave in Chicago. A <i>McDonnell</i> man. Specifically	
					a Harry legacy. It has been a well known fact since the	
					merger that you only tell Mike good news. Bad news	
					messengers are axed (and that would include Carson).	
					So every status meeting has been full of good tidings	
					and great joy. Until the rubber meets the tarmac."	
9	Seattle	Scott	Firm	α	'How does a quote like this happen? 'I personally	On the
July 2009	Post-	Carson			believe the airplane could fly today.' Boeing	culture
2009	Intellige ncer,	, CEO Boeing			Commercial Airplanes CEO Scott Carson, Paris Air Show, June 16, according to Bloomberg News <i>Boeing</i> is a big	of modular
	"Boeing	Comm			company with about 160,000 workers spread across the	enterpri
	Culture:	ercial			world and a corporate culture that varies from division to	se
	Kill The	Airpla			division. Flightblogger Jon Ostrower presents an	architec
	Messen	nes			interesting debate on corporate culture within the 787	tures in
	ger vs.				program. In Ostrower's latest commentary, "It's time for	mature
	Speak				Boeing to talk. To itself," he goes over some of the	environ
	Truth				internal communication problems that plague the 787	ments.
	То				Dreamliner program. The story suggests that	
	Power"				communicating program delays upward to	
	(Andrea				management is a challenge, even while rumor	
	James)				rampantly flies sideways and out of the corporate	
					borders."	
					Posted by unregistered user at 7/9/09 5:04 p.m.	
					"As a 20 year <i>Boeing</i> veteran, I can tell you that	
					communicating bad news is a career hazard. There is	
					no such thing as constructive criticism. Any sort of	
					criticism, negative analysis, or attempts to forsee	
					problems are viewed as contrarian negativism, (Being	
					ANTI BOEING) and are dealt with acordingly. Then	
					you find yourself suddenly passed over for raises,	
					promotions, If you are forthright, strident, or try to	
					argue your point, you can find yourself escorted out the	
					gate under armed guard. Being wrong is not negative,	
					as long as you are cheerful and dismissive."	
					Posted by unregistered user at 7/9/09 5:43 p.m.	
					"I personally believe the airplane could fly today."	
					Boeing Commercial Airplanes CEO Scott Carson, Paris	
					Air Show, June 16 and this is part of the <i>Boeing</i> ethics	
					policy that I think Scott Carson should revisit.	
					'Employees must not engage in conduct or activity that	
					may raise questions as to the company's honesty,	
					impartiality, or reputation or otherwise cause	
					embarrassment to the company.' In this regard I believe	
					that many top leaders in <i>the Boeing Company</i> have broken their own ethics policy."	
10	The		Firm	α	"A prominent aerospace analyst has floated a worst-case	On
July	Seattle				scenario that two years ago wouldn't have been thought	modular
2009	Post-				plausible. The 787 could easily get mired down in more	(non-
	Intellige				delays. And 'there's also an unlikely but not impossible	systemi
	ncer				worst-case scenario: a 787 that's simply a mediocre	c)
	"Say it				aircraft,' writes Richard Aboulafia, an aerospace analyst	analyst'
	Ain't				with the Teal Group Corp. And if that is the case, he adds,	
	So: The	I			with the real Group Corp. And it that is the case, he adds,	s late

787		which replaced leadership with people who cared most	revised)
Possibly		about money. Boeing's all new 787 Dreamliner program	evaluati
Just a		has been delayed by two years, which has made the	on of a
'Medioc		company ripe for criticism and analysis.	modular
re Airc		company ripe for entiresin and analysis.	
raft"		From Aboulation most recent aircraft letters (The presson	enterpri
		From Aboulafia's most recent aircraft letter: 'The proven	se
(Andrea		Boeing track record ('We're ten for ten!') has been	architec
James)		replaced by the unpleasant memory of McDonnell	ture's
		Douglas's checkered past. The nickel and dimed MD-	systemi
		11 mediocrity, the useless MD JSF competitor, the out-	c
		of-control cost overruns of the C-17, and worst of all,	problem
		the scandalous MD/GD A-12 carrier stealth attack	s.
		plane. The likely (or at least hopeful) scenario is that	
		the 787winds up like the C-17, a nightmare	
		development program followed by an impressive	
		technical achievement and a profitable production	
		phase. But we can't rule anything out. The A-12 is the	
		most haunting extreme outlier: a mere Potemkin	
		Village plane. Those of us at the 7-8-07 rollout wouldn't	
		have dreamt of that comparison at the time. But who	
		knows what to believe anymore? In short, the 787 has	
		become less of an adrenaline rush of optimism, and more	
		of await-and-see story. Boeing's latest delay its fifth	
		and purchase of supplier Vought combine to prove that	
		the company's strategy of saving money from	
		outsourcing work to suppliers 'has been dwarfed by	
		the cost of remedying the damage wrought by that	
		strategy.' 'This is all seriously bad,' Aboulafia said. 'As	
		we digested the news, I paused to reflect on just what a	
		tremendous drug-like rush the 787 program once was, and	
		just what a ghastly let down it has become.' What was	
		supposed to be a category killer has turned out to be	
		even worse than the 'commercially irrelevant' Airbus	
		A380, Aboulafia said. Because, at least the A380 flies.	
		Finally, Aboulafia brings a sense of history to the	
		present: To understand how this happened, you need	
		to look back in time. A grossly oversimplified recent	
		history of <i>Boeing</i> : Twelve years ago <i>McDonnell</i>	
		Douglas effectively used Boeing's money to buy Boeing.	
		This resulted in a struggle between a faction that	
		wanted to invest in <i>Boeing's</i> future (basically the legacy	
		Boeing crowd) and a faction that wanted to invest in Boeing/r shareholdow (beeing/ly the McDerner/l	
		Boeing's shareholders (basically the McDonnell	
		Douglas leadership). The future investment faction won,	
		but at a price: the McDonnell Douglas zombie bit them	
		before it died. To sell the new plane to the board and to	
		investors, they needed to get as much cost and risk as	
		possible off Boeing's books. This resulted in a short-	
		sighted decision to trust enormous parts of the 787's	
		development and integration work to partners, without	
		due diligence to ensure that these partners were up to	
		the job. (Disclosure: I was a big fan of this approach at	
		the time, and I still think production work outsourcing	
		is a good idea.) Finally, the new Boeing also	
		disempowered the company's engineers, turning its	
		back on a decades-old management culture that didn't	
• • • • • • • • • • • • • • • • • • •	I	and a decide of management culture that than t	

always produce profits but did always produce great
planes. Instead, it embraced McDonnell Douglas's
culture of leadership by money people.""
Posted by halfshaft at 7/10/09 4:01 p.m.
"I have said it here before and I will say it again; 'We
told you so!!!' Legacy Boeing employees realized 10
years ago what Aboulafia is realizing now. 'Twelve
years ago McDonnell Douglas effectively used Boeing's
money to buy <i>Boeing</i> .' We were saying the same thing a
decade ago. Harry Stonecipher famously declared that
Boeing, 'was no longer and engineering company',
right before SPEEA went on strike for more than 40
days. SPEEA rightfully declared that they were trying
to save Boeing from it's own mis-management. It looks
like ultimately, they were unsuccessful. And again; I
wish someone would track down those truly responsible
for this mess and bit*h slap both of them; Phil Condit and
Harry Stonecipher. I guess at least Phil can be blamed for
setting the groundwork for the failure of only one aircraft
manufacturing giant. Harry was responsible for destroying
two companies. At least current management is still
following Harry's leadblame a two week strike by the
evil union for 5 different delays over two years. Talking
about covering your incompetent as*!"
Posted by keepreadinifithurts at 7/10/09 5:57 p.m.
"I'm hearing a lot of SNIVELING, here, these miserable
union SOB's cut their OWN throats, JUST like at GM,
demanded too much revenue out of the whole process of
building an aircraft, and the health insurance companies
used the union people to get what THEY wanted too, is
there anyone left at Boeing that enjoys building and flying
airplanes, or are they all just a bunch of corporatized,
bureaucratized, pampered, spoiled, overweight, whiny,
money-grubbing stooges? It bears keeping in mind that
cloth-and-wire really aren't that far back in history, maybe
this whole glut-thing with overpriced passenger aircraft is
a hidden godsend, Airbus with their glued-together
garbage will end up doing it to themselves, so why try
to win the race to the bottom? Build 10 EXCELLENT
aircraft per year, and stop trying to be a global mega-
mega like GM did, which was a 'zing' on their
management and their inability to keep their profit
hubris in their pants. I think Boeing should harken back
to the days of radial engines and manual levers and so
forth, and see if they can sort of re-kindle the spark that
took the aviation world on its' century-long whirlwind
development spree, figure out what went right, what went
wrong, and what their future's going to look like. Maybe
McDonnell-Douglas and whatever else the Boeing whale
ate should be regurgitated within swimming distance of
shoreBoeing IS a global mega-megaand most of those
people that run the place probably couldn't identify a
wheel chock if you pointed it out to em, so they're just
jed politica it out to only to just

people riding the train, so to speak. Downsize!"
Posted by unregistered user at 7/10/09 8:24 p.m.
"It's a pity because Boeing has gone from a product
focussed organization to a share holder value org.
Merger with McDonnel Douglas started the rot. We
only have to look at Harry Stonecipher's record or lack of
during his tenure."
Posted by Tenochtitlan at 7/10/09 10:25 p.m.
"I hate to see great American corporations brought to
their knees because of Wall Street's predominant
culture of 'Immediate profits at any cost!' I hate to see
workers who took such pride in the fruit of their labors
forced to watch their legacy looted and scuttled by the
modern-day robber barons. And I hate to see clueless
'right to work'-ers blame the dedicated, loyal employees, who made the company great, for the
abuses and negligence of the management. "I'm hopeful
that the 787 will become everything it's hoped to be, and
that <i>Boeing</i> will learn a lesson about the costs of
outsourcing manufacture and assembly: because what's in
the future for an airplane company that doesn't build its
own airplanes and abandons its own employees, and all
their knowledge?"
Posted by mojojojo at 7/10/09 10:52 p.m.
"The relation of men of wealth to the flying problem
presents many points of similarity to that of North Pole
hunting. It would be folly to back such attempts as
business propositions, or at least it could be considered
nothing better than the very rashest speculation If wealth is to be interested on a mixed basis of
benevolence and hope of pecuniary return, it ought to
be made sufficiently clear that the latter could hardly
be considered a satisfactory insurance against finally
resting in a pauper's grave'
-Wilbur Wright to Octave Chanute Jan. 5, 1902
True then. Still true today. Bill Boeing made his fortune
in the timber business. He didn't start an airplane
company to get rich. He started an airplane company
because he liked airplanes and figured he could make a
good one. But being a good capitalist and entrepreneur,
he also succeeded at growing it into a (mostly) healthy
business. He struck a balance between passion and profitability. This is why <i>Boeing</i> has now started down
the path to failure. If the only thing you want to make
is money, you are definitely in the wrong business.
That's not some sense of misguided nostalgia. That's
just the way it is."
Posted by JanMost at 7/10/00 11:30 p.m.
Posted by IanMost at 7/10/09 11:39 p.m. Aboulafia is an idiot!!! He writes about how <i>Boeing</i> has
had to spend billions buying back its failed outsourcing
strategy but his disclaims that he agrees with the

	concept. Well HELLOOOOO!!!! Richie, it isn't working!!"	
	Posted by unregistered user at 7/11/09 12:32 a.m. "Why do you give this guy the time of day, he cosistently talks out of his ****, I listen to what he says and it's never praise. Who the hell are <i>Teal</i> in some backdrop and who is this guy who just seems to slag off Both <i>Boeing</i> and <i>Airbus</i> all the time. Anytime there's some aviation news why get this guys comment or opinion, i don't understand? From the rubbish he spouts he should just be ignored, but then half the rubbish he spouts wouldn't be news I guess!!"	
	Posted by rightwingrick at 7/11/09 8:11 a.m. "This (Boeing history recently) is a perfect description of what has gone wrong with much of American business. It's not the unions; it's short-sited leadership that has taken its eye off the long-term ball (quality product to serve your customer better than anyone) and instead focused on short-term money (how much can we get to our stockholders next quarter by nickel and diming the company to death). Want another local example? Take a look at Weyerhaeuser."	
	<u>Posted by barney48 at 7/11/09 9:12 a.m.</u> "Way late and over budget on the 787, a NONGOVERNMENT project?? Clearly something's wrong with this picture. Why aren't the beancounters and lawyers, that supposedly run the company now, lowering the boom? Maybe they're as incompetent as the ones who seem to ruin company after company's product, or for that matter don't know squat about anything other than the current year's bottom line (if even that)."	
	<u>Posted by Lookitsme at 7/11/09 9:40 a.m.</u> "Another great company being brought to it's knees by stunning corporate mis-management. Naturally, the higher level management types that have created the problems will continue to reap their absurdly high salaries, bonuses, and stock options while the folks who actually do the work take it in the shorts"	
	Posted by unregistered user at 7/11/09 4:21 p.m. "When I heard that Boeing bought McDonnald Douglass, I imediately sold Boeing. The only good AC that Douglass made was the DC-3 and that was 75 years ago. MCDonald AC were not so good. Now Boeing is going to pay, pay, pay for it's greed. What in the heck ever happend to the Taft-Hartley Act? That law was passed especially to stop American Companies from becoming monoplies. It's just like the Auto Business, we too will loose our AC industry to Asia and now y'all want to USG to run health care? Good luck!"	

	1	1			Posted by The Unrepentant Lib at 7/11/09 4:22 p.m.	
1				1	"Another great company, ruined by the corporate	
					mentality of short term profit over all other concerns.	
					To them their is no God but the Almighty dollar."	
					Posted by unregistered user at 7/11/09 4:31 p.m.	
					"Boeing arrogantly tried to surpass Airbus with the	
					787, but is is far behind the A350 on the technology	
					front. Once the structural redesign has taken place all	
					that extra weight will put the 787 on a par with the	
					A330, leaving the A350 to clean up. 787 cancellations	
					have yet to flow, there are many customers with itchy	
					trigger fingers."	
					Posted by Shoreline50 at 7/11/09 8:25 p.m.	
					"Unfortunately, Boeing has the worst of all worlds	
					terrible management combined with terrible unions. They	
1					need to:	
1					1. Get the <i>McDonnell Douglas</i> symbol out of their logo.	
1					 Move their headquarters back to Seattle. Purge the management of the failed McDonnell 	
1					Douglas people and get back to the Boeing	
					management style.	
					4. End strikes either through agreement or by having	
					additional production facilities elsewhere."	
					Posted by unregistered user at 7/12/09 4:01 a.m.	
					"Ahhhhhh, the unions. Once a good idea, now a	
					dinosaur. A rather self-destructive one too. Just keep	
					asking for more more more and walk with a sign. Then	
					badger your company until they have to give in. Next, they go broke paying a "union man" ten times his due. Next,	
					Union Man whines when his company goes bankrupt and	
					be blames his company instead of his Union. Pretty	
					simple. Greedy unions get exactly what they deserve.	
					Always have and always will."	
11	The	Frederi	Firm	α	"General Motors Co. kicked off a new era following its	On a
July	Wall	ck "Enita"			exit from bankruptcy protection on Friday, with Chief	modular
2009	Street Journal,	"Fritz" Hender			Executive Frederick "Fritz" Henderson promising to transform the auto maker into a leaner and more	enterpri
	"GM	son,			customer-focused company. The new company will put	se architec
	Takes	CEO,			a premium on speed, accountability and risk taking,	ture's
	New	Gener			and root out the layers of management that had	focus on
	Directio	al			hobbled decision making, he said at a news conference.	short-
	n" (John	Motors			'Business as usual is over at GM,' Mr. Henderson said.	term
	Stoll &	; Edm			'Everyone at GM must realize this and be prepared to	speed.
	Sharon Terlep)	Edwar d E.			change, and fast." In a preview of a broader management	
	Terrep)	d E. Whitac			shakeup to come, Mr. Henderson said the company was scrapping a number of senior posts and has disbanded two	
		re Jr.,			committees of top executives that made key decisions for	
		Chair			the company's automotive operations. Mr. Henderson	
		man,			expects hundreds of middle managers to be let go in the	
		Gener			weeks ahead, and the company's sales and marketing	
		al			operation will be reorganized. 'Our culture to this point	
		Motors			has been an impediment,' Mr. Henderson, a 25-year GM	
					veteran, said. 'This is all about flattening the	

		
	management structure.' Mr. Henderson said he is	
	adopting some techniques used by the alliance of Renault	
	SA and Nissan Motor Co., led by Carlos Ghosn. Several of	
	GM's highest-ranking executives studied Mr. Ghosn's	
	approach in 2006 while GM's board weighed a potential	
	merger with Nissan-Renault. Mr. Henderson and his top	
	lieutenants also are planning to hit the road in August to	
	talk to dealers and consumers to gain insight into the U.S.	
	market. In the past, <i>GM</i> based much of its decision making	
	on market-research studies, focus groups and strategy	
	meetings among executives. Dealers said the company	
	needs to reconnect with consumers. Mr. Henderson also	
	plans to engage in Web chats and to field criticism and	
	suggestions on an 'Ask Fritz' Web site. GM filed for	
	bankruptcy protection June 1. Friday morning,	
	General Motors Corp.'s best assets, such as its	
	Chevrolet and Cadillac brands, were sold to a new	
	company General Motors Co. The 40-day stay in	
	bankruptcy reorganization left the company with lower	
	costs, a lighter debt load and four automotive brands	
	instead of eight. The new GM is also getting several	
	new directors appointed by the U.S. government, which	2
	now owns 60% of the company thanks to \$50 billion it	
	committed to invest in the auto maker. 'We all want to	
	win, and we are going to win,' said Edward E.	
	Whitacre Jr., the former AT&T chief executive selected	
	to serve as chairman by the Obama administration's	
	auto task force. 'I know most Americans want this	
	company to succeed [and] we certainly have the	
	fundamentals' to do so, Mr. Whitacre said. Mr.	
	Henderson has been leading GM since the late-March	
	ouster of former CEO Rick Wagoner. From his first day,	
	the 50-year-old Mr. Henderson has set a tone of urgency,	
	first by embracing the possibility of a bankruptcy filing	
	and then taking tougher actions than Mr. Wagoner	
	when it came to downsizing. The government made his	
	task easier in recent weeks when it decided to convert	
	nearly all of the money it provided GM into a 60%	
	equity stake. The United Auto Workers union,	
	bondholders and the Canadian government followed	
	suit, converting billions into sizable minority stakes in	
	the new GM. Mr. Henderson said he plans to repay the	
	government loans before the 2015 due date. In an	
	interview Friday, GM Chief Financial Officer Ray Young	
	said the company will spend the next few weeks	
	forecasting whether it needs as much as the government	
	has offered and trying to accelerate repayment of the	
	government loans. Among the first moves Mr. Henderson	
	will make will be moving longtime product czar Bob Lutz,	
	who planned to retire at year's end, from the design studio	
	to the marketing department. After building a career on	
	creating automotive hits ranging from the <i>Ford</i> Explorer to	
	Dodge Viper, Mr. Lutz, 77 years old, will return to his	
	professional roots and run marketing and	
	communications."	
13 Seattle Firm- α	"Periodic mass layoffs are an expected fact of life for	On a

Juy 2009	Post- Intellige ncer, "Instruc tor Pilots Sue Boeing Over Possible Layoffs " (Andrea James)		Emplo yees		almost all <i>Boeing</i> employees, particularly early in their <i>Boeing</i> careers, when their seniority is relatively low," the company said, citing the cyclical nature of the commercial aircraft business."	modular enterpri se architec ture's exogeno us views of the cyclical nature of their business , and its effects on labor.
20 Juy 2009	Seattle Post- Intellige ncer, "Unions ask: Who has Guts to Stand Up to Boeing, Big Busines s?" (Andrea James)		Firm- Emplo yees	α	 "Washington state's unions are teaming to support politicians who will fight for worker rights and stand up to big business. On Friday, the Machinists, which make up <i>Boeing's</i> largest union, and the UFCW released a joint statement in support of DIME PAC. "In the last week, some Democratic leaders implied that unions should accept a no strike clause with <i>Boeing</i>, adding fuel to this fire," the statement said. The unions demanded answers: "Why did not one of these politicians say <i>Boeing's</i> no strike demand was outrageous and that companies are equally responsible for strikes? Why did not one of these politicians say loudly the right to strike is a fundamental, field-leveling right in a democracy? Why did not one of these politicians point to <i>Boeing's</i> failed outsourcing model as the main culprit for their business problems?" 	On a modular enterpri se architec ture's inter- stakehol der conflict, with labor's more systemi c argume nt than the firm.
21 July 2009	CNN.co m "Ryanai r Slashes UK Flight Schedul e"	Micha el O'Lear y, CEO, <i>Ryanai</i> r	Firm	α (la te- en tra nt)	"Budget airline Ryanair announced plans Tuesday to slash its winter flights schedule from its main UK hub, blaming a collapse in the British tourism industry, rising airport costs and 'insane' aviation taxes. The Irish carrier currently operates 40 aircraft out of Stansted Airport, near London, but it plans to cut capacity by 40 percent to 24 aircraft by October 2009. That will mean a 30 percent drop in the number of weekly flights and a loss of 2.5 million passengers between October and March 2010, Ryanair said in a statement. Ryanair Chief Executive Michael O'Leary said the move was motivated by the refusal of BAA, which manages Stansted, to cut passenger fees despite falling traffic, including a six percent drop during June. O'Leary also criticized government plans to raise Air Passenger Duty levied on travelers by £1 (\$1.6) to £11 (\$18) on short-haul flights, calling the tax 'insane and damaging.' 'Sadly UK traffic and tourism continues to collapse while Ryanair continues to grow traffic rapidly in those countries which welcome tourists instead of taxing them,' O'Leary said. 'Ryanair's	On a (late- entrant) modular enterpri se architec ture's strategy for rapid (negativ e) short- term growth.

21 July 2009	Forbes, "Delays Drag on Boeing" (Melind a Peer)	Firm- Investo r	α	40 percent capacity cutback at London Stansted shows just how much Gordon Brown's £10 tourist tax and the BAA Monopoly's high airport charges are damaging London and UK tourism and the British economy generally.' <i>Ryanair</i> said it planned to switch capacity to countries which had scrapped tourism taxes and passenger fees, including Belgium, the Netherlands, Greece and Spain." "'787 troubles are a major cause of increasing weakness of the company's balance sheet and cash flows, since inventories should continue to increase and research and development should remain elevated until it starts delivering aircraft,' said JPMorgan analyst Joseph Nadol, adding that delays to both the 787 and the 747-8 could result in financial penalties and pressure margins."	On a modular enterpri se architec ture's systemi c problem s.
21 July 2009	Flightbl ogger, "A Month Later, Boeing Continu es Work Develop ing 787 Wing Fix" (Jon Ostrowe r)	Firm	α	"With almost a month since <i>Boeing</i> announced it was forced to ground its 787s for structural reinforcement, the company continues to work to develop, install and test a fix that can get its troubled Dreamliner into the sky after more than two years of delays. According to a senior program source: "There is good news and bad news. The good news is we know what to fix, and how to fix it. The bad news is the location is a [expletive] to get to.' While the fix is being developed and a fully revised schedule finalized for airlines, sources at both <i>Boeing</i> and partner suppliers indicate that the existing production plan has slid roughly one and a half to three months for the delivery of Airplane Ten's components to Everett, even as suppliers continue to prep parts for shipment. The slip, the sources say, allows <i>Boeing</i> to finalize and test the fix and limit the number of aircraft in final assembly required to undergo the fix in Everett. <i>Boeing</i> previously stated that any fix developed would be able to be installed no matter the location of the parts in the supply chain. A corps of <i>Boeing</i> engineers are working 80-hour weeks to design the fix that allows the 787 to fly with a robust flight envelope and achieve FAA certification with 150% of limit load on the wing, sources say. Veteran structural engineers tell FlightBlogger that the key to developing a reinforcement centers around ensuring that the loads that caused the initial problem at the site of the wing stringer caps are not redistributed elsewhere causing a further structural issue. Second, as the area is stiffened <i>Boeing</i> engineers must take great care to develop a fix that isn't susceptible to long term fatigue issues that come from the normal structural aging of the aircraft. Sources say the area that will be reinforced at the side of body is extremely tight and difficult to reach as the installation area of the fix will provide very little room to install the fasteners to secure the reinforcement. The installation of the fix may begin as early as the	On a modular enterpri se archihte cture's continu ed inability to stop process es and solve root causes of systemi c problem s.

the works, a key discussion centers on the future of 787
production and when the permanent fix is designed
into the wing to body join. Sources say a revision of
the upper part of the wing to body join is almost
certainly necessary to create a permanent long-term
solution and eliminate the time consuming installation
of the remedial fix. Boeing says there are about 40
787s in process throughout the global supply chain and
a question yet to be answered is the timing of
incorporation for the permanent fix."
By Jerry1t on July 21, 2009 7:52 PM
"I find it a disturbing account of what appears to be a
complex solution for a complex problem. After all is
said and done, it still does not manage to fit into my
mind. With all the clarity that Jon brings to the
description, it still sounds like it is unresolved and
forces engineers to work '80 hour weeks' I remember
Scott Francer saying that a handful of fasteners will
solve this problem 'in situ'. And now we are presented
with an ongoing effort to come up with a solution. I am
sure there will be more accolades about how great and
efficient this plane will be and how it will change flying
forever. But until this plane is able to fly it remains a
mythand an expensive one at that. It is still
outrageous that <i>Boeing</i> and its Parrners could not
manage to design a plane where the wings would hang
tight and enable it to fly. You think they would have
learned from <i>Airbus'</i> similar problem but clearly, they did
not. No one has been more of a fan of the 787 than I, but I
am worn out by the excuses and failures on the part of
this team to get things right. One of the key and crucial
parts of a plane and they design it inadequately. Please
do not fill this column with tales of challenges and how
this is expected. That is just 'plane' nonsense. This is
another screw up and it will cost in terms of time and
monies . All sorts of excuses will follow but that is just
sentiment. This is a another failure on the part of
Boeing and it does not leave me with any confidence
about its schedules, its solutions, its promises, etc. Until
they manage to get the 787 in the air flying it is a
project in the works and one that has been terribly
mishandled. I wish I felt better about this endeavor,
but <i>Boeing</i> and its Partners have taken alot of joy and
cost out of this and have left alot of credibility issues
still unresolved. Would Scott Carson and Scott
Francer please show us that handul of fastners at
tomorrows earnings presentation."
Be be seen and the second s
By Boeing Investor on July 21, 2009 7:59 PM
"The more I read this account, the more discouraging
it appears. There remain many challenges before a
solution is designed and installed. The article is an
attempt to bring some order and clarity to a problem that,
in truth, remains disorderly and lacking in clarity. How
very disappointing."

 -	 		
		 By Raoul on July 21, 2009 8:06 PM "Just as I have said before. Installation of the fix in-situ on completed aircraft will be neither easy nor cheap, and the latest confirmation illustrates <i>Boeing's</i> folly of continuing wing/body joins, rolling out, and fueling aircraft before the repair is installed. Ask anyone familiar with composite aerostructure asssembly and they will tell you one of the most difficult operations is close tolerance drilling of a titanium composite stack of materials. And they will most likely tell you that THE most difficult is back drilling into titanium to match existing close tolerance holes in the underlying composite, without damaging the existing fastener holes in the composite. By continuing joins, <i>Boeing</i> raises the danger/difficulty to new hights, by adding restricted access, entry into a confined space, and entry into at least some wet fuel cells." By Jerry11 on July 21, 2009 8:16 PM "Does Raoul's comment make sense. It seems to. Why are they fueling up the planes and readying them for flight testing when they do not have a solution to a problem for any of them yet. Would someone explain" By Boeing Investor on July 21, 2009 8:28 PM "Will be very interesting to see how Jim McNearny covers this topic at tomorrow's earnings call. Since he was unaware of it problem a few weeks ago, will he be aware of it tomorrow? His able sidekick Scott Carson may be prgrammed to be called in to conjure up some minor excuses and schedule promises." By Concerned on July 21, 2009 8:47 PM "This makes my head spin. This is a three dimensional problem that has yet to be solved." By airplanesense on July 21, 2009 9:23 PM "After reading Jon's as-usual excellent description and all the above postings, it now seems evident it is time for <i>Boeing</i> to bite the big bullet: forget the interim fix/modification, redesign the entire body join area, and build and fly only a/c with the permanent redesign, even if it means s	
		proceeds with the interim fix/mod what will it gain? Degraded a/c with the fix, reduced capability, and all	
		By JayPee on July 22, 2009 3:52 AM "Jon, I am unclear on something here. The test that ran the loads up to somewhere between 120% and 130% in April supposedly did not reveal the problem with the 'side of body' join. It appeared in some test with lower loads that occurred in late May. The test in April that went beyond	

		120% was supposedly not required for first flight. Boeing	
		claims that the 787 could have flown albeit with such a	
		small flight envelope such that it would not have been	
		worth it to fly. Here are a few questions:	
		1. Why can <i>Boeing</i> not give out the exact percentage of limit load was achieved in the April tost? Surply their	
		limit load was achieved in the April test? Surely their instrumentation should be accurate enough to measure	
		this.	
		2. Did the damage occur during the April test or	
		during the May test?	
		3. If it did occur during the April test, why did they not	
		find the damage until the later test?	
		4. If the damage actually did occur during the May test	
		(with lower loads), should not <i>Boeing</i> be totally	
		worried about such an issue? After all, this would be	
		roughly a case of fatigue failure occurring after a very	
		limited number of load applications.	
		5. Had Boeing not gone 'above and beyond' the	
		requirements for their first flight tests, could one surmise	
		that they could have had an unfortunate 'incident' with	
		their flight test aircraft?	
		Regards, John"	
		Pu Desire For Director on July 22, 2000 (-22, AM	
		By Recipe For Disaster on July 22, 2009 6:32 AM "Follwoing comments were apparently found on Aviation	
		Week (cannot find them myself).	
		<i>Boeing</i> decides to build an airplane having	
		performance not previously achieved, using engines not	
		yet built, claiming fuel specifics not yet attained, and	
		constructed out of materials never before used for a	
		similar purpose. It specifies a barrel-fuselage structure	
		never before used on a large plastic airplane. It uses	
		vendors not familiar with the material and designs	
		using computer models that aren't verified. It	
		outsources nearly all work using vendors inexperienced	
		with Boeing and its processes. It specifies an electrical	
		system having three times the power of existing aircraft	
		systems, designed using a wild frequency technique not	
		previously used, operating at twice the voltage of	
		previous airplanes, using a system designer who hadn't previously designed such systems. It guarantees to do	
		this with top-level management that has never built an	
		airplane or managed outsourcing, on a schedule never	
		before achieved on a conventional airplane, and plans	
		not to pay the vendors until the airplane is delivered.'	
		What could possibly go wrong?"	
		By Layman on July 22, 2009 9:45 AM	
		"A different perspective: Airbus elected to go the more	
		conservative composite route for the A350, even though	
		they started their design so much later - did they see	
		something that Boeing missed?"	
		D. 11	
		By diane Wilson on July 22, 2009 10:10 AM	
		"@Concerned, I guarantee to you that the agressive schedule is due in large part to pressure from Wall	
		schedule is due in large part to pressure from wall	

2

Street and from shareholders. They are not blameless,	
and it takes very strong management to stand up to	
them. Shareholders tend to take very short-term views,	
and that can be (and usually is) detrimental to long-	
term, high-risk development programs. In addition,	
shareholders want certainty in a world where certainty	
doesn't exist. Like any large company, Boeing's internal	
communication is not flawless, but on the other hand, I	
can easily understand that they would not want to	
share bad news with investors until they have both the	
technical facts and the business facts well understood."	
By Shareholder on July 22, 2009 11:13 AM	
"Listening to Earnings Conference callMcNearny's	
address takes 787 with stride and indicates a fix is in	
place and only implementation is the challenge. Not	
alarmed nor thwarted but indicates 'lesson's learned' I	
understand this attitude but it is a standard corporate	
coverup for failures and mistakes. Challenges always	
exist but this CEO would never own up to	
mismanagement. Its just categorized as a normal	
matter thus exculpating their ability to eliminate or	
minimize these problems. Corporate stonewalling is	
characteristic of Boeing and the present Officers are	
masters at it."	
By Edouard on July 22, 2009 11:25 AM	
"Talk to serious insiders, talk to engineers working	
with aerospace subcontractors on both sides of the	
pond, and most, if not all of them, will tell you that	
going the full plastic and full barrel option for an	
airplane of this size was the riskiest possible. If the 787	
ever flies, it will be a very average product, to the deep	
disappointment of the 50 + airlines who succombed to	
Boeing's PR. Let's hope Airbus will learn the full lesson	
of this fiasco and draw the right conclusions with regard to	
the A 350 (like beeing modest and transparent, for a	
start)."	
By Pointman on July 22, 2009 5:38 PM	
"I think if Boeing hadn't given away the wing and wing	
box assembly to overseas partners the discovery and fix	
would have been made earlier. That is the first time	
Boeing as given away that exclusive structural property.	
It's a wholly different process to walk over to the other	
side of the factory and talk with the assembly engineers	
in process- as opposed to breaking business/cultural	
obstacles to have a dialogue. I read somewhere that	
the Partners hold their own proprietary patents on	
their parts and drawings that they supply to Boeing-	
hampering quick redesign and recovery from setbacks.	
Maybe someone could clarify that information Rumors	
are running rampant all over the factory regarding	
shutdowns and layoffs in the 787 program- the wish is	
that management would be honest and level with the	
workers and investors so we're not blindsided again."	
and the second second to not be made a game	

By Paulo M (Johannesburg, RSA) on July 22, 2009 6224 PM "That someone that leaked this information belongs to the part of the Boeing Company that is precise, they know their trade, they know exactly what is going on, they know exactly how to get things to WORK, and they belong to the exactly the same culture that built the Boeing 747, the Saturn V/Apollo system, the Airbus A300, and the BA(Aérospatiale Concorde - whether or not we, the public agree with these programs. These people are engineers, they make things WORK and they are the only reason why there's still high regard surrounding Boeing and - like the general sentiment here agrees - in sharp contrast to Boeing (and Airbus) Management. Boeing's problems are the result of non-engineering people making decisions on behalf of engineering folk. Things as seemingly simple as product schedules ARE exclusively for engineers to reasonably decide - NOT Wall Street. It requires input from people of years is a pointer to the complexity involved in coordinating its manufacture and assembly. That the 787 has been the elayed is a victory in common sense to allow for normal procedures in aircraft development. Hear, hear! The people that matter are in control." By Anonymous on July 23, 2009 10:14 AM "I have to say, it's disappointing to see Jon continue to play cheerleader for Boeing. Jon is always very quick to report positive milestones such as 'rock[ing the gauntlet' but less so on negative news that shows Boeing is in disarray. Specifically, I find it unbelievable that there is no post about the fix, the program, etc. Jon's technical posts maby be of high quality, but as far as news, investigation, and commentary, in my humble opinion, he might as well be a Boeing spokesman." is used to take for the Program. Apparently there are too many KTs wandering aroud. My supervisor confirmed tha

	By Uwe on July 23, 2009 10:53 AM "To Anonymous on July 23, 2009 10:14 AM Afaik Jon started out as a professed <i>Boeing</i> fan with an investigative mind . He never went overboard in dissing rumors but tried to get information for substantiation (or not, see the delam issue short of Xmas 2008). But i have the impression that he has been consciously missled at that time. He certainly seems to have lost his innocence . I like his reporting style (though I can't really get into the 'freshly painted planes are so sexy' thing) and I like him not jumping into the rumor millrace but waiting for unsubstantiated information to condense into a more reportable presentation. Uwe"	
	By Jerry1t on July 23, 2009 11:48 AM "Ewe, I certainly understand your response and do not find it offputting in any way. I am trying to entertain the possibility that lessons have been learned and that there is an actual attempt to address the issue in the best way possible. Given that posture, I think we are hearing alot of rumors but do not truely know the extent and time frame in front of the fix. That two unindentified engineers get more credence than the President of the Company is an example of this and is unfortunate. I am only saying that we do not know the factuality yet but hope it will emerge from credible sourcesincluding the Company"	
	By SonOfEinstein on July 24, 2009 11:15 AM "It's time to focus on re-designing the joint. The interim repair will NOT suffice. It's too challenging to implement feasibly. It won't work. Scrap the current wings on ZA001 thru ZA006 and replace them with new wings from <i>Mitsubishi</i> with the newly- incorporated interface when they are ready. Tack on another year to the schedule and bite the bullet. And BTW fire Scott Carson while they're waiting for it all to happen. SoE"	
	By gorbidog on July 24, 2009 12:37 PM "I 'somewhat' agree with 'SonOfEinstein' in that <i>Boeing</i> might just have to 'bite the bullet' if this intermediate wing repair job doesn't work out as planned. Ideally, it will suffice for the test airplanes (hopefully!) but I'm quite concerned that it's not the long-term solution, and <i>Boeing</i> engineers and management obviously realize this. I have also heard rumors about a production line shutdown - and this would clearly be necessitated by the fact that <i>Mitsubishi</i> is going to have to RE-TOOL the wing mould to incorporate the PERMANENT solution for this wing-body join interface. Realistically, I don't see the 787 entering service for another two years, because it's going to take another six months for first flight (optimistically), and then roughly another	

	r	r	T	T		
1					year for flight testing. Tack on some margin of six to	
					eight months for more UN-expected issues, and you	
					have late 2011 for first deliveries, or roughly FOUR	
					years past the original estimate. But it's better to be	
					SAFE than SORRY. Now the ONLY question is, with	
					all these delays, engineering cost overruns, penalties	
					and cancellations, is this plane going to be PROFIT-	
					able? Them bean-counters better start sharpening their	
					pencils!"	
22	Seattle		Firm	α	"The structural flaw that delayed the first flight of the	On a
July	Times				787 Dreamliner is more complex than originally	modular
2009	"Boeing				described by the company, and the plane's inaugural	enterpri
	787				takeoff is likely at least four to six months away, say	se
	May not				two engineers with knowledge of Boeing's problem.	architec
	Fly This				'It's got to take at least three to four months just to get	tue's
	Year"				something installed on an airplane,' said a structures	continu
	(Domini				engineer who has been briefed on the issue. 'It's definitely	ed over-
	c Gates)				a costly fix to go and do this work.' A second engineer,	promise
					who is familiar with the details of Boeing's construction	and
					method, said the fix must first be made on the nonflying	under-
					test airplane in the Everett factory. Assuming that's	delivery
					successful, it will take another month or two to install the	
					fix on the first airplane to fly. Both engineers said the	
					issue requires a thorough redesign of the plane's wing-	
					to-body join, and the necessary parts will be very	
					difficult to install on the test airplanes that have	
					already been built. The engineers' accounts differ	
					from Boeing's description June 23 when it	
					acknowledged a problem and again postponed the first	
					flight of the much-delayed plane. Dreamliner program	
					chief Scott Fancher said then that the fix would be 'a	
					simple modification' requiring only 'a handful of	
					parts.' But almost a month later, heading into today's	
					quarterly earnings report, Boeing has neither set a new	
					schedule nor outlined its planned fix of the problem.	
					The second engineer said the problem is caused by high	
					loads at the ends of the stringers on the upper wing skins.	
					Stringers are the long composite rods, shaped like I-beams,	
					that stiffen the inside of the wing skin. There are 17	
					stringers on each upper wing, all of them subject to	
					compression forces when the wings flex upward in flight.	
					At the point where each stringer ends, close to where the	
					wing and body of the plane are joined, those forces pull	
					the stringer away from the skin. During a wing-bending	
					test in May on the ground-test airplane inside the	
					Everett factory, the fibrous layers of the composite	
					plastic material delaminated at these stress points.	
					Such a separation of the material isn't likely to lead to	
					catastrophic failure of the airplane, but it would require	
					constant monitoring and potentially costly repairs by	
					the airlines. Any tear in the material would have to be	
					promptly fixed to avoid spreading of the delamination.	
					If Boeing's initial fix fails to divert enough of the load	
					away from the stress points, the delay in first flight	
					could extend beyond six months, pushing the date out	
					into 2010. 'There's no guarantee that what (Boeing) is	
					× 0/	

	doing will work,' the second engineer said. 'If the	
	testing or analysis shows it doesn't get rid of the load,	
	then the engineers are back to square one.'	
	Further delays	
	Beyond first flight, solving the structural flaw could	
	also further slow the plan for ramping up production.	
	Boeing's current focus is on an interim solution to the	
	stringer problem for the test planes that it has already built.	
	The first engineer said <i>Boeing</i> hasn't had time yet to	
	figure out at what point in production to introduce a	
	permanent redesign on all subsequent jets. 'None of	
	that is nailed down yet,' he said. 'There's no schedule.' Boeing has a large team of engineers working on the	
	analysis, the redesign and how the fix could be	
	implemented. Those engineers are focusing on a solution	
	that will send mechanics inside the wings of the assembled	
	planes to trim the ends of each upper wing-skin stringer.	
	They will create a U-shaped cutout in the end of the	
	stringer, leaving the flanges at top and bottom untouched.	
	The U-shaped cut in the stringer ensures that the load on	
	the flange away from the skin, the inner flange, will	
	transfer entirely into the strong titanium fitting at the	
	wing-body join and not into the wing skin, the engineers	
	said. The hope is that will reduce the stress point load	
	enough to prevent future delamination. The reshaped	
x	stringer ends must be refastened with newly designed parts	
	to the titanium fitting, which connects the wing stringers to	
	similar stringers on the fuselage side of the join. And the	
	design must accomplish this without creating another	
	stress point somewhere else. To reinforce the stringer	
	ends, mechanics will also add some fasteners that go	
	through stringer and skin. The 17 stringers on each side	
	don't all require the same reinforcement, but Boeing	
	wants one design fix for all, so whatever is the beefiest	
	reinforcement needed will likely be done for all the	
	stringers, said the first engineer. This retrofit will be	
	tremendously difficult to implement on the airplanes	
	already built because the mechanics will have to do the	
	tedious and meticulous work inside the confined space of	
	the wing. 'Drilling holes in titanium is difficult.	
	Drilling holes in composite is difficult. And the access will be your difficult' said the second angineer. And	
	will be very difficult,' said the second engineer. And when <i>Boeing</i> finally comes to do the job on Dreamliner	
	No. 1, it will first have to empty the fuel from the wing	
	tanks so that repair crews can work inside.	
	anno so una repair erews can work inside.	
	Previous problems	
	Excessive loads at stringer ends (known to engineers as	
	'runouts') is not something that should have struck	
	Boeing out of the blue. 'The problem with stringer	
	runouts has been identified in the past and recognized	
	as a problem,' the second engineer said. He said the issue	
	has arisen on other composite airplanes. Indeed, the first	
	engineer said the stress point at the end of the 787	
	stringers showed up as a 'hot spot' in <i>Boeing's</i>	
	and an an an and a por in boung b	

computer models before the delamination in the wing	
bend test — but for some reason it was never	
addressed. The delamination happened after the wing	
bend test reached ultimate load, which is 50 percent higher	
than the maximum load expected in service. The second	
engineer said reaching that load proves that <i>Boeing's</i>	
heavy titanium structure is as strong as it needs to be.	
However, the delamination of the wing skin could have	
begun well before that load was reached, he said. In the	
tests of the proposed fix that lie ahead, he said, engineers	
will have to inspect the stress points for delamination	
closely at every increment up to the highest loads. Boeing	
spokeswoman Yvonne Leach said the company 'will	
provide details on the technical solution in due course as	
we finalize our plans for implementation.' The company	
reports its quarterly earnings before the stock market	
opens today. In an early-morning teleconference after the	
earnings news is released, Boeing management will be	
quizzed closely by Wall Street analysts for more detail on	
the expected program delay. It's likely the executives won't	
yet have precise answers."	
jet nave precise answers.	
Duvallruss Duvall, WA July 22, 2009 at 11:33 PM	
"I'm a long time stockholder. This situation is the last	
straw. Not only are there serious technical, schedule	
and cost problems with the 787, top management now	
has little or no credibility with stockholders, customers	
and other stakeholders. Boeings reputation has been	
seriously compromised. When will the board 'clean	
house'?"	
LostintheGreatNorthwest Marysville, WA July 22,	
<u>2009 at 7:08 PM</u>	
"I believe it is clear that Fancher and his assoicates on	
the program and probably all the way up to the CEO	
have broken the law in that they willfully and	
knowingly made false statements concerning the 787	
that constitute violations of the Securities Law. If you	
run a public company and you lie about the business	
then you a defrauding the stockholders. You get to go	
to jail. As to the two engineers, bad news gets worse with	
age. Fancher is again really at blame. He could have	
told the truth. Then there would not have been a leak."	
foodmart Seattle, WA July 22, 2009 at 5:30 PM	
"I support these <i>Boeing</i> engineers who leaked this info.	
Whistle blowing is a tough decision, filled with neither	
glory nor total shame. Simple truth: Boeing has lied or	
misled its customers, stock holders, financers and	
anybody who listened as to the condition of this	
aircraft. What's criminal is that we were told by	
Boeing that this fix would only take a few weeks, at	
most. More lies. Can't trust Boeing management any	
longer. Consider this whistle blowing as a sign of the	
turmoil within the company. These executives have	
forced good and prideful engineers to this, IMO.	

Imagine the horror of going to work everyday and having to live and be responsible for building this plane while your bosses acted like jacka352es and lied their builts off, yet never got in trouble, nor were held accountable." <u>nonews2me Peck, KS July 22, 2009 at 4:23 PM</u> "For those of us old enough to remember the DC10 problems. We also remember the leadership at the time.The lies the misinformation and what happend to that company. They bough Bosing, a soid, proud, strong, credible company for over 80 years. Now look what they are doing with it. This all has 1. medonnel and H. Stonecipher written all over it. BRILLIANTHH!!" <u>Dean Turner irvine, CA July 22, 2009 at 4:04 PM</u> "The bad thing about being the first mover is that the competition can sit back and take notes so that their execution of the book. The DC-10 Case by John H. Fielder and Douglas Birch. Although out of print, this book can sell for \$160.00." <u>hortonobk Kent, WA July 22, 2009 at 3:55 PM</u> "Thm disappointation to the Press. They withheld their names in this press release because they violated <i>Booing Company</i> Communication Procedures and would very likely be terminated for their reckless and insubordinate actions. If these <i>Booing Employees</i> had had the course of their on convictions, they would have identified that a couple of the would have identifies indicate mal- intent and make all their chains suspect. Worse than biting the hand that feeds they would have identified themselves and suffered the consequences. Their hidden licenties mal- intent and make all their chains suspect. Worse than biting the hand that feeds they would have identified themselves and suffered the consequences. Their hidden licenties mal- intent and make all their chains suspect. Worse than biting the hand that feeds them, they caused a lot of noise that took everyone's eyes off the ball of getting that airplane in the air. I hope they get busted for it." <u>theReferee Seattle, WA July 22, 2009 at 3:57 PM</u> "This project is a mess, and it will be hard to revive it with t	
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that I saw earlier and the pictures from <i>MHI</i> scared me. <i>Boeing</i> has forgetten how to transition stringers. This has nothing to do with unions. It has to do with the guys I knew 10 or 20 years ago who were the best in the world now being retired. You can't square off the stringers like that. The transition is critical. <i>Boeing</i> needs some real airplane builders because no real one would have made these mistakes. BTW <i>Boeing</i> has
been quoted in this paper as saying they own this part
of the design so don't blame the Tier 1s for this one. It is square on the "B" and the liers like Scott Fancher
who don't know how to build an airplane."
stagfury SPOKANE, WA July 22, 2009 at 1:32 PM "SELL!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
mukilteomanMukilteo, WA July 22, 2009 at 10:43AM"Boeing's commercial plane division started going downhill after Mulally left. It doesn't matter that he is an 'aerodynamics guy'. He is an excellent manager who knows how to run a business. Boeing made a huge mistake when they passed him over as CEO. The proof of his ability is in results. Ford may be the only major car company to not declare bankruptcy and/or take government loans. Remember how Detroit lamented the fact that he wasn't a 'car guy'? That's what took GM and Chrysler down: too many traditional 'car guys' who would not adjust to consumer tastes and could not build consensus with unions to reduce costs to be competitive."FL390 Grtr SEA Area, WA July 22, 2009 at 10:28 AM
"It sure seems like <i>Boeing</i> has been backpedaling since
the merger with McDD. McDD commercial side was a total failure warmed up obsolete technologythe MD- 11, MD-80, MD-90 and 717 should never have happened. Did the failed McDD mgmt destroy Boeing?"
 <u>spokane cougar Spokane, WA July 22, 2009 at 10:26</u> <u>AM</u> "Who is running <i>Boeing</i>? A two year old or a monkey? What a joke of a company. Everything started going
downhill once they moved to Chicago. This continues
there might not be much competition between <i>Airbus</i> and <i>Boeing</i> , as <i>Airbus</i> seems to be able to not make itself
look like a complete idiot all the time."
lifeliberal Seattle, WA July 22, 2009 at 9:46 AM "This is simply corporate greed yet again running wild. This company should be given to the workers who actually build the planes. Obama needs to step in here and take this over. If the unions owned the
company all the jobs would stay here and planes would be built on time."

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	CapHillMax Seattle, WA July 22, 2009 at 9:20 AM "Boeing seems to have been on the slow, downward slide ever since McDonnell Douglas execs did a reverse take-over of Boeing. It's a shame that Bill Boeing's legacy is being destroyed."
	El Diablo Blanco Ocean Beach, CA July 22, 2009 at 9:11 AM "Apparently the door seals don't even match up. Not exactly a plane I'd want to fly in 15 years down the road."
	Restore the Republic End the FED, WA July 22, 2009 at 9:09 AM "EVERYTHING in the 787 program is a clusterFk. That's what happens when you outsource major structural parts to mitsubishi and othersyou lose precision. I won't be flying in this plane."
	thunderbolt hawaii kai, HI July 22, 2009 at 9:07 AM "Boeing 787the De Havilland Comet of the 21st centuryI christen thee the Flying Mass Grave."
	JCowles Kent, WA July 22, 2009 at 8:51 AM "Doug H: 'Why were these people not identified? Were they doing this against the wishes of their employer?' Simple answers to simple questions: (1) they were not identified because they would get their hinies fired if their identities were made known; (2) they are doing it because <i>Boeing</i> has not been straight with stockholders or the public about the real seriousness of the 787's structural problems. What the "Times" is doing is what the "Washington Post" was doing in the 1970s with Watergate: investigative journalism. So you have a choice: do you trust the "Times" or do you trust
	 Boeing? Whose credibility is greater? Even MFC should see the answer to that one. JC" Bark Snohomish, WA July 22, 2009 at 8:38 AM "As for production The original ' workforce ' assemblying the 787 was mostly inexperienced kids right out of high school or their first job at <i>McDonalds</i>. <i>Boeing</i> hired them on the cheap (never works), @ \$12.50 an hour. This generation did not grow-up like my 'Baby Boomer ' generation. They were not drilling holes or building things, rather playing video games. This became a HUGH problem, causing much re-work
	and bad holes, etc. A few weeks of 'training' does not make an aerospace mechanic. It may sound simple to drill a hole, but if you are not able to 'FEEL' a drill bit going from composite to any 'metal' (or vice versa), the hole is going to be elongated or any number of other bad holes. The thing about that NOW is If you cannot drill a GOOD hole in a wide open area how is it going to be done while confined inside a wing, surrounded by various structure, etc? That said The engineering was done years ago, long before manufacturing and integration

	began in FAD. The analysis and design for the 'current'	
	Wing Box ' (which is the heart of the A/P), was proven	
	wrong after the fact via the fatigue A/P's ongoing testing.	
	As with any engineering the expertise and strengths of	
	each individual S/B evaluated by their management. It is	
	very apparent it was not done early on in this	
	development. Project Leadership was sorely lacking	
	Still is. Often when a new Program starts many people	
	are promoted out of existing programs beyond their	
	abilities = POOR Management. As for Commercial	
	President Carson I have said it before, he is not to	
	be believed. He is a mouthpiece for the powers that be	
	in Chicago and has yet to ' run ' ANY Program @	
	Boeing that did not fail. Also, he is NOT an engineer. If	
	Mulally had not gone to Ford no one would be hearing	
	from Carson. Of course the governor believes everything	
	he saysNot having a clue as she doesn't. Retired - Eng	
	32 years (consulting 2 years 787), new programs - 767,	
	777, 747-400, Peacekeeper, RSLP, ALCM, on and on	
	This is NOT a union issue SPEEA or Mechanics."	
	THIS IS INOT A UNION ISSUE OF LEA OF MICCHAINCS.	
	Axion44 Seattle, WA July 22, 2009 at 8:00 AM	
	"Between the militant and lazy union and the inept and	
	ethically challenged management it amazes me that	
	anything gets done at <i>Boeing</i> ."	
	TheWholeTruth Bellevue, WA July 22, 2009 at 7:32	
	AM	
	"Boeings profits up. Watching brainwashed neocons	
	and their mouthpieces bad mouth their American	
	brothers and sisters is sickening. Seems to me that	
	Boeing has PLENTY of cash to share with it's union	
	employees!"	
	chiptoy cost	
	bellevuezog Bellevue, WA July 22, 2009 at 7:04 AM	
	"Boeing-Best Engineers and Machinists anywhere.	
	Worst Management Ever."	
	worst management Ever.	
	111 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
	certaindoom seattle, WA July 22, 2009 at 7:03 AM	
	"Boeing profits up Q2, 787 might not fly in 2009. Yep,	
	I'd say the same jerks that moved the headquarters to	
	Chicago are full on getting their way. Mission	
	Accomplished guys. Lets all sing the praises of modern	
	day Boeing management, outsource everything in a	
	rear-guard action to end-run the union, doesn't matter	
	if a plane or two is delayed, we'll be closing down	
	everett and renton in a few years anyway. Make all	
	that expensive labor head south where they are	
	overjoyed to work for half. And you, Unions, you	
	happy yet? Called enough strikes to prove you're boss yet?	
	Let me put it to you like this, is your goal to drive your	
	jobs out of town? Mission Accomplished at you too.	
	When I moved here 20 years ago Boeing was one of the	
	pillars of the Northwest. For a while that stayed true. What	
1 1	I see now is no longer the case. I don't know what	
	happened, but every time I run across an ex-Boeing	

	employee at some other job he's typically an outdated dinosaur, sometimes way overweight, and often does not really measure up compared to guys I work with that doen't have <i>Boeing</i> on their resume. I'm sure it just matters by which division you were in or what you did, but the big quality that <i>Boeing</i> did stand for in management as well as in employment just does seem to be eroding badly before our eyes. We need big successful businesses here. Everyone that gripes about Boeing (me at least) wants them to succeed because we all benefit when it succeeds. But seriously. This 787 is just a wake up call to the rest of us that <i>Boeing</i> might not be <i>Boeing</i> any more."
	hoarsewhisperer Seattle, WA July 22, 2009 at 6:51 AM "This is exactly what Jack Welch's GE disposable employees philosoophy has brought to U.S. manufacturing. Management are not the only people with knowledge and experience that matter, and engineers as well as the people on the line are not interchangeable parts that can be replace from anywhere on the globe without consequences. This is a great example of the Hubris in American Corporate Leadership."
	tikitrek Seattle, WA July 22, 2009 at 6:25 AM "A violation of company policy or an unofficial leak to the press. I have no idea but it seems timely to be releasing information that is too diffecult to release officially. The mistrust seems to linger because of an awareness by some or a feeling that other issues are lurking in the wood work or is it in the composite structure. They are complex issues but <i>Boeing</i> appears to suffer more by not airing the issues early enough to mitigate negative criticism."
	mrblank Everett, WA July 22, 2009 at 4:23 AM "What scares me most about the poor management and dumb outsourcing of the 787. Is the fact that no matter how hard I work or how many days in a row, I can't save there butt this time.We are going loose an American Icon, because of corporate greed, and lies. It is sad."
	johnnyo513 Milton, WA July 22, 2009 at 2:46 AM "I agree with C2H5OH whole heartely and believe me problems like this isn't just a 787 problem, the 737 has so many problems on the production line that none of them coming off the production line lately are anywhere near air worthy!! There is almost more re- work then original work being done, yet the company continues to lay off production workers while trying to keep the same production rates, only an idiot doesn't see where thats going to lead to"
	Sam Marmon Federal Way, WA July 22, 2009 at 12:52 <u>AM</u> "@takn - I know <i>Boeing</i> has an interest in what

22 Wall	Jim	Firm-	α	information it disseminates in public, but I'm concerned that what we've seen from the <i>Boeing</i> PR and management isn't open, honest, and transparent regarding the 787 program. It would seem there is a willful negligence to understand the problems or an effort to mask or minimize the magnitude of the issues. While I'm sure these engineers are violating some PRO, they are also shedding light on a program that probably deserves more scrutiny from the public and <i>Boeing's</i> investors." "Boeing Co. executives maintained Wednesday that its	On a
July Streeet 2009 Journal, "Boeing Says 787 Still Profitab le, To Update	McNer ney, CEO The Boeing Compa ny	Investo rs		much-delayed 787 program remained profitable and that the latest setback wouldn't require a major redesign. The U.S. aerospace company said it would provide an update later in this quarter on when the aircraft might fly, after shelving a first flight in June because of structural problems with the area where the wings join the body. <i>Boeing</i> Chairman and Chief Executive Jim McNerney and Chief Financial Officer James Bell were	modular enterpri se architec cture's possible understa tement
Progra m In 3Q" (Ann Keeton)				pressed repeatedly about the 787's economics on a conference call after reporting second-quarter earnings. While it has secured 850 orders for the 787, an existing delay of more than two years has forced Boeing to increase research spending and pay penalties to customers awaiting the plane. Bell admitted there were 'concerns' about the program's financial contribution, but said on the call that the company still forecasts that it would be profitable over its lifetime. McNerney said Boeing can make a 'straightforward' fix to the 787's latest setback, brushing aside reports that a solution could take months to develop. The company will also provide an update on the financial impact when it reveals a new flight and test schedule for the aircraft. Boeing on Wednesday stood by its financial outlook for full-year revenue in a range of \$68 to \$69 billion, with earnings-per-share in a range of \$4.70 to \$5.00. Bell said Boeing is managing its cash carefully, and could delay a pension payment this year, but doesn't plan to cut its dividend. Investors and analysts were stung by Boeing's sudden announcement last month that Boeing would delay the first flight of the 787 for an undetermined amount of time. While some customers have asked to defer orders on a variety of aircraft due to the global recession, McNerney said deferral requests have slowed compared with earlier this year. McNerney said Boeing doesn't see a need now to make further cuts in aircraft production, but will continue to assess the	of problem s to investor s.
22 Thomso July n	Jim McNer	Firm- Investo	α	market." Jim McNerney (<i>The Boeing Company</i>): "The fundamental operating engine of this company is	On a modular
2009 Reuters Researc	ney, Chari	r		running very well right now. Production and services programs in both BCA and IDS delivered strong earnings	Enterpri se
h, excerpt from <i>"The</i>	man and CEO; James			in the quarter, supported by our continued focus on productivity improvements and disciplined cash management . We are also making solid progress on some key development programs including the P8-A and the	Archite cture's defense of its

Company y, Q2CFO, The model. Assembly is now 75% complete on this airplane and the program continues to work toward a first flight late anceal perform ance2009 Boeing Earning s Call pt"in the side of body section of the airplane. Alternative pt"and the program continues to work toward a first flight late tanscript"ancept"in the side of body section of the airplane. Along with Chief Technology Officer John Tracy, I have been in frequent contact with the BCA team and reviewed the program in detail lats week. I can tell you the team is making solid progress toward resolving this issue. We have duplicated in our analytical models the condition we discovered during static testing and we have identified a technical solution chosen from a number of options. From an engineering standpoint, the fixed design is straightforward and involves a relatively small number of parts supplied to the areas that need reinforcement. There is nothing we have latenared to lead us to believe that this is anything but a local issue which can be addressed with a local fix. The team is currently in the process of evaluating alternative ways to implement the preferred solution, taking into account a variety of factors including accessibility of the physical area recreated by the installation process we select, particularly on airplanes already built. Once the implementation approach is determined, an aircraft modification and testing plan will follow. As these plans firm up, the team will assess impacts on our flight test and production schedules and then deternine the resulting financial impacts. While addressing this issue, we are working hard to minimize any additional impacts on the overall program effort. Postponing first flight was the right decision; given the reduced flight e	finanaic	Boeing Bell, 747-8. On the 747-8, we have performed the final body	Boei
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and the second processing and the second sec			
		plan will be finalized and shared later this quarter. This	
latest 787 development strongly underscores the			
importance of our drive and imperative to strengthen			
enterprise, technical and supply chain disciplines on			
our programs, both inside and outside our four walls.			
We have and will continue to make changes to our			
processes and organizations to accomplish this			
objective. We have also been implementing tactical			
adjustments to the 787 operating model with the recent			
agreement to purchase Vought's South Carolina			
operations being a key step in both optimizing work			
between Boeing and our suppliers and also bolstering			
our ability to develop and produce large composite			
structures. We expect this transaction to close in the		structures. We expect this transaction to close in the	

near future. We are learning from our lessons on this program and will not hesitate to take the steps necessary to ensure its ultimate success, even if it means redrawing some lines that were established when we first started. Despite the delay in first flight, the 787 program is moving forward with critical flight test preparations and has made some important progress. We completed gauntlet testing and taxi testing at speeds up to 130 knots on the first flight test aircraft. The airplane performed as expected and we were pleased with the results. Airplane number two has moved to the flight line and has performed engine runs. Airplanes three and four have completed power on and the team is in the process of assembling the major sections of airport number seven, the first production aircraft. Through all of our experience on this program to-date, it's important to remember that we are doing something here that has never been done before. The innovation and technology applied to this program is unprecedented in scope and in the impact it will have on commercial aviation. We remain gratified by a 787 backlog that stands strong with 850 orders from 56 customers around the world, and we continue to believe the 787 is a game changer that will add tremendous value to both our customers and our company over time. Beyond the 787, BCA continues to generate strong operating performance in a very difficult period for the industry. Deliveries remain on track for the year and the team has made good progress on productivity and cost improvements to help offset a range of market pressures that include, lower production rates, softening spares volumes at lower delivery price escalation forecast. The environment continues to be challenging in both commercial and defense markets. In April we announced a reduction to our 777 production rates starting in June 2010 and we postponed rate increases planned for the 67 and the 47. Since that time, BCA has accommodated about 70 airplane deferrals in addition to the 60 processed in the first quarter, and the backlog of deferral requests has come down this quarter. Accordingly, there has been no change in our current thinking about commercial production levels including our assessment that we can hold 737 at its current build rate. We will continue to evaluate production rates based on market conditions and customer discussions. The aircraft financing markets, while still tough, are also showing signs of gradual improvement. It has been encouraging to see U.S. capital markets begin to open up with recent double EETC offerings completed by a few U.S. airlines. We also continue to aggressively manage our infrastructure, costs and investments. As of June, we have reduced our headcount by approximately 5000 positions versus our November 2008 base line and we remain on track toward the estimated 10,000 position reductions we expect by year's end."

James Bell	
"Jim talked about the 787, but let me discuss how we	
evaluate the financial status of this program. Each	
Construction and the second	
quarter we perform a 787 gross margin accounting	
analysis. At the pre-delivery stage in the program, the	
primary purpose of this analysis is to determine if we	
believe the program is in a profit or a loss position over	
an initial quantity of airplane. Up to the point to decide	
a body issue, our assessment was that the program was	
not in a loss position. The cumulative impact of	
scheduled delays including the current one being	
assessed is obviously putting pressure on the program's	
profitability. At the same time, BCA has an ongoing	
effort to evaluate opportunities to improve efficiencies	
within our factory and across the global supply chain	
as we prepare to ramp up build rates. Both schedule	
impacts and cost improvement opportunities are being	
evaluated and upon completion they will be	
incorporated in the 787 accounting position. This will	
also include an assessment of potential financial impacts	
on our current production programs. We will update you	
on that in conjunction with the 787 schedule revision.	
Included in the company's gross inventory is \$7.9	
billion related to 787 work in process, supplier	
advances, tooling and other nonrecurring costs. Our	
gross inventories on this program has been building at	
approximately \$800 million per quarter. As we work	
through our 787 challenges, the remainder of BCA	
continues to perform very well, strong execution in the	
core production and services programs generated good	
financial results in this quarter. BCA's second quarter	
margins were 9.7%. Unit cost margins were 10.8%	
driven by 777 model and customer mix as well as lower	
supplier costs. The 777 deferred production balance	
decreased approximately \$400 million during the quarter	
which reflects favorable mix and a lower supplier cost for	
both delivered and work in process units. BCA won 57	
gross orders during the quarter including 36 737's while	
52 orders primarily 787's previously disclosed were	
removed from the order book. BCA's backlog remains	
large at \$257 billion representing greater than seven times	
current annual revenues.	
Unallocated expenses increased this quarter as compared	
to last year due to higher deferred compensation and share	
based plan expense. Somewhat offset by lower unallocated	
pension expense. We expected total unallocated expense to	
be approximately \$700 million in 2009 with other segment	
expense forecasted to be about 200 million.	
Now, let's turn to slide 8 and discuss cash flow. We	
generated \$1 billion of operating cash flow in the quarter,	
reflecting cash from earnings somewhat offset by	
continued working capital buildup on our development	
programs and timing of accounts receivables. During the	
quarter we did not acquire any of our shares, but we	
did pay approximately \$300 million in dividends. Turning	
and pay approximately to be minimum in arritability i fulling	

to slide 9; our financial strength remains solid. We ended the quarter with \$5 billion of cash in marketable securities and that's up 6% from the end of the first quarter. Debt declined during the quarter due to maturities principally at BCC. As previously announced, we expect to be using cash in the third quarter for the purchase Vought's South Carolina facility and to pay guarantees related to the Sea Launch Chapter 11 filing. In light of these and other cash demands, our primary focus is to continue aggressive management of cash flows related to our operations. We are also fortunate to have good access to the debt markets at reasonable rate. We have had a successful bond offering in March and this form of capital rising continues to be an attractive option for us. Now let's turn to slide 10. Our financial guidance remains unchanged and will be reevaluated upon completion of the 787 assessment. 2009 earnings per share is expected to be between \$4.70 and \$5 per share with revenues of 68 billion to 69 billion. The 2009 commercial delivery forecast remains between 480 and 485 airplanes. 2009 operating cash flow guidance remains at greater than \$2.5 billion, although the 787 schedule assessment will likely put downward pressure on the timing and the level of cash flows. We are still assuming 2009 pension funding of approximately \$500 million, although the amount of mandatory contributions this year is less than \$100 million. We will make a final decision on funding towards the end of this year. Total company pension expense is expected to be about \$900 million in 2009, with slightly more than that recorded at the business unit and a small offset in the unallocated segment. The R&D expense forecast is unchanged at \$3.6 billion to \$3.8 billion and capital expenditures are expected to be approximately \$1.4 billion."

Jim McNerney:

"Our priorities remain, getting the 787 on track and in the hands of our customers, continuing to reposition our defense business while extending our existing programs and expanding in the international markets, growing our services businesses, maintaining our lead in innovation technology and preserving our financial strength through productivity improvements and aggressive cash management. I do believe we will get through the current challenges and at the end we will be a fundamentally stronger company with the right products and better position to grow and improve financial performance overtime. With that said, we would now be happy to take your questions."

Cai von Rumohr (Cowen & Company):

"Yes. Thank you very much. I guess 787 is on a lot of our minds. Jim, you mentioned that the fix is straightforward, but I guess first would be with this fix, if it's straightforward, what does it imply for performance of the aircraft maintainability and service

1:6-9 Secondly theme have been all hinds of more
life? Secondly, there have been all kinds of rumors
about kind of a partial redesign of the wing, is that just
to make it easier to kind of implement this fix or is it
something broader and what kind of rough range of
timeframes could this imply?"
lim McNornov:
Jim McNerney: "Well, we have learned nothing, Cai that says this is
anything other than a local issue with a local fix. I'm
not sure where the discussion comes from that says a
major redesign of the wing is in the offing. We don't
see that. Having said that, we have been through the
analysis that confirms and predicts what happened
analytically. We have now have chosen the approach we
want to take on the fix itself in terms of the parts and their
placement to reinforce the area and we have done some
initial testing to give us a high degree of confidence that
we have got the right fix. Now we are onto putting
together an implementation plan which has some
challenges as you're moving around in very tight
spaces in the airplane and getting some things done and
that's what we are in the midst of doing. So a high degree
of confidence in knowing what to do and working
through with an abundance of caution exactly how to
do it, but with a great deal of confidence that we are on
the right path here. As to its impact on the
performance on the airplane, we don't see that. Either
performance metrics or maintainability, there is not
much weight involved. The performance of the
airplane is not impacted and therefore it's a matter of
working through this issue and getting to the other side
and getting the program back on track, and we will be
updating you as we said this quarter."
Howard Rubel (Jefferies):
"Thank you very much. I just wanted to talk for a moment
about inventories. It's appreciated that you disclosed the
size of the 787, but could you address how you're
recovering from the strike and why we're not seeing
some improved runoff and then also how is it that
you've now finally been able to or talk about the
success on the 787 in relieving some of the deferred
costs there, James?"
James Belly
James Bell: "Hey Howard. We have liquidated quite a bit of the
strike inventory we did over a billion one in first
quarter and another about half a billion this quarter.
Obviously, it's been more than offset by the increase in
inventory on our two development programs, both 787
and on our 747 programs and obviously that's been
impacted as the delivery of those units slide, but clearly
we have done that. Now, you talked about the how
we're going to relieve the inventory on 87. Obviously
we are not going to be able to do that until we start
getting into delivery and we'll have to wait until we

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complete the assessment of the fix to actually know when that will resume and then how those inventories will be relieved over time."	
Howard Rubel (<i>Jefferies</i>): "So we'll continue to see an inventory build for the next 18 to 24 months?"	
James Bell: "We will continue to see an inventory build until we start delivering, that is correct."	
David Strauss (UBS): "Jim, just to clarify your comments on 787, so the fix that you talk about and you identified in the press release, were you're referring to is a permanent fix or is this a temporary fix that you've identified?"	
Jim McNerney: "No. This is a fix that will both be retrofittable on airplanes that have already been built and will easily flow into the production process technically."	
<u>Robert Spingarn (Credit Suisse):</u> "Question on guidance. Why not just adjust it or withdraw it when you know there is some type of cost coming that's associated with the 787 fix or perhaps is it simply absorbable this year and more of a 2010 event?"	
James Bell: "Rob, first and foremost at Jim mentioned and I think our results reflect, the underlining engine in this company is performing well and that's predominantly the basis of our guidance, and until we really have a clearer understanding of the impact of the fix on that performance, we think it's appropriate to hold it and just make sure we disclose that to date we haven't included in it yet what, if any, impact on those numbers the fix will have."	
Robert Spingarn (Credit Suisse): "Okay, and then of the 7.9 billion in 787 inventory; what portion of that will be amortized over the delivery aircraft?"	
James Bell: "All of it."	
Robert Spingarn (Credit Suisse): "All of it? Then some of its just work in process?"	
James Bell: "Yeah, some of it is work in process, some of it is advances to supply chain which will ultimately result in work in process being delivered to us in the future, and	

then some are deferred costs like tooling, and so over the course of this program we would expect all those costs to be amortized over the deliverable units."	
Robert Spingarn (Credit Suisse): "I guess I'm talking about the latter portion that's going to be somewhat linearly equal over each delivered aircraft. So the development associated costs, the tooling, the capitalized development."	
James Bell: "Yeah, that's probably the smaller portion right now of the inventory balance, but in fact, it is the smaller portion of the inventory balance right now, but it will be amortized primarily over the bulk of the units. Now, as you know in deferred production costs, that grow as you introduce new models and there's new tooling, new effort that is a benefit to the subsequently delivered units. So that number will change over time, but it will get amortized over the deliveries."	
Ron Epstein (Banc of America-Merrill Lynch): "Jim and James, just maybe a broader question. When you step back and you look at the culture of Boeing commercial and kind of how everything played out at the air show and how news flow went on the 787. From an outsider looking in it appears that bad news doesn't flow up. Is that the case and if it is, what can you do to change that?"	
Jim McNerney: "I'll take a swing at that one. The story here is a tough program, not that news doesn't travel around our company. I do recognize, though, where your question comes from because we all sounded confident that we were going to be flying in June and pretty late in the game we sounded confident and that's because we were and it's just one of the latter tests we did just before flight turned up wrong and we found out about it right away and so this was not an issue of information flow. It's an issue of the thousands upon thousands of tests we do to confirm our analytics with static testing, in this case or other kinds of tests that bear on certification, the performance of the airplane and these literally are thousands upon thousands that one of them turned up wrong that we didn't anticipate. So the story here is not information flow. The story here is the comprehensiveness of our testing because we have got to get this airplane right. We all wish it didn't happen, we all wish that we didn't sound so confident at such a late stage, but other than this, the development of this plane was on track and feeling good about it as subsequent testing has borne out."	
Ron Epstein (<i>Banc of America-Merrill Lynch</i>): "The one piece I guess I don't understand, Jim, is the	

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	issue about the stringer run out; the extra stress on the stringers, particularly in a composite wing isn't really a new issue, right? I think the engineers knew it a couple of months ago other folks could actually have experienced for the composite wings. I could have predicted something like this might have happened, so I guess that's what I don't understand, I mean how the confidence could be there up till the very end and then, then it was this one test that?"	
	Jim McNerney: "The purpose of static testing is to confirm analytical models based on the material you use and the forces and stresses you put on them. By and large our analytical models are pretty good, but the reason why you do static testing is to confirm them and in this case they were not confirmed and there are lessons for us. Of course we understood stringers and wings and we do understand composite structures, but this is one where the model did not predict the behavior we should have done better and we will do better but that's what happened and we are going to as I said in my remarks we are going to continue to tighten up our engineering disciplines as we go forward and you always try to learn from these things."	
	Joe Nadol (JPMorgan): "Question for either or may be for both Jim and James. Just in the balance sheet, James thanks for the additional color you gave in your prepared comments its tough at this point to predict what the use of the cash are going to be on the absence of the 787 schedule over the next two or three years, but in terms of sources you hinted pretty strongly that you are going to go back to the bond markets in you did a successful \$2 billion or close to it offering in Q1. How much more do you think you can or want to do in terms of bond offerings? Then if you could and may be help out in terms of the rank order of alternative source of cash. How are you thinking about dividend policy in terms of the pension you have signaled that you have may be a few hundred million dollars of opportunity there not putting in, some of your discretionary contribution, et cetera?"	
	James Bell: "Yeah. You know, first and foremost, we are going to continue to have aggressive management of cash in this company and we are starting to see and I think you saw in the second quarter benefits of that. We are controlling pretty tightly any expenditure that doesn't directly support our priority which is obviously getting the 787 airplane, getting that development done and in the hands of our customers, and any other expenditure that's not going into the productivity or the production of our products we are managing very, very carefully so that's our first priority. Clearly, we do have the ability to get back in the bond	

markets and we'll probably do some of that, I don't know exactly what the optimal number is, but you'll see it and we'll let you know as we do that. We are not at a point where we are considering cutting our dividends. I want to be very clear on that. We are not there. We do have some options relative to how much we put into our pension plan and we'll take a hard look at that as we go forward and, again, we'll be very aggressive in managing our expenditures going forward and we will be very disciplined in managing the cash inflows to make sure that on delivery we are receiving the cash associated with the deliveries and making sure we stay on our, get our advances on time and for our contracts."

Joe Nadol (JPMorgan):

"Okay. Then just a clarification; you highlighted during your comments that you're obviously, look at every quarter you look at the 787 program in its entirety, whether it's in a profit or a loss position and you're going to do that after you get a new schedule. Again, just it's never been quite clear to me exactly the block size that you, under which you evaluate that. You've said repeatedly that you're going to determine that when you delivered the first airplane, but you have to have something in mind when you do this analysis every quarter, given your backlog now entered in 50 units, what sort of block are you going to use to determine that after you get a schedule together?"

James Bell:

"You're absolutely right, we haven't been clear on that and we are not going to be, Joe. We are not going to determine that until we start recording either a profit or loss on this program, but I think you got a pretty good indication knowing that we have 850 orders, then the issue is when the market looks out over the time period, we can estimate it and produce a number of airplanes. So clearly it's going to be higher than what you've seen traditionally, but until we finally have to book financials on our P&L statements, we are not going to disclose what that number is."

Joe Campbell (Barclays Capital):

"I'd like to stay on this 787 inventory and the conclusion that it's not in a forward loss position. I mean, you've got a lot of numbers, we've had a lot of delays but as far as I can tell, really the only number you've shared with us is the 8 billion that we now see this quarter in inventory and I'm wondering, there's a lot of delays, no commentary ever about, what the cumulative overrun will you know is going to be. I mean, it seems like its, 8 billion, 6 billion, 10 billion. It's hard for me to understand given all the commentary about need to pay penalties all the suppliers say you owe them each hundreds to even 1 billion. It seems like the run rate is another 800 million

a quarter, plus whatever the extra R&D is and it sounded in the comments like maybe you need other <i>Boeing</i> efficiencies to make sure this thing doesn't have a forward loss and if you're talking about \$85 billion you know, 800, 850 planes, you're talking about estimating out to 2018. I mean, how are you sure that you're not losing money on this thing?"
James Bell: "Well, clearly we've had our challenges on this program, Joe, and all you've said are things that we have to take in consideration, but the one other thing that drives most of this and which is normally the most difficult thing to estimate over time is the revenue stream. Well, we have sold 850 of these and we know we are way ahead of our competition and the market is still going to be robust over a timeframe that we think we have the ability to estimate and there are a lot of factors and a lot of moving pieces in determining that and we go through a very careful disciplined process quarterly to satisfy ourselves and our auditors that where we are relative to profitability on this program. Now again, as I mentioned in my opening remarks, this last assessment and combined with the cumulative impact of the other things you mentioned, really puts pressure on the profitability of this program, but on the other side of this, we have a new production system that allows us to really have substantial improvement beyond anything we have ever experienced in the past and then the assurance of the amount of orders. This being the best selling wide body airplane in the history of civil aviation gives us a lot of assurance that we'll have production rates going for a you know, a pretty long time and we ought to be able to harvest the productivity. Now, obviously we have to capture all of that and we'll be conservative as we have been in how we would book keep that today and we'll learn more as we go, but as you know, airplanes, 850 airplanes is a wide body program and when you think of the 777 and we have only sold a 1000 of those to-date and delivered a little over 700 of them. Again, we have seen an extraordinary improvement in performance over the life of that program that we have to figure out how to
predict given the size of the program that we have in front of us."
Joe Campbell (Barclays Capital): "It sounds like we are trying to say that this delay is local, we know the fix. You're talking about a program that's \$85 billion big if you pick these great big block sizes, you must have spent, 20 on the way to 30 before we get into production, and if we pay the you know, if we count up the penalties and the other things. I'm having a hard time trying to sort of reconciling how this little local delay is going to push us close to being

	
	James Bell: "That's not what I said. I said to you the cumulative impact of all the other schedule delays and then what" Joe Campbell (<i>Barclays Capital</i>): "Yeah, but we knew all these delays last quarter, and we weren't worried then."
	James Bell "Oh, I've never said we weren't concerned about it, Joe. I just said that when we have gone through and done our assessments, we still believe the program to be profitable. We have always been concerned with the cumulative impact of the schedule delays and the pressure it puts on costs. We also have been concerned with the delays to our customers and how that converts to penalties or settlements we have to work through with them. I've never said we weren't concerned. What I have said to you is that we have gone through a very disciplined process and quite frankly, the element that's most difficult to tie down and get high assurance on is the revenue stream and we have it on this program because of the unprecedented success of this offering. So it's not like it's not without its challenges, but so far we have determined that the program is profitable. We'll be back to you as quickly as possible with this latest assessment and see how that plays out along with the other cumulative impact of the other things and challenges we are dealing with."
	Heidi Wood (Morgan Stanley): "James I can ask then a small question on the financial implications just to understand what buckets we should put it in. The fix has been described as not costly. There's 41 planes involved, so clearly that's not what you need to update us on the financial implications, or should we be thinking about potentially higher R&D or greater working capital build or greater supplier support or customer penalty payments? Can you kind of just help us?" James Bell: "Yeah, but Heidi, I think we got to look at all of those. I
	 Teah, but Heidi, Fulfik we got to look at an of those. I don't know what the magnitude of each of those buckets would be, but clearly there would be some R&D associated with it. There would be some recurring costs element of it. If it resulted in a schedule change or slight, or adjustment, which it very well could, then we would have to obviously deal with customers as well." <u>Heidi Wood (Morgan Stanley):</u> "Jim, you talked about one of the things. When you first got on board that you and I have discussed is this cultural openness that was stressed during the 777,

where the emphasize both ability to kind of raise their hands, so their problems surfaced early, and we have had great discussions, you and I, about, the need for greater accountability and people sort of owning their problems. As you think about what's happened here, where I think there was a lot of confidence about first flight materializing and this news coming really in the eleventh hour. How does that shape your thinking about what needs to be done with respect to that balance between letting people raise their hands and discuss problems and yet balancing accountability?"
Jim McNerney: "Yeah. This one was asked when you were dropped, Heidi, but let me say it again, because you frame it in a slightly different way. The story of this delay is not about information flow or openness. This is really a story of the thousands of tests that we do all the time leading up to first flight and one surprising us. The purpose of static testing is to confirm analytical models and this is one out of a thousand tests we did, where that confirmation was not forthcoming and the flight envelope available to us was not enough to really get enough out of the first airplane's flight test. So, that's why we made the call, but even though it did not look pretty, because we were all confident that we were going to be flying the airplane in June, because everything we knew is that we were, but this outlying test result is, we had to deal with it and we dealt with it right away."
Noah Poponak (Goldman Sachs): "I'd like to dig a little deeper on 737. You gave us the 70 deferral number versus 60 in the first quarter. The 60 number you had said was about half and half narrow wide body. Can you give us the split in that 70? Then you mentioned the backlog of deferral requests being down, I mean, can you sort of size that and give us a magnitude? Is it very meaningfully down or slightly down and what kind of second half deferral number does it imply versus what we saw in the first half?"
Jim McNerney: "Again, the deferral, I don't have the plane-by-plane data here in front of me, but the deferrals were pretty much proportional across model types in terms of what we produce and also fairly proportional across geographies. So, very tough to find a model or geographic theme, this again leads me to believe that it's a broad systemic economic credit issue for some airlines that are under pressure. As to the trend, this quarter is down meaningfully. Okay? Now, I again would treat that data cautiously. The extent to which you think the economy is totally out of the woods that would be a meaningful number. The extent to which you believe that the economy remains problematic until we see long-term improvement would suggest treat it as one data point right

now, be somewhat encouraged by it, but we all want to see more."	
Itay Michaeli (Citi): "Just wanted to drill back to the earlier question on the balance sheet. You mentioned that the possibility of looking to go back to the debt market , but when you look at the full year cash flow guidance of \$2.5 billion, if you kind of hit that number, even when we assume, or bake in the thought of cash outflow, it looks like you probably end cash around the \$4 billion 'ish level at the end of the year. I know you mentioned earlier that the May meeting that you thought 2010 cash flow would be up meaningfully and the minimum cash is typically around 2 billion. So just wanted to drill a little bit more about the thought process around with that being the debt market at this time . Is it maybe just a desire to have more cash or is there meaningfully less confidence in the 2010 cash flow trajectory?"	
James Bell: "Well obviously we want to make sure that we have adequate liquidity to deal with the challenges that still lie ahead that are presented by the 787 and the other development programs we have. We also want to deal with the Vought's transaction. We are going to use a considerable amount of cash or 600 million or so of cash there to close that deal, and then the issue with Sea Launch where we had the up front take care of those guarantees and we want to make sure that we deal with all of those things and still have adequate liquidity to deal with the operational challenges that lie ahead."	
Troy Lahr (<i>Stifel Nicolaus & Company</i>): "Thanks. James, how does the <i>Vought</i> facility purchase impact your 787 profit loss analysis and are you assuming that you guys end up doing a second line?"	
James Bell: "To your last question, it doesn't assume that at all, but it does allow us to have better control over a significant element of the production process that supports the 787 and obviously our intent in going in and acquiring it is to drive better performance. So we don't know how that ultimately will turn out but the hope, the aspiration is that it would improve the performance in both cost and technical performance on the program."	
<u>Troy Lahr (Stifel Nicolaus & Company):</u> "Okay, thanks, and then on the 787 now, I mean, given the delays, how is that not impacting the 747? Because in the past you've said the 747 is delayed because you can't switch the engineers over. So, how is it that one is delayed but the other one is still on track then?"	

Jim McNerney:
"This is Jim. We are largely beyond that issue of the
engineering constraint. So these are fundamentally
independent programs now as we go forward."
David Greising (<i>Chicago Tribune</i>):
"I've got a two part question. The first is when you look
at the Vought facility purchase and you look at the
issues facing Future Combat System program, I think
if you look at them together it raises a bigger question
about the systems integrator strategy and the viability
of the kind of asset light approach that the company
adopted when launching the 787. I'd like to know, Jim,
what your view is of how viable that concept still is and
the second part of the question has to do with your own
leadership here. One of the analysts asked about
accountability and it seems that if your analytics now
can replicate the problems with that wing that was
missed early on and I would like you to comment also
on the question of your role as CEO of kind of that mix
between accountability and vision. Where do you draw
the line, well how much of it and what part needs to be
insisting on accountability and what part needs to be kind
of providing vision for where this company needs to go?"
Jim McNerney:
"As to your first question on system integration, there
is no doubt that we are drawing a line in a somewhat different place on 787, but still when taken in total is a
different place on 787, but still when taken in total is a big systems integration job with lots of partners
working together, we have chosen to bring some of it
back in house and that's what I would anticipate as
learning as you go, making practical decisions on what
you do with partners and what you do yourself. This is
a very innovative program and we are learning as we
go, but we are not going to go back to the days where
we do everything in-house. Future Combat Systems is
more a story of the government wanting to reconfigure a
specific program in a way that still leaves us with a lot of
scope, but somewhat less scope, and that's not uncommon
in government contracting to sort of go back and forth and
we are going to figure out a way to add as much value we
hope as we would have added historically. So, drawing
the lines and adjusting is really the story as opposed to
is there one theory that's always right or one theory
that's always wrong.
The accountability issue; listen, I think there are a lot
of people in this company that feel accountable for the
results of the company. As a leader you are always
trying to balance that culture with a culture of
enterprising spirit and inspiration, and I'm not sure
that one static test result is emblematic of the lack of
accountability in the company. You always want to do
better and we are going to learn from it, and we are
going to continue to drive disciplines and
accountability in this company, and engineering tools

aren't perfect, which is why you have static tests."	
Dominic Gates (The Seattle Times):	
"I have a question for Jim McNerney. I'd like to ask about	
the machinists. Recently through the Washington State	
legislators we learned that you at Boeing and you	
personally are pushing to try and get some agreement	
with the machinists that will stop the strikes that have	
hurt you so much. Now that coming out the way it did	
here, wasn't, it was seen as an implied threat, the threat not to do the second line here. It wasn't received	
very well by the machinists. Can you talk about your	
strategy for labor peace and do you anticipate any such	
agreement would come only through negotiations with	
the machinists. Do you anticipate offering some carrots	
that would go with the stick of the threat?"	
Jim McNerney:	
"The performance of this company and the role of every	
person that works for us as we strive for better	
performance is what this company is all about and we're	
not issuing ultimatums. We're trying to figure out a better	
way to work with our represented employees. We will	
always, always try to do that. You're right. The past has	
not been perfect. The IAM and the company are meeting together, trying to find new ways of working together so	
that we don't impact our customers and the	
performance of the company as badly as we have	
historically as we go through these disruptions. We're	
going to keep doing that. At the same time, the as you	
know and I think your question implied it we're going	
through an evaluation of where we put the second line of	
the 787, and we will continue a balanced evaluation there looking at Seattle, Everett as well as other places and	
come up with the best answer for the company, but as we	
go through that process, we want to work with the IAM as	
productively as we can."	
Daniel Levin (Associated Press):	
"There have been some reports suggesting that the 787	
may not fly this year, that the fix maybe more expensive	
and time consuming than initially described by Boeing. Is	
that a reasonable estimate of the time frame for the first	
flight at this point?"	
Jim McNerney:	
"Well, listen as we said before we're not in a position to	
say what the impact is on our flight test and delivery	
schedule. We have characterized the fix in the best way we	
know how, and characterized where we are in the process	
of both designing it and implementing it and we are	
entering the implementation phase right now, and when we understand that we'll have a much better understanding	
of its impact on the schedule and our financials and we'll	
be in a position this quarter to talk about those impacts."	

 Susanna Ray (Associated Press): "Jim, I am just wondering if you have enough engineering experience in your top management levels now and was it sort of shake up and new projections that were announced in December. Was that a way to address holes in that area and is there more that should be done in that area to make sure there are no further surprises?" Jim McNerney: "This company has strong engineering capability in its management. Having said that, we can always do better with our disciplines and we're always striving to do better with our disciplines, and that's a never-ending challenge particularly when you're dealing with the kind of innovation that the 787 represents. If we were just punching out aluminum airplanes, the challenge we give ourselves wouldn't be as difficult, but we're absolutely committed to lead innovation in this industry and that has its challenges, and we're fighting through them with one of the best engineering teams around." Hal Weitzman (<i>The Financial Times</i>): "First a clarification, later on in thinking that James told us that the late delay was putting pressure 787 profitability in the initial stages are and my question is, where are these pressure coming from? Are they coming primarily from penalties and settlements or the cost of 	
Jim McNerney: "I think what James said, and James you could correct me, but I think what James says was we go through a regular process that estimates to the best of our ability, the profitability on the program and which takes into account dues of unit volumes and revenues associated with that, as well as the cost and productivity we see on these programs. As you point out the costs include in our case because of some delays here, some customer settlements, some supplier impacts that impart we deal with and so there are as well as we work cost on the airplane So, we add that all up through a process that we have on a routine basis to assess our financial position and we're going to do it again with latest fix we are working on." <u>Hal Weitzman (<i>The Financial Times</i>):</u> "Where will most of the pressure come from? Will it come from the penalties or will it come from the cost of fixing the problem?"	
Jim McNerney:	

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"It's hard to predict precisely. I mean every customer arrangement is different from every other one. Every supplier arrangement is different from every other one and every engineering change or fix is different from other ones and that's why in the minds of many, we're taking too long to come up with the assessment, but it's a customized assessment every time, even though the process is routine."	
Dan Reed (USA TODAY): "Sure you've heard the general criticism that marketing, and marketing driven by financial planning, financial goal was driving the company too far ahead of where engineering was proved to be capable of taking it in terms of the timeframe. A, how did you respond to that, and B is that necessarily a bad thing, is it true?"	
Jim McNerney: "Listen, as you look back on this program, there is no doubt that the baseline was too ambitious, and it's hard for me to characterize exactly whether it was marketing ambition, or financial goals, but clearly the initial plan outran our ability to execute it. That's obvious. Now, you are right. Some of that is good, because it drives an organization and sets goals and milestones that people reach toward, but I think we got a balance wrong at beginning of this program."	
Dan Reed (USA TODAY): "How long will it take not in terms of just the 787 fix, and getting that one program, how long will it take to get the company to rebalance to that?"	
Jim McNerney: "I think with regard to the issue, you and I are talking about. It is rebalanced. In terms of base lines for future programs going forward, we've learned a hard lesson here."	
James Bell: "Operator, we have time for one last question."	
Mike Mecham (Aviation Week): "Can you help us understand at what point in the testing you were with the bend of the wing? Was it close to the nominal bend at the 100% rates, was it higher than that and also is there any implication in the actual process of making the wing? The processing of the wing, the auto [Inaudible] and that sort of things implied here or is strictly designed?"	
Jim McNerney: "Listen, this as I mentioned before is to the best of our knowledge and we've learnt nothing that says different that this is a local issue with a local fix associated with it	

			We do not see a systemic issue with the entire wing."	
			 We do not see a systemic issue with the entire wing. <u>Mike Mecham (Aviation Week):</u> "You were just a few days before first flight land. Had you passed the normal loads that you would expect on a wing or were you just getting to them. I mean, normally I think I have a certification picture clear up to the 150." <u>Jim McNerney:</u> "As you know Michael, there's a lot of parallel testing going on as you prepare for flight and in this case, it was a retesting of a result that the team questioned and the retesting showed us that we just didn't have the flight envelope we needed for first flight." <u>James Bell:</u> "Operator that concludes our earnings call. Again for members of the media, if you have further questions please call our media relations team at 312-544-2002. Thank 	
23 July 2009 <i>Times</i> <i>"Boein</i> Doesn' Know Yet How Long 787 Fi Will Take" (James Wallac)	Boeing Compa ny	Firm- Investo r	 α "On the earnings call, Barclays Capital analyst Joe Campbell asked Chief Financial Officer James Bell the question in plain English: 'Are you sure that you're not losing money on this thing?' The concern is that Boeing, despite the huge order book for 850 Dreamliners, may not be able to make enough money on each plane to recover over time all the added costs piling up: the extra research and development needed to solve the current problems, the late penalties that will have to be paid to customers and suppliers, and the cost of holding all the expensive inventory for months longer without any income. Bell disclosed that Boeing has in its inventory almost \$8 billion worth of 787 structures work — completed and partially built airplanes — for which it can receive no income until the jets are delivered to customers. He said this 787 work-in-progress inventory is growing at a rate of \$800 million per quarter. In response to Campbell, Bell conceded that the new 787 delay 'puts pressure on the profitability of this program.' 'We've always been concerned with the cumulative impact of the schedule delays and the pressure it puts on cost,' Bell said. 'We also have been concerned with the delays to our customers and how that converts to penalties or the settlements we have to work through with them." But Bell said Boeing expects to create efficiencies over the expected long production run of the 787 that will reduce costs and increase profit per plane to cover all the extra expenses. 'We still believe the program to be profitable,' Bell said. In an interview later, Campbell said that in rough numbers, using the figures released Wednesday, Boeing will have spent up to \$13 billion on inventory buildup by the time it starts delivering the 787s. If has maybe an additional \$8 billion to \$10 billion sunk into 	On a modular enterpri se architec ture's non- systemi c approac h to costs.

23 The James Firm. Fi	July	Financi al Times "Boeing Warns Dreamli ner Likely to Make Early Years Loss" (Hal Weitzm	Bell, CFO The Boeing Compa	Investo	α	 one-voice tulsa, OK July 23, 2009 at 6:31 AM "This doesn't surprise me at all. Its the result of a bad engineering culture from mismanagement. Boeing engineering has never been great. A 'good' engineer at Boeing is very bureaucratic, political, technically 20 years behind, technically limited, insular, timid, and uncreative. This proves it. And Boeing has been asking for it for years by treating engineers like crap. They drive out talent and experience and attract lowly grunts and bureaucrats. Outsourcing was a bad idea too, because Boeing engineers were in charge of the partner's engineers. Why would they want them to succeed? Instead they stifled them even more than engineers are stifled at Boeing and made things worse. Now, much of the 787 engineering is being done by the cheapest engineers they can find worldwide." LostintheGreatNorthwest Marysville, WA July 23, 2009 at 3:53 AM "Liar, Iiar. McNerney, Fancher et al are clueless. They do not know how to build an airplane. That is the tragedy. The once great company is sick. It needs leadership amputation. You need engineers would not have screwed this up." Old55 Des Moines, WA July 23, 2009 at 3:36 AM "I see this every day. Boeing upper management is a failure. Sadly I see no future for the Boeing company." "Boeing's troubled 787 Dreamliner looks unlikely to make a profit for at least two years after its first delivery, as the aircraft-maker warned yesterday the programme could make a loss in its initial stages. The manufacturer is poised to announce the details of the fifth delay to the 787 programme after discovering weaknesses in the structure where the wings join the body. Although it has repeatedly emphasised that the fault can be fixed using a relatively mior technical solution, Boeing is gearing up for significant financial implications because of the cost of solving the problem and penalties to customers. The company warned yesterday that the latest delay could	modular enterpri se architec tue's systema tic cost problem
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					solving the problem, although it promised to give that	
					information before the end of September. James Bell,	
					chief financial officer, said: 'Up to the point of the side-	
					of-body issue, our assessment was that the programme	
					was not in a loss position.' 'The cumulative impact of	
					schedule delays - including the current one being	
					assessed - is obviously putting pressure on the	
					programme's profitability.'	
					Robert Spingarn, an analyst at <i>Credit Suisse</i> in New York, said: 'It was interesting that they're finally addressing the possibility of a forward loss.' 'We've thought a forward loss is possible but do not think it would be	
					declared until the third quarter. I don't expect them to	
					book a profit on the 787 for at least the first couple of years. ' Boeing is suffering as the global economic	
					downturn hits air travel: it lost 41 orders for 787s in the	
					past three months and received only 13 new orders,	
					leaving it with firm orders for 850 aircraft. It continues to	
					face other problems: the aircraft-maker was forced this	
					month to take over a key supplier in an effort to gain	
					tighter control of the production process. The problems	
					with the 787 have raised questions about the company's	
					management. Jim McNerney, chief executive, batted	
					away suggestions that there was a lack of accountability within <i>Boeing</i> ."	
23	Reuters,		Firrm-	α	<i>"The Boeing Co.</i> on Thursday sold \$1.95 billion of	On a
July	"Boeing		Investo	~	senior unsecured notes in a three-part deal, said IFR, a	modular
2009	Co Sells		rs		Thomson Reuters service. The sale included \$750 million	enterpri
	\$1.95				of 3.50 percent five-year notes priced to yield 110 basis	se
	bln				points over comparable U.S. Treasuries. It also included	architec
	Notes in				\$750 million of 4875 percent ten-year notes priced to	ture's
	3 Parts"				yield 130 basis points over Treasuries, and \$450 million of	approac
	(Camill				5.875 percent 30-year notes yielding 145 basis points over	h to
	e				Treasuries, according to IFR. Banc of America	finance.
	Drumm				Securities, Deutsche Bank, and Morgan Stanley were	
24	ond) Wall St.	Yoshi	Firm	β	the joint lead managers on the sale." "Toyota Motor Corp. got 'a little bit lost' in its North	On the
July	Journal	mi		٣	American strategy and fell out of touch with customers	dis-
2009	"Toyota	Inaba,			and the market, its new North American chief, Yoshimi	integrtat
	Lost	VP,			Inaba, said Monday. After years of growth and profits	ion of
	Touch,	Toyota			at Toyota, Mr. Inaba said, elements of complacency	an
	Executi	Motors			and arrogance infiltrated the company, which prides	integral
	ve Seur"	North			itself on being efficient and customer-oriented as well	enterpri
	Says" (Kate	Ameri ca			as constantly improving. To address this, Mr. Inaba plans an overhaul of <i>Toyota's</i> North American	se architec
	Linebau	Ca			operations. 'Our sense has been always that we listen	ture –
	gh)				to the market, we listen to customers, we listen to the	and
	8)				dealer. That element is a little bit lost,' Mr. Inaba told a	attempts
					group of reporters. He added that he is conducting an	to re-
					'overall replanning of our North American operation.' As	integrat
					the global vehicle market sunk last year, Toyota posted its	e.
					first loss in 58 years and projects to record another loss	
					for this fiscal year. In the first six months of this	
					calendar year, the company's U.S. sales fell 38%, more than the overall market's 35% decline. Last month,	
					than the overall market's 55% uechne. Last month,	

						
					Akio Toyoda, great-grandson of the company's founder,	
					took over as president as Toyota seeks to return to	
					profitability. Mr. Toyoda is emphasizing swifter	
					decision-making by local executives and seeking to add	
					more 'passion' to the company's products, Mr. Inaba	
					said. Mr. Inaba who was dispatched by Mr. Toyoda to	
					fix its biggest market says Toyota's North American	
					operations could return to profitability in the next fiscal	
					year as he seeks to reassess the company's business. He	
					said he expects U.S. light-vehicle sales to grow to about	
					12 million next year, though it will take time to return	
		_			to the 2007 level of 16 million. He expects sales this year	
					to be about 10 million. In the short term, Toyota has 'to	
					figure what to do with idle capacity,' said Aaron	
					Bragman, an analyst at IHS Global Insight. 'Toyota is	
					used to weathering ups and downs. They don't	
					necessarily react on a short-term scale. They don't lay	
					people off and shutter all the factories.' Toyota grew	
					rapidly this decade, adding factories and expanding its	
					product line in North America, home to seven of its	
					assembly plants. It opened a new plant in Canada at the	
					end of last year. But in the wake of plunging sales, many	
					of its plants aren't operating at capacity and the company	
					is faced with deciding the fate of a 25-year-old plant in	
					California that is a joint-venture with General Motors	
					Co. Mr. Inaba disagreed with the contention that	
					Toyota expanded too fast in North America. 'We were	
					having a tough time catching up with demand,' he said.	
					He stressed that the U.S. auto market 'remains the most	
					important market for Toyota.' Struggling to cope with	
					overcapacity, Mr. Inaba said the company hopes to	
					decide what to do with its California joint-venture	
					plant 'as quickly as possible.' GM said it was exiting	
					the partnership as part of its bankruptcy	
					reorganization. As part of the overall replanning process,	
					Mr. Inaba said he is evaluating what to do with a	
					partially built plant in Mississippi where Toyota	
					planned to produce its Prius hybrid. That factory was	
					indefinitely postponed last year. Restarting work on it	
					depends on how strong demand is for the Prius and	
					how the company reshuffles production to address	
					overcapacity. Prius sales have fallen after soaring last	
					year amid then-high gasoline prices. To assemble the	
					Prius in the U.S. Toyota would seek to produce some of	
					the vehicle's parts locally, he said. Mr. Inaba also said	
					Toyota wants to grab market share that GM and	
					Chrysler Group LLC lose through their restructurings,	
					though he conceded that Ford Motor Co. is best	
					positioned to benefit from the downsizing. 'We	
					certainly want a good chunk of it,' he said. 'As the dust	
					a second second a second s	
					settles down a little bit we would also like to go after	
					any incremental volume."	
24	Flightgl	Akbar	Firm-	α	"Qatar Airways CEO Akbar Al Baker is meeting with	On
July	obal,	Al	Custo		Boeing officials tomorrow to discuss the latest delays to	adversar
2009	"Qatar	Baker,	mer		the Boeing 787 programme, and possible changes to the	ial
	CEO to	CEO			carrier's 787 delivery schedule that could result in	relation
					•	

		 delivering from 2011. Specifing to report on at last monthly	ching
Meet	Qatar	deliveries from 2011. Speaking to reporters at last month's Paris Air Show Baker warned the carrier may cancel its	ships within a
with	Airway		modular
Boeing	S	30-aircraft 787 order if the airframer does not quickly	enterpri
Tomorr		resolve delay issues. At a media briefing in Washington	-
ow to		DC today, Al Baker says <i>Boeing</i> has responded to this warning by scheduling a meeting with the carrier. 'The	se architec
Discuss		· · ·	ture due
787 Deliveri		meeting is at their request because they are now concerned which way <i>Qatar Airways</i> will go,' Al Baker	to over-
es"		says. 'They are taking a very proactive stand with	promise
es (Brenda		Qatar Airways.' Al Baker says 'there are a few issues we	and
n Sobie)		will discuss with them' including the latest delays in the	under-
11 50010)		787 test programme and the possibility of assuming earlier	delivery
		delivery slots. He says <i>Qatar's</i> first 787 is now scheduled	denvery
		to be roughly the 50th production aircraft to roll off the	·
		assembly line, but there should be an opportunity to move	
		up as airlines ahead of <i>Qatar</i> have requested deferrals.	
		<i>Qatar's</i> first 787 was originally scheduled for delivery in	
		mid 2010, but programme delays have pushed back all	
		deliveries by at least two years. Al Baker is now asking for	
		slots in 2011 and says if <i>Boeing</i> can only offer 2012	
		deliveries it may cancel its entire order. 'If it slips into	
		2012 for delivery then we'll have to consider cancelling	
		our order," he says. 'We'll have to consider	
		[cancelling] because if there is another big slippage the	
		deliveries will be at the same we are receiving this large	
		order of A350s and the A350 mission will be very close	
		to the 787. If there's a huge overlap then why am I	
		buying two types of airplanes that are doing the same	
		mission?' Qatar has 100 A350s on order. Its 787 order is	
		for 30 firm aircraft plus 30 options. The carrier had been	
		planning to use the 787 to replace its A330s on	
		medium-haul routes and open new long-haul markets.	
		Al Baker says the A350 will be used for similar routes	
		but <i>Qatar</i> decided initially to also acquire 787s because	
		it needed additional capacity earlier. 'We'll start	
		getting the A350 during the last quarter of 2013 if they	
		are on time,' he says, 'I think there could be a six month slippage maximum, but at the same time I feel	
		more confident Airbus will deliver on time due to the	
		fact they're learning huge lessons from the mistake	
		Boeing has made. ' Al Baker believes 2011 deliveries for	
		the 787 are still feasible despite the latest delays in the	
		aircraft's first flight. He explains while aircraft number 50	
		may now not be delivered until after 2011 Qatar should be	
		able to move up to a 2011 slot because airlines which are	
		now ahead of it no longer want their 787s until after 2011.	
		'The people that are committed to the airplanes before us	
		are not taking those airplanes,' he explains.	
		He adds Qatar should be in position to receive these slots	
		because 'others that have ordered after us don't have the	
		right' to move up and take these slots. Al Baker says	
		Qatar will not accept any early production aircraft	
		because these will be heavier and will have	2
		performance limitations. But he believes Qatar can	
		move up to 2011 slots without having to take any of these	
		 early aircraft. He says last month Qatar was 'about to	

					send [Boeing] a letter of termination' but Boeing's response since his comments at Paris gives him hope the manufacturer may be able to provide the delivery slots and 'other technical requirements' Qatar seeks. 'They knew that when Qatar Airways says something it's not just talk but we will follow it up with our decision,' he says. He would not specify what new technical requirements Qatar wants Boeing to meet, explaining they are confidential and customer specific. But he says they do not involve performance guarantees because these are already specified in the original contract. 'We have very water tight performance guarantees they will have to meet or else they will have to keep on giving us cash,' Al Baker warns. He says if Qatar fails to provide the delivery slots and technical requirements it seeks the Qatar government's new aircraft leasing company could take over the order and remarket the 30 787s to other airlines. 'Or we'll just cancel it to send a message to Boeing that they shouldn't mess around with customers,' Al Baker quickly adds. The Qatar Airways chief believes Boeing knew about the delays at Paris although it did not announce them until the following week. Al Baker also criticises Boeing for not taking steps earlier to mitigate the delays. 'Boeing has	
					have been corrected a long time ago,' he claims, adding <i>Qatar</i> had a better relationship with <i>Boeing</i> when Alan Mulally was still CEO. 'I'm having a meeting with <i>Boeing</i> here [Washington, DC] tomorrow. They will have to brief me awarthy where this programme is 'Al Baker adds."	
24 July 2009	Seattle Post- Intellige ncerl, "Qatar Airways CEO Would Take Boeing CEO Job, Make 'Heads Roll' (Andrea James)	Akbar Al Baker, CEO Qatar Airway s	Firm- Custo mer	α	me exactly where this programme is,' Al Baker adds." "Boeing CEO Jim McNerney had better look out another industry CEO says he would take the job, and do better at it. Qatar Airways CEO Akbar Al Baker has not been shy about his disappointment with Boeing's delays for the 787 Dreamliner. Earlier this week, he spoke in Washington, D.C. at a media luncheon. USA Today reports: 'Unfortunately Boeing has lost its leadership,' Al Baker said. 'The mess with this (787) program could have been corrected a long time ago. If they had correctly focused management, they could have seen this coming.' When asked if he'd take the job as CEO at Boeing if it were offered to him, Al Baker said: 'I would take it and a lot of heads would roll. Just like it my airline People must deliver.'"	On adversar ial relation ships within a modular enterpri se architec ture due to over- promise and under- delivery
26 July 2009	Aviation Week "787 Schedul e Eludes Boeing" (Michae l Micham	Jim McNer ney, CEO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny;</i> James	Firm	α	"More than four weeks after the 11th-hour cancellation of the maiden flight of the 787, <i>Boeing's</i> leaders are not providing basic details about how the problem of a failed wing test will be corrected and when the new jet will fly. In its past 787 program slips - there have been six of them - <i>Boeing</i> has been unable to keep to schedules that gave it as much as six more months of breathing room each time. Following that scenario, the company's assurances that a new schedule will be set by the end of	On a modular enterpri se architec ture's overpro mise and

Joseph	Bell,	 September will make it difficult for first flight before	under-
C.	CFO,	2010. Some skeptics in the investment community believe	delivery
Anselm	The	the first-flight delay could be as long as one year. Looking	
o, Guy	Boeing	at deliveries, Cowen & Co. analyst Cai von Rumohr is	
Norris)	Compa	estimating the previous goal of starting in second-quarter	
	ny	2010 will be stretched to the fourth quarter. Morgan	
	·	Stanley analyst Heidi Wood does not see them until 2011.	
		In a second-quarter earnings call last week, Boeing	
		Chairman James McNerney said the goal of program	
		managers has not changed since a failed wing test was	
		revealed a week before Boeing's previous deadline for first	
		flight. The 787 team wants a plan 'that is retrofittable and	
		will easily flow into the production process,' he said.	
		McNerney says a plan is in hand 'in terms of parts and	
		reinforcements.' It is needed to strengthen composite	
		stringers on wings already built by Mitsubishi Heavy	
		<i>Industries</i> (MHI) to prevent them from delaminating under flight loads. The stringers are delaminating where they	
		flight loads. The stringers are delaminating where they join the center wing box made by <i>Fuji Heavy Industries</i> .	
		It is not clear whether retrofits will be limited to the	
		stringers or also involve <i>Fuji's</i> center wing box. While	
		some initial tests have been run, a way to install	
		strengtheners 'in tight-fitting spaces in the airplane' is still	
		being sought, says McNerney. Boeing has indicated that	
		its suppliers have assemblies for some 40 aircraft in	
		various stages of development. How many wingsets are	
		at MHI is unclear, although Credit Suisse analyst	
		Robert Spingarn estimates there are at least 25 shipsets	
		not yet mated. Boeing hopes to buy time by strengthening	
		the wings it has while it devises a permanent solution for	
		wings still to be built. The company revealed the size of	
		its 787 investment for the first time in a second-quarter 10-Q filing with the Securities and Exchange	
		Commission that includes work in progress of \$4.4	
		billion, supplier advances of \$2.6 billion, and tooling	
		and other expenses of \$866 million - a total of	
		approximately \$7.9 billion. Jeffries & Co. analyst	
2		Howard Rubel notes that work in progress rose \$1.4	
		billion during the first half of 2009 and the other two	
		categories increased by about \$150 million. Chief	
		Financial Officer James Bell says 787 costs are growing	
		\$800 million a quarter, but asserts that 'as we work	
		through these tough challenges, execution continues	
		very well.' Wood concludes that delays are 'obviously putting pressure on the program's profitability.' The	
		profitability and cash flow of any program as large as the	
		787 are always grist for analysts' mills - but especially so	
		when they get in trouble. Von Rumohr sees cash flow	
		being stressed next year and in 2011 by the 787 delay.	
		Spingarn was not soothed by McNerney's assurances.	
		'While Boeing characterizes the wing-join issue as a	
		local problem with a local solution, we think it could be	
		time-consuming and expensive,' he says. He is looking	
		for research and development spending to grow this	
		year and in 2010, contrary to Bell's forecasts of its	
		being 'relatively flat' over the next 18 months after	

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	growing \$110 million to \$360 million in the second	
	quarter. Looking at cash flow, Rubel estimates that	
	ZA001, the first flight-test article, has become a \$500-	
	million aircraft, and unit costs will not be driven down	
	to the \$220-million range until the 20th 787 (the 13th	
	delivered) rolls out. He chose that number because	
	change and program disruptions probably mean there	
	will be no production learning curve until then. He	
	therefore estimates that Boeing will not have its unit	
	costs fall below selling costs until the 75th airplane at	8
	the earliest and possibly as late as No. 125. Following	
	those assumptions, Rubel sees program costs reaching \$45	
	billion by the 500th aircraft. A major advantage of the	
	composite fuselage is that the 787 requires far fewer parts	
	than a traditional aluminum airplane. That was supposed	
	to provide <i>Boeing</i> with a manufacturing breakthrough that	
	would speed production. But the company already has	
	surpassed the time it took to build, flight test and	
	deliver the first 777 - its last large-fuselage aluminum	
	airplane. McNerney acknowledges that early	
	production plans were rosy scenarios. 'This is very	j.
	[much] an integration program and we are learning as	
	we go,' he told the analysts as they sought some clarity on	
	why things went wrong. Describing 'a never-ending	
	challenge,' McNerney said it was 'hard to characterize	
	whether it was marketing ambition or financial goals' -	
	rather than traditional engineering assessments - that	8
	prompted the company to set manufacturing ambitions	
	it has been unable to meet. The program is now running	6
	two years late. 'If we were just punching out aluminum	
	airplanes, the challenge we gave ourselves would not be	1
	as difficult,' says McNerney. When Boeing said it had	
	a wing problem on June 23, program managers said it	8
	would take 'a few weeks' to reset their plans. The fact	
	that McNerney was unable to go beyond that	
	assessment increased skepticism about the program.	
	'Second-quarter earnings per share beat our estimate and	l l
	the consensus estimate; but with the absence of a new 787	
	schedule, we see [the earnings call] as largely a nonevent,'	3
	said JPMorgan analyst Joseph B. Nadol. The rest of	
	Boeing's second-quarter report was largely positive,	
	especially considering the worst economic crisis since the	
	Great Depression. The company posted a 17% gain in	
	second-quarter net income and eked out a 1% sales	
	increase. It holds a \$32-billion backlog, including \$70	
	billion in defense programs, that is nearly five times	
	current annual revenues. And its earnings per share rose	
	22% to \$1.41. Airline customers deferred 70 deliveries in	
	the quarter, up from 60 in the first quarter, but the	
	company is not changing its production levels. McNerney	
	says the deferrals are spread across all airplane types and	
	there is no pattern to them other than a weak worldwide	
	economy. 'Our backlog of deferral requests is coming	6
	down right now,' he says. The goal early this year to	
	deliver 480-485 airplanes is regarded as achievable.	
	Completion of the body join on the first 747-8	

29 July 2009	at Barclay s Capital " (Robert Daniel) New York Times,	James Farley, head	Firm	α	schedule or financial impact.' The financial impact of four delays in the project and 'the costs of pre- production, technical fixes, penalties to airlines and supplier claims' add up to 'significant, but as yet undisclosed overruns,' the analysts said in a report. Because of the costs, the risk is increasing that <i>Boeing</i> will decide it must 'declare a forward loss on the 787,' they said. On the other hand, once <i>Boeing</i> gets past the startup problems and 'when, as planned in 2013, the 787 is being produced at 120 per year,' the plane 'has the potential to be the most profitable aircraft Boeing has ever had,' they said." "After a 20-year run, the <i>Ford</i> Taurus was headed for the scrap heap in 2007. The automaker planned to retire the name, and call its new sedan the Ford Five Hundred	optism On a modular enterpri
27 July 2009	Market Watch, "Boeing		Firm- Investo r	α	Freighter last week is an indication that the program is no longer tied to a loss of engineers to support the 787. Although defense budgets are under threat, <i>Boeing</i> 's operating margins rose 10.1% as revenues reached \$8.7 billion, compared with a \$7.9-billion performance last year. While company officials have declined to provide specifics of how much load the static wing was under when it failed, it is a safe assumption that the team had passed the 100% flight-load level that characterizes normal operations. Comments made by the management team indicate engineers were headed toward the 150% extreme load level needed for FAA certification. At some as-yet-unspecified point in the stress testing, <i>Boeing</i> 's predictive model did not equate with actual test results. As a way of understanding the problem, engineers apparently began retesting the wing at lower loads and learned that it was failing them, too. How close those loads were to nominal flight levels is unclear, but they apparently were well below 150%. Aside from the 787 marking commercial aviation's first composite fuselage, the program has stretched the industry's use of a global supply network beyond anything seen before. When suppliers were unable to meet earlier delivery deadlines, many suggested <i>Boeing</i> had taken the model too far. The company restructured its program management earlier, but the 787's continuing problems have raised the question of how quickly senior managers learn about production issues. 'Bad news doesn't appear to flow up,' said Bank of America/Merrill Lynch analyst <i>Ron Epstein</i> . McNerney denies that is the issue. 'This is not an issue of information flow,' he responded. 'It's an issue of them turned up wrong that we didn't anticipate.' And so the whole program is in limbo." "Boeing Co., the Chicago aerospace giant, was cut to equal weight from overweight at <i>Barclays Capital</i> . The investment bank's aerospace and defense analysts also cut	On a modular enterpri

	" O	of			instead. But Ford's new chief executive, Alan R. Mulally,	60
	"Once	of			reversed course, figuring the Taurus name still had value,	se archthie
	Moth-	global			even though its reputation had faltered as the car became	cture's
	balled	market			U 1	0 (0.000 000 000 000 000 000 000 000 000
	Taurus	ing,			best known as a staple of rental car fleets. Those instincts	focus on
	is Back	Ford			will be tested when a new version of the Taurus begins	radical
	on				arriving in dealer showrooms next week. How consumers	product
	Stage at				respond will answer a big question for Ford: can it make	develop
	Ford"				money on a full-size sedan? 'This a real acid test for our	ment.
	(Bill				product strategy,' said James Farley, Ford's head of global	
	Vlasic)				marketing. Ford says it will exercise a new sense of	
					discipline with the Taurus. Rather than aiming for a	
					home-run product that sells hundreds of thousands of	
					units — and then be forced to offer incentives to	
					persuade shoppers to buy them all — Ford plans to	
					build lower numbers of the Taurus. That way, it might	
					be able to avoid steep discounts so it can turn a profit	
					on each one. If the car languishes on dealer lots, though,	
1					Mr. Mulally's fledgling turnaround could stall. The car's	
					base price of \$26,000 is higher than some competing	
1					models. Mr. Farley and other <i>Ford</i> executives readily	
					acknowledge that previous versions of the car were	
					utilitarian and hardly up to the standard of comparable	
					sedans from <i>Toyota</i> and <i>Honda</i> . But they also are	
					counting on the image of the old Taurus fading from	
					the public's consciousness. 'Its deterioration over time	
					has allowed us the freedom to write a business plan to	
					more realistic expectations,' Mr. Farley said. At its peak	
					in the late 1980s, Taurus was the top-selling car in the	
					United States with more than 500,000 sales a year. The	
					new model's targets are somewhere from 50,000 to 75,000	
					annually. 'Ultimately customers are going to judge you	
					on whether you're offering something new,' Mr. Farley	
					said. 'This car can't just be a little better. It has to be	
					demonstrably better in every respect.' The advertising	
					campaign, which begins next week on national	
					television, focuses on technology. One of the new	
					features is the 'blind spot information system,' sold as	
					an add-on, that uses radar to detect vehicles that can't	
1					be seen in the mirror. Another is the so-called 'eco-	
1					boost' engine that provides additional power without	
1					using more fuel. Ford's marketing managers spent a	
1					month last year interviewing three dozen of the car's	
					engineers to determine which features might be most	
1					compelling to potential buyers. 'The design speaks for	
1					itself, but we've got the goods to show when it comes to	
					features,' said Matt VanDyke, director of Ford brand	
1					marketing."	
29	The	Tom	Firm-	α	"The Machinists union at <i>Boeing</i> announced Tuesday a	On a
July	Seattle	Buffen	Emplo		deal to ease the sting of the plane maker's continuing	modular
2009	Times,	barger,	yees		layoffs. The company has agreed to offer a voluntary	enterpri
2009		IAM	yees		layoff package that could be attractive to older	se
	"Boeing	a second constraints				253425 35 YE
1	Agrees	nationa			workers. And yet — despite much speculation that a	architec
1	to	1			long-term labor agreement is being negotiated to help	ture's
	Volunta	preside			ensure future plane work for the state - labor	continu
	ry	nt;			relations between Boeing and the International	ed
	Severan	Doug			Association of Machinists (IAM) remain perilous. Even	adversar

	Wish4	as IAM District 751 President Tom Wroblewski welcomed	ial
ce Backage	Kight, VP	the layoff pact, the union's national boss, Tom	ial repation
Package	a for a second	Buffenbarger, flatly rejected <i>Boeing</i> management's	ship
, but Broader	Boeing	publicly stated goal of a long-term, no-strike agreement	with
Agreem	Comm	with the union. 'It's all smoke and mirrors,' said	labor.
ent with	ercial	Buffenbarger. 'They aren't offering anything.' He	lucor.
Machini	Airpla	added: 'This is all a drama being played out for the	
sts Still	nes	benefit of the politicians and the Boeing Company.	
Far Off"	nes	We're not going to agree to a no-strike agreement.	
(Domini		They had their chance.' The voluntary layoff package	
c Gates)		announced Tuesday could save the jobs of younger	
e Guilloy		workers as those approaching retirement see an advantage	
		in volunteering to leave early. The incentives include up	
		to 13 weeks of severance pay and continued health	
		benefits for six months. In addition, workers 49 and older	12
		who volunteer will be eligible for a company pension	
		when they turn 55. Those are incentives designed to	
		appeal to those nearing retirement and who want to leave.	
		The severance pay offered is only half what a worker	
		laid off involuntarily would get. And workers with skills	
		deemed critical will not be eligible. However, a previous	
		Boeing voluntary layoff deal in 1993 offered no	
		incentives, said IAM spokeswoman Connie Kelliher. One	
		veteran Machinist said the Everett assembly plant was	
		abuzz Tuesday with talk of the deal. 'People who want to	
		leave can leave. This is a way that people with young	
		families, that the company has just gotten trained, they can	
		stay,' said the Machinist, who asked not to be named. 'It's	
		a win-win. (Boeing) is lowering its labor costs. It's good	
		for morale. It's good for the community.' Wroblewski	
		said the union has pressed for the deal since Boeing said in	
		January it intended to cut 10,000 jobs companywide this	
		year. The state has lost more than 3,000 Boeing jobs since	
		the recent peak last November.	
		Union sought deal	
		Wroblewski said discussions to improve relations will	
		continue. However, his boss, Buffenbarger, went out of	
		his way Tuesday to quash the notion that the layoff deal	
		might lead to a long-term, no-strike deal, an idea floated	
		by politicians to try to secure future <i>Boeing</i> work for the	
		region. Earlier this month, local politicians including U.S.	
		Rep. Norm Dicks, D-Bremerton, revealed Boeing is	
		pushing the union hard for a no-strike deal by the end of	
		the year. He presented one aspect of the talks as	
		effectively an ultimatum to the union: That a no-strike deal	
		would mean Everett would get a second 787 final-	
		assembly line, but that no deal would result in the line	
		going somewhere else. Dicks and Gov. Chris Gregoire	
		said Boeing needed to negotiate with the union and offer	
		something substantial in return. After those public	
		comments by the politicians, Boeing's top labor	
		negotiator, Doug Kight, laid out the barriers to any	
		long-term deal in a July 14 internal message to all Boeing	
		Commercial Airplane managers. Kight's message tacitly	
		confirmed that 'a series of discussions with union	

					leadership' is indeed focused on reaching a no-strike	
					agreement. But he also laid out why it will be hard to	
					achieve: A stumbling block for management is that in	
					the absence of a strike option, it would likely have to offer the Machinists some kind of independent arbitration	
					for disputes. 'It's important to realize that a long-term	
					labor agreement, enabled in part by some form of third-	
					party dispute resolution, would ask a great deal of both	
					sides,' Kight's letter said. 'It would be difficult for a	
					union to give up its option to strike. At the same time, it	
					would be just as difficult for <i>Boeing</i> to allow a third	
					party to make decisions that affect our competitiveness	
					and how we run our business,' the message went on. 'No	
					company could give away its ability to run its business	
					as conditions require.' Last week, in a teleconference	
					timed for the company's quarterly earnings report, Boeing	
					CEO Jim McNerney said talks are proceeding. 'The IAM	
					and the company are meeting together, trying to find new	
					ways of working together so that we don't impact our	
					customers as badly as we have historically as we go	
					through these disruptions,' McNerney said. 'We're going	
					to keep doing that.'	
					No substance	
					But Buffenbarger said there is no substance to the talks.	
					He said Boeing has refused all his suggestions of	
					independent mediators to aid the discussions. And instead of offering some enticements to the union to agree	
					to forfeit its strike weapon, he said, management has been	
					asking the union for suggestions. 'They are trying to get	
					us to bargain with ourselves,' Buffenbarger said.	
					'We've seen that tactic before. We're not buying into	
					it.' A veteran local Machinist with knowledge of the talks	
		200			said there have been meetings both in Seattle and in	
					Washington, D.C. He cautioned Tuesday that	
					Buffenbarger's position as head of the union requires him	
					to adopt an aggressive public posture. He insisted 'labor	
					peace is still negotiable.' But if that's ever to happen,	
					Buffenbarger has a clear message as to who will do the	
					negotiating. 'Boeing is making another ill-fated attempt	
					to negotiate an agreement in the wrong places with the	
					wrong people,' Buffenbarger said. 'I invite the governor, Norm Dicks and the other politicians to butt out.'"	
30	Busines	Bob	Firm-	β	"A bidding war for tiny <i>Frontier Airlines</i> ? The bankrupt	On an
July	sWeek,	Jordan,	Custo	۲	carrier, which in June agreed to be acquired by <i>Republic</i>	integral
2009	"South	Execut	mers		Airways (RJET) for \$108.8 million, has drawn the interest	enterpri
	west	ive			of Southwest Airlines (LUV), a major rival in the contested	se
	Airlines	Vice			Denver market. Southwest submitted a nonbinding	architec
	Moves	Preside			proposal on July 30 offering to pay a minimum of \$113.6	ture'
	in on	nt ofor			million for Denver-based Frontier. Any other interested	real (or
	Frontier	Strateg			parties have until Aug. 10 to submit a binding bid for the	apparen
	"	y and			carrier under terms approved by a U.S. Bankruptcy Court's	t) dis-
	(Justin	Planni			review of Republic's proposal. An auction is scheduled for	integrati
	Bachma	ng,			Aug. 11 at Davis, Polk & Wardwell, the New York law	on
		Contlan	1		Firm approaching Execution in the next metaning Couthward	
	n)	Southw est			firm representing <i>Frontier</i> in the restructuring. <i>Southwest</i> says it would operate <i>Frontier</i> as a wholly owned	

			
	Airline	subsidiary 'for a period of time with its Airbus aircraft	
	S	and personnel.' But that period would end within	
		about two years, after which Southwest would not add	
		Frontier's Airbus jets to its all-Boeing 737 fleet.	
		Southwest's bid, if successful, would mark a tiny step in	
		the U.S. airline industry's consolidation and could swiftly	
		reorder the competitive balance at Denver, a hub for	
		United Airlines (UAUA), long the dominant carrier. Over	
		time, Frontier's domestic capacity in Denver, currently	
		about 10% of the market, would likely supplement	
		Southwest's operation incrementally, as growth warrants.	
		In the interim, Southwest would immediately become a	
		stronger competitor to United, which has a 36%	
		market share at Denver, compared with 21% for	
		Frontier and 12% for Southwest, according to the	
		Bureau of Transportation Statistics. As United has been	
		cutting capacity at Denver in response to the downturn	
		in air travel, coupled with its own efforts to curb costs,	
		Southwest has identified the market as one of its biggest	
		strategic opportunities. With Frontier the carrier could	
		easily become the largest player in Denver. If its bid is	
		successful, Southwest would also need to determine	
		whether to expand into two important airports <i>Frontier</i>	
		serves but Southwest has long avoided: Atlanta, the busiest	
		U.S. airport and a hub <i>Delta Air Lines</i> (DAL) has	
		defended staunchly; and Washington's Reagan-National	
		Airport, which has 'perimeter' constraints on how far	
		flights can operate.	
		nights can operate.	
		Less Competition, Pricier Tickets?	
		Another byproduct could be higher fares, as <i>Southwest</i>	
		culls overlapping <i>Frontier</i> flights. Competition at Denver	
		has been fierce, with <i>Southwest</i> claiming much of the	
		credit for lowering fares. Average fares from Denver	
		have fallen by over 10% in the past year, 35.5% from 2001	
		to 2009, and now stand at \$292, according to federal data.	
		Since 2001, only Long Beach, Calif.; Charlotte, N.C.;	
		Richmond, Va.; and White Plains, N.Y., have seen steeper	
		fare decreases among the top 100 U.S. airports. The	
		Frontier bid also would give Southwest entrée to	
		Mexico, where it does not yet offer flights. On a	
		conference call with reporters, Bob Jordan, Southwest's	
		executive vice-president for strategy and planning, said	
		the company is pleased about the prospects of	
		expanding into Mexico with a Frontier acquisition. 'I	
		can tell you that we are very interested in doing the due	
		diligence work in understanding the near-international	
		market,' Jordan said. 'I think that's a very exciting	
		opportunity for Southwest Airlines.' Acquiring a	
		carrier with Mexican destinations, as well as marketing	
		relationships, facility leases, and other necessary	
		infrastructure, makes it easier and less expensive for	
		Southwest to enlarge its network. The Dallas-based	
		airline has struggled to expand its services abroad, taking	
		tentative steps in recent months to develop code-sharing	
		agreements with Canada's WestJet Airlines and Volaris, a	
		agreemento mar cunuda mesoce minutes and rotaris, a	

31 July 2009	The Econom ic Times, "Loss- Hit Air India Cancels Five Boeing Orders "	Arvind Jadhav , Chair man and Manag ing Direct or, <i>Air</i> <i>India</i>	Firm - Custo mer	α	low-cost airline in Mexico. In May, Southwest decided to delay plans for its WestJet partnership, and final details of the Volaris alliance are not expected until mid-2010. Frontier also would give Southwest additional landing slots at New York's slot-constrained LaGuardia airport— which it began serving in June—and could give the company additional opportunities to more easily link the metro New York and Philadelphia markets to destinations in the West with one-stop service." "Indian flagship carrier Air India, struggling with massive losses, has cancelled orders for five Boeing 777 planes, a report said Friday. The Hindustan Times also said the state-run airline was claiming 710 million dollars from the US planemaker for failing to deliver 27 B-787 aircraft on time. 'The cancellation orders have already been issued by my engineering department,' Air India chairman and managing director Arvind Jadhav was quoted as saying by the newspaper. He alleged that Boeing's failure to deliver the 27 B-787 planes had caused large losses for the company. 'The entire schedule of Air India has gone haywire. We have put a claim of 710 million dollars for their failure to deliver the aircrafts to us in time,' the Air India chief told the newspaper. The airline faces a financial crisis after posting an estimated one billion dollar loss for the fiscal year ended March 31 and is hoping for a big government rescue package."	On moduli enterprise archite ture's relation ship with custom rs, regard g ove promise and under- deliver
31 July 2009	Seattle Post- Intellige ncer "More and More, Invstors Place Bets Against Boeing' s Success " (Andrea James)		Firm- Investo rs	α	"When considering the health of Chicago-based The Boeing Co., what factors would you take into account? Boeing's business is coming to a point where it is being evaluated on Wall Street as either 787 Dreamliner- related or everything else, says Barclays aerospace analyst Joseph Campbell. As reported in this blog in the past couple of weeks, Boeing has several airplane programs particularly on the defense side that are doing well, on time and on budget. But bad news about Boeing's much hyped 787 tends to overshadow all that. As far as Boeing's stock is concerned, investors are increasingly betting against Boeing's success. Aerospace analyst Scott Hamilton recently posted a list of numbers showing the number of short sales on Boeing's stock from the year that the 787 was launched in 2004 through July 15, 2009. Hamilton received the data from a Wall Street analyst who pulled it off of a Bloomberg terminal, he said. The number of short sales grew from just under 10 million in January 2004 to nearly 23 million in July. When an investor buys a 'short sale' on a stock, he or she is essentially betting that the stock will go down. It's a bet against the company's success. I put the numbers into Excel, for a graphic representation, and the result is telling: Analyst Campbell says that the 787 should be viewed as a growing asset, not a liability, but also acknowledges that as long as the market is uncertain about the 787, 'Boeing shares will be volatile.'"	On modul enterp se archite ure's delaye valuat n over- promis & under- delive

			#342873 Posted by Redcedar at 7/31/09 4:54 p.m.	
			"Ever since the McD coup/Chicago move, Boeing has	
			been progressively taken over by the same folks with	
			the same disease who sank McD. The 787 is brought to	
6			you by the McD team. The investors are seeing the	
			impact of their poor decision-making and are fleeing.	
			We need the current executive team to go away, we need	
			Boeing to come home. Perhaps the best part of this will	
			be when Commercial goes belly-up and gets sold off	
			because the McD side can no longer milk it to death,	
			and BCAG gets reborn as a Seattle company building	
			metal airplanes. Couldn't happen? Notice that all the	
			tooling now sits on wheels. All we need is a flat floor and	
	5		a roof. And when the IDS/McD guys run us into the	
			ground, that property in Everett will be up for a fire	
			sale."	
			#2.42006 Dested by mehoryall at 7/21/00 5:25 p.m.	
			<u>#342906 Posted by mshowell at 7/31/09 5:35 p.m.</u>	
			"Redcedar, I have to agree. The Nightmare liner is a	
			joke, a Spruce Goose. And because of it a and the <i>mickieD's</i> , <i>Boeing</i> is slowly dying. The only thing	
			keeping it alive is the 737. I'm betting in twelve to	
			eighteen months they will announce the ending of the	
			787. It was and is a good idea, but it needs to be	
			throughly researched, maybe a much smaller plane	
			first."	
			11 50.	
			#342936 Posted by unregistered user at 7/31/09 6:52	
			p.m.	
			"I've said it before and I'll say it again. B787 will not fly,	
			ever."	
			#343335 Posted by unregistered user at 8/1/09 12:39	
			<u>p.m.</u>	
			"Condit was Boeing's Benedict Arnold. He sold out the	
			company because Harry told him he could get him more	
			money in 1 year than he had gotten in 35 years. And that's	
			what happened. From \$2 million/year to \$19.8 million	
			/year. The cost to <i>BoeingMcD</i> executives getting the	
			top Boeing jobs over the Boeing heritage execs. EVERY	
			one of <i>Boeing's</i> problems, including Sears, they got from	
			<i>McD.</i> Both, Harry Stonecipher and McNerny are proteges	
			of Jack Welch of <i>GE</i> , who along with Roger Smith of <i>GM</i>	
			are the most NOTORIOUS CEOs in history, and you can	
			see results at both GE and GM. Unless Boeing gets rid of the present CEO and senior executives and heard of	
			the present CEO and senior executives and board of directors very soon, <i>Boeing</i> will go bankrupt."	
			uncetors very soon, beeing will go ballkrupt.	
			#343337 Posted by Vegas Dog at 8/1/09 12:56 p.m.	
			"I think <i>Boeing</i> is finished as far as being a viable	
			commercial aircraft manufacturer. It won't close it's	
			door in the near future, but is never the less a goner."	
			asses in the next future, out is never the loss a goner.	
			#343392 Posted by fisquid at 8/1/09 3:31 p.m.	
			"Boeing is not a goner if it can get rid of its current	
			leadership and get some new blood at the top. The	

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problem: the bills are now paid by legacy products produced under previous management. If the current management cannot execute a new design, then the company goes bankrupt when its existing designs become obsolete and stop selling. It's that simple. So, you know what's going to happen, now you know when. Absent a turnover in top management, you can rest assured of what the future holds."#343416 Posted by John Roger at 8/1/09 4:36 p.m. "The three whiz kids that worked at GE under Jack Welch have done nothing but harm to the companys that hired them as CEOs: Boeing, Home Depot/Chrysler and GE."
 #343421 Posted by unregistered user at 8/1/09 4:46 p.m. "#343336 got it right. Condit, who once ran the successful 777 program before becoming President and CEO, got sucked in by Stonecipher and his minions who took over so many <i>Boeing</i> corporate and commercial leadership positions. The reason <i>Boeing</i> is not making tankers today is because of now ex-con Mike Sears, who by the way ran the military side of <i>MDC</i>. That arrogant jerk proved in spades that he had no integrity and was not capable as a corporate chief financial officer. Commercial airframes for military purpose get logged as military sales. And for the idiot who said <i>MDC's</i> military book of business is saving <i>Boeing</i>, you better check again, because those products are stale and C-17, is on the edge of being discontinued. Thanks to Stonecipher, and the outdated offering of the Harrier jump jet technology in the joint strike fighter competition in 2001, <i>Boeing</i> lost out to Lockheed Martin. Again, thanks to Stonecipher <i>Boeing</i> R&D leading to the offering of the 787 was delayed for something two years. The legacy of Stonecipher and his decisions have nearly killed <i>Boeing</i> to date (ever hear the fairytale the emporer's new clothes - it could have been about Harry). Harry wanted to hear only things that reinforced his views. That meant no bad news or differing optinos. For the last 10 years, since trying to digest the <i>MDC</i> and <i>Rockwell</i> acquisitions is a company in search of its soul. There has never been a good business case made for the expensive corporate move to Chicago. Thank Stonecipher and the <i>MDC</i> contingent of the Board of Directors for that, including Condit. It's less than 300 miles from St. Louis to Chicago. McNerny got on the board because he once ran <i>GE</i> engines before going to <i>3M</i>, and only became CEO when Lou Platt (former <i>HP</i> exec.), <i>Boeing</i> Board Chairman suddenly died. Can anyone name anything that Harry Stonecipher at 18/109 5:12
p.m.

	"You idiots that always blame the IAM union workforce for <i>Boeing's</i> problem have no idea what you are talking about. I always hear that the hourly workers are paid too much money. If that is the case, how come the salary people at <i>Boeing</i> (non-union) have much higher annual	
	earnings and much better retirement benefits? The corporate media has managed to brainwash all of you fellow middle class workers into believing that it is the worker salaries that are killing the companies instead of the bad decisions that management is making. Answer	
	this, what per cent of <i>Boeing</i> operating costs goes toward hourly worker pay each year? What would be a fair number? 15% 10% ??? Actual costs to <i>Boeing</i> for the hourly workers is only 2.8%How can that be bankrupting <i>Boeing</i> ?"	
t.	#343460 Posted by unregistered user at 8/1/09 6:05 p.m. "This chart shows nothing. You need to plot this against long sales, and against general short sales in the down market since mid-2008."	
	#343468 Posted by 777mech at 8/1/09 6:27 p.m. "You can blame both <i>Boeing</i> and <i>McD</i> execs for the mess the company is in. Stonecipher and John McDonnell told Mullally that he had to bring the 787 in at 50 percent of what the 777 cost, which was \$10 billion. How can you set a limit like that 15 years later on an airplane more complex than the 777? So Mullally came up with global partnership plan. Then cut and run. "	
	#343496 Posted by Chronic at 8/1/09 8:18 p.m. "From my knothole in the fence, they quit building airplanes like they used to. They tried too many new things at the same time. They decided they were so good they did not need a certain type of integration labWrong Move! I was around during the 777 days. We had problems then but overcame and moved on. Many lessons learned but the knowledge was not carried on. I think the 787 team was like the Keystone Cops. Where did they	
	come from? Obviously not from our recent successful past. We will get there and overcome but there are so may I-told-you-so's it is just ridiculous. Too many parts farmed out then finding out those partners could not keep up with the job. We had to either supply workers to bail them out, or to buy back those partners. A real cost savings solution. What is even more ridiculous is all this being blamed on a machinists strike. I wish the ignorant would get a clue."	
	#343517 Posted by unregistered user at 8/1/09 9:28 p.m. "Ah yes. MDC CEO John McDonnell who drove them to the brink of bankruptcy, and hired Harry away from Sundstrand to find a buyer for MDC commercial and military. They couldn't compete against Boeing and Airbus for commercial planes, had their A-12	

	r	r			Avenger bomber aircraft unilaterally cancelled by	
					Secretary of Defense Cheney for huge cost overruns, lost	
					in a preliminary round of the joint strike fighter	
					competition, and screwed up their rocket business. And,	
					as a board member and largest individual Boeing	
					shareholder, John Mc was actively involved through	
					Stonecipher in telling <i>Boeing</i> how to make and finance commercial aircraft. Stonecipher should have never	
					crossed the threshold of a <i>Boeing</i> property."	
					crossed and an esticita of a Booming property.	
					#343530 Posted by unregistered user at 8/1/09 10:33 p.m.	
					"NOT A RANT: High short interest is actually	
					considered bullish in the near term. Short sellers risk a	
					margin call with every uptick in price. When they buy to cover, the price ticks up again, and they have to	
					cover more, and more. Market players understand this,	
					and will tease out little blips in the prices just to start	
					this reverse run. Sooner or later the short sellers get	
					squeezed out and the price falls back to a stable point,	
					no telling where. Agree with 343460 that you have to	
					compare with long positions to confirm an inbalance."	
					#343557 Posted by Leelaw at 8/2/09 2:06 a.m.	
					"The problems plaguing the 787 program arose during	
					Mr. Mulally's leadership of BCA, whether he would	
					have done a better job of resolving the problems of his own making than the demonstrably ineffectual Messrs	
	1				McNerney, Carson, and Duberstein (board ringleader)	
					have, will remain a mystery."	
					<u>#343565 Posted by unregistered user at 8/2/09 3:08 a.m.</u> "it took <i>Sunstrand</i> 10 years to recover from Harry	
					Stonecipher, and even that was miraculous because	
					everyone thought that Harry had killed Sundstrand.	
	6				Donald Douglas Jr. killed Douglas, and Harry killed	
					McD-Douglas with a lot of help from McD."	
3 Aug.	The Seattle	Fred Kiga,	Firm- Emplo	α	"A standoff between <i>Boeing</i> and the Machinists union that could thwart Everett's chances to win the second 787	On a modular
2009	Times,	vice	yees		Dreamliner production line became clearer at an aerospace	enterpri
	"Boeing	preside	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		conference in Lynnwood on Monday. <i>Boeing</i> is pushing	se
	Looking	nt of			for a no-strike deal that would influence the decision,	architec
	at Europett	state			which may come by the end of the year. But the	ture's
	Everett, Other	and local			International Association of Machinists (IAM) sees no need to reopen the current contract, signed last fall	adversar ial
	Sites for	govern			after a two-month strike, and is working toward the	relation
	Second	ment			next scheduled contract in 2012. 'There's a	ship
	787	relatio			disconnect,' Snohomish County Executive Aaron Reardon	with
	Producti	ns,			conceded. 'It has to be resolved.' Earlier in the day in	employ
	on Line"	Boeing Comm			Charleston, S.C., Dreamliner program chief Scott Fancher officially unveiled the company logo on the side of its	ees (unions)
	(Domini	ercial			newly acquired fuselage-assembly facility. In a separate	(unions)
	c Gates)	Airpla			development in Charleston, a worker filed a petition last	
		nes;			Thursday — the day Boeing formally closed on the	
		Larry			purchase of the operation from its 787 partner, Texas-	
		Brown			based <i>Vought</i> — to decertify the Machinists union at the plant. That will likely trigger a wate that could put	
		, IAM			the plant. That will likely trigger a vote that could oust	

legislat	the union two years after it organized the factory.	
ive and	Because of discontent in the Charleston work force over	
politic	the contract the IAM agreed to there last November,	
al	that move has a good chance of success. If the	
directo	decertification goes through, Everett will be competing	
r	against a nonunion facility for the second 787 line.	
	Larry Brown, IAM legislative and political director, said	
	the union is working with <i>Boeing</i> to improve relations. He	
	said the union proposed to help <i>Boeing</i> be more flexible	
		I
	in its production by deploying machinists to a mixed	
	assembly line that could roll out either 787s or 777s,	
	according to demand. 'Boeing already has the tools,	
	the facilities and the experienced workers in place to	I
	open the second 787 line here,' he said. Brown said the	
	union hopes to raise the level of trust sufficiently so	
	that the contract negotiations in 2012 don't end in	
	another strike. 'The only possible guarantee of no-strike	
	when our current contract expires is for Boeing and the	
	Machinists union to be committed to negotiating a	
	settlement and not a strike,' Brown said. 'We have time	
	to build the kind of relationship we need to make that	
	happen.' In contrast, <i>Boeing's</i> Fred Kiga, vice	
	president of state and local government relations,	
	reiterated that management wants a long-term, no-	
	strike agreement and wants it in place well before the	
	current contract ends. 'I don't believe we have until	
	The second	
	2012,' said Kiga in an interview. 'We at the Boeing	
	Company have a sense of urgency about finding	
	production stability.' Kiga said choosing a final-	
	assembly site somewhere other than Everett would, in	
	the event of a work stoppage at one plant, give Boeing	
	an alternative to keep its jets rolling out. In his speech	
	at the conference, Kiga decried the '20-year pattern of	
	labor disputes and strikes' with the IAM and expressed	
	optimism about the current talks with the union, which	
	he called 'long overdue.' 'We intend to continue the	
	conversation,' Kiga said. 'We have an opportunity. We	
	have seized it We're hopeful we can take the risk of	
	labor stoppages out of the equation.' 'Nobody wants to	
	participate in the decline of the aerospace industry in	
	Washington,' he said. Politicians at the Lynnwood	
	summit encouraged the two sides to come to an agreement,	
	though they offered advice gingerly because last week	
	IAM international President Tom Buffenbarger in an	
	interview asked politicians to 'butt out' and leave	
	negotiations to the union. The summit's keynote speaker,	
	U.S. Rep. Norm Dicks, D-Bremerton, said the people of	
	Washington and their elected representatives have a	
	serious stake in the outcome, but conceded that only the	
	union leadership and <i>Boeing</i> management can get it done.	
	'The Hatfields and the McCoys have to stop feuding,'	
	said Dicks. He said the loss of a second 787 line could	
	well lead later to the loss of an assembly plant for a new	
	jet to replace the 737 toward the end of the next decade.	
	Dicks said the outcome of the IAM/Boeing talks could	
	prove to be 'Washington's finest hour or the most dismal	
• · · · · · · · · · · · · · · · · · · ·	<u>···</u>	

3 Aug. 2009	Telegra ph, "Senior Profits Hit by Boeing Dreamli ner Delay" (Jonatha n Liew)	Mark Rollins , CEO, Senior	Firm- Suppli er	α	setback and a loss of national leadership."" "The company reported a pre-tax profit of £21.1m in the six months to June, down from £27.2m in the same period last year, which it blamed on weak land vehicle and business jet markets, the residual impact of last year's <i>Boeing</i> strike and de-stocking by customers. The 787, for which <i>Senior</i> supplies air ducts and other parts, is already two years late and has been delayed five times by <i>Boeing. Senior</i> estimate it would increase sales by around 12pc and its commercial aerospace revenue by around 50pc, with each plane worth around \$800,000 (£473,000) to the company. Mark Rollins, Senior chief executive, said that although he did not expect the 787 to be ready for another six months, <i>Boeing's</i> delay would not adversely affect the company in the long-term. He added: 'We have phenomenally good relations with them and usually have the inside track, but they've generally gone quiet for everybody on the 787s, so we're reliant on their public statements.' 'But we are talking with <i>Boeing</i> about what else they could give us, so we may win some extra work because of the delay.'"	On a modular enterpri se architec ture's low trust
3 Aug. 2009	Blombe rg, "Boeing Dreamli ner Faces Six- month Delay, Senior Says" (Tim Barwell	Mark Rollins , CEO, Senior	Firm- Suppli er	α	"Boeing Co. may not get the 787 Dreamliner flying for another six months following its fifth postponement, said Senior Plc, a British supplier of air ducts and other parts for the plane. 'We estimate another six-month delay,' Chief Executive Officer Mark Rollins said today in a telephone interview. 'Their credibility is somewhat in question.""	On a modular enterpri se architec ture's low trust
6 Aug. 2009	<i>USA</i> <i>Today</i> "From Dreamli ner to Lost Military Deals, Problem s Nag <i>Boeing</i> " (Dan Reed)		Firm	α	"This was to be <i>Boeing's</i> summer of triumph. Dozens of its groundbreaking 787 Dreamliners were supposed to be in commercial airline service around the world by now, changing the nature of global air travel. A family of ultra- high-tech spy satellites made by <i>Boeing</i> (BA) was to be in the heavens, reading the license plate numbers of the USA's vilest enemies from 150 miles up. Profits from regular launches of commercial satellites from a floating launch pad on the equator were supposed to be rolling in. The Air Force was to take delivery of a fleet of new air-to- air refueling tankers based on the <i>Boeing</i> 767. But none of that is happening this summer. And some likely never will. 'Every aircraft, and every defense program <i>Boeing</i> is involved in is having problems, " says Scott Hamilton, an independent aircraft manufacturing and sales analyst and consultant. " <i>Boeing</i> is, quite simply, a mess right now. And I say that as an unhappy shareholder." This is quite a turnaround for <i>Boeing</i> , which is America's largest exporter. Barely a year ago, the company was doing well. Or so it seemed. Its stock traded at a 52-week	

	high of \$68.75. It boasted an unprecedented backlog of	
	firm orders for jetliners worth well over \$350 billion,	
	including more than 900 for Dreamliners, the fastest-	
	selling plane in history. It was coming off two straight	
	years of sales victories over Europe's Airbus. Both the	
	revolutionary 787 and the 747-8 extension of the venerable	
	Boeing 747 jumbo jet were moving toward their first	
	flights. Its defense and space business seemed to be	
	booming. Then came last fall's costly 58-day strike by	
	production workers at <i>Boeing's</i> Commercial Airplane	
	division that delayed delivery of dozens of planes. That	
	was followed by a fourth major setback for the 787 and	
	rapid deterioration of the economy that destabilized	
	Boeing's airline customers worldwide. A growing number	
	of less-publicized setbacks took place in the company's	
	defense and space business. Some were related to	
	changing program priorities and shrinking budgets under a	
	new president and Congress. Others resulted from	
	Boeing's failure to perform to expectations.	
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	787 becomes 'Nightmareliner'	
	The Chicago-based company still managed to report a	
	modest first-quarter profit this year, then a large \$998	
	million second-quarter profit, up 17% from the second	
	quarter of 2008. But industry analysts are fretting about	
	bloated inventory costs, sagging cash flow, increased	
-	borrowing and mounting cancellations of orders. They	
	also worry about defense contracts that have been scaled	
	down, lost or threatened because of Boeing's inability to	
	deliver on its promises. Take, for instance, Boeing's role	
	as systems integrator of the Army's ambitious Future	
	Combat Systems program, the Pentagon's second-biggest	
	weapons development program. It has been scaled back	
	partly because of poor performance. Analysts also are	
	expecting Boeing to swallow a charge against earnings	
	of up to \$500 million related to the June 22 Chapter 11	
	bankruptcy filing of the Sea Launch commercial satellite	
	launch joint venture. <i>Boeing</i> owns 40% of heavily	
	indebted Sea Launch. Companies in Norway, Russia and	
	Ukraine own the rest. On June 23, <i>Boeing</i> delivered its	
	most disquieting news yet. Ground testing of the 787	
	Dreamliner had revealed a structural failure in the world's	
	first jetliner made mostly of composite materials rather	
	than aluminum and steel. The discovery of 36 tiny weak	
	points where the wings join the fuselage forced a last-	
	minute scuttling of the 787's first flight. It was the fifth	
	time in two years that Boeing had to tear up its 787 test	
	and delivery schedules. Worse, officials still can't say	
	for sure when the project will get back on track, though	
	they hope the plane will fly by year's end. Industry	
	analysts were particularly peeved that this latest delay	
	came less than a week after Boeing executives had	
	assured them at the Paris Air Show that the 787's first	
	tlight would be before the end of June Wage who'd	
	flight would be before the end of June. Wags, who'd already been calling the Dreamliner the 7-LATE-7'	
	already been calling the Dreamliner the 7-LATE-7,' came up with an even more scathing nickname: The	

'Nightmareliner.' So when Boeing executives hosted a	
conference call on July 22 to talk about the company's	
better-than-expected second-quarter profit, the tone of the	
conversation was anything but celebratory. Investors	
instantly picked up on the analysts' concerns. Boeing's	
shares, which already had fallen 35% since last August,	
dropped another 2.4% to \$42 that day and another nickel	
the day after that. Wednesday the stock closed at \$44.03.	
Analyst Brent Miller, who follows Boeing for Gradient	
Analytics in Scottsdale, Ariz., says the tone of the call	
'was very negative, and the market's response was very	
tepid' because 'management is starting to lose	
credibility.'	
Trying to turn a corner	
<u>Trying to turn a corner</u> That's damning criticism for any company, but	
especially for <i>Boeing</i> , which had recently appeared to	
have its act together after years of costly failures and	
misdeeds. Veteran industry analyst Richard Aboulafia of	2
the <i>Teal Group</i> says that in the years following <i>Boeing's</i>	
1997 merger with old rival McDonnell Douglas, the	
company developed a habit of failing to deliver on	
grand promises to win big defense contracts. At the	
same time, <i>Boeing's</i> name was dragged through the	
mud by a series of embarrassing ethical lapses by key	
executives. The list of improprieties was long. But most	
notably, former CFO Michael Sears ended up in prison	
for trying to win the Air Force tanker contract by	
offering a high-paying job to the Pentagon decision-	
maker. Two former chairmen were shown the door in	
2003 and 2005, the latter, Harry Stonecipher, for a	
national headline-grabbing extramarital affair with	
another Boeing officer. Jim McNerney, a former 3M	
CEO and onetime head of General Electric's successful jet	
engine division, was hired in mid-2005 to clean up	
Boeing's mess. And, seemingly, he did. The straight-	
arrow McNerney got high marks in his first three years	
at Boeing's helm for changing the company's culture,	
streamlining its organization and cutting costs. The share	
price's run to record levels was viewed as evidence McNerney had <i>Boeing</i> back and headed for a long run	
of big profits. But McNerney also was riding on the	
back of the promised riches of the Dreamliner. The	
feather-light plane made of strong composites is billed as	
20% more fuel-efficient and 30% less expensive to	
maintain than its metal-skinned ancestors. For travelers,	
Boeing says, it will be the most comfortable ride ever. Its	
promise created a near-stampede by airlines scampering to	
Seattle, home of Boeing Commercial Airplanes, to place	
orders. By last fall, Boeing had more than 900 orders	
worth \$135 billion to \$160 billion in revenue over the next	
decade. The number of orders is now down to 850, as	
airlines, upset by the delays or unsure whether they can	
afford the planes, have begun canceling. Although that's	
still a record number of orders for an airplane that hasn't	
been certified to fly, the financial damage is an	

				estimated \$9 billion to \$10 billion. And the question isn't whether there'll be more cancellations, but how many? Reaction to the latest bad news on the 787 has been disappointment and consternation. 'Management not knowing about these problems until the last minute is horrible because it means engineering information isn't flowing upward through the organization. That's scary,' Miller of <i>Gradient Analytics</i> says. 'But what's more scary is management knowing, and not telling. I just don't know which it is.' Several analysts, including at <i>Barclays, Oppenheimer, Credit Suisse and Gradient</i> , have downgraded their ratings of <i>Boeing's</i> securities or target stock prices. Even McNerney acknowledges <i>Boeing</i> blundered by putting sales of the 787 ahead of engineering. 'Clearly the initial plan outran our ability to execute it,' he told analysts in the July 22 conference call. 'We've learned a hard lesson here.' But the chief source of <i>Boeing's</i> summer of discontent, the Dreamliner, also represents the company's path to success — if it	
6 Aug. 2009	The New York Times "Inside G.E., a Little Bit of Enron" (Floyd Norris)	Firm- Investo rs	α	can get the plane flying. Carol Levenson, a bond analyst at <i>GimmeCredit</i> in New York, says <i>Boeing</i> has time to get the Dreamliner fixed. 'Their credit quality is still pretty good,' she says, 'so they can borrow money to make up the damage this is doing to their industrial balance sheet.' And <i>Barclays Capital's</i> Joseph Campbell, one of the analysts who has lowered his <i>Boeing</i> ratings, nevertheless says the 787 will be a big winner for <i>Boeing</i> once it gets airborne. 'When the 787 is being produced at 120 a year,' he wrote in a new assessment, '(it) has the potential to be the most profitable aircraft <i>Boeing</i> has ever had.'" "'A decade ago, <i>General Electric</i> was the shining star of American business. Its longtime chief executive, Jack Welch, was named manager of the <i>century</i> by <i>Fortune Magazine</i> , and its stock seemed always to go up. It ran a bewildering array of businesses but somehow always managed to make the expected profits. That record was viewed as proof of superior management, and the battle to succeed Mr. Welch in 2001 was watched all over the business universe. When a winner emerged, the losers quickly were hired to run other major companies. <i>G.E.</i> is different now. The stock has fallen and the aura has dissipated. This week <i>General Electric</i> agreed to pay \$50 million to settle a suit filed by the Securities and Exchange Commission that said the company fiddled with its books repeatedly early in this decade. In at least one case, that allowed it to preserve its reputation for making the numbers. Some of the details are eerily reminiscent of <i>Enron.</i> As is customary in such settlements, <i>G.E.</i> neither admitted nor denied the charges. But it sounded contrite. 'The errors at issue fell short of	On a modular enterpri se architec ture's use of "strategi c misinfor mation" or "strategi c deceptio n"
				our standards, and we have implemented numerous remedial actions and internal control enhancements to prevent such errors from recurring,' said a company statement. Another view of <i>G.E.</i> 's accounting standards emerged a few years ago in a book written by a man who	

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worked there for six years in the early 1980s, before	
concluding the corporate life was not for him and entering	
a seminary. James Martin may be the only Jesuit priest	
with a degree from the Wharton School of the University	
of Pennsylvania. 'The primary task of my first job was to	
issue very long, monthly statistical reports,' he wrote in	
his book, "'n Good Company: The Fast Track From the	
Corporate World to Poverty, Chastity and Obedience.'	
'The first month,' he recalled, 'I informed one executive	
that our results were coming in low" because of losses	
in overseas operations. 'So what?' replied the	
executive. 'Just reverse a few journal entries.'	
Corporate headquarters, he explained, would come down	
hard on them if they missed the numbers. Another boss	
told him he was 'taking those accounting courses way	
too seriously.' The S.E.C. complaint makes it sound as if	
those days came back, assuming they ever left. It tells of	
corporate accountants discovering misstatements and	
secret side deals, and of more senior executives telling	
them to sign off on the books anyway. It outlines four	
separate violations, two of which it says descended to the	
level of fraud. It is notable how this investigation came to	
be. Post-Enron, the commission used its authority to look	
at $G.E.$'s books to figure out whether there were violations	
in the area of so-called hedge accounting, which	
determines whether companies can avoid reporting profits	
and losses from a variety of derivative securities. The	
commission evidently found three violations, two in hedge	
accounting and the other in an Enronesque scheme to	
inflate profits with fake sales. 'It was like peeling an	
onion,' said David P. Bergers, the director of the Boston	
office of the S.E.C., as one accounting issue led to	
another. The fourth violation appears to have been	
reported by G.E. All have been fixed in restatements.	
While it may seem odd to view the government as an	
underdog, it was. G.E. says it spent \$200 million on	
outside lawyers and accountants in dealing with the	
investigation. By contrast, the S.E.C.'s entire annual	
enforcement budget, spread over thousands of inquiries	
and investigations, was less than \$300 million when this	
investigation began in 2005. You can be sure that $G.E.$	
spent a lot of time arguing that the amounts involved, only	
a few hundred million per violation, were not really	
material to a company its size. There may be more to	
come. The S.E.C. said that its investigation of G.E. was	
over, but it did not say that about any of the accounting	
officials at the company, or any of the people at KPMG,	
<i>G.E.</i> 's longtime auditor. <i>KPMG</i> 's role is interesting. The	
complaint indicates that unnamed accounting officials at	
G.E. failed to provide important information to KPMG,	
but $G.E.$ says that information was later given to the	
auditors. The S.E.C. filing says that on one of the hedge	
accounting issues, the KPMG auditors consulted the	
accounting firm's national office. But when push came to	
shove, and the question was whether to approve	
accounting that the S.E.C. now says was clearly wrong,	
and the state how sugs has clearly wrong,	

	the local auditors signed off without telling the national	
	office what was going on. Could it be that the local	
	auditor feared the national office experts would have	
	backbone, and force him to anger a very important	
	client? A KPMG spokesman declined to discuss any	
	aspect of the case. This all took place in January 2003,	
	days before G.E. was to announce its annual profits for	
	2002, Jeff Immelt's first full year as chief executive.	
	Had G.E. not fudged the accounting, it would have	
	missed its profit forecast by \$200 million. Not since	
	1994 had G.E. failed to make the numbers. You may	
	recall something similar happened at Arthur Andersen	
	when it was auditing Enron. In that case, the local	
	auditors chose to ignore the national office. It is easy to	
	have some sympathy for G.E. on the hedge accounting	
	issues. The rules are devilishly complicated, and the	
	accounting penalties for a small deviation can seem	
	excessive. For good reason, the rules are being rewritten.	
	But that sympathy vanishes when considering the	
	accounting alchemy that G.E. used to make its	
	numbers at the end of 2003. In a move reminiscent of	
	Enron's Nigerian barges deal, it 'sold' some railroad	
	locomotives to banks, with side letters and verbal	
	promises to assure the banks they could not lose	
	money. That enabled G.E. to book profits early and	
	make the numbers. The banks, facing S.E.C. actions	
	for doing similar deals with Enron, asked G.E. to	
	reassure them that KPMG knew about the side deals	
	and concurred with the accounting. The banks had	
	reason to be worried, given that G.E. executives had asked them not to refer to the side deals in documents	
	seen by auditors. At G.E., a spokeswoman, Anne Eisele,	
	told me that it was wrong to think these violations were	
	'indicative of some larger problem in G.E.'s overall	
	culture, its finance function or compliance practices.	
	G.E. is committed to the highest standards of	
	accounting and good corporate governance. We are	
	confident in our controls and culture, which have been	
	made even stronger through the process that we've just	
	completed.' It is interesting to compare the G.E. and	
	S.E.C. versions of the locomotive deal. In a company	
	filing in 2007, G.E. said 'several individuals in our rail	
	business and in our capital markets group engaged in	
	intentional misconduct that misled those responsible	
	for accounting oversight.' It added that the accounting	
	oversight team failed to adequately review the	
	transactions. The S.E.C.'s complaint makes it sound as if	
	the matter was thoroughly aired inside G.E. in 2002, when	
	it was first used, and again in 2003. The corporate audit	
	staff challenged the accounting in 2002, but was overruled	
	by a 'senior accountant,' the S.E.C. said. G.E. added that	
	the amounts involved were so small that they were not	
	material, 'less than 0.2 percent' of the company's total	
	revenue or profits each year. The S.E.C. says the fudges	
	caused quarterly profits of the G.E. Transportation	
	Systems business to be overstated by as much as 40	
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10	Flightbl	Firm-	α	percent. All those numbers are accurate. Tricks to take profits in the wrong quarter, as in this case, are not likely to change annual earnings very much, particularly for the conglomerate. I doubt anyone at <i>G.E.</i> thought at the time it would have been immaterial if the company missed its profit forecasts. I called Father Martin, now an editor at America magazine, a Jesuit publication, and asked him to read the S.E.C. complaint and call me back. He did. 'Little of this is surprising,' he said. 'I was sometimes asked to squirrel away 'excess earnings' in fake accounts with made-up names, to be used when earnings were down in later months,' he said. One such account was called 'Plug.' Ms. Eisele, the <i>G.E.</i> spokeswoman, declined to comment on Father Martin's book. Much has changed at <i>G.E.</i> since Father Martin was hired. The long paper spreadsheets that he used have been replaced by computers. Some of the financial instruments involved in <i>G.E.</i> 's hedge accounting violations had not been invented. But some things, it appears, never change."	On a
Aug. 2009	ogger, "A30X to be Assemb led at XFW in Return for A350 Launch Aid" (Jon Ostrowe r)	Labor	&β	Deutschland (German) and later confirmed by Flight, <i>Airbus</i> will fully assemble the successor to A320, currently dubbed the A30X, in Hamburg. This news comes as the German government and <i>Airbus</i> are working out final terms for for €3.3B in A350 launch aid. Currently, A320 family production is primarily based in Hamburg and Tianjin, while part of the A320-200 is built in Toulouse then flown to Hamburg for finishing. Let us, for a moment look beyond the obvious - and ongoing - debate about the merits/legality of launch aid, and try to examine this deal through a different, possibly overlooked lens. This long term deal addresses key questions about the future growth and expansion of <i>Airbus</i> . It's not surprising that Hamburg would be the final assembly site, but the deal largely closes the book on any debate about final assembly operations at <i>Airbus</i> for almost a generation to come with A30X not set for service entry until at least 2020. If we examine this through a broader strategic lens, with the involvement of national stakeholders, <i>Airbus</i> has gained labor stability and industrial predictability, with a distinct political subtext attached. Yet, perhaps it's an appropriate point of juxtaposition to the relationship between <i>Boeing</i> and its stakeholders, the IAM and SPEEA. We are just months away from the selection of a second 787 final assembly line as <i>Boeing</i> weighs its options as perceived stability vs. perceived instability. One viewpoint says that setting up a second line in Everett would introduce additional instability because of the risk of future strikes and delivery disruption. On the flipside, a native and experienced workforce with extensive widebody assembly experience is an asset not to be discounted. For a site outside of Everett, stability would be found in removing the labor obstacle by setting up a second line in a right to work state. On the	modular industry blogger' s newfou nd integral point of view.

10 Aug. 2009	Watch "South	Kelly, CEO,			Frontier Airlines, which will be sold at auction as part of	enterpri
	Market	Gary	Firm	β	"Southwest Airlines said Monday it has submitted a binding cash offer of more than \$170 million to acquire	On an integral
	Market	Gary	Firm	6	company could devote some effort at resolving that." By 787 Accountant on August 11, 2009 3:22 AM "From both perspectives, what is the cost of bad relations? The unions are winning the strikes but losing the wars as their numbers shrinking. <i>Boeing</i> lost a billion dollars over the last strike. <i>Boeing</i> lost \$700 million in the 2005 strike over less than a \$90 million difference which the union got at the end of the strike anyways. Now instead of working towards a longer term solution, <i>Boeing</i> is willing to spend an additional billion dollars (my estimate for building and tooling) to open a second line elsewhere. Some business sense needs to be injected into the process. Perhaps, instead of demanding a no strike clause, <i>Boeing</i> should ask, of the union and themselves, what would it take to sign a 30 year contract? Perhaps they more in common than we think."	On an
					By Paulo M (Johannesburg, RSA) on August 11, 2009 1:13 AM "Very good. In fact, excellent. This point of view would seem to indicate that <i>Boeing</i> is far more predisposed to the idea of cost - particularly labour, as you so rightly point out - and for obvious reasons. In my opinion, it would be a mistake for it seek out production sites other than those in Washington without making some sort of peace with the unions. As far as I know, <i>Boeing</i> has had far more industrial action taken against it by unions in the past decade than in the preceding 50 years combined. Perhaps the	
					demonstrated the challenges, and high cost, of setting up a greenfield site. Ultimately, for <i>Boeing</i> and <i>Airbus</i> , steadily growing the business means the predictability of future costs, made all the more predictable by stability. Decision-making on issues like the location of aircraft final assembly operations will be driven by this motivation. Yet does the push-pull dynamic between <i>Boeing</i> and its unions, vis-a-vis the selection of final assembly, add to the long term stability and predictability of <i>Boeing's</i> business? If <i>Boeing</i> is facing a potential forward loss on 787, then ensuring predictable future costs is essential to the future of the company. The question then becomes, how does <i>Boeing</i> , as well as its unions seek stability and predictability for the future, then perhaps both sides should take a page from its competitor's playbook."	

Air" including Frontier, its creditors, employ customers,' said Southwest Air's Chief Executive Kelly in a prepared statement. The auction is ended with the second statement.		h to a
(Curran)	serve carj	modular
Nozee)	expected to	activity.
start on Thursday"	Apoored to	activity.
	to down as	On the
	t Monty a	leadersh
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	ing around	locally-
	a BBO this	integral
	when you	leader
	aned Scott	of a
	my phone	modular
	m' I said	enterpri
o) number that following Saturday morning. 'Him 'That can't be. He's not going to have Alan of		se
honestly figured Scott was going to call to give	e me some	architec
insight into the Edge. When my phone rar	ng with a	ture.
Michigan number during my daughter's birthd		ture.
let it go to voicemail. I would call Scott back af	fter When	
I finally checked the voicemail it was not f	rom Scott	
Monty, but rather Alan Mulally. He was s		
praises of the Edge and what I thought was loo	king like a	
cute PR stunt ended up being a sincere messag	e with the	
request to call him back. Let's pause for a s		
process this. The CEO of Ford Motor Company		
mega-brand run by a man who is probably more		
all of my friends combined, is taking time	out of his	
Saturday to call me? Seriously? No, seriou	usly? So I	
called back. Alan picked up and we talked. I s		
experiences. Alan listened. He listened to me e	explain my	
loyalty to VW/Audi. He listened about my new		
money while I bootstrap my entire life as we ge		
up and running. He listened while I ranted		
dealerships blowing me off. This went on for o		
minutes. Instead of saying 'Thanks for your tin		
you buy the Edge.' Alan put some serious		
motion. Alan first said that he really wanted		
into a Ford, because he believed in it so muc	ch and if it	
helped offered me friends and family pricing		
Anyone would be ecstatic at that point, but h	he went on	
to tell me that we needed to get this dealer		
resolved so he was going to contact their Ger		
Manager, Randy Ortiz, to have him follow u		
An hour later Randy calls. An hour after that		
"Enza" Sleva, the New England Regional		
called and then while on the phone wit		
received two separate calls from the owner		
Ford, Fraser Lemley and his son Chris w		
President. I was overwhelmed to be he		
everyone made themselves available to a		
questions and to provide me an education on		
how they do business. Each and every one of		
available over the course of the month it took		
everything squared away to the point wh		
ready to make the deal. Everyone collective		
on this deal too. The Ford corporate team d	lid not just	

r						pass the buck to the dealership. They stayed actively	
						involved. I made suggestions for carving out a better deal. They made productive counter-offers. There was never a no in the negotiations. They wanted to make it work and in the end it did. I'm fully aware that this is not a normal life experience and I'm not somebody with access to the golden gates of global icons either. As a professor of entrepreneurship at Boston University I always stress the importance of leading by example, respecting everyone around you, exhausting all solutions before saying no and consistently doing the unexpected. This is how you win people over and become a great leader. Not only does Alan Mulally have a big fan, but he also has a new customer."	
	11 Aug. 2009	The Seattle Times "Boeing Charlest on Worker s to Vote on Machini sts Decertif ication " (Domini c Gates)	Mark Blondi n, IAM nationa 1 aerosp ace coordi nator	Firm- Emplo yees	α	"Production workers at <i>Boeing's</i> newly acquired assembly plant in Charleston, S.C., plan to vote Sept. 10 on a petition to get rid of the Machinists union. At a National Labor Relations Board hearing in Charleston this morning, the company and the International Association of Machinists (IAM) agreed to the vote. A decision to decertify the IAM at the Charleston facility could influence whether <i>Boeing</i> will move future airplane assembly work there, including a second production line for its new 787 Dreamliner. If the vote succeeds, nonunion <i>Boeing</i> Charleston will compete directly with the unionized Everett plant for the new 787 work. That raises the specter for the Puget Sound region of <i>Boeing</i> developing for the first time a major final assembly site on the East Coast that could siphon off production work on future airplanes. The petition that sparked the vote was filed by Dennis Murray, a quality inspector at the Charleston plant unhappy with the way the union forced through a weak contract last November without significant consultation with employees. 'I want people to have a fair voice in what happens to them,' said Murray. 'That's the position a union traditionally fights for. In this case, it's the workers fighting against the union to achieve that.' The union was not immediately able to say how many workers in the bargaining unit of almost 300 employees pay dues. Murray claimed more than 75 percent support for his petition among the workforce, based on his own canvassing for signatures. In the weeks ahead, the company will make its preference clear to the workforce: <i>Boeing</i> management wants rid of the union at the plant. Company labor relations spokesman Tim Healy said managers will share 'facts and data' with the workforce outlining the differing treatment of unionized and nonunion workers at <i>Boeing</i> . 'We'll tell them we prefer to deal with our employees directly, without an intermediary,' Healy said. IAM national aerospace coordinator Mark Blondin said the Charleston workforce has the right to ch	On a modular enterpri se architec tue's adversar ial relation ship with labor.
						'Facts don't lie,' said Blondin. 'Boeing does not treat nonunion workers well.' Last month, Boeing bought the Charleston assembly plant, which builds the composite	

plastic aft fuselage for the Dreamliner, from Texas-based	
Vought. The Charleston operation had been plagued	
with startup problems, partly due to the inexperienced	
workforce. In addition, the long delays in the 787	
program left Vought with no income stream and a	
requirement for further hefty investment it was unwilling	
to make. To secure control of its supply chain, <i>Boeing</i>	
stepped in with a \$580 million purchase, plus the	
And the second	
forgiveness of loans to Vought that bring the total cost to	
\$1 billion. A major obstacle the union must overcome	
before the September vote is resentment among the	
Charleston workforce over the contract the union	
signed last November. The contract delivered a meager	
annual raise of 1.5 percent, with a possible merit bonus	
of up to 2 percent determined by managers. The union	
ratified that contract in a last-minute, barely	
publicized "emergency meeting" with only 13 people	
present, to meet a one-year deadline. Murray was one	
of the workers incensed by that tactic. The Boeing	
acquisition offers a new opportunity to revisit the	
decision. 'The contract with Vought did not live up to	
many of those members' expectations,' Blondin	
conceded. 'Not everybody got to vote.' But he said the	
rushed vote was necessary because the company had	
dragged out negotiations deliberately to try to oust the	
union. He pointed out that the contract, however weak	
economically, secured recall rights for those workers	
being laid off. He said the union now has a right to	
improve the contract. 'We've got a great track record in	
negotiating contracts,' Blondin said. 'The leverage will	
depend on the people and how strong they want to be.'	
The labor showdown in Charleston is happening against a	
backdrop of ongoing, tense negotiations between <i>Boeing</i>	
and the IAM in the Puget Sound region. Last fall, the	
IAM signed a new four-year contract here after a two-	
month strike. Since then, the company has mounted an	
unprecedented behind-the-scenes campaign to reopen	
that contract and win a long-term no-strike agreement.	
Boeing chairman Jim McNerney forcefully conveyed that	
message to Washington state political representatives,	
including Gov. Chris Gregoire and Rep. Norm Dicks (D-	
Bremerton), in a meeting in Washington, D.C., in March.	
He told the politicians that union relations would be a	
major factor in the decision about where to locate a second	
787 production line; the head of the 787 program said the	
decision may be made before year-end. In July, following	
the announcement that Boeing was buying the Charleston	
plant, Dicks and Gregoire publicly called for both the	
company and the union to make concessions, reach an	
agreement and secure future Boeing airplane work for this	
region. Talks between the union and the company have	
been ongoing, though the union insists that it still has	
received no formal proposal of a no-strike agreement. At	
a conference in Lynnwood last week, <i>Boeing</i> vice	
president Fred Kiga said that creating a second final-	
assembly site outside the Puget Sound region would offer	
asseniory site outside the ruget sound region would offer	

13 Aug. 2009 Blows	din	α & β	the company the opportunity to continue production in the event of a work stoppage here. But industry analysts are skeptical that <i>Boeing</i> would make the second 787 assembly line decision based on the union issue alone. Creating an assembly line in Charleston would require substantial investment in tooling and buildings. And, the lack of an experienced workforce in the area would inevitably bring added risk to a program already more than two years behind schedule. The IAM's Blondin doubts that <i>Boeing</i> would risk further delays by placing new 787 work outside Puget Sound. 'Is <i>Boeing</i> making an emotional decision or an economic decision?' Blondin asked rhetorically. Still, if <i>Boeing</i> is insistent on radically reducing its vulnerability to labor unrest, a win in the Sept. 10 vote in Charleston would certainly provide the company extra leverage.'' "NOT a lot has gone right for <i>Boeing</i> recently. After declaring to the world at the Paris air show in June that its chronically delayed 787 Dreamliner would take to the air before the month was out, executives were forced to announce an indefinite postponement of the high-tech aircraft's first flight only days later because of a problem with the wing mounting. The company also seems to have been hit harder by cash-strapped airlines cancelling orders than its main rival, <i>Airbus</i> . But <i>Boeing</i> is anticipating a triumph in the next few weeks when the World Trade Organisation (WTO) comes to a preliminary decision on a complaint made by America nearly five years ago about subsidies given to <i>Airbus</i> by European governments. In 2004 at the urging of Harry Stonecipher, <i>Boeing's</i> boss at the time, America terminated a 1992 agreement with the European Luncin regulating government support for the commercial-aircraft industry and initiated a WTO dispute- settlement procedure. The agreement had capped European launch aid for new airliners at 33% of all development costs on condition that the money was repaid at an interest rate that at least covered the cost of the governme	On moduli and integra enterpo se archite ture's differin g approa h toward the govern ment stakehe der.
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				proposed A350, a potential competitor to both the American firm's highly successful 777 and larger versions	
				of its new lightweight all-composite 787. Whereas Boeing	
				felt it was betting the company on the 787, it believed that	
				Airbus could develop its rival aircraft with far less	
				financial risk and lower capital costs. In addition to a	
				claimed cumulative benefit of more than \$100 billion from	
				launch aid over 20 years, Boeing says that Airbus has also	
				been the recipient of other handouts including funding for	
				roads and runways it relies on and soft loans from the	
				European Investment Bank. Boeing puts the combined	
				value of all the subsidies Airbus has received at \$205	
				billion. Europe's response was to lodge a counter-	
				complaint alleging that Boeing gets an array of subsidies	
				from different American agencies ranging from	
				America's space agency, NASA, to the Export-Import	
				Bank of the United States (known as "Boeing's Bank")	
				as well as tax breaks from several states. Europe puts	
1				Boeing's subsidy haul at only \$24 billion over the past two	
1				decades and up to 2024, but says that using America's	
				methodology, the figure would be nearer to \$305 billion.	
				Europe also complains that <i>Boeing</i> has received launch	
				aid from Japan, where large parts of the 787, including	
				most of the wing, are made. It estimates that up to \$7	
				billion-worth of government aid of one kind or another	
				has gone into the 787. The boss of Airbus, Tom Enders,	
				describes the 787 as the most heavily subsidised civil	
				aircraft in history. Airbus also notes that since 1992 it	
				has paid governments 40% more than it has received	
				from them, thanks to interest and royalties on	
				successful designs developed with state aid. In an	
				average year it repays about \$500m. The WTO's ruling	
				on Europe's complaint should come within the next six	
				months. It would not be surprising if both complaints were	
				upheld, at least in part. Both parties say they are willing to	
				negotiate a new deal limiting subsidies and making those	
				that remain more transparent. That would send out a	
				message to other countries (Russia and China) wanting to	
				muscle in to the large commercial aircraft market. But	
				both sides also want to see who comes out of the WTO	
				process worst before starting talks. Unfortunately, there	
				will be plenty of opportunities to escalate hostilities in the	
				meantime. In the next few weeks European governments	
				are expected to agree to give some €3.5 billion (\$5 billion)	
				in launch aid for the A350. Boeing describes it as a	
				'provocative' move, but an Airbus spokesman says the aid	
				is not in doubt and that Europe will not be 'intimidated'.	
				Another bone of contention is the battle between <i>Boeing</i>	
				and Airbus, with its partner Northrop Grumman, to supply	
				America's air force with its next fuel tanker—a contract	
				won by <i>Airbus</i> last year which is being fought over again	
				after <i>Boeing</i> protested. The grounds for further complaint,	
				and thus the opportunities for inflicting mutual damage,	
12	The	 Einer	0	are immense." "Negotiation not litization is the best way to limit the	0
13	The	Firm-	α ε.	"Negotiation, not litigation, is the best way to limit the	On modulor
Aug.	Econom	Gover	&	subsidies to Airbus and Boeing—and stop a trade war.	modular

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One America's (for which read Boeing's) complaint against be senthist architec ture's commercial architec ture's states alleges that this support was worth \$200 billion over 20 years. Whatever the outcome—and Boeing is confident of victory—this will be only the first stage of a length process. In a few monts the WTO will rule on a counter-claim by the European Union that Boeing received about \$24 billion in subsidies over the past two decades as well the gave contracts. Both rulings are subject to appeal. Peter Mandelson, Europe's trade commissioner before becoming govern ment Mandelson, Europe's trade commissioner before becoming in the biggest, most difficult and most expensive in WTO bistory. This first ruling is a potential thunderbot that could ignite a damaging trade dispute between America and Europe at a time when both economies need to present a united front on trade, to prevent a slice towards protectionism. The origins of the dispute lie in America's decision, at Boeing's prompting, to withdraw in 2004 from a 12-year-old bilateral agreement with Europe governing trade in large civil aircraft. The agreement banned direct production and sales subsidies, but let governments continue to fund money into new aircraft projects. It permitted both repayable direct state aid (the European approach) covering up to a third of all development costs, known as launch aid, and indirect state aid (the American approach) woverer, says it expected the deal to lead to a gradual reduction in subsidies to the A380, the subergimed basing however, says it expected the days to achieve the avered A300. Auterication is that it is a subsidie distort competition. But although the subsidies that dirbaw the dispute the days of the domestic industry's sales volume. Boeing abowarde to shield is 777 and the asynetimed dispute that a subsidies distort competition. But although the subsidies that dirbaw the form of the A380, the superipmod heagined to bring	1					
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12	Flighth	Eim		riskiness of large commercial-aircraft projects has forced even <i>Boeing</i> to create extended international supply chains. Second, the aircraft-makers' subsidies pale by comparison with those doled out by governments on both sides of the Atlantic in the past year. Leaving aside the trillions of dollars spent on preventing financial collapse, industrial subsidies of a kind almost certainly illegal under WTO rules have mushroomed. <i>General Motors</i> alone has been propped up to the tune of \$55 billion. If America and Europe were to go to war over subsidies now they would find what military planners call a 'target-rich environment'. Both sides should therefore hold their fire until the WTO rules on Europe's complaint. Then, putting further litigation to one side, they should head for the negotiating table. The aim should be to secure a new deal along the lines of the old agreement, but this time with an explicit goal of phasing out the most egregious subsidies within a reasonable period. The alternative of an escalating tit-for- tat trade dispute between Europe and America does not bear thinking about."	
13 Aug. 2009	Flightbl ogger, "Breaki ng: Structur al Flaw Halts Producti on of <i>Alenia</i> 787 Sections (Jon Ostrowe r)	Firm- Suppli er	α	"Alenia Aeronautica has halted production of two major 787 structural components due to wrinkles in the fuselage skin caused by manufacturing flaws in subcomponents of the one-piece composite barrel, according to a letter obtained by FlightBlogger. The letter's subject: 'SECTION 44 and 46 STOP WORK ORDER FOR BARREL' details a correspondence between Jay Campbell, sr. manager for supplier management for the 787 fuselage supply chain, James E. Simmons section 44/46 sr. engineering manager and Ciro Occipinti of Alenia Aeronautica in Naples, Italy. The letter, signed and dated June 23 on Boeing letterhead, was sent the same day Boeing announced the latest delay in the program citing a need to reinforce the side of body structure. Boeing and Alenia Aeronautica did not respond to multiple requests for comment. The status of production at Alenia's Grottaglie facility remains unknown at this hour. This structural issue, sources say, appears entirely separate from the wing fix. Section 44 and 46 are two of the four major structural components that comprise the integrated center fuselage. Section 44, a bonnet section, sits directly on top of the center wing box (section 45/11) while section 46, a complete barrel, is joined to the aft part of the center wing box. Campbell and Simmons explain the justification behind the production halt as 'related to stringer edge steps' causing wrinkles in the skin of the fuselage that were larger than previously 'demonstrated during the [preproduction verification] PPV on these components.' Stringer edge steps, as one veteran composite engineer explains, comprise the stacks of the composite fibers that make up the longitudinal structure that is cured and bonded to the skin of the fuselage barrels to give it its strength. The letter goes on to detail the recommendations for the proper step height of each layer of composite fiber, plus or minus	On a modular enterpri se architec ture's over- promise and under- delivery

a given tolerance. The letter says that the guide for	
building fuselage stringers includes a note that says that	
step heights beyond a given a specified tolerance 'will	
lead to significant degradation of the structure.' The	
tolerances and dimensions of the stringer were specifically	
outlined in the letter and are not included in this report due	
to the proprietary nature of the information. However, the	
letter continues: 'Boeing engineering evaluations of the	
cross-sections provided by <i>Alenia</i> demonstrate that	
negative margins exist in the line 7-19, and line 20 and on,	
configurations for section 46. Line 5 and 6 are still under	
evaluation. While efforts are underway to refine that	
analysis, it is doubtful that the negative margins will be	
recovered, and that repair of at least line 7-29 will be	
required.' Of those 25 shipsets, four have been	
delivered to final assembly in Everett, Wash, eight are	
undergoing center fuselage integration at Global	
Aeronautica in Charleston, S.C. and the remaining 13	
are in Grottaglie, Italy. Each 787 barrel section contains	
80 stringers that run the length of the fuselage. The letter	
did not detail what portion of the 80 would require repair.	
The size of the edge steps on the stringers, the letter says,	
were increased first on 'line 5 when Alenia began using	
the GFM stringer manufacturing cell at Grottaglie.' Line 5	
refers to Airplane Five or ZA005, the first General	
Electric GEnx powered 787, that entered final assembly in	
January of this year. Sections 44 and 46 were delivered by	
Alenia for integration at Global Aeronautica in April	
2008. <i>GFM</i> is a company that does milling, cutting,	
routing and forging of various materials, including	
composites components. During the manufacturing	
process, the composite stringers are fabricated in a clean	
room, loaded onto the preformed mold, or mandrel, then	
are wrapped in a preset amount of carbon fiber tape. After	
lay-up, which is done by a robotic wrapping machine, the	
mandrel is bagged and moved to the autoclave for high	
temperature curing. <i>Boeing's</i> instructions in the letter to	
Alenia was to complete any carbon fiber placement	
currently underway, but not to begin any additional	
bonding or curing of barrels. According to the letter,	
specifications were authored to control the height of the	
'edge step' as a result of what was learned during	
preproduction verification (PPV). The letter states that	
Alenia determined it 'cannot comply with the	
requirement' and had requested 'that the step height	
control provisions be eliminated.' Boeing concluded that	
'based on the structural analysisthis is unacceptable'	
because the wrinkles 'represent a risk of a major	
repair to every unit that is built without engineering	
coverage.' Boeing's conclusions on this structural	
analysis were conducted on two scrapped barrel sections	
identified as being from Airplane 15 section 46 and	
Airplane 20 section 44. 'Sections cuts from the scrapped	222
AP15 barrel show wrinkle geometry well in excess of	
those found during the PPV.' Adding that the	
specification 'does not allow wrinkles in the skin, and	
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the existing effects-of-defects data does not sufficiently
characterize the structural performance of wrinkles of
this magnitude.' Boeing has yet to provide a revised
schedule, known internally Z18, that dictates the 787
production and delivery schedule to suppliers and airline
customers. The company has said a revised planning
schedule will be available by the end of September. This
structural issue appears to not affect the first flight
planning for ZA001 through ZA004, but it is yet unknown
if delivery planning of the early production aircraft will be
impacted while this issue is being resolved."
impacted withe this issue is being resolved.
By TheLastInspector on August 13, 2009 10:29 PM
"The question should be, instead, given the current
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mismanagement team, what cannot go wrong on the
program. These negative margins are likely just more
fallout from Boeing's decision to design the 787 to zero
safety margins. As pressure to save weight gets greater
with later line numbers to meet performance
guarantees, look for more problems cropping up. Its
disturbing to me, even though I was the one who originally
exposed that Boeing was designing the 787 to zero safety
margins, that these problems are coming so often and the
plane in many months from even flight tetsting that will
undoubtable expose many more problems, both with
structures and systems. Thanks to Jon for giving
investors the news they need when Boeing has
demonstrated it won't, if the news is potentially
negative in nature to the stock price. Their rosy coloring
of the bad news on the program in their last minute they
can hold the news from investors is troubling, and their
many announcements proven false even more so (schedule
of the program, etc.)."
of the program, etc.).
By quiet guy on August 17, 2009 3:52 PM
"I work at one of the 'suppliers' for the 787. I have also
worked with <i>Alenia</i> on the Tanker and on the F-35. The
incompetence of Alenia is very well known. It is
amazing to me that <i>Boeing</i> would continue to use these
guys as a supplier. As many previous posters have said,
it all boils down to money. The Bean counters have run
amok. They give zero credence to quality and the skills
of longtime workers and engineers. That doesn't count
any more, Program decisions are strictly driven by
cost. There is however no feedback as to real costs
when these low bidders screw up. Boeing has
completely lost its way!! Regarding Alenia and the
wrinkles, this problem occurred on ship 7 and up
because of the weight redesign. The skin ramps were
steeper due to a reduction in the basic skin thickness.
The 'Other' South Carolina supplier has seen these
problems and fixed them via the MRB system from the
onset. Regarding ridiculous schedules. Who was the
idiot that decided to roll out this plane on 7/08/07? As
one of these suppliers trying to meet this goal, we found
it totally impossible to spool up our supplier base. This
in terms impossible to spool up our supplier base. I lis

13 The Bocing decided to complete these barrels in Everett, that's when the real delays started. They were not prepared for this effort and by taking over the responsibility themselves; they caused the suppliers to stant the learning curve." On a modular the suppliers to start the learning curve." 13 The Aug. Seattle Supplier C "Bocing's technical problems with the 787 Dreamliner go work or all the suppliers to situat the learning curve." On a modular enterprise or "Bocing's technical problems with the 787 Dreamliner go work on all the completer wing join issue publicly acknowledged by the company. Engineers have discovered wrinkles in ese architection on 787 problem (and said the problem can be fixed with a simple patch." On a modular enterprise of the supplier of the affected section and said the problem can be fixed with a simple patch." On no modular enterprise or dred the supplier of the affected section and the supplier of the affected section and the supplier of the affected section and the supplier of complet the fixe on the fixed pace barels and accomplete the fixed and the indefinite postpomement. Still, the wrinkling is serious complet the fixed sege barels until they can complete the fixed indefinite postpomement of the Dreamler's first flight. Bocing spokeswoman Lori Gunter said that timing was a coincidence, and the first-flight delay action of the affected section or a new fuselage barels until they can complete the fixed postpomement of the Dreamler's first flight. Bocing spokeswoman Lori Gunter said that timing was a coincidence, and the first-flight tains and would no have caused a delay in first-flight tains and would no have caused a delay in first-flight tains and would not have to be repared. Aleanc			 			
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13 The Seattle Firm- Suppliers to stunt the learning curve." On a modular beyond the upper wing join issue publicly acknowledged by the company. Engineers have discovered wrinkles in the fusclage skin just behind the wing that will require sea architec work on 187 Fuselag es Made in Italy to Fix On a "Boeing Stops Work On a modular output to the stop of the single patch." On a modular output to the stop of the single patch." Wirkle d Skin" (Domini c Gates) Firm- stop of the antifaction has already been designed and is being installed nov (in Charleston, South Carolina, and will be g and non- stop of the affected sections in Italy and Evert, Boeing sind in a statement to Sill, the wrinking is serious enough that Boeing's engineers ordered the supplier of the affected section — Alenia of Italy — to stop work ord new fusclage barrels until they can complete the fix of the manufacturing process. Boeing issued a stop- work order thue 23, the same day executives announce the indefinite postponement of the Dreamliner's first flight. Boeing spokeswoman Lori Gunter said that timing was a coincidence, and the first-flight delay came because of an unrelated problem with the upper wing join. "This flightage barrels on airplanes from at least No. 7 through No. 29 will have to be regaried. Alenia has already scrapped two fusclage barrels and sectioned portions of them in an attempt to understand the defect. The problem arises in the manufacture of the osting specifications require accuracy in the manufacture of the osting specifications require accuracy in the manufacture of the setting specifications require accuracy in the manufacture of the stop specifications require accuracy in the tord outler said. If the stringer-edge stop sare the wrong depth, the skin around the fusclage wrinkles. When the fusclage subsequently bends — as when an airplane lands, fo					· · · · ·	
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	According to Boeing's order - signed by Jay Campbell, a	
	senior manager of the 787 fuselage-supply chain, and	
	James Simmons, senior engineering manager for the two	
	defective sections — the problem was introduced into the	
	manufacturing process in the building of airplane No. 5	
	when Alenia began using a new machine to build the	
	stringers at its 787 facility in Grottaglie, Italy. 'Boeing is	
	making every effort to work with Alenia to resolve these	
	issues,' the order states. 'Until the issues have been	
	resolved, this stop-work order will be in effect.' The	
	order states that the wrinkles are big enough that Boeing's	
	defects analysis 'does not sufficiently characterize the	
	structural performance of wrinkles of this magnitude.'	
	The order also cites a <i>Boeing</i> technical manual cautioning	
	that stringer-edge steps higher than 0.04 inch, compared	
	with the specification of 0.015 inch, could 'lead to	
	significant degradation of the structure.' Gunter said	
	the deviations found in the <i>Alenia</i> structures are not that	
	large. The order states ' <i>Alenia</i> has determined that they	
	cannot comply' with <i>Boeing's</i> requirements and	
	requested the step-height tolerances be relaxed. But	
	Boeing decided that 'this is unacceptable in that the	
	subsequent bow wave skin wrinkles represent a risk of	
	a major repair to every unit that is built.' The long-	
	term fix, Gunter said is to let <i>Alenia</i> continue to build	
	the stringers exactly as it has done, and to redesign the	
	-	
	skin at the wrinkle points by adding extra plies of	
	carbon fiber to make it stronger. 'Changing the	
	stringers is difficult,' Gunter said. 'The easier solution	
	is to strengthen the skin by adding plies.' Boeing will	
	do that on all Dreamliners as they are built from airplane	
	No. 30 forward, Gunter said. As for fixing the barrels	
	already produced, Gunter said it amounts to 'putting a	
	patch over the top' of the wrinkled skin. 'The	
	modification is relatively easy to make and requires no	
	special access,' she said. Responsibility for the flaw	
	appears to lie with Alenia, although Boeing declined to	
	assign blame. The stop-work order specifically states that	
	the assemblies built in Grottaglie do not meet <i>Boeing's</i>	
	specification. <i>Alenia</i> representatives in Italy did not	
	respond to e-mail requests for comment before publication	
	time. Gunter said the fuselage skin wrinkling is an	
	entirely separate problem from the one <i>Boeing</i> recently	
	acknowledged. On the day the stop-work order was	
	issued, 787 program chief Scott Fancher publicly	
	explained that first flight was being postponed because of	
	a problem with the upper wing join, not the fuselage.	
	Fancher described a localized separation, or delamination,	
	of the layers of composite fibers in a very specific area:	
	'specifically limited to the upper portion of where the	
	wing and side-of-body join.' But he said the problem was	
	limited to that area. 'This is not a problem that extends	
	out the wings or down into the aircraft,' Fancher said	
	June 23. Since then, Boeing elaborated on its 787 problem	
	most extensively in a teleconference call with Wall Street	
	analysts July 22, the day it announced its second-quarter	

Firm-Suppliers	α	earnings. Boeing CEO Jim McNerney spoke at length about the upper wing join problem, again as a localized issue, and with no mention of the fuselage skin. Gunter said Boeing did not mention the problem because it was not considered a big deal. 'It's really a fairly routine occurrence. It didn't have an impact on the budget or the schedule,' she said. 'things come up regularly in a development program and we just deal with them.' 'It does not have a material impact on the program in terms of either schedule or cost,' Gunter said. Boeing has promised to come up with a new schedule for first flight and delivery by the end of September.'' "'My recent post about Boeing's leak that it had shut down Alenia, one of its suppliers in Naples, Italy, encouraged several people close to the company to contact me. One of these people, who requested to remain anonymous, told me he spent two years working as a consultant with the 787 program across several of Boeing's systems and manufacturing organizations. While I have only exchanged emails with him and spoken to him once, his concerns about the 787 program seem plausible. And he estimates that the 787's problems could take at least another two years to solve. How so? My source told me that there are significant problems with a number of systems for the 787- news of which has so far not reached the public. The delays to date have been blamed on a variety of ills including suppliers not meeting deadlines, an insufficient number of fasteners, a machinist strike, problems where the wing attaches to the fuselage and most recently, fuselage skin wrinkling. But I was stunned by his claim that several of the systems which are being made by Hamilton Sundstrand (HS) a United Technologies (UTX) subsidiary are not working. He identified the the 787's Environmental Control System (ECS), which is intended to pressurize the aircraft, as a particular problem. He says he believes there is not a technological solution to the problem. When I asked Boeing for comment, a spokesperson	On a modular enterpri se architec ture's over- promise and under- delivery . Also on a non- systemi c view on leadersh ip.
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		development program.' A Hamilton Sundstrand spokesperson told me that he had no knowledge of such problems. However, my source told me he spoke just yesterday with an engineer employed by a current Boeing partner who confirmed that this problem has not been solved. In addition to the ECS problems, he says that the 787's electrical system has not lived up to expectations and several redesigns are necessary before the aircraft enters into service. I don't know what my source's motivations would be for providing this information, but given all the delays and leaks, I thought it worth reporting.	

		1	1	1	There is a deeper problem with the 707 and that has to	
					There is a deeper problem with the 787 and that has to do with <i>Boeing's</i> management style. As I wrote in my book, <i>Boeing</i> has a long history of command-and- control leadership where top executives tell everyone else what to do. Under its new CEO, Jim McNerney, Boeing had adopted a so-called Transformational Leadership (TL) approach which empowered workers to make decisions, have ownership, and to take responsibility for success and/or failure. TL was behind <i>Boeing's</i> radical decision to outsource 60 percent of the 787 design and manufacturing to its suppliers. In the past, <i>Boeing</i> had given its suppliers very detailed specifications. But with the 787, <i>Boeing</i> let the suppliers do the design and manufacturing. The first manager of the 787, Mike Bair, was a transformational leader. Bair took the blame for the 787's delays and <i>Boeing</i> replaced Bair with Pat Shanahan from <i>Boeing's</i> defense unit. As such, <i>Boeing</i> reverted back to its old command-and-control style of leadership. My source claims that when <i>Boeing</i> spent three days in the spring of 2008 with HS, the supplier of the 787's electrical systems, <i>Boeing</i> issued orders to its supplier about how it wanted HS to fix the problems. Rather than listen to what HS thought would work, Shanahan's team issued orders. And according to my source, HS agreed to what Shanahan wanted even though it did not believed that his ideas or time-line would work. This story, if true, is deeply troubling because it suggests that <i>Boeing</i> could be panicking and reverting back to its old style of working but this time without sufficient technical know-how to make the right decisions. If <i>Boeing</i> is suffering from this deeper management problem, delivering the 850 787 Dreamliners that the airlines have ordered is going	
20 Aug. 2009	Bloomb erg, "Boeing Cuts travel Amid 'Signifi cant Impact' from 787" (Susann a Ray)	James Bell, CFO, <i>The</i> <i>Boeing</i> <i>Compa</i> <i>ny</i>	Firm	α	to be an even bigger nightmare than I had previously thought." "Boeing Co. said it has reduced travel costs by a third and will keep cutting jobs this year as the recession hurts airlines' profits, the Pentagon axes programs and delays mount on the 787. The 787 Dreamliner's setbacks are 'having a significant impact on our financial performance,' Chief Financial Officer James Bell said in a memo posted on the company's internal Web site today. The Dreamliner, a new airliner being built with lightweight composites to reduce fuel consumption, is indefinitely postponed while engineers reinforce sections along the wing. Chicago-based Boeing, the world's second-biggest commercial jet builder, initially planned to deliver the first 787 aircraft in May 2008. "The cumulative impact of schedule delays on this program has resulted in significant cost overruns and penalty payments to customers that are putting pressure on the program's profitability and increasing our cash requirements,' Bell said. The \$4 billion of new, long- term debt issued over the past few months 'is not a permanent solution' to strengthen the company's	On the a cost implicat ions of a modular enterpri se architec ture's over- promise and under- delivery

—	T	1		financial position, the CFO said. Boeing is about	
1				halfway through 10,000 job cuts and will keep shrinking	
				the labor force as airlines order fewer aircraft and the U.S.	
				Defense Department scales back fighter-jet and missile-	
				defense programs that <i>Boeing's</i> involved in, he said.	
				r 5	
				FlightBlogger Prediction	
				The Dreamliner's maiden flight may be slated for late	
				November or early December, with the first delivery to	
				Japan's All Nippon Airways in the fourth quarter of	
				2010, according to a posting today on Flightglobal.com's	
				FlightBlogger site. The blog cited unidentified sources	
				familiar with the schedule and said that Scott Carson, the	
				head of the company's commercial operations, has already	
				viewed an internal document with a preliminary timetable	
				including planning for production and deliveries. Boeing,	
1				which didn't immediately return a call for comment today, has said it would provide a new schedule by the end of	
1				September, after the latest delay was announced June 23."	
20	The	Firm-	α	"The Federal Aviation Administration (FAA) on	On a
Aug.	Seattle	Gover		Tuesday extended the authority of <i>Boeing Commercial</i>	modular
2009	Times,	nment		Airplanes to self-certify its aircraft and aircraft	enterpri
	"FAA			technologies. Under the agency's new safety oversight	se
	Extends			model, Boeing manufacturing and engineering	architec
	Boeing'			employees will perform delegated tasks for the FAA,	ture's
	<i>S</i>			including signing certificates approving new designs.	attempt
	Authorit			The new system extends further an already established in-	to
	y to			house inspection system at the airplane maker, whereby	integrat
	Self- Certify			much of <i>Boeing's</i> inspection work is delegated to more than 400 company in-house inspectors. Though	e
	Aircraft			appointed by and accountable to the FAA, for the past	govern ment
	"			decade those inspectors have reported their findings	oversig
	(Domini			largely through an internal Boeing organization. The	ht
	c Gates)			new system increases the authority of the in-house	function
				inspectors directly managed by Boeing, allowing them	
				to review new designs, oversee testing to ensure the	
				products meet all applicable standards, and sign off on	
				certification. The FAA is setting up a new Boeing	
				Aviation Safety Oversight Office that will monitor	
				Boeing's internal inspection organization through audits and review of written reports submitted by <i>Boeing</i> . That	
				unit will initially have just eight staff, including two	
				engineers, growing to nearly 30 staff as the new system is	
				phased in. Following completion of training and readiness	
				reviews, Boeing will officially shift to the new	
				certification system, known as Organization Designation	
				Authorization, on Aug. 31."	
				cimelvin Bellingham, WA August 20, 2009 at 3:15 PM	
				"At first read this sounds like a terrible idea. Self	
				reguation usually does not turn out well. I do admit that	
				I am ignorant to the specifics of this and would also like further elaboration."	
			_		
	, , ,			citizenq Seattle, WA August 20, 2009 at 2:47 PM	
				"Would someone please explain as if to a 4th grader?	

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					Given the many issues the latest <i>Boeing</i> jet has had and	
					the many 'fixes' it has required, why is a 3rd party not	
					testing/certifying it to ensure it can fly safely? I'm not	
					questioning <i>Boeing's</i> integrity - it's just a common sense question."	
25	Aviation	Ulf	Firm-	α	Air Berlin says it may cancel its order for 25 Boeing	On the
Aug.	Week	Huett	Custo	~	787s. Delays in the program are 'everything but	consequ
2009	"AirBer	meyer,	mer		satisfactory,' CFO Ulf Huettmeyer says. 'It's no fun	ences of
2009	lin	CFO,			anymore.' Germany's second-largest airline plans to	a
	Mulls	AirBer			make a decision in the next few months. The decision will	modular
	787	lin			be based not only on the program status, but also on its	enterpri
	Order				own long-haul strategy. The airline operates a total of 13	se
	Cancell				Airbus A330s that it originally planned to replace with	architec
	ation"				787s when it ordered the type in 2007. But it has since	tue's
	(Jens				drastically scaled down its long-haul services after its	over-
	Flottau)				strategy to revert to a more business traveler-oriented	promise
					model failed and it was forced to close down new China	and
					routes. Air Berlin officials say that given the 787	under-
					program delays, the airline can easily cancel the order,	delivery
					which was announced on the eve of the 787 roll-out on	
					July 7, 2007. One alternative option considered is to	
					sell the delivery slots to another operator once demand	
					for the type resurges and economic conditions improve."	
27	The	Jim	Firm	α	"The Boeing Company (NYSE: BA) today announced	On a
Aug.	Boeing	McNer	гиш	^u	that the first flight of the 787 Dreamliner is expected by	modular
2009	Compan	ney,			the end of 2009 and first delivery is expected to occur	enterpri
2007	v	Chair			in the fourth quarter of 2010. The new schedule reflects	se
	website	man			the previously announced need to reinforce an area within	architec
		and			the side-of-body section of the aircraft, along with the	ture's
		CEO,			addition of several weeks of schedule margin to reduce	over-
		The			flight test and certification risk. The company projects	promise
		Boeing			achieving a production rate of 10 airplanes per month	and
		Compa			in late 2013. 'This new schedule provides us the time	under-
		ny			needed to complete the remaining work necessary to put	delivery
					the 787's game-changing capability in the hands of our	
					customers,' said <i>Boeing</i> Chairman, President and	
					Chief Executive Officer Jim McNerney. 'The design	
					details and implementation plan are nearly complete, and the team is preparing airplanes for modification	
					and the team is preparing an planes for mountcation and testing.' Based on the revised schedule and other	
					assumption updates, the company has determined that	
					the 787 program is not in a forward-loss position.	
					However, separate from the updated program	
					profitability assessment, the company has concluded	
					that the initial flight-test airplanes have no commercial	
					market value beyond the development effort due to the	
					inordinate amount of rework and unique and extensive	
					modifications made to those aircraft. Therefore, costs	
					previously recorded for the first three flight-test	
					airplanes will be reclassified from program inventory	
					to research and development expense, resulting in an	
					estimated non-cash charge of \$2.5 billion pre-tax, or	
					\$2.21 per share, against third-quarter results. This	
					charge will have no impact on the company's cash outlook going forward. The 787 team working the side-of-body	
					going torward. The 767 team working the side-of-body	

27	Boeing	Jm	Firm	α	reinforcement has completed initial testing and is finalizing design details of new fittings that are expected to ensure full structural integrity of the joint. The static test procedure that uncovered the issue will be repeated and the results fully analyzed before first flight is conducted. Fatigue testing also will be performed on stringer components to validate the long-term durability of the modification. The first 787 test airplane and static test unit have been prepared for the new fittings. Installation is expected to begin within the next few weeks." James Bell (<i>The Boeing Company</i>): (time = 9:30)	On a
Aug. 2009	"787 Progra	McNer	A real of classes and the		"We will reclassify the \$2.5 billion charge of manufacturing cost previously recorded from	modular enterpri
2009	m	ney, Chair			inventory to research and development expense given	se
	Update	man &			that the sole use of these aircraft is flight test activities.	architec
	Webcas t"	CEO, The			This amount will be removed from the program accounting cost base. Further expenditures incurred	ture's accounti
		Boeing			on those planes will be charged to R & D expense."	ng of
		Compa			Robert Stallard (Macquarie Research): (time = 12:15)	non- perform
		<i>ny;</i> James			"James, would it be fair to say that if you didn't take	ance
		Bell,			the \$2.5 billion write-off, that the 787 would be in a	
		CFO, The			forward loss situation?"	
		Boeing			James Bell:	
		Compa			"Ah, no it would not be We had some productivity	
		<i>ny;</i> Scott			assumption updates When we completed that assessment, we found that we were not in a forward	
		Carson			reach."	
		, Preside nt,			<u>Robert Stallard (<i>Macquarie Research</i>):</u> "O.k. but taking the \$2.5 billion out of the program	
		Boeing Comm			should have a pretty positive impact?"	
		ercial			James Bell:	
		Airpla nes;			"I would agree with that."	
		Pat			Joe Campbell (Barclays Capital): (time = 15:00)	
		Shanah an, VP			"James you concerned us by raising the spectre of not being able to rule out a forward loss on the last call,	
		Airpla			and frankly we had thought that you were a long way	
		ne			from that. And it appears that with your answer to Bob Stallard's question that whatever the undisclosed	
		Progra ms,			Rob Stallard's question that whatever the undisclosed cushin between the expected revenues and the expected	
		Boeing			costs are, certainly and apparently more and maybe	
		Comm ercial			considerably more than the \$2.5 bilion which you have written off. Can you give us any color into what are	
		Airpla			the issues that were resolved during the period."	
		nes			James Polli	
					<u>James Bell:</u> " productivity improvements and some operating	
					model adjustments that we think will be appropriate	
					going forward. In the analysis, we found we did not have a forward reach. Now, I'm not telling you that we	
					had \$2.5 billion worth of cushin, but that analysis	
					determined that we were not in a loss position."	

		<u>Joe Campbell (Barclays Capital)</u> : (time = 17:00) "But if you took \$2.5 billion out, effectively if you weren't in a forward loss before the charge, the charge effectively gave you \$2.5 billion more profit later, by expensing it now and taking it out so I'm just doing the arithmetic to conclude that the cushin must have exceeded \$2.5 billion before the write-off, if you didn't have a forward loss even without the write-off. I am just trying to understand it."	
		James Bell: "You don't understand it. That's not the right conclusion. Your first part of the conclusion is correct, obviously writing it off, taking the charge gives us more cushin. It does not assume that you had \$2.5 billion of cushin prior to the write-off."	
		Joe Campbell (Barclays Capital): "How could that be? I'm just I don't follow that, I mean if you took \$2.5 billion out and you were not in a forward loss, even had you not taken it out, then I don't see why you wouldn't have more than \$2.5 billion before."	
		James Bell: "We did the assessment first with it in. We left the test airplanes in the program accounting quantity and did the assessment first, determined that we weren't in a reach, then we went through and did the analysis on those three airplanes and determined that we needed to re-classify the inventory."	
		Joe Campbell (Barclays Capital): "I am sorry, so now you have at least \$2.5 billion. O.k. Great, thanks very much."	
		<u>Howard Rubel (<i>Jeffries & Co.</i>):</u> (time = 18:50) "Why should we have confidence in this schedule?"	
		Jim McNerney: "We have a high degree of confidence in the fix and the time it will take."	
		Pat Shanahan: "I'm feeling good about where we are."	
		Ron Epstien (<i>BofA Securities</i>): (time = 25:45) "What triggered the recognition that the three airplanes weren't commercially viable? Couldn't you have made that decision maybe six months ago? What triggered that now?"	
		<u>James Bell:</u> "We got information that the customers didn't want the first six airplanes over the course of the first part of	

	this year. We got all that information togetherright about now."	
	<u>Heidi Wood (Morgan Stanley):</u> (time = 27:30) "Question for you James. Based on the revised schedule and other assumption updates, and you also talked about operating model changes, based on lessons learned, I am wondering if you are telling us in an indirect way that R&D is going to be going up and that you might be taking some of the development of the derivatives from the suppliers. Can you sort of flesh that out, and if so, how much of the derivative content would you be taking back or describe what would be going back in house."	
	James Bell: "Heidi, I wouldn't go that far. I would say to you that we will be looking at the R&D effort going forward and how to better balance the plan we had previously to one that gives us what we feel better control and better efficiency, better efficient utilization of our technology resources on our derivative models, so we are going through that balance, we have made an assumption to as to what that would mean to what we have had in the past, but I wouldn't go so far as to saying that we just take everything back and redraw the lines but we have on an ongoing basis, over time had experiences here that we have learned from and we've tried to figure out how to utilize those experiences to improve the performance of the program going forward, to improve our discipline, our control over it, and as we come to some concrete assumption as to how we're going to do that, we include in our normal quarterly update of profitability on this program. And that's what you're seeing."	
	Heidi Wood (Morgan Stanley): "But James, I just want to understand from the suppliers side, I mean they've been struggling with – call it – four or five years of no cash on the program, and they think that there are bills for re-work and re- engineering, and in some ways maybe the only way to make up the added expense was to seek better economics on the derivatives. So in some respects are you putting the burden of the forward loss more onto the shoulders of the suppliers?"	
	James Bell: "No, we're not."	
	Heidi Wood (Morgan Stanley): (laughter)	
	James Bell: "You asked and I gave you an answer. We're not. Basically what I said we aere doing is we're looking at	

	how we can make this operating model better for both us and our supply chain and make this program more successful as we figure out how to manage this program better going based on our experience and the lessons we've learned, and that's what we are going to do. But this is not intended to shift any burden to our supply chain this is intended to make the performance on this program stronger for both us and our supply partners."
	Joe Nadol (J.P.Morgan): (time = 30:00) "My question is about the predictive enginerring model. It failed you on the wing-body join, it failed you I believe last year on the wing box. Have you changed the model? Have you decided to discard it and just what are you doing?"
	<u>Pat Shanahan:</u> "We'll let see. The models still remain credible. So there isn't a fundamental change in how we look at composite design.
	Joe Nadol (J.P.Morgan): "Well have you changed the models such that what actually happened now shows up as what would have been predicted?"
	Pat Shanahan: "Absolutely. In the original model, there was a condition that we did not evaluate. The update has that condition modeled. We feel very comfortable now, designing to those models."
	Joe Nadol (J.P.Morgan): "What was the condition?"
	Pat Shanahan: "Well, it was a stress condition that we found in our side- of—body in our test fixture."
	Joe Nadol (J.P.Morgan): "O.K. So you have complete confidence that now that this one change has made the model work for every other structural aspect of the aircraft?"
	<u>Pat Shanahan:</u> "Well, that's two questions. So the first question : I have absolute confidence that the analysis, the modeling and the design associated with the side of body will work.
	<u>Cai Von Rumohr (Cowen and Company):</u> (time = 33:00) "Can you tell us about 787 production rates?"
	Jim McNerney: (whispering to James Bell) "It's the same ramp as the prior schedule."

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					James Bell: "It's the same ramp as the prior schedule." <u>Samuel Pearlstein (Wells Fargo Securities)</u> : (time = 36:00) "Can you share with us the assumptions of forward losswhat kind of order of magnitude you are using? <u>James Bell:</u> "Uh, No. What I can say is that we have sold over 800 airplanes, which usually on a wide-body program at this stage of its production life, we've normally sold a hundred. So you can kind of get a sense of where we're going."		
					<u>Myles Walton (Oppensheimer & Co.):</u> (time = 37:30) "Could you compare the \$2.5 billion charge to R&D to the R&D spent to date on the program?"		
					James Bell: "Obviously this is a significant increase to R&D spent on the program."		
					<u>Myles Walton (<i>Oppensheimer & Co.</i>):</u> "But the \$2.5 billion, is it 25%?"		
					James Bell: "We don't tell ya. We've told you how much BCA has spent on R&D ove the years but we have not, we don't specifically give out what's on this program. Suffice it to say that it is a significant increase to what we spent today."		
					Jon Ostrower (Flight): (time = 44:00) "The 787 has been in a crisis state over the past two years. How has this affected your leadership?"		
					Scott Carson: "Obviously it has been a challenge, and we have taken steps a number of times to strengthen the team where we thought the team needed adjustment based on the lessons we were learning. We have obviously done a lot more outreach and coordination with our supply base, than we had initially. But I would say the team has held up very well to the challenges having <i>Boeing</i> be as large as it is, with as much capability across the enterprise as we have, we have been able to reach out and strengthen the team by bringing people in from IDS and other locations within <i>Boeing</i> . I think the team today is as strong as it has ever been and has held up well to the challenges."		
28	Dla L	Chinin	Einer	G	Jim McNerney: "I would echo that."	0-	the
28	Bloomb	Shinic	Firm-	α	All Nippon Airways Co., the first customer for Boeing	On	the

		1.				agets of
Aug.	erg "All	hiro	Custo		Co.'s more fuel-efficient 787 plane, will seek compensation for a fifth delay in the delivery of its	costs of over-
2009	Nippon Air will	Ito, Preside	mers		Dreamliner. The Japanese carrier will consider buying or	promise
	Seek	nt, All			leasing new planes to make up for the delay, President	and
	Compen	Nipon			Shinichiro Ito said in an interview in Tokyo today. 'We'll	under-
	sation	Airway			study whether to bring in new planes or delay retirements,'	delivery
	From	s			Ito said. 'Discussions on compensation will start from	for a
	Boeing	-			now.' Boeing said yesterday the Dreamliner will fly for	modular
	for 787				the first time by the end of this year and be delivered to	enterpri
	Delay"				customers in the fourth quarter of 2010. The delivery	se
	(Chris				target is about 2 1/2 years behind the original goal of	architec
	Cooper				May 2008. ANA, has ordered 55 of the 787s, which will	ture.
	and				seat as many as 330 passengers. The carrier's initial order	
	Kiyotak				of 50 planes in 2004 was worth about \$6 billion at list	
	a				prices. Rival Japan Airlines Corp. has ordered 35 of the	
	Matsud				aircraft. 'The delay could disrupt the introduction of the	
	a)				787s by a year, said Makoto Murayama, an analyst in	
					Tokyo at Nomura Securities Co. 'ANA will probably	
					receive compensation from <i>Boeing</i> in the form of discounts on new orders.' All Nippon sold new shares	
					last month to raise as much as 142 billion yen (\$1.5	
					billion) to buy planes."	
28	Bloomb		Firm-	α	"The European Union signaled governments will proceed	On
Aug.	erg		Gover	&	with subsidies for the Airbus SAS A350 even if a pending	modular
2009	"Airbus		nment	β	World Trade Organization decision finds previous aid to	and
	A350				the world's biggest planemaker violated global trade rules.	integral
	Loans				'Independently of new developments in the current	enterpri
	'Have				case before the WTO, it has always been our position	se
	No				that any support for the A350 has no relation to the	architec
	Relation				current WTO litigation,' Lutz Guellner, a spokesman for	tures
	, to				the European Commission, said today in a statement. A	relation
	WTO				WTO panel is set to issue a preliminary ruling Sept. 4,	ship to
	Ruling, EU				addressing whether Europe violated WTO rules when the three European nations provided launch aid for previous	govern ment.
	Says"				Airbus models. Airbus benefited from risk-free grants	ment.
	(Andrea				worth \$23 billion over the past four decades, the 2004	
	Rothma				U.S. complaint alleged. Several weeks before the U.S.	
	n and				filed its original complaint, then- <i>Boeing</i> Chief Executive	
	Jonatha				Officer Harry Stonecipher said he wanted to block	
	n				European countries from providing further loans. 'I don't	
	Stearns)				want to wake up next Wednesday and find that Airbus	
					is doing a new plane' with government help, he said on	
					Sept. 2, 2004. The U.S. filed its complaint on Oct. 6, 2004.	
					No Advantage	
					Airbus, a unit of European Aeronautic, Defence & Space	
					Co., hasn't received an unfair advantage, European officials say. 'It's not subsidy but an investment,' U.K.	
					Business Secretary Peter Mandelson said. Airbus itself	
					says it has a right to the loans. 'Boeing received more	
					than \$5 billion in grants and other subsidies for the 787	
					from the U.S. taxpayer alone, none of which is	
					repayable,' the Toulouse, France-based planemaker	
					said in a statement. Loans for the A350 will 'ensure	
					fair competition and level the playing field with	
					Boeing,' Airbus said."	

30 Flightbl Aug. ogger, 2009 "Depen ds Or What Your Definiti on o 'Flight Test" is?" (Jon Ostrowo r)	Hess, (forme r) CEO, Hamilt on f Sundst rand	Firm- Suppli ers	α	"The 787's environmental control system and electrical system have gone through significant development challenges and revisions, a fact publicly acknowledged in 2008 by then CEO of <i>Hamilton Sundstrand</i> David Hess. Simply stated 'We're all late,' Hess said of the entire 787 supply base, including his company's contribution."	On a modular enterpri se architec ture's overpro mise and underde livery
31 The Aug. Boeing 2009 Company y website, Memos to Employ ees from Flightbl ogger	Chair man and CEO, <i>The</i> <i>Boeing</i> <i>Compa</i>	Firm	α	 Boeing Commercial Airplanes President and CEO Scott Carson announced today that he will retire from the company at the end of the year. Boeing Chairman, President and CEO Jim McNerney has named Jim Albaugh, 59, to Carson's leadership role at Boeing Commercial Airplanes (BCA), Both appointments are effective Sept. 1. 'Thanks to his leadership and operational experience, Boeing Commercial Airplanes has performed extremely well in a tough business environment and remains positioned solidly for continued market success,' said McNerney. Message to Employees from Scott Carson "Today I am announcing my retirement from Boeing. My decision is tied to many factors, but perhaps the most important reason for me was resetting the schedule on the 787. With this baseline in place the new leader will have a clear path forward. I also know that you will give Jim the same outstanding support and world-class effort that you have demonstrated to me over the past three years. I wish you every success and thank you from the bottom of my heart for the journey we have taken together. Sincerely, Scott Carson" Message to Employees from Jim Albaugh "To this day, I believe Boeing did more to change the 20th century than any other company on Earth. Over the past 90 years, Boeing has led the way in commercial aviation. Boeing is truly an iconic company and I believe we have the opportunity to change the 21st century just as we have changed the last one. The 787 is the starting point. In its soul, Boeing has always been and remains an engineering company. As an engineer I look forward to learning from and working with you. Working with the world's premier commercial airplane company team as we prepare to fly two revolutionary airplanes - the 787 and 747-8 - is an opportunity of a lifetime. And today we are facing significant issues on our two major development programs. Going forward I believe we have three imperatives: flawless execution, profitable growth and improve efficiency. I know we have the rig	On leadersh ip changes in a modular enterpri se architec ture.

I. Feedback on Research

The following appendix summarizes the written (not spoken) feedback that the author has received from participants involved in critiquing and co-developing the theory. The participants have included executives in organizations comprising the primary sample, professors, graduate students and other executives who challenged the theory's internal validity (by proposing plausible rival hypotheses), external validity or generalizability and parsimony. Having taken into account their feedback over the past seven years, and continuously iterating and updating the theory, the following comments summarize the level of "fit" with their empirical experience.

Custom Executive Education at Fortune Global 100 Companies Executive Feedback

"Ted, thank you again for your time with us and our leadership team. The breadth of your talents continues to amaze me. You are helping guide us down a path that represents the most significant (and most difficult) transformation this company has been through. This is shaping up to be one for the history books and you are playing a pivotal role. I imagine it won't be long before Porter is replaced by Piepenbrock in business schools. Cheers..."

Director of Business Strategy Fortune Global 100 Company

- "You may be in some ways... bigger and more important than our [leadership] team... based on your many achievements." (Chairman, President & CEO)
- "Ted, thank you... I learned a lot. We need to find a way to have more time as these are important issues for us to grapple with." (President & CEO)
- '[Because of 'Red-Blue'] we are going to re-evaluate our whole business, our understanding of the industry, what our competitor does and what it takes to be successful.' (President & CEO)
- *'Tremendous.' 'Fascinating.' 'Meaningful and impacting.' 'This is our future.'* (President, CEO; VP Business Strategy & Marketing; VP, CFO)
- 'Ted was among the best speakers we have ever had, and his topic was extremely relevant to us.' (President, CEO)
- 'Ted's 100,000 foot view of our industry allowed me to see for the first time a 100-year history of where we've been and where we're headed. It helped me so much to move forward with new understanding and conviction.' (Chairman of the Board)

- "Your presentation and subsequent questions reflect a deep understanding of our markets and competitive environment. Your expertise, enthusiasm and energy are refreshing and very welcomed. I shared several of your top-level observations with [our Chairman and CEO] who was intrigued. Thank you again." (SVP, Business Development & Strategy)
- "Expanding our comfort zones is what it will take to win. Count me in." (SVP, Business Development & Strategy)
- "Ted, enjoyed the meeting and conversation. Look forward to future meetings." (SVP, COO)
- "Our leadership team values the time we spent with you and the learning that has taken place. You have challenged our thinking, and encouraged us to mature our strategies. I am looking forward to seeing you again very soon." (VP/GM)
- "i can't tell you how much I enjoy the time we are able to spend together. it really helps remove the cobwebs from my brain and to re-energize me. i hope we are able to continue our learning together and to continue expanding the size of the circle." (VP/GM)
- "I can't thank you enough for your active involvement and encouragement. It really does help to know you are working so hard to bring new thinking (and action) into the place." (VP/GM)
- "i really enjoy our meetings because i leave thinking about a lot more important, and complex, issues than i did when i arrived." (VP/GM)
- "Great learning today... you are a very good teacher." (VP/GM)
- "Thanks ted. As always, it was good to see you and to get the old brain engaged." (VP/GM)
- "i'd say the outcome was a major opportunity for us to move forward. it gave me hope. ted....thanks for helping us learn." (VP/GM)
- "ted, thanks for staying in touch. i miss our discussions and the learning that has gone along with those sessions." (VP/GM)
- "as usual, our time together was too short. i always learn a lot and our discussions provide a welcomed time for me to think about our future." (VP/GM)
- "I wanted to let you know how much I enjoyed our lean enterprise discussions. I look forward to continuing the conversation." (VP/GM)
- "I think the world of Ted and the work he has been doing." (VP/GM)
- "Everybody [on the Leadership Team] thinks it's beneficial to continue to use Ted." (VP Business Strategy & Marketing)

- 'Many thanks for taking the time with us to share your thoughts and insights. I hope there are opportunities going forward for us to continue to share and learn.' (VP, CFO)
- "I think we're in for several interesting sessions Ted and hopefully some real progress. Thanks!" (VP, CFO)
- "Great perspective and review. Thanks." (VP, CFO)
- "Ted, our "red v. blue" strategy is number one on our strategic agenda for 08. We need to pull the team together to discuss how we'll rollout the discussions/data for the leadership team--time is of the essence. Thanks for your support!" (VP, HR)
- "Thanks, Ted always a pleasure. We're making progress look forward to our next session." (VP, HR)
- "Ted really enjoyed the time with you and the team. Look forward to future discussions!" (VP, HR)
- "We had a good session with our Leadership Team, and Ted... is critical to our efforts." (VP, HR)
- "Nice to meet you. Very thought-provoking stuff." (VP, Strategic Management)
- "Ted has a gift, passion and provocative vision that reaches people. We are privileged to learn and partner with him." (VP, Strategic Management)
- "Ted, thanks for staying close to us, believing in us... and pushing us. You are making a difference! (VP, Strategic Management)
- "It warms my heart to see the team finally get the traction we needed. You told us from the very beginning to go slowly and that it would take a long time. I wasn't sure if the team was going to have the emotional resilience they needed to be successful, but they did and I love them for it. I cannot thank you enough for believing in us and believing that a little strategy team could help drive such significant change. Now you have senior leadership to drive and lead this. Wow. Don't ever give up on us. We just might surprise you :)" (VP, Strategic Management)
- "I always enjoy the dialog and exchange of thoughts, ideas and concepts. Sure hope we can get this moving..." (VP, Finance)
- "Ted I thought we had a rich conversation during the meeting and I look forward to working with you in the future." (VP, Finance)
- "Thank you for your years of contribution to [our company] and myself. I know how much you have helped me grow as a person and hopefully as a leader." (VP/GM)

- "Thank you Ted. Inspiring to learn from you a usual. The whole team, even those who were quiet received a lot of energy from the dialog. I look forward to the next engagement." (VP/GM)
- "Your presentation was outstanding and it really got me thinking." (VP)
- "Ted, the magic you add to the equation for the leadership team, renewed my confidence that we can pull this off. To see that same spark of confidence energized among those who are leading was fantastic." (Director, Business Strategy)
- "You are an integral part of this team and I cannot envision us pulling this off without your continued participation." (Director, Business Strategy)
- "Ted, the level of your commitment to help us succeed is astounding." (Director, Business Strategy)
- "Thank you for your tireless efforts continuously nudging the system in the right direction." (Director, Business Strategy)
- *"Ted, thanks again for your tireless support of the team and [the company]."* (Director, Business Strategy)
- "It was really helpful, as usual, to have your insight and guidance during such tense times." (Director, Business Strategy)
- "Your help in growing our understanding of the system and how to facilitate change is incredible for me. My head is in the game and I'm enthused. I don't think I ever thought we'd get to this day, this soon. I totally understand we have a long way to go, but still... It's impressive. I've mentally recommitted to this, knowing it will continue to be hard but that we can be agents of change. Thanks again. We couldn't do this without you." (Strategy Analyst)
- "Ted, i would like to thank you again for all the time and effort you have invested in me. i hope you can see the immense impact it has had... and i'll always be grateful. i've had so many kind words from the team regarding my leadership and support and i know that wouldn't be possible without all that you have invested in me. With the deepest gratitude...' (Strategy Analyst)
- "I want to thank you for your leadership. You have always helped me to find my True North and have been the one leader who has never let us down." (Strategy Analyst)
- "I am so grateful for your guidance and leadership and for supporting me in my toughest times." (Strategy Analyst)
- "Thanks again for your guidance and leadership." (Strategy Analyst)

- "Ted, I wanted to thank you for everything you have done for me and the team. You have had and continue to have a profound impact on my life and the way I see things – and I am grateful for that. Thank you again for continuing to help me personally. You are truly extraordinary and I am grateful to have the opportunity to work with you." (Strategy Analyst)
- "You have this extraordinary ability to turn every situation, no matter how difficult, into an opportunity. You truly embody this notion of finding the potential in all things. It is a rare and beautiful thing to see." (Strategy Analyst)
- "I want to say thank you. Thank you for your continued support as a part of our team. Thank you for always helping us become better leaders. I hope you know that we consider you part of the our family." (Strategy Analyst)
- "Thank you for continuing to coach us in the learning process. Your contributions to the team are appreciated. Also, thank you for your commitment to us. I look forward to continued engagements." (Strategy Analyst)
- *"Thank you for the privilege to work and be a part of a team with you."* (Strategy Analyst)
- "Your work on enterprise architecture is right on!" (Strategy Analyst)
- "Your work /research has been inspirational, and I highly value both the substance/content as well as the way you approach to have meaningful dialog." (Strategy Analyst)
- "This is a major change in our strategic direction. Your ingenuity, articulate presentation, teamwork, and patience have paid off after years of steady approach in sharing the enterprise architecture. Congratulations and thank you! Hope you'll be back here soon and we can discuss more in depth!" (Strategy Analyst)
- "It was a very thought-provoking session. Thanks for taking the time and look forward to further discussions." (Strategy Analyst)
- "I attended your presentation at the Lean conference. My one word evaluation 'Brilliant.' Thank you for your 100K ft level analysis!" (Analyst)
- "As always, you have stretched my thinking and I think have set the stage for our continued discussions. Ted, thanks for helping us to see clearer and for your passion on the subject. Its contagious!" (Director, Strategic Initiatives)
- "I found our discussion fascinating and feel your knowledge of [our company] incredibly valuable. I would like to keep a dialog open between us and work towards establishing opportunities for you to share your wisdom with us." (Director, Career Development)

- "Your dissertation is the most compelling, comprehensive explanation of business and management I have seen. I recognize that it is much more than just business and management but I'd run out of bytes trying to list all the disciplines that are encompassed." (Strategy Analyst)
- "I wanted to congratulate you on influencing and shaping how corporations and all of the stakeholders think about sustainable competitive advantage... perhaps even allow us to fundamentally reconsider how and why the corporation exists." (Strategy Analyst)
- "Ted, I just wanted to say how much I appreciate you taking the time to chat. As I said before, it was incredibly illuminating. I've spent the last several days feeling a bit like Moses coming down from the mountaintop with a new found clarity." (International Industry Blogger)

"We appreciate the thinking and originality of your research and the energy you bring to the world of executive learning. Thank you for the time that you spend with us, Ted."

Gay Haskins Dean, Executive Education Saïd Business School, University of Oxford

"Ted's lecture at our executive education programme went over splendidly."

Prof. Rafael Ramirez Professor of Management, HEC School of Management, Paris Fellow in Strategic Management, Saïd Business School, University of Oxford

- "Subject matter was outstanding. I found the subject matter a key element of our mission success."
- "Data was dynamite, great story for us to learn. Very knowledgeable presenter, he mentioned lots of things from Wharton."
- "A fascinating insight into what may lie behind successful companies. It made me consider own business strategy & question our approach to short & long term gain."
- "Astoundingly compelling thesis and seductively presented. Sampling this work in, say, another two or three years would be interesting to get a better view of 'Redness' and 'Blueness' and perhaps taking 'Red' attributes into a 'Blue market'."
- "Very thought provoking. Lots to think about and learn."
- "Main points:
 - o good 'out-of-the-box' analysis of underlying long term performance.
 - o high energy impact.
 - o knowledgeable of subject matter with good real world examples."
- "Good connection to our company- very relevant and great discussion over dinner. Would like to do more with the rest of our company on the 'Red Blue' debate."
- "Ted's material was excellent. The 'Red vs. Blue' contest is very relevant to our business environment."

- "Provided a set of strong concepts that challenge the way things may be viewed. My thought is how in an established organisation can you achieve the 'Red' outcomes?"
- "Provocative: this tension of 'Blue' vs. 'Red' companies is worth further exploration. And is the best state being both?"
- "The red/blue concept is awesome and should continue as part of this course."
- "We needed a whole day on this to get the benefit."
- "Very interesting."
- "Lots of information; extremely interesting. Good session, and overall enjoyment."
- "Enjoyed the content and delivery."
- "Wish we had more time on this."
- "Very good although 'very fast' presentation. 'Red vs. Blue' comparison quite revealing. Needed quiet reflection to understand what had actually been presented."
- "Very stimulating. Excellent content."
- "Excellent material. Great value."
- "Very interesting need more time."
- "Very thought provoking. Many lessons here."
- "Very thought provoking analysis. Completely different perspective from anything I have seen before. It will be interesting to see how we evolve, knowing this data exists."
- "Obviously extremely knowledgeable."
- "Very interesting concepts, though provoking. I would have enjoyed spending more time on this and understanding the 'integral' business type further."
- "Very provocative. Good energy. Very lively and engaging discussion."
- "Good material which stimulated thought. Could have debated for hours!"
- "Super speed!!"
- "A little quick needed to spend much more time on this. Red/Blue interesting concept but requires more time."

- "Massive amount of material."
- "Outstanding!"
- "Ted was incredibly able to think at pace, however it needed more time and slower pace to review the outcome and the impact to [our company]."
- "Excellent model and concept which is very relevant to us."
- "Excellent topic."
- "I really enjoyed the fast paced, in-depth and interactive module."
- "Unbelievable real food for thought we are blue. A high speed journey, could have spent all day."
- "Content was excellent. I would have liked the session to be extended."
- "Very interesting."
- "Overall I found Ted's session incredibly mentally stimulating; however, it may have been useful to dedicate more time to this session."
- "Very eye-opening discussion with some useful links to what we do. Ted discussed his subject with passion!"
- "Ted has a massive knowledge on the subject."
- "An eye-opener of a session! A longer session could have been beneficial."
- "Great content and discussion."
- "Very intriguing subject, rich in content and discussion and energetically put across!"
- "Very thought provoking."
- "High velocity information transfer! Red and Blue meta-models will allow me to advance a critical debate within the business relating to entering a new market."
- "Much learning and interesting subject matter."
- "Thought-provoking."
- "Very interesting, we could have spent longer on this topic."
- *"Fascinating stuff."*

- "Red/blue concept was illuminating."
- "Very bright individual with a good story to tell."
- "Very interesting proposition."
- "Thought provoking presentation."
- "Ted had some incredible information."
- "The red/blue concept was good."
- "Very good concepts."
- "Very good material."
- "The 'blue' and 'red' models were interesting."
- "Worth hearing for longer."
- "It really challenged us to think differently about what we are doing."
- "A lot to take in!"
- "Top notch!"
- "Good message."
- "Very compelling opens up the aperture."
- "Brilliant mind."
- "Great content."
- "Fascinating. Ted is always thinking. For me more time is required on this!"

"Congratulations on the excellent presentation you made. I'm so thankful that I was invited to attend your session. You could hear a pin drop...we were spellbound, hanging on every word. Listening to you was like being in the presence of a great 'business prophet'. You will be known as a da Vinci of the 21st century. You have the ability to engage an audience around a very challenging and compelling subject, even inviting others to participate in the process of discovery and debate. Your sincerity, humility, and competence were so refreshing."

> Dr. Rita Murray CEO, Performance Consulting Group, LLC

- "Mr. Piepenbrock has a masterful understanding of a very complex business model and is able to present this information is an understandable manner."
- "Ted Piepenbrock shared a wealth of information that inspired excellent questions, discussions and hopefully actions from all of us. I feel very privileged to have been in the company of respected members of the leading industries in the country. It was an affirmation to me that leaders of industries really do care, respect and seek out each other to exchange ideas and knowledge to work toward a common goal of succeeding."
- "I was fortunate to attend your event. I was very impressed with the depth of information you shared. I have a burning desire in me to understand why there is such a difference from companies like Toyota, Airbus and Southwest to all the rest. Your presentation was very enlightening and inspiring; and presented with such passion that I feel very privileged to have been able to partake in this type of forum. Thank you for sharing your years of experience and knowledge gathering."
- "Very well done and researched. Ted has a high level of energy and was very engaging."
- "Excellent content. Thought provoking. Immediately started dissecting my own company based on these values and criteria."
- "Your talk was very interesting. If one of your goals is to be thought-provoking, you have succeeded."
- "Nice job, Ted! Clearly knowledgeable and passionate on the subject."
- "Wonderful work. The delivery was exceptional."
- "This is my first experience with MIT and I thoroughly enjoyed it. I would welcome the opportunity to partake in future events."

- "I enjoyed the day very much. Ted is an outstanding speaker!"
- "So much info. so little time! Interesting, interesting, interesting stuff!"
- "Love the concepts."
- "Good data."
- "Very good material being shared fact based."
- "Very good session. I learned a lot of strategy for future opportunity."
- "Presenter was nimble and able to bring up slides to support the emerging conversation."
- "Would look to schedule a presentation of this material for Senior Leadership."
- "The content was informative and was a positive learning experience, somewhat different than what was expected."
- "First time I have seen this concept."

"This is either the work of a madman or a genius – and at this point, I am inclined to think that it is the latter."

Dr. Michael Hammer Author: Reengineering the Corporation Time Magazine's "25 most influential individuals" Professor, MIT; Associate Fellow, University of Oxford, Saïd Business School

- "Ted's work is the stuff that ground breaking business books are made of."
- "Ted is exceptional, truly outstanding and consistently exceeds very high expectations. He is a superb speaker and a brilliant analyst of strategy in the broadest sense. He is very mature and has a great deal of experience interacting with senior executives. In many ways his work and thinking have gone beyond my own...."
- "Ted has developed an excellent mastery of the business strategy and organization behavior literatures and would be an invaluable colleague."
- "The class enjoyed your presentations very much. Your lectures received more positive feedback than any other speaker! They really appreciated your work."
- "Your work is very well perceived and helped to inform the broader set of attendees as to the value of the kind of enterprise research we are doing. It definitely helped to differentiate us from the typical "lean" research."
- "You had a most impressive presentation. The implications of your work could be significant. Keep up the great work ... and the passion....."
- "You must have done an outstanding job at the symposium, since I've heard several people mention your work."
- "Ted, I believe there is a great story to be told. You can have a great life doing what you are doing the way you are doing it."
- "Things went GREAT with Ted today! Where can I start???? I have been blown away with Ted's class today. It was meant to stop at 4 but it went on up until 6.30pm with at least 10 hardcore listeners until the end. I have been blown away. A really good presentation.. and it was nice to see how his research has evolved in two years."
- "I think the speaker series is a great addition to the content of the course. This was especially the case with Michael Hammer and Ted Piepenbrock's talk."
- "Other concepts I found particularly interesting were Hammer's Process Enterprise and Piepenbrock's Modular versus Integrative."

- "Ted Piepenbrock's lectures on integrated and modular enterprises helped me build on the principles that Prof. Charles Fine introduced in his book, Clockspeed."
- "One speaker that I found particularly interesting was Ted Piepenbrock. I found that he gave a fresh perspective on different types of enterprises."
- "I thought that Ted Piepenbrock's presentation was a fascinating study in modular versus integral enterprises and how that underlying structure of the enterprises slates it for making or taking the market. Though I am taking a strategy course at the Sloan School, Ted's spin on strategy was thought provoking and challenging to the simple frameworks that we use on the Strategy course. I realized that in many of my courses at Sloan, we do not take into account all aspects of the enterprise but instead focus on various sections. Ted's research opened me to the idea of how organizations may be forced to significantly reinvent or die due to the company architectures and the state of the industry. It is tempting to continuously improve when a serious re-architecture is needed as Ted Piepenbrock pointed out."
- "To understand architecture one needs to understand the political and cultural dimensions of leadership and architecting, as Ted Piepenbrock described. And to facilitate a process of reflection and organizational development, one must be able to diagnose the larger structural forces generating interpersonal challenges, as well as contribute intelligently to visioning and rearchitecting conversations. Within academia, the process orientation has fallen by the wayside with the conclusion of Argyris, Schon, and Schein's academic careers, and the structural orientation is resurgent. The class, with the possible exception of Ted Piepenbrock's presentations, swung too far in this structural direction."
- "With Ted Piepenbrock's research/executive education efforts at [Fortune 100 company], the audience is the Board of Directors, who are trying to make architectural decisions about their enterprise. Ted's role is not to be an outside architect; rather he is operating as a kind of facilitator in the board's own thinking about its architecture. He does, however, carry out his own research in the firm – this gives him credibility with that audience and helps him elucidate the key choices and consequences facing them in their architecting (i.e., modular versus integral enterprise). It is, I would argue, more sophisticated in its understanding of enterprises as enacted systems and enterprise architecture as a practice that requires embedding. This isn't to say that implementation will be successful – Ted himself thinks it will be near impossible for a modular enterprise to become integral. But he is putting the possibility of implementation at the center by locating architects and audience in the same, very powerful people and using himself and his expertise as provocation and facilitator."
- "I attended your lecture on Boeing & Airbus I and found your presentation fascinating. This is a fascinating topic for me and it will be great to become more educated in the concepts."
- "I find your research on Red and Blue companies fascinating."
- "Your lecture on Blue vs. Red companies, was one of the best and most interesting lectures I had while at MIT. I think there are a lot of good lessons I can use throughout my career."

action research, 253, 278, 282, 283, 700 Airbus, 128, 136, 140, 162, 210, 211, 233, 234, 235, 265, 267, 273, 283, 284, 286, 291, 324, 325, 327, 328, 401,

402, 456, 474, 479, 491, 717, 723

Architectural, 181, 335, 341, 385, 432, 454, 487, 571, 574, 576, 577, 578, 579, 716, 720

architecture, 59, 86, 119, 127, 133, 140, 161, 173, 185, 190, 194, 195, 204, 206, 207, 209, 218, 219, 222, 228, 234, 245, 247, 251, 252, 253, 257, 286, 294, 327, 328, 335, 336, 339, 341, 343, 350, 371, 377, 384, 385, 386, 387, 392, 401, 402, 414, 430, 432, 433, 439, 440, 456, 457, 458, 459, 460, 461, 472, 475, 477, 478, 487, 516, 517, 524, 540, 541, 542, 545, 546, 547, 548, 571, 577, 578, 694, 695

B

Behavioral complexity, 270

- Boeing, 10, 128, 136, 162, 210, 233, 234, 235, 265, 267, 273, 283, 284, 286, 287, 289, 324, 325, 328, 402, 456, 474, 479, 491, 578, 717, 723, 763, 765
- Burns and Stalker, 185, 193, 223, 235, 365, 366, 392, 439, 515, 516, 571, 747

С

- chaos, 192, 218, 299, 383, 436, 751
- clinical methods, 225, 252, 278, 281, 283, 284, 285
- Co-Evolution, 583, 742
- community ecology, 220, 375, 481
- competition, 3, 12, 48, 49, 50, 51, 53, 59, 60, 61, 63, 64, 65, 68, 72, 73, 76, 91, 95, 97, 104, 105, 107, 108, 110, 111, 114, 115, 119, 121, 127, 128, 132, 134, 136, 145, 159, 167, 182, 199, 205, 210, 221, 230, 247, 262, 265, 267, 271, 302, 306, 329, 330, 331, 333, 347, 349, 350, 351, 352, 358, 381, 397, 408, 441, 457, 459, 460, 465, 468, 481, 483, 485, 486, 487, 490, 494, 495, 498, 499, 509, 517, 539, 571, 572, 585, 586, 591, 593, 595, 596, 597, 598, 599, 601, 615, 617, 618, 621, 622, 623, 632, 633, 636, 637, 638, 650, 654, 695, 706, 750, 751, 771, 777, 806, 811, 835, 856, 878, 935, 939, 951, 957, 965, 990, 1013, 1069, 1141, 1165, 1182, 1203, 1234, 1242, 1273, 1291
- complexity, 6, 128, 135, 139, 145, 147, 191, 195, 218, 219, 221, 222, 240, 260, 273, 282, 300, 301, 303, 328, 383, 385, 392, 432, 439, 510, 511, 512, 514, 571, 694, 751
- configuration, 191, 192, 193, 194, 195, 196, 221, 305
- contingency, 185, 187, 190, 192, 218, 223, 245, 365, 380, 515, 516, 517, 571, 747
- Corvi, 3, 7, 10, 130, 234, 554, 763, 773, 774, 989, 1006, 1008

D

discontinuity, 268, 509, 519, 524, 541, 576, 577

dominant design, 51, 95, 97, 99, 101, 102, 104, 114, 141, 222, 264, 421, 518, 519, 520, 521, 524, 542, 545, 571, 572, 575, 576, 577, 632

dynamic complexity, 328

Ε

- ecology, 3, 56, 59, 62, 64, 70, 71, 72, 73, 105, 106, 107, 108, 111, 121, 141, 152, 186, 223, 235, 373, 374, 375, 481, 487, 498, 500, 516, 517, 521, 523, 574, 585, 587, 591, 593, 599, 620, 695
- economics, 128, 185, 218, 219, 221, 240, 245, 258, 342, 343, 350, 353, 354, 356, 372, 376, 377, 410, 441, 501, 516, 517, 518, 523, 700, 741, 747
- Ecosystems, 1, 3, 13, 485, 681
- Engineering Systems, 8, 127, 130, 203, 204, 205, 206, 207, 209, 210, 211, 222, 286, 303, 304, 699, 715, 727, 728, 744
- enterprise, 3, 8, 13, 59, 86, 127, 128, 133, 136, 140, 146, 147, 150, 152, 153, 161, 162, 172, 173, 180, 185, 190, 191, 192, 193, 194, 195, 196, 197, 204, 205, 206, 207, 209, 211, 218, 219, 222, 225, 228, 247, 249, 251, 252, 253, 262, 263, 264, 267, 271, 273, 283, 695
- enterprise architecture, 133, 140, 209, 234, 335, 336, 341, 350, 402, 457, 472, 487, 516, 545
- environment, 59, 65, 119, 127, 132, 133, 135, 136, 139, 140, 141, 143, 145, 150, 152, 172, 173, 180, 184, 187, 193, 195, 196, 204, 218, 221, 222, 223, 230, 233, 250, 251, 262, 271, 273, 294, 306, 308, 328, 331, 339, 356, 363, 364, 372, 378, 387, 428, 446, 459, 472, 477, 486, 487, 490, 494, 499, 501, 508, 510, 511, 512, 514, 515, 516, 517, 518, 523, 524, 534, 540, 541, 542, 547, 548, 570, 571, 573, 578, 583, 694, 695
- ethnography, 253, 282, 283, 296
- Evolution, 1, 3, 12, 13, 49, 50, 51, 56, 57, 59, 60, 61, 63, 64, 66, 67, 69, 70, 71, 91, 97, 103, 105, 110, 119, 120, 121, 122, 124, 127, 128, 132, 134, 141, 143, 145, 158, 160, 164, 169, 170, 171, 173, 174, 178, 180, 183, 191, 194, 195, 196, 197, 199, 200, 201, 204, 206, 215, 220, 221, 222, 224, 226, 233, 247, 253, 255, 256, 259, 264, 267, 274, 299, 300, 301, 302, 303, 304, 305, 331, 333, 338, 353, 363, 373, 382, 386, 401, 410, 418, 436, 446, 449, 455, 465, 481, 482, 483, 485, 486, 493, 494, 495, 496, 497, 498, 499, 501, 502, 505, 506, 514, 515, 516, 517, 518, 519, 520, 521, 523, 525, 534, 536, 538, 540, 541, 543, 544, 545, 546, 547, 548, 570, 571, 572, 576, 577, 583, 585, 615, 684, 685, 688, 689, 695, 700, 709, 711, 713, 717, 719, 720, 734, 736, 742, 751, 857, 1013, 1066, 1141
- exploitation, 162, 432, 459, 494, 572
- exploration, 162, 230, 235, 239, 243, 249, 342, 360, 362, 433, 460, 494, 572, 1316

- Fine, 1, 3, 6, 8, 9, 47, 57, 63, 71, 75, 83, 122, 127, 130,
- 152, 158, 172, 219, 227, 235, 245, 267, 296, 299, 335,
- 385, 391, 393, 401, 403, 408, 428, 430, 433, 460, 546,
- 566, 575, 685, 687, 703, 710, 853, 1322
- Forms, 374, 432, 436, 706, 709, 731, 742, 763
- function, 127, 136, 178, 180, 184, 197, 204, 205, 206, 207, 350, 363, 386, 387, 455, 459, 523, 534, 576, 578

G

- General Motors, 272, 327, 478
- grounded theory, 128, 166, 187, 211, 218, 223, 230, 231, 239, 240, 241, 243, 245, 263, 278, 286, 287, 296, 307, 361
- growth, 86, 146, 162, 173, 219, 221, 222, 247, 257, 285, 341, 432, 437, 441, 443, 446, 447, 453, 455, 456, 457, 458, 459, 460, 469, 473, 478, 485, 487, 488, 492, 494, 497, 505, 506, 510, 517, 518, 534, 541, 542, 545, 546, 571, 572, 573, 578, 684, 705, 711

I

- integral, 3, 59, 77, 128, 130, 140, 190, 194, 234, 264, 273, 336, 341, 342, 343, 350, 353, 356, 383, 384, 386, 391, 402, 414, 416, 421, 427, 432, 433, 439, 455, 456, 457, 458, 459, 460, 471, 472, 473, 474, 478, 487, 490, 492, 494, 510, 511, 516, 524, 541, 545, 546, 547, 548, 572, 576, 577, 578, 695
- inter-species, 3, 12, 50, 59, 60, 63, 64, 65, 105, 111, 121, 128, 586, 599, 601, 621, 622, 623, 638, 654, 695
- intra-species, 63, 64, 115, 119, 373, 593, 595, 596, 597, 598, 601, 615, 617, 618, 633, 636, 650

L

- Lawrence and Lorsch, 127, 150, 185, 187, 189, 218, 223, 244, 272, 365, 369, 370, 392, 447, 513, 514, 515, 516, 523, 571, 747
- life cycle, 91, 241, 267, 496, 497, 503, 518, 523, 524, 544
- life-cycle, 3, 59, 128, 206, 294, 497, 501, 508, 512, 518, 523, 524, 695
- long-term firm performance, 3, 59, 127, 128, 140, 150, 151, 159, 172, 205, 206, 209, 218, 221, 222, 324, 327, 334, 440, 462, 493, 583, 694, 695

Μ

Marnette, 7, 130 modular, 3, 59, 77, 128, 190, 194, 234, 264, 336, 341, 342, 343, 350, 356, 383, 384, 391, 402, 414, 421, 427, 432, 433, 439, 455, 456, 457, 458, 459, 460, 471, 472, 473, 478, 487, 492, 494, 516, 524, 541, 542, 543, 545, 546, 547, 548, 571, 572, 576, 577, 578, 695 morphology, 3, 48, 56, 59, 70, 71, 72, 176, 362, 695

Ν

Nightingale, 1, 3, 6, 9, 130, 208, 209, 219, 234, 385, 401, 699, 727, 728

0

objective function, 350, 386 open systems, 363, 364, 427, 432, 433, 446, 516

Р

Penrose, 60, 61, 66, 133, 135, 161, 167, 175, 218, 219, 221, 222, 224, 227, 239, 241, 244, 257, 258, 264, 335, 383, 441, 442, 443, 453, 459, 460, 473, 506, 703, 719, 729, 733, 747, 748, 749

physiology, 3, 48, 56, 59, 70, 71, 72, 176, 362, 695 population ecology, 500

Porter, 52, 53, 57, 61, 64, 68, 69, 71, 72, 76, 83, 86, 91, 121, 132, 145, 147, 151, 152, 161, 166, 170, 213, 218, 227, 243, 260, 263, 264, 302, 327, 338, 353, 383, 384, 408, 462, 477, 494, 497, 515, 518, 523, 539, 546, 573, 704, 725, 726, 730, 746, 748, 749, 1309

R

- Repenning, 63, 66, 296, 299, 301, 416, 421, 488, 729, 732, 733, 738
- retention, 3, 59, 70, 145, 179, 180, 200, 265, 484, 499, 548, 695, 1162

S

- Sako, 7, 63, 130, 132, 169, 219, 385, 386, 387, 397, 402, 409, 416, 426, 541, 692, 733, 734
- selection, 3, 57, 59, 64, 70, 121, 124, 127, 145, 173, 179, 180, 200, 244, 259, 264, 265, 273, 274, 275, 331, 382, 484, 498, 499, 524, 548, 574, 575, 695, 898, 918, 1078, 1186, 1285
- Sheffi, 3, 7, 9, 130, 709, 736
- sociology, 219, 240, 245, 258, 376, 377, 441, 501, 517, 576, 747
- Southwest, 140, 211, 235, 272, 273, 310, 311, 327, 416, 439, 479, 717

stability, 146, 192, 193, 194, 206, 222, 246, 247, 299, 341, 361, 433, 446, 447, 448, 455, 456, 458, 459, 474, 478, 487, 488, 492, 494, 510, 572, 573

- stakeholder, 6, 60, 86, 135, 136, 150, 152, 161, 219, 223, 224, 234, 240, 251, 264, 281, 289, 292, 293, 294, 295, 310, 336, 341, 363, 372, 386, 416, 421, 422, 423, 424, 432, 433, 457, 488, 490, 542, 735
- strategic management, 127, 131, 132, 133, 136, 139, 147, 161, 167, 178, 185, 187, 191, 192, 193, 203, 205, 206, 209, 218, 219, 221, 222, 225, 228, 230, 239, 240, 244, 245, 258, 261, 262, 263, 272, 281, 285, 301, 303, 304, 305, 306, 372, 376, 380, 383, 441, 454, 457, 490, 494, 517, 518, 523, 542, 747
- Structural Dynamics, 1, 3, 13, 172, 191, 204, 222, 233, 305, 336, 341, 427, 441, 446, 450, 458, 459, 473, 474, 492, 493, 516, 573, 730
- system dynamics, 127, 165, 209, 222, 235, 247, 256, 285, 296, 299, 300, 364, 441, 471, 485, 488, 490, 510, 546, 700, 723, 732

- time, 3, 6, 59, 60, 77, 119, 127, 132, 135, 143, 150, 162, 166, 167, 172, 187, 190, 192, 194, 206, 218, 228, 230, 231, 235, 241, 253, 254, 255, 262, 263, 271, 274, 281, 287, 289, 293, 294, 304, 310, 324, 327, 328, 331, 378, 383, 391, 392, 402, 412, 413, 416, 421, 429, 437, 450, 455, 457, 459, 471, 473, 474, 477, 485, 486, 490, 494, 510, 515, 523, 524, 545, 546, 548, 570, 571, 576, 577, 578, 694, 695, 723, 735
- *Toyota*, 211, 235, 272, 273, 310, 311, 327, 382, 425, 437, 478, 492, 572, 716, 728
- Tushman, 63, 97, 101, 102, 221, 226, 335, 400, 432, 514, 518, 519, 520, 521, 545, 580, 699, 727, 729, 740, 748, 749

U

United Airlines, 272

V

variation, 3, 59, 70, 89, 105, 111, 145, 179, 180, 200, 223, 224, 233, 265, 338, 365, 373, 484, 499, 500, 548, 599, 620, 695, 808

W

Whittington, 218, 353, 372, 436, 439, 454, 461, 477, 478, 517, 524, 744 wicked, 260, 270