

HOW DO SENIOR LEADERS CONCEIVE AND RE-ARCHITECT THEIR ENTERPRISES?

by

Francisco A. Zini

B.S., Industrial Engineering
Instituto Tecnologico de Buenos Aires, Argentina, 2001

Submitted to the System Design and Management Program
in partial fulfillment of the requirements for the degree of

Master of Science in Engineering and Management

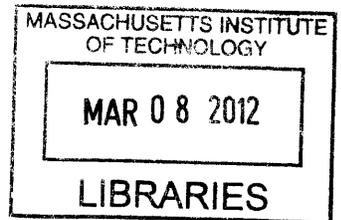
at the

Massachusetts Institute of Technology

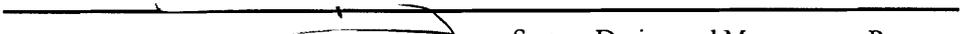
February 2012

© 2012 Massachusetts Institute of Technology. All rights reserved.

ARCHIVES



Signature of
Author


System Design and Management Program
January 20, 2012

Certified By


Prof. Deborah J. Nightingale
Professor of the Practice, Aeronautics & Astronautics and Engineering System Division
Co-Director, Lean Advacement Initiative
Director, Center for Technology, Policy and Industrial Development
Thesis Supervisor

Certified By


Ricardo Valerdi, Ph.D.
Research Affiliate, Center for Technology, Policy & Industrial Development
Associate Professor of Systems & Industrial Engineering, University of Arizona
Thesis Supervisor

Accepted By


Patrick Hale
Director, Program of System Design and Management

Dedicated to my family. Especially my daughter Abril and my son Matias. They are the light of my eyes and the blood in my heart. I appreciate their effort and patience to allow me work on this endeavor and reach my professional goals.

This page has been intentionally left blank.

How do senior leaders conceive and re-architect their enterprises?

HOW DO SENIOR LEADERS CONCEIVE AND RE-ARCHITECT THEIR ENTERPRISES?

by Francisco Zini

Submitted to the System Design and Management Program in partial fulfillment of the requirements for the degree of

Master of Science in Engineering and Management

Abstract

This research proposes enhancements to the Enterprise Architecture Method developed by Nightingale and Rhodes. By Enterprise Architecting we consider the following definition: “applying holistic thinking to design, evaluate and select a preferred structure for a future state enterprise to realize its value proposition, and desired behaviors.” (Nightingale & Rhodes, 2011)

In this thesis we will focus on the steps needed to design the enterprise “To Be” Architecture. We try to find an answer to how senior leaders conceive and re-architect their enterprises. We propose five prescriptive steps to follow in the pre-architecting stage of the enterprise, and four steps to follow in the design of the “To Be” alternatives. Those steps enable a systematic process that assures the architect that all the main issues of candidate generation are covered, as well as, it helps to bring new and fresh ideas in the design phase of the Enterprise.

Those steps are included in a broader method called the Enterprise Architecting Method for Generating and Evaluating Potential Future States (EAMGE), a systematic technique to guide enterprise leaders to make better decisions when deciding a future architecture when employing an enterprise transformation process. The method follows a spiral model of design that leads to more refined architectures. It allows to understand alternatives as well as estimate effectiveness, effort and risk for different alternatives and analyzes tradeoffs among them, leading to a more informed decision making process. Future work (is undergoing) will provide the evaluations stages proposed by EAMGE and will complement the steps proposed in this thesis.

Thesis Supervisor: Deborah J. Nightingale

Title: Professor of the Practice, Aeronautics & Astronautics and Engineering System Division

Co-Director, Lean Advancement Initiative

Director, Center for Technology, Policy and Industrial Development

Thesis Supervisor: Ricardo Valerdi, Ph.D.

Title: Research Affiliate, Center for Technology, Policy & Industrial Development

Associate Professor of Systems & Industrial Engineering, University of Arizona

How do senior leaders conceive and re-architect their enterprises?

This page has been intentionally left blank.

Acknowledgments

I would like to thank to all the people that helped me go through this journey: peers, advisors, professor, friends and family. Especially, I am grateful for the knowledge, wisdom, insight, and support from: Debbie Nightingale, Donna Rhodes, and Ricardo Valerdi. This thesis will not have been possible without their guidance which provided the direction for our research and encouraged us to think beyond traditional boundaries of this topic. In addition, I want to thank Jorge Sanz, having his industry view of the research allowed us to get closer to the business domain in order to facilitate usage of our method. Last but not least, I want to thank my SDM11 peer Matias Raby. This research was possible thanks to the support and effort we encouraged as a team on this endeavor. I started this journey with a peer, I leave it with a great friend for life.

How do senior leaders conceive and re-architect their enterprises?

This page has been intentionally left blank.

Table of Contents

| | |
|--|----|
| Abstract | 5 |
| Acknowledgments | 7 |
| 1. Introduction..... | 13 |
| 1.1. Research Motivation | 13 |
| 1.2. Thesis Roadmap..... | 15 |
| 2. Methodology | 16 |
| 2.1. Applying the Nightingale & Rhodes EA method | 16 |
| 2.2. Development of EAMGE..... | 16 |
| 2.3. Validate the updated EA method | 18 |
| 3. Enterprise Architecting Method for generating & Evaluating Potential Future States (EAMGE) .. | 19 |
| 3.1. Development of the model | 22 |
| 3.2. Heuristic Principles of EA..... | 22 |
| 3.3. Proven decision making approach | 24 |
| 4. Steps to consider before Designing (Pre-Architecting steps)..... | 26 |
| 4.1. Pre-Architecting Step 1: Embrace a Holistic view of the Enterprise | 28 |
| 4.1.1. Defining the boundaries | 28 |
| 4.1.2. Holistic View | 28 |
| 4.2. Pre-Architecting Step 2: Define Vision | 33 |
| 4.2.1. Core Ideology..... | 34 |
| 4.2.2. Envisioned Future | 35 |
| 4.2.3. Vivid Description..... | 36 |
| 4.3. Pre-Architecting Step 3: Understand the Enterprise Dynamic Capabilities | 39 |
| 4.4. Pre-Architecting Step 4: Identify the Gaps Found in “As Is” Analysis | 41 |
| 4.5. Pre-Architecting Step 5: Understand the Environment and Context..... | 43 |
| 5. Notes on Creativity | 47 |
| 5.1. How to inspire creative thinking | 47 |
| 5.2. Creative Techniques | 49 |
| 5.2.1. Brainstorming | 49 |
| 5.2.2. Carousel Brainstorming | 49 |
| 5.2.3. Brainsteering | 51 |
| 6. Steps for New Enterprise Candidates Generation..... | 53 |
| 6.1. Architecting Step 1: Own Thinking | 54 |
| 6.1.1. Enterprise as a system | 54 |
| 6.1.2. Grouping | 56 |

How do senior leaders conceive and re-architect their enterprises?

| | | |
|--------|--|----|
| 6.2. | Architecting Step 2: Learn From Experience | 60 |
| 6.3. | Architecting Step 3: Ask for Suggestions | 61 |
| 6.4. | Step 4: Extreme Organizations | 62 |
| 7. | Case Study | 64 |
| 7.1. | Pre-Architecting steps | 64 |
| 7.1.1. | Step 1: Embracing a Holistic View of the Enterprise | 64 |
| 7.1.2. | Step 2: Defining the Vision | 71 |
| 7.1.3. | Step 3: Understanding the Enterprise Dynamic Capabilities..... | 72 |
| 7.1.4. | Step 4: Identifying gaps found in the “As Is” | 73 |
| 7.1.5. | Step5: Understanding the Environment and Context | 75 |
| 7.2. | Enterprise Candidates Generation | 77 |
| 7.2.1. | Step 1: Own Thinking..... | 77 |
| 7.2.2. | Step 2: Learn from Experience | 79 |
| 7.2.3. | Step 3: Ask for Suggestions | 80 |
| 7.2.4. | Step 4: Extreme organizations..... | 82 |
| 7.3. | Candidate proposal | 82 |
| 7.3.1. | Overall Description of Candidate Architectures..... | 83 |
| 8. | Conclusion | 92 |
| 9. | Appendix..... | 94 |
| 9.1. | Major Processes within SSTG | 94 |
| 10. | Bibliography..... | 97 |

Table of Figures

| | |
|---|----|
| Figure 1. Summary of Favorable Critiques to Nightingale & Rhodes Framework..... | 17 |
| Figure 2. Summary of Improvement Opportunities proposed to Nightingale & Rhodes Framework ... | 17 |
| Figure 3. Enterprise Architecting Road map adapted from (Rhodes & Nightingale, 2011) | 20 |
| Figure 4. Enterprise Architecting Heuristics and EAMGE | 23 |
| Figure 5. ProACT Decision Making Process and EAMGE. | 24 |
| Figure 6. EAMGE framework | 25 |
| Figure 7. Pre-architecting steps..... | 27 |
| Figure 8. “Event-oriented view of the world” (Sterman, 2000) | 28 |
| Figure 9. “Feed-back view: our decisions alter our environment, leading to new decisions, but also triggering side effects, delayed reactions, changes in goals and interventions by others. These feedbacks may lead to unanticipated results and ineffective policies” (Sterman, 2000)..... | 30 |
| Figure 10. Single Loop Learning..... | 31 |
| Figure 11. Double loop learning (Argyris, 1985)..... | 32 |
| Figure 12. Articulating a Vision (Collins & Porras, 1996)..... | 33 |
| Figure 13. Core Values examples (Collins & Porras, 1996)..... | 38 |
| Figure 14. Core Purpose examples (Collins & Porras, 1996) | 38 |
| Figure 15. Vision of Sony in the 50s (Collins & Porras, 1996)..... | 39 |
| Figure 16. Example of Gaps found in Smart Care Division | 43 |
| Figure 17. Five Forces affecting the industry/Invalid source specified..... | 44 |
| Figure 18. 8-lenses Nightingale-Rhodes | 50 |
| Figure 19. Steps for Idea Generation | 53 |
| Figure 20. Grouping options..... | 57 |
| Figure 21. Advantages and Disadvantages of Grouping Options adapted from (Nadler & Tushman, 1997)..... | 59 |
| Figure 22. Boundary definition of our project..... | 65 |
| Figure 23. I-SOFTWARE Public Corporate Overview on Partner Relations | 68 |
| Figure 24. Major SSTG Stakeholders | 77 |
| Figure 25. I-Software SSTG Functional Structure "As-Is" | 83 |
| Figure 26. Functional Structure of "To-Be" Candidate - Strong Outsourcing Strategy | 84 |
| Figure 27. Functional Structure of "To-Be" Candidate –Backsourcing: Produce Everything in House .. | 86 |
| Figure 28. Functional Structure of "To-Be" Candidate - Create an Outsourcing Team..... | 88 |
| Figure 29. Functional Structure of "To-Be" Candidate - Process Owner..... | 90 |
| Figure 30. I-SOFTWARE SSTG Functional Structure and Processes..... | 95 |
| Figure 31. I-SOFTWARE SSTG Outsourcing breakdown structure | 96 |

How do senior leaders conceive and re-architect their enterprises?

This page has been intentionally left blank.

1. Introduction

1.1. Research Motivation

The speed of change in technology is affecting the life cycle of enterprises. As stated by Charles Fine, the clockspeed is increasing across all industries (Fine, 1998). One interesting example is given by Tom Peters in his book "Re-imagine". In that book he argues that technology is revolutionizing all aspects of our lives, including the organizations we work for. To illustrate this, he mentions that in 1970 it took 108 persons five days to unload a timber ship that arrived at the London docks. That represents 540 man days. In contrast after the "containerization", in the 1990s it only took 8 people for one day to unload the same vessel. This represents a reduction of 98.5 % on manpower requirement! (Peters, 2003) Disruptive cases like this are common in all industries and therefore organizations need to adapt at a very fast pace to survive. In this environment, Enterprise Architecting becomes a key capability in today's business. As expressed by Nightingale: "Most organizations are compelled to continuously transform the way they perform in order to achieve their strategic business objectives" (Nightingale, 2009).

Another important point is that what makes an enterprise grow and be successful may not be what will keep the enterprise competitive. In the times we are living one could argue that only one thing is "absolute" and that is that the increase in the speed of change is unavoidable. Usually big and successful enterprises seem to become their worst enemy whenever a new change is needed. William B. Rouse exemplifies this statement using an analysis done by Schumpeter in 2009 in an article published by The Economist. Rouse summarizes it as follows:

- "In 1956-1981, an average of 24 firms dropped out of the Fortune 500 list every year. This amounts to 120% turnover in the 25-year period.

How do senior leaders conceive and re-architect their enterprises?

- In 1982-2006, an average of 40 firms dropped out of the Fortune 500 list every year. This amounts to 200% turnover in the more recent 25-year period.” (Rouse, 2011)

In this scenario, the enterprises have to have the ability to re-invent themselves constantly. Managers need to have a method to quickly adapt the enterprise to the new challenges. Then the question arises: How do senior leaders conceive and re-architect their enterprises? The current EA method developed by Nightingale and Rhodes has proven to be a useful structure to examine the current state of an enterprise and to identify potential areas of improvements in support of enterprise transformation. However, there are certain aspects of the method that offer opportunities for enhancement. Specifically, the approach for developing the possible ‘could be’ states, and evaluating and selecting the best alternative is currently done using heuristics. The development of a prescriptive framework can guide architects¹ through the EA process and increase the objectivity and repeatability of the method.

At the same time, the consideration of multiple evaluation criteria and their tradeoffs can help decision makers make more informed choices in the evaluation the future enterprise architecture options. A framework that incorporates the analysis of the levels of impact, risk and effort required to implement each option would lead to more objective decisions in the enterprise architecting process. In a joint effort developed with Matias Raby we propose a new method that will help senior leaders of enterprise generate new ideas on how to re-architect and evaluate their enterprises. The focus of this thesis will be on the idea generation of potential candidates for the transformation process. Future publications will analyze the ways of evaluating and selecting those candidates.

¹ By architect we mean the person (or persons) that is in charge of the Enterprise Architecting process. He/she is the one leading the analysis and is in charge of synthesizing. This person should have direct access to senior leaders and the people involved in the transformation of the enterprise.

1.2. Thesis Roadmap

The thesis is divided into 8 chapters where:

- **Chapter 1** addresses the motivation for the research and the organization of the thesis
- **Chapter 2** describes the research approach used in this thesis. We started with the Nightingale & Rhodes Enterprise Architecting methodology and analyzed the strengths and weaknesses found by users of this methodology.
- **Chapter 3** presents the basis for the method developed in order to tackle the main opportunities of improvement of the Nightingale and Rhodes EA methodology. This add-on method is call Enterprise Architecting Method for Generating & Evaluating Potential Future States (EAMGE).
- **Chapter 4** introduces the 1st step of EAMGE: “Pre-Architecting Steps”
- **Chapter 5** presents creativity guidelines and tools to stimulate the generation of ideas in the To Be steps
- **Chapter 6** introduces the 2nd step of EAMGE: “Candidates Generation”
- **Chapter 7** includes a case study done to apply and validate the 1st and 2nd step of EAMGE.
- **Chapter 8** synthesizes the main findings encountered while applying EAMGE.

2. Methodology

2.1. Applying the Nightingale & Rhodes EA method

This thesis research uses as a starting point the Enterprise Architecture framework developed by Nightingale & Rhodes at MIT. The main concept they bring in the framework is that “Enterprise Architecting looks at the enterprise as holistic and highly networked structure wherein planning decisions must be accomplished by applying a systems perspective, and encompassing all of the facets of the enterprise.” (Nightingale & Rhodes, 2011)

After applying the Enterprise Architecting method in a real case project, our team found some shortfalls and gaps in the current method: lack of a road map to guide the architects in the Enterprise Architecting process, need for clearer guidelines on how to create the To Be enterprise architecture alternatives, and finally and how to evaluate those alternatives to select the To Be candidate to implement.

2.2. Development of EAMGE

Aiming to understand if the same problems were met by other people using this EA method, we gathered the critiques and improvement opportunity areas presented by the students of the Enterprise Architecting class taught at MIT. For this, we collected and analyzed 56 papers written by Enterprise Architecting students of the 2010 and 2011 classes. In this research we were able to identify the strengths and weaknesses of Nightingale & Rhodes method. In the following table we summarize the findings:

How do senior leaders conceive and re-architect their enterprises?

| Favorable Critiques | | # |
|---|--|-----------|
| 8 Views Framework | | 23 |
| Holistic Methodology (ST) | | 18 |
| Pugh tool | | 8 |
| Stakeholder Analysis | | 6 |
| Ilities | | 6 |
| Metrics revision (2010) | | 5 |
| Epoch Based Analysis | | 5 |
| X Matrix tool | | 5 |
| Heuristics | | 4 |
| Consideration of several candidates architectures | | 3 |
| Integrative methodology (Nexus with SE, LE and Organ. Dynamics) | | 1 |
| Checkpoints for transformation | | 1 |
| | | 85 |

Figure 1. Summary of Favorable Critiques to Nightingale & Rhodes Framework

| Improvement Opportunities | | # |
|--|--|-----------|
| More Complete Candidates Evaluation method (C/B, Linking 8 views with ilities, Schedule) | | 14 |
| Improve Toolkit & Quantitative Methods | | 12 |
| Need of a more detailed Road Map for EA | | 9 |
| Need of stronger candidate generation process | | 6 |
| New lenses proposal: culture & external factors | | 2 |
| Clearer definition of 8 view's aspects | | 1 |
| | | 44 |

Figure 2. Summary of Improvement Opportunities proposed to Nightingale & Rhodes Framework

With this information we decided to tackle the main issues found in that analysis:

- i) the need for a more complete candidate evaluation method,
- ii) the need for a more detailed Roadmap for Enterprise Architecting and,
- iii) the need for a stronger architectures candidates generation process.

How do senior leaders conceive and re-architect their enterprises?

With those goals in mind, we collected of the best practices from the literature on enterprise transformation as well as MIT research theses, and then applied selected methods of system engineering: stakeholder analysis, decision making techniques and modeling tools.

Finally we collected and selected the heuristics from the literature and also reviewed the heuristics proposed by the MIT Enterprise Architecting classes of 2009, 2010 and 2011 (total of 82 students). Our method synthesizes the main findings from the literature, students proposals and critiques, as well as the field heuristics that are being applied in EA.

2.3. Validate the updated EA method

In order to validate this method we consulted an Industry expert (Jorge Sanz, IBM Research USA) that gave us a real life view of our method. He gave us feedback that was incorporated in our final proposal.

Additionally, we are including a case study based on a worldwide leading networking technology company. During the process we were able to use and prove the usefulness of our method, as well as refine some of the points proposed.

Finally, further validation will be performed by a large number of users in MIT in the near future. This method will be presented to the EA class of 2012 in order to gather their feedback and critiques. We expect that some adjustments will be needed, however, based on the validation already executed we are confident that our proposal serves as a good foundation in the generation and selection of To Be candidates.

Ongoing work is being performed regarding the evaluation criteria and selection of To Be states. This will complete the EAMGE method by Spring 2012.

3. Enterprise Architecting Method for generating & Evaluating Potential Future States (EAMGE)

In order to address the main shortfalls found in the EA method, we developed the Enterprise Architecting Method for Generating and Evaluating Potential Future States (EAMGE), a systematic technique to guide enterprise leaders to make better decisions when deciding a future architecture along the transformation process. The method follows a spiral model of design that leads to more refined architectures. It provides an approach to understand alternatives as well as estimate effectiveness, effort and risk for different alternatives and analyzes tradeoffs among them, leading to a more informed decision making process.

EAMGE complements particular aspects of the Enterprise Architecting (EA) framework, an integrated methodology that provides a holistic way of thinking to guide transformations of enterprises. The methodology, developed by Nightingale and Rhodes, has been evolving since 2004 and has been shown to be a useful structure to guide transformations in many different types of product and service enterprises. During the last years, the framework has been applied to several transformation initiatives in various domains including aerospace, healthcare, medical device manufacturers, start-ups, software, high tech and IT. “In each case, significant insights were gleaned from taking an enterprise perspective” (Nightingale, 2009).

One important aspect of the EA framework is that it not only guides the process of assessing and designing the future enterprise, but also leverages several tools and methods developed in the MIT Lean Advancement Initiative (LAI) to assist architects. Figure 3 illustrates the major steps of the EA framework. In its current level of maturity, the framework incorporates several tools and quantitative analytic techniques for gaining a holistic understanding of the current state of an enterprise and creating a future state vision (left side of the V). On the other hand, the steps at the bottom right side

How do senior leaders conceive and re-architect their enterprises?

of the V are guided mainly by qualitative heuristic principles and lessons learned that emerge from the application of the methodology to various enterprise case studies. The combination of both generates a value proposition that consider both 'art' and 'science' in the process of taking an enterprise from its current state to a possible future state.

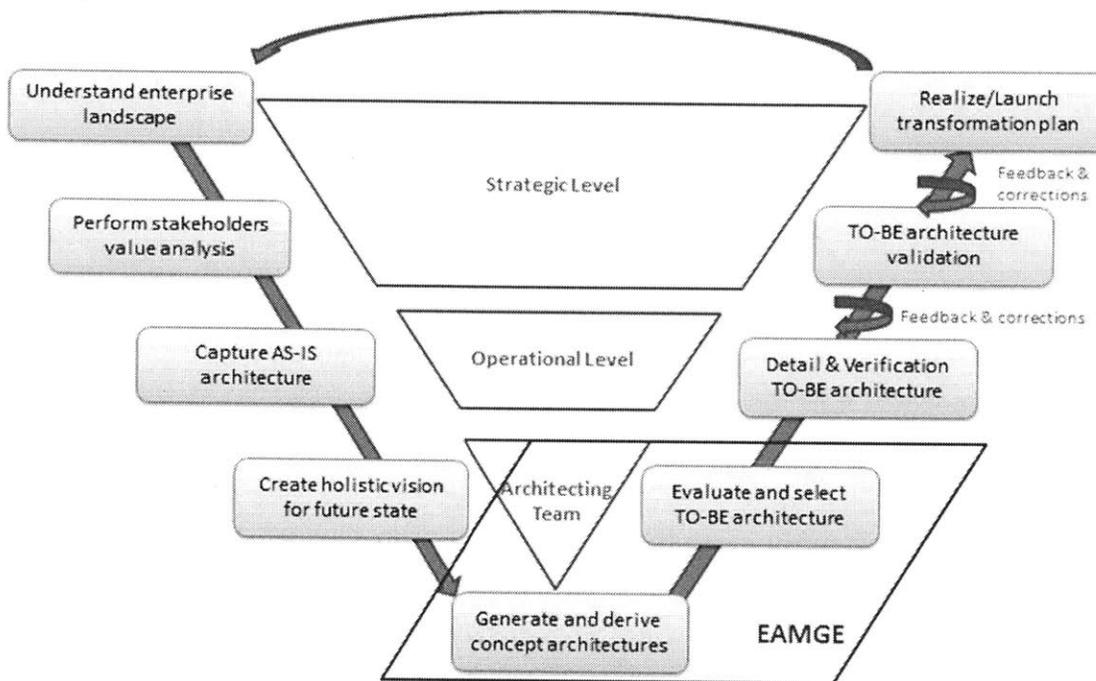


Figure 3. Enterprise Architecting Road map adapted from (Nightingale & Rhodes, 2011)

Although heuristics and lessons learned are valuable starting points for generating and evaluating architectures, they have limitations in being prescriptive because they do not tell architects what specific steps should be taken to accomplish the end result. Through the creation of the EAMGE, we aim to provide a more explicit and quantitative process for generating and evaluating the future state of an enterprise. Our goal is to use the qualitative heuristic principles and lessons learned from applying the framework in different contexts, as well as a proven decision making model, to create a systematic technique that will provide architects with a structure for reasoning about the processes

How do senior leaders conceive and re-architect their enterprises?

of generating and evaluating future potential architectures . This thesis introduces EAMGE and its major steps. In particular we will focus on the pre-architecting and designing stages. The evaluations steps will be published by Matias Raby in the Spring of 2012.

After analyzing feedback from previous users of the EA framework, as well as learning about the results of other evaluation methods, such as the Architecture Tradeoff Analysis Method (Kazman, Klein, & Clements, 2000), we developed the following list of benefits of using EAMGE in conjunction with the EA framework:

- It provides steps that allow the architect to generate more alternative architectures (idea generation) creating a broader solution space and ensuring that key steps are considered in the process.
- It provides a structure for reasoning that can make inherent qualitative processes more prescriptive and repeatable. Through a set of key steps, it provides guidance to clarify and concretize the analysis of each factor. The method helps architects reason about complex architecture decisions that are affected by several factors.
- The method considers the connection of several factors that influence decision making and permits principled reasoning about the tradeoffs that result from such connections. This is possible because it characterizes factors such as effectiveness, effort and risk for different architectures, identifying interactions and tradeoffs that exist among the different options. For this reason, it not only reveals how effective an architecture is satisfying required attributes, but also illustrates consequences in terms of effort and risk that are associated with the alternatives.

How do senior leaders conceive and re-architect their enterprises?

- It facilitates a multi-dimension analysis of alternatives that allows architects identify improvement opportunities to better design and simplify the detection of potential problems in the design phase, before enterprise resources are committed to a transformation project.

3.1. Development of the model

The EAMGE is a spiral model inspired and shaped by two major sources: Heuristic principles developed from the application of the EA framework to several case studies; and the ProACT (Hammond, Keeney, & Raiffa, 1999) approach, a proven method for decision making developed by experts from the Harvard Business School.

3.2. Heuristic Principles of EA

One of the starting point in knowledge generation are heuristics. As described by Maier and Rechtin, heuristics “are guidelines, abstractions, and pragmatics generated by lessons learned from experience”. In addition they highlight that “heuristics are principles that encapsulate insights that have to be attained and practice before a masterwork can be achieved.” (Maier & Rechtin, 2009)

In the area of enterprise architecting, they represent an experience based method that can provide guidance to address important steps on the methodology. These heuristics have been collected as a result of eight classes of MIT graduate students that have applied the methodology in the course “Enterprise Architecting”, creating a spectrum of over 1000 heuristics that provide insights of different aspects of enterprise architecting.

As was stated before, the development of EAMGE has been influenced by a number of these heuristics, in particular those related to generating or evaluating architectures. Inspired by the principles used by Valerdi’s paper *Heuristics for Systems Engineering Cost Estimation* (Valerdi, 2011) (Valerdi, 2011), the methodology for selecting heuristics followed four general guidelines. First, there

How do senior leaders conceive and re-architect their enterprises?

had to be a relationship between the heuristic and the design of the model for generation and evaluation we are creating. Second, there had to be agreement among experts that the heuristic was useful and correct. Third, the applicability of the heuristic had to be apparent over time. Fourth, the heuristic had to be resilient across different scenarios, beyond the one under which was created.

Some of these heuristics are listed in figure 4. Information about its general context and the relationship with the model is also provided. Some heuristics have been reworded from their original form in order to make them applicable for different cases.

| Enterprise Architecting Heuristic (Nightingale & Rhodes, 2011) | Influence to EAMGE |
|--|--|
| <i>“Don’t jump ahead in a transformation without a holistic understanding of the enterprise”</i> | Generate architectures based on inputs from enterprise’s current state and context. |
| <i>“No ideas should be excluded in the early concept generation”</i> | First create alternatives, then evaluate them. |
| <i>“Expand the boundaries to foster ingenuity and creativity to widen the range of possibilities”</i> | Incentive fresh thinking and generation of alternatives from different perspectives. |
| <i>“The same evaluation criteria might have a different answer when looked through different point of views”.</i> | Evaluate alternatives considering different stakeholders. |
| <i>People don’t like change. And you must change wisely, or else your EA initiative will succumb to “flavor of the day” syndrome.</i> | When evaluating, consider also the implementation effort associated with each alternative. |
| <i>“No organizational change is independent there are always unforeseen implications”</i> | Look for potential side effects of each alternative. |
| <i>“Enterprise Architecture evaluation is about balancing tensions; an architecture cannot be perfect on all measurable performance dimensions”</i> | Evaluation should consider different aspects and tradeoffs among them. |

Figure 4. Enterprise Architecting Heuristics and EAMGE

3.3. Proven decision making approach

In addition to the EA heuristics, we researched other proven decision making models to avoid being constrained only to the enterprise architecting field. We looked for two main objectives: learn from others' experience and ensure we were covering all the critical aspects about how decisions should be made.

The development of EAMGE has been influenced by one particular approach: ProACT (Hammond, Keeney, & Raiffa, 1999). The method was developed by decision making experts from HBS based on their extensive experience teaching and writing in this field. Similar to what we are proposing with EAMGE, their approach does not tell users what to decide, but rather shows them how to frame the process of thinking.

In their research, they found that even the most complex decision can be analyzed considering a set of five core elements and three additional elements. These eight elements and their influence to the EAMGE model are listed in Figure 5:

| Eight Elements of ProACT (Hammond, Keeney, & Raiffa, 1999) | Influence to EAMGE |
|---|--|
| <i>"Work on the right decision problem"</i> | Consider the input of the 'motivation for change' |
| <i>"Specify your objectives"</i> | Consider inputs from 'future vision' and 'stakeholder value analysis' |
| <i>"Create imaginative alternatives"</i> | Incentive fresh thinking and generation of alternatives from different perspectives. |
| <i>"Understand the consequences".</i> | Evaluate alternatives both in terms of effectiveness and effort. |
| <i>"Grapple with your tradeoffs"</i> | Evaluation should consider different aspects and tradeoffs among them. |
| <i>"Think hard about your risk tolerance"</i> | Consider evaluation of risk of each alternative |
| <i>"Clarify your uncertainties"</i> | Evaluate the risk of the proposed architecture |
| <i>"Consider linked decisions"</i> | Assure holistic view of the enterprise |

Figure 5. ProACT Decision Making Process and EAMGE.

How do senior leaders conceive and re-architect their enterprises?

Synthesizing the research, the current state of EA and the literature, we developed the EAMGE method in figure 6.

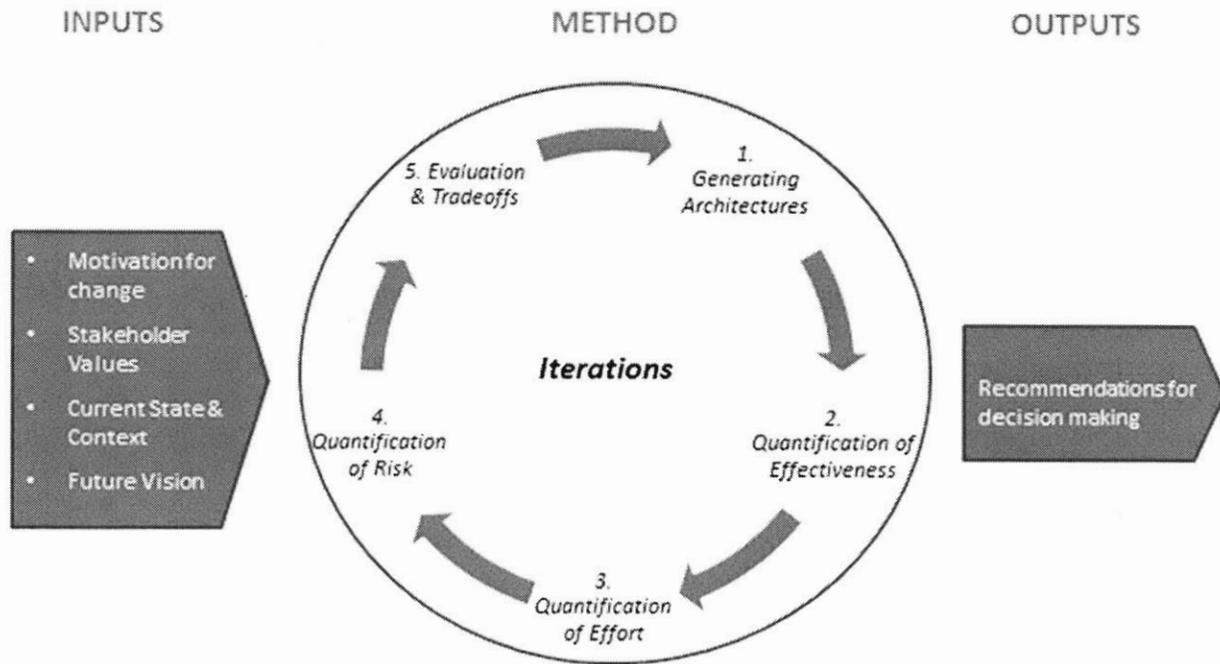


Figure 6. EAMGE framework

In the following sections we will cover the first step of the methodology: Generating candidate architectures. The rest of the steps are being developed in detail and will be published by Matias Raby in the Spring of 2012.

4. Steps to consider before Designing (Pre-Architecting steps)

Once stakeholder values and the “AS IS” of the enterprise are defined, the next step in the roadmap is to start architecting the future enterprise. By enterprise architecture we mean “a documented abstraction of the fundamental organization of an enterprise as a dynamic holistic system with nonlinearly interacting components.” (Nightingale & Rhodes, 2011). In order to begin, architects initiate a collaborative process to understand the motivation for change, process the information about the current state, and project the future of the enterprise and the environment. Along the way, specific artifacts that represent various elements of the analysis are created to support dialog and decisions downstream. In the following paragraphs we include the steps that will help the architect to assure the consideration of all the key aspects in architecting as well as provide guidelines to generate new ideas in this process. It will become apparent that this process is complex and requires a mixture of science and art, but by following a deliberate process we can evolve the methodology from a heuristics-based approach that is largely dependent on experts to a systematic approach that can lead to more rigorous results.

One of the issues we found while applying the EA method was that at some point the architect finds itself with a lot of information that is difficult to put together. How to organize this information and to understand what is vital to generate the future states is crucial for the architect.

The following steps aim to give a more repeatable and prescriptive process to assure that the all the main issues are covered before the designing of the To Be Architecture. Figure 7 summarizes the main steps to consider in this stage.

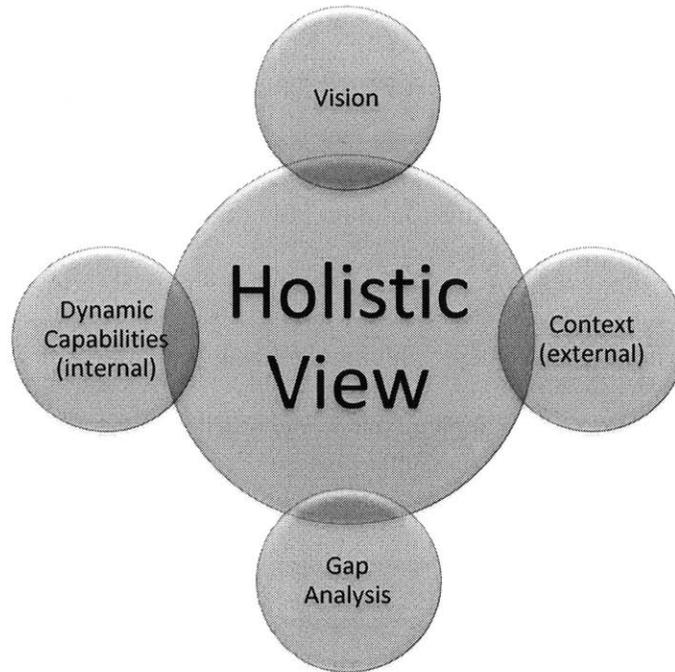


Figure 7. Pre-architecting steps

The first and most important point is to keep a holistic view of the enterprise. In the following paragraphs we explain in details what a holistic view implies. Then, it is essential to assure that a clear Vision of the enterprise is defined. This will be the “north star” in the process of designing and evaluating. The next step implies understanding the ecosystem in which the company is embedded. To facilitate this analysis, we consider the internal context by thinking in the dynamic capabilities of the enterprise. This means understanding the past, present and future options of the enterprise. Then, it is key to understand what is the environment of the industry in which the enterprise is situated. To tackle this issue we found very useful to adapt the 5 forces analysis proposed by Porter (Porter, 1980) and adapt it to our method. Finally, we need to understand what are the gaps found in the current enterprise.

We consider that the architect should have a clear picture on each of those points before starting the journey of designing the enterprise architecture. In the following paragraph we will give a comprehensive guide to follow for each of the steps proposed.

4.1.Pre-Architecting Step 1: Embrace a Holistic view of the Enterprise

4.1.1. Defining the boundaries

When architecting an enterprise the first step is to define the boundaries of the enterprise. What is the scope of the work to be done? Where are the limits of the enterprise? In addition, it is very important to understand the reason for change: why are we doing the Enterprise Architecting? Last but not least, is to understand who are the sponsors and how much support will the transformation be given.

4.1.2. Holistic View

Then, it is essential to embrace a holistic view. In order to so, we need to be aware of the unintended consequences of our actions. In several cases, well intended actions simply make things worse. This is mainly a result of unexpected dynamics in the enterprise that were not considered at the time of the transformation. It is essential to avoid the event-oriented world-view that leads to an event oriented approach to problem solving. As shown in Figure 8, the usual way to solve a problem is by assessing the environment and comparing that to the enterprise goals. The gap between the environment and the target goals are perceived as the problem. Based on this, actions are decided and results are expected.



Figure 8. "Event-oriented view of the world" (Sterman, 2000)

How do senior leaders conceive and re-architect their enterprises?

However this line of thought is missing the reaction from the enterprise. As described by John Sterman in his book *Business Dynamics*: “the results of our actions define the situation we face in the future. The new situation alters our assessment of the problem and the decision we take tomorrow” (Sterman, 2000).

To better assess the situation, feedback loops have to be considered. When actions are taken usually there are intended effects and unintended effects. The latter are usually considered “side effects” even though they are the results of the actions taken. Managers have to be conscious about those potential side effects to avoid surprises, and have to realize that in complex situations, such as enterprises, cause and effect are usually distant in time and space.

Sterman proposes the following causal loop diagram in order to describe the behavior of the this way of thinking (Figure 9).

How do senior leaders conceive and re-architect their enterprises?

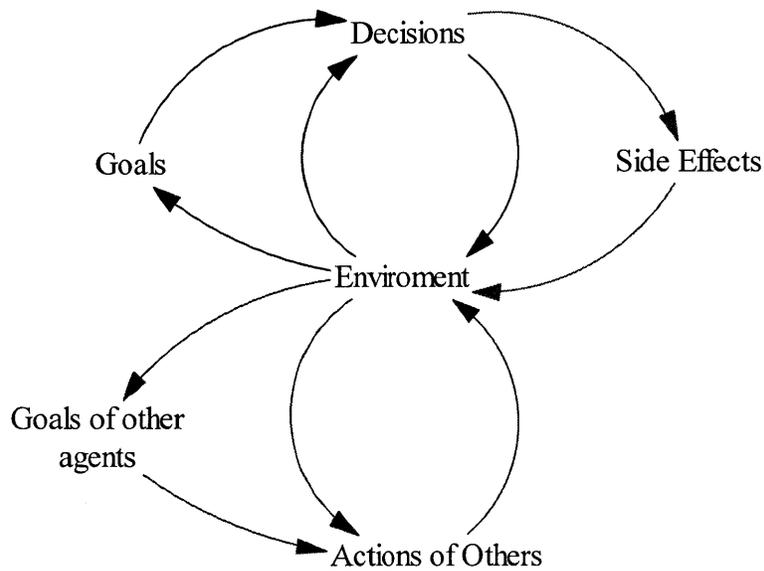


Figure 9. "Feed-back view: our decisions alter our environment, leading to new decisions, but also triggering side effects, delayed reactions, changes in goals and interventions by others. These feedbacks may lead to unanticipated results and ineffective policies" (Sterman, 2000)

To avoid the unintended consequences, the architect needs to be aware of his/her mental models feedback loops in the system and their implication on his/her decision making. To better understand this, Argyris introduced the double loop learning process (system thinking) (Argyris, 1985).

The most basic learning feedback loop is presented in Figure 10:

How do senior leaders conceive and re-architect their enterprises?

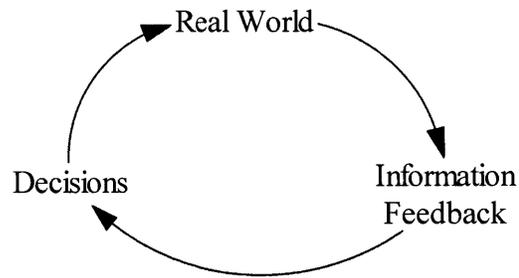


Figure 10. Single Loop Learning

The feedback from the real world drives our decisions that in turn affect the real world. This way we can close the gap between our desired state and the real world. However, the information we received is processed by our mental model, that is, the way we perceive the world. “The policies are themselves conditioned by institutional structures, organizational strategies and cultural norms. These, in turn, are governed by our mental models. As long as the mental models remain unchanged, the feedback loop remains the same. We learn to reach our current goals in the context of our existing mental models.” (Sterman, 2000)

In order to enrich our decisions, Argyris proposes to add the second loop to our learning experience.

This new diagram is shown in Figure 11:

How do senior leaders conceive and re-architect their enterprises?

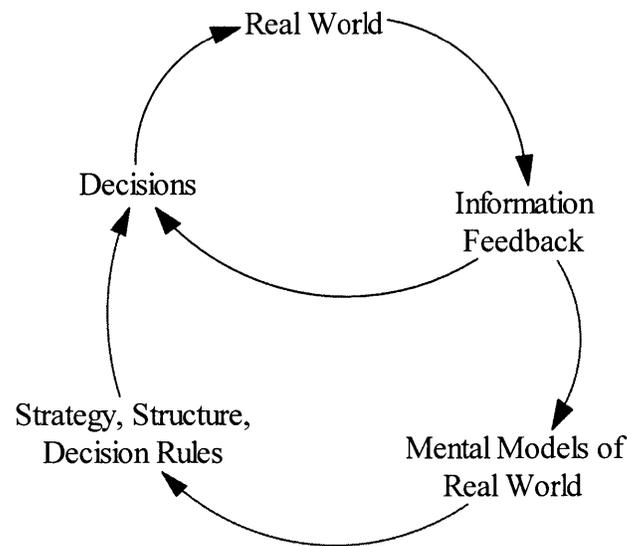


Figure 11. Double loop learning (Argyris, 1985)

This kind of thinking allows us to have a holistic view of the system. Architects need to be aware of the mental models (culture, paradigms, structures) they are using in order to evaluate the information received from the real world and adjust them based on the new data they receive. As described by Sterman: “information feed-back about the real world not only alters our decisions within the context of existing frames and decision rules but also feeds back to alter our mental models. As our mental models change we change the structure of our systems, creating different decision rules and new strategies. The same information processed and interpreted by a different decision rule, now yields a different decision” (Sterman, 2000).

Having this double-loop view (system thinking) allows the architect to understand the enterprise as a dynamic system in which actions in current structure will have long term effects. Achieving this holistic view of the enterprise is essential to increase the chances of success. The holistic view allows

How do senior leaders conceive and re-architect their enterprises?

one to understand the whole before working on the parts. For example, it should allow the architect to optimize the whole enterprise instead of just focusing on a part or area.

4.2.Pre-Architecting Step 2: Define Vision

The second step in the architecting process is defining the vision of the enterprise under consideration. In the last decades this term has been used and misused several times. In order to clarify the key aspects of what Vision means, we refer to the work done by Collins and Porras (1996) in their article "Building Your Company's Vision". According to Collins & Porras, the vision of a enterprise defines its identity because vision has two components: core ideology and an envisioned future. This idea is represented in Figure 12.

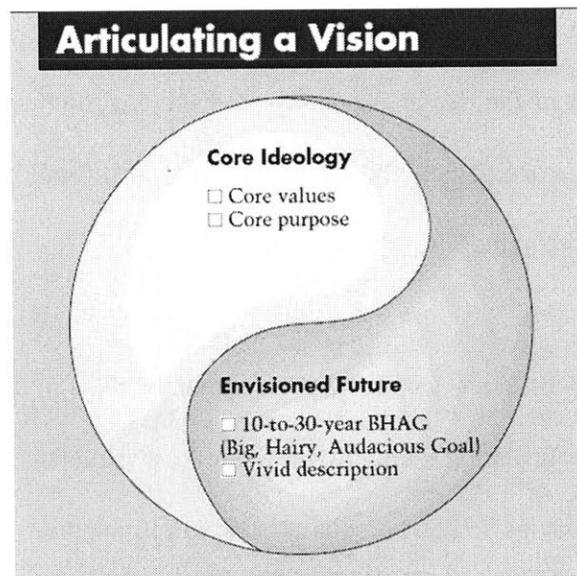


Figure 12. Articulating a Vision (Collins & Porras, 1996)

In the following paragraphs we will discuss in detail the meaning of both concepts.

How do senior leaders conceive and re-architect their enterprises?

4.2.1. Core Ideology

The Core Ideology “defines the enduring character of an organization – a consistent identity that transcends product or market life cycles, technological breakthroughs, management fads and individual leaders” (Collins & Porras, 1996). The Core Ideology is found inside the organization and cannot be imposed or “faked” by its leaders. The Core Ideology has to be authentic. Leaders have to be passionate about these values.

The Core Ideology is composed by two parts:

- **Core Values:** the handful of principles by which the company guides its decisions and actions. These are a few principles that do not change over time. They are the only constant things in the companies and act like anchors in difficult times. They determine what path to follow when all of the rest of the things are not clear. If the environment changes and is no longer appropriate for the core values, the company is better off looking for new markets rather than changing its core values. (Collins & Porras, 1996)

In order to identify the core values of the company Collins and Porras proposed that the people involved in articulating them answer the following questions:

- What core values do you personally bring to your work?
- What would you tell your children are the core values that you hold at work and that you hope they will hold when they become working adults?
- If you awoke tomorrow morning with enough money to retire for the rest of your life, would you continue to live those core values?
- Can you envision them being as valid for you 100 years from now as they are today?

How do senior leaders conceive and re-architect their enterprises?

- Would you want to hold those core values, even if at some point one or more of them became a competitive disadvantage
- **Core Purpose** is the enterprise's most fundamental reason for being. This goes far beyond of making a profit. It captures the sole of the organization. It is important to point out that even if purpose is never achieved it can inspire people in the enterprise. Members of the company are stimulated to change and progress in order to realize the purpose. In exploring the purpose of the enterprise it is useful to ask the *five whys*. This technique was originally developed by Toyoda and implemented by Toyota during the evolution of their manufacturing methodology. The main goal of five whys is to explore the cause and effect relationships underlying a specific problem (route cause analysis). Similarly, the five whys can be applied to understand the "root cause" of the enterprise. This technique helps understand the reason why the enterprise does what is does. As described by Collins and Porras: "start with the descriptive statement: We make X products or we deliver X services, and then ask, *Why is that Important?* five times. After a few whys, you'll find that you are getting down to the fundamental purpose of the organization" (Collins & Porras, 1996).

4.2.2. Envisioned Future

The second component of the vision is the envisioned future. As suggested by Collins & Porras there are two main components of the envisioned future:

- The BHAG (Big, Hairy and Audacious Goals)
- Vivid description of what achieving those goals would be

How do senior leaders conceive and re-architect their enterprises?

BHAG applies to the whole organization and defines the goals for the next 10 to 20 years. They go beyond the current strategy of the company and invite the leaders of the enterprise to “dream” about the future of the organization. They “require future thinking beyond the current capabilities of the organization and current environment. They have to be tangible, energizing and highly focused” (Collins & Porras, 1996). One clear example of BHAG is the one set up by President JFK in his speech of September, 12, 1962 when describing the U.S. space program: “We choose to go to the moon. We choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win, and the others, too.” (Kennedy, 1962). As a final note, leaders need to consider that the BHAGs are not a sure bet, but they feel confident that they can be achieved.

4.2.3. Vivid Description

The vivid description of the envisioned future is the call for action for the people in the enterprise. It brings out the passion, emotion and conviction of the vision. It has to be engaging and vibrant so employees can feel what achieving the BHAG will feel like.

In summary, the envisioned future implies a “creation” of the future and is generated from the passion and emotions of the leaders. It is embedded in the deepest values of the organization and challenges the capabilities of the current enterprise. It requires confidence and commitment from the leaders and the employees. The type of questions proposed by Collins and Porras to help find the envisioned future of the company are:

- Does the envisioned future get our juices flowing?
- Do we find it stimulating?

How do senior leaders conceive and re-architect their enterprises?

- Does it spur forward momentum?
- Does it get people going?

The envisioned future should be so exciting in its own right that it would continue to keep the organization motivated even if the leaders who set the goal disappeared.

We consider that in order to start the idea generation for the new enterprise architects should start with a clear understanding of the vision of the organization. Most of companies already have a Vision, however, the moment of enterprise architecting is a good time to review and confirm that the vision is still valid and defined with all the components described above. Then, the architect has to understand that anything that moves away from this Vision will lead the enterprise to failure.

In the following figures we are including real companies examples presented by Collin and Porras . This can help understand better the definitions and concepts discussed on the previous paragraphs.

Figures 13-15 include:

- Core values companies examples
- Core Purpose companies examples
- Sony's VISION in the 1950s

Core Values Are a Company's Essential Tenets

Merck

- Corporate social responsibility
- Unequivocal excellence in all aspects of the company
- Science-based innovation
- Honesty and integrity
- Profit, but profit from work that benefits humanity

Nordstrom

- Service to the customer above all else
- Hard work and individual productivity
- Never being satisfied
- Excellence in reputation; being part of something special

Philip Morris

- The right to freedom of choice
- Winning—beating others in a good fight

- Encouraging individual initiative
- Opportunity based on merit; no one is entitled to anything
- Hard work and continuous self-improvement

Sony

- Elevation of the Japanese culture and national status
- Being a pioneer—not following others; doing the impossible
- Encouraging individual ability and creativity

Walt Disney

- No cynicism
- Nurturing and promulgation of “wholesome American values”
- Creativity, dreams, and imagination
- Fanatical attention to consistency and detail
- Preservation and control of the Disney magic

Figure 13. Core Values examples (Collins & Porras, 1996)

Core Purpose Is a Company's Reason for Being

3M: To solve unsolved problems innovatively

Cargill: To improve the standard of living around the world

Fannie Mae: To strengthen the social fabric by continually democratizing home ownership

Hewlett-Packard: To make technical contributions for the advancement and welfare of humanity

Lost Arrow Corporation: To be a role model and a tool for social change

Pacific Theatres: To provide a place for people to flourish and to enhance the community

Mary Kay Cosmetics: To give unlimited opportunity to women

McKinsey & Company: To help leading corporations and governments be more successful

Merck: To preserve and improve human life

Nike: To experience the emotion of competition, winning, and crushing competitors

Sony: To experience the joy of advancing and applying technology for the benefit of the public

Telecare Corporation: To help people with mental impairments realize their full potential

Wal-Mart: To give ordinary folk the chance to buy the same things as rich people

Walt Disney: To make people happy

Figure 14. Core Purpose examples (Collins & Porras, 1996)

Putting It All Together: Sony in the 1950s

Core Ideology

Core Values

- Elevation of the Japanese culture and national status
- Being a pioneer – not following others; doing the impossible
- Encouraging individual ability and creativity

Purpose

To experience the sheer joy of innovation and the application of technology for the benefit and pleasure of the general public

Envisioned Future

BHAG

Become the company most known for changing the worldwide poor-quality image of Japanese products

Vivid Description

We will create products that become pervasive around the world.... We will be the first Japanese company to go into the U.S. market and distribute directly.... We will succeed with innovations that U.S. companies have failed at – such as the transistor radio.... Fifty years from now, our brand name will be as well known as any in the world...and will signify innovation and quality that rival the most innovative companies anywhere.... “Made in Japan” will mean something fine, not something shoddy.

Figure 15. Vision of Sony in the 50s (Collins & Porras, 1996)

4.3.Pre-Architecting Step 3: Understand the Enterprise Dynamic Capabilities

“Knowing others is wisdom, knowing yourself is enlightenment.”Lao Tse (600 BC-531 BC)

In the process of defining the Vision, leaders have to look inside to find the enterprise identity and imagine the future of the environment to project the organization. During this process they should also look for the dynamic capabilities of the company. **Dynamic capability** is defined as the firm’s ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments (Teece, Pisano, & Amy, 1997).

Teece, et al. (1997) suggest that “the competitive advantage of firms lies with its managerial and organizational processes, shaped by its asset position, and the path available to it. A firm’s processes and positions define the competencies and capabilities they have. Furthermore, they shape the

How do senior leaders conceive and re-architect their enterprises?

possible path available for the future. It is important to note that competencies are usually developed inside the company and are typically not successfully incorporated when they are outsourced (i.e., acquisitions, adoption of partial practices from other industries, etc.).” From our point of view, understanding the dynamic capabilities implies that management should always keep in mind the enterprise’s past (i.e.: culture, core values, weaknesses), be aware of the present enterprise position (i.e.: market share, competitiveness) in order to be able to project and design the enterprise’s future. Having these points clear allows the architect to know what the enterprise really is.

Another key aspect in the projection of the enterprise future is to see what the tendencies from the market are, what the future needs are, and what features from the enterprise’s past and present should be exploited in order to have a strategic advantage over the competitors. Past and present situations cannot be ignored as they shape the possible paths for the future.

Even in those cases in which the future can be projected with a high degree of certainty, companies may find themselves with the dilemma of adjusting their current practices or paradigms to new market environments. This requires three considerations:

- Identifying what paradigms the company is currently using. By paradigm we mean the practices, routines, culture and procedures that are in place.
- Defining what transformations and or changes that are needed to be successful in the future
- Implementing the changes in paradigm (mental models acquired in the past).

It is important to note that paradigms are good, and in fact, save people and companies a lot of time and effort in doing things. However, we need to be conscious that paradigms have their limitations. They typically do not allow us to consider that there are different ways of thinking about a particular situation. We consider this the essence of dynamic capabilities. In order to clarify this concept we are

How do senior leaders conceive and re-architect their enterprises?

including the following simple example: once we learn how to drive a car in any western country, we do not need to re-think how to drive the car every time we return. The framework we incorporate helps us reduce the stress in driving and provides unconscious reactions that could save us from accidents. However, if we were to drive in UK, Japan or New Zealand (driver seat on the right), one needs to realize that the paradigm is different and needs some training and time in order to get used to the different traffic rules. In this simple example, the successful driver would be the one who realizes the capabilities he/she has acquired throughout time and are able to change their successful habits to new environments. Clearly, in this case, the capabilities and change in paradigm are evident, however it helps us understand how a company should be aware of its current capabilities, be able to identify what changes are needed, and be able to implement the new framework.

Understanding the current enterprise paradigms and digging inside the company to find the dynamic capabilities of the organization will help the enterprise architect to better understand the key elements of the company that need to be considered. Those elements should be taken into account when designing the new enterprise.

4.4.Pre-Architecting Step 4: Identify the Gaps Found in “As Is” Analysis

Taking into account that the “As Is” analysis was already performed, one of the key elements that the architect has to address is the gaps of the current enterprise. It is helpful to define those gaps through the view of each of the eight lenses proposed by Nightingale and Rhodes: strategy, process, information structure, organization, policy, products, services and knowledge. At least the most dominant views should be covered when identifying the gaps.

How do senior leaders conceive and re-architect their enterprises?

In order to illustrate this we include the work performed by a group of students and professors in the Enterprise Architecting class at MIT in the fall of 2011. This group analyzed the Smart Care Service division of one of the most important players in the networking industry. In the following paragraphs and in Figure 16 we summarized the main gaps found on the dominant views in that case:

Gaps in Strategy View

- Heavily weighted toward tactical execution of outsourcing. More focus on getting things done quickly than on building long term relationships and trust with providers.
- Multiple providers in different countries that offer flexibility but add complexity to proper coordination and control.

Gaps in Process View

- Fragmented and ad hoc outsourcing processes within the departments. Lack of standardization or alignment in current practices.
- Outsourcing decisions taken within the departments without coordination between different team leaders, or an established governance model.
- Absence of metrics or indicators to evaluate the performance of providers.
- Time consuming process for Managers due to information disclosure restrictions and lack of a communication plan.

Gaps in Organization View:

- Apparent weak coordination among departments on the outsourcing decisions.
- Lack of quantitative metrics and evaluators at the BU level to measure performance of outsourcers.
- Rigid outsourcing structure that offers scalability and complexity restrictions for future growth.

How do senior leaders conceive and re-architect their enterprises?

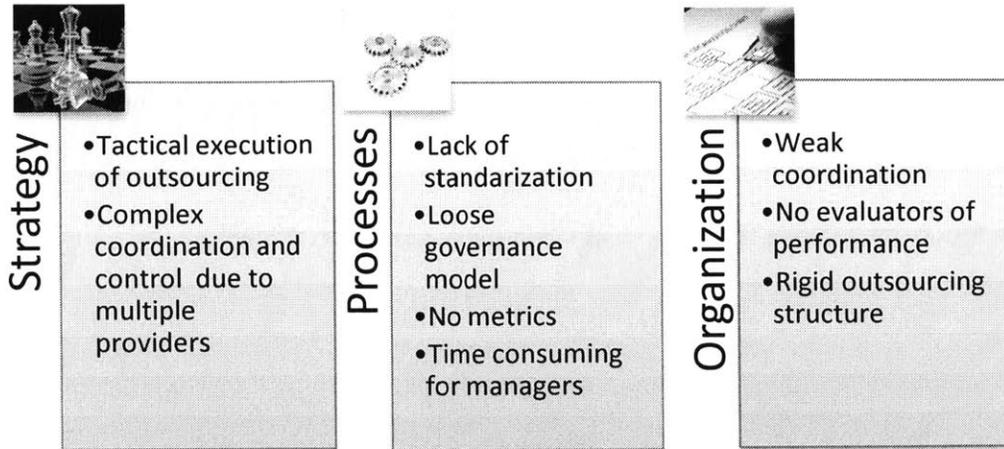


Figure 16. Example of Gaps found in Smart Care Division

In this particular case, the team that was carrying out the analysis decided that there were 3 dominant views that allowed them to summarize the most important gaps of the enterprise. A similar analysis should be performed by the architecting team before starting the desing of a new enterprise.

4.5.Pre-Architecting Step 5: Understand the Environment and Context.

Once the vision, gaps and dynamic capabilities of the enterprise are understood it is very important to see the context and the environment of the enterprise. The architects need to understand what is the landscape outside the company? What are the main events happening outside? What are the trends in the industry and outside the industry?

There are several ways the architect can work on this but we propose to use one of the most famous frameworks defined in strategy: *Porter's Five forces analysis (Figure 17)*. This framework was developed to determine the competitive intensity and therefore attractiveness of a market. In our case, the use of this framework is aimed to do a better analysis of the industry that can help find opportunities or threats to the future enterprise.

How do senior leaders conceive and re-architect their enterprises?

Porter argues that the five competitive forces combine to erode the long-term profitability of any industry. An industry should defend itself against these competitive forces or influence them in its favor. By understanding the dynamics of those forces, firms can outperform their competitors and take advantage of the opportunities that may happen in the market (Porter, 1980).

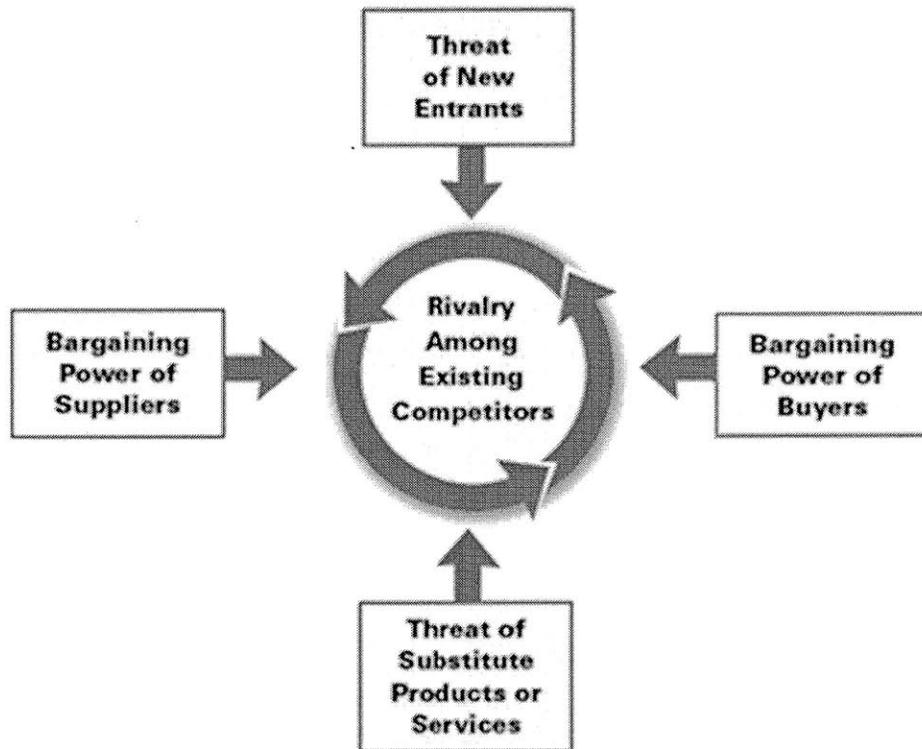


Figure 17. Five Forces affecting the industry. (Porter, 1980)

In the following paragraphs we will briefly analyze each of the forces with emphasis in the enterprise architecting perspective:

- **The threat of substitute products:** what new technologies/products could compete with our products? How easy or difficult would it be for our customers to switch to alternatives (switching cost)? What price level would the substitute products have? What would be the perceived product differentiation?

How do senior leaders conceive and re-architect their enterprises?

- **The bargaining power of suppliers:** these include the providers of raw material, services and labor. For each of them we need to ask the following questions: how powerful are our suppliers? How critical are they for our enterprise? What type of relationship should we develop with them? Should the enterprise adapt to the model they impose? What level of dependence do we have with them and they have on us? What is the strength of the distribution channel? Is there any possibility to integrate vertically? What would be the benefits and drawbacks of such integration? What is the level of concentration of the suppliers? For example, the architect may consider working on a Just in Time model of raw materials provision, but the enterprise may not represent any significant volume to the raw material providers, and therefore does not have any power to negotiate with the suppliers.
- **The bargaining power of buyers:** powerful customer can result in profit erosion. Their pressure can affect the enterprise and their price sensitivity can define losers and winners. The following questions can help understand better their pressure: how concentrated are they? What is the bargain leverage they have? How much information do they have available? In B2B transactions, customers are other firms that can backward integrate and therefore take over our enterprise. Buyers/customers are always key stakeholders in any enterprise, however the strength they have makes a big difference at the time of deciding the future of the enterprise.
- **Threat of new entrants:** increase competition and therefore drives profits down. Porter argues that highly profitable industries attract new players and unless incumbents can block those entries profit rate will be driven down. The architect should understand what the current barriers of entry the industry has. Are there any other barriers that could be added to

How do senior leaders conceive and re-architect their enterprises?

the industry (anti-dumping laws, patents, rights)? What would be the switching cost of other firms to join the industry? What is the customer loyalty to our products?

- **Rivalry among competitors:** in general terms the higher the numbers of competitors the higher the intensity of the competition and therefore the lower the profit margins. In this case the questions are: how can the enterprise differentiate from the competitors? What are the main advantages the enterprise has? Should it compete on product innovation or cost reduction? How will competitors react to the enterprise changes? How much information can we gather from them and can they gather from us? Are there any partnerships that could be considered?

It is important to understand that these forces and structures are not static. What may be attractive today may become a commodity in the future. It is the role of the architect to identify the most relevant forces in the present and their possible future evolutions. Finally, the relevance of each of the forces will help determine the potential success or failure of future candidates.

As mentioned earlier, by no means does this represent the only way to evaluate the context, however Porter's five forces provide a proven and systematic way to analyze it.

In the following chapter we will briefly discuss how to inspire creativity as well as introduce some techniques that can help foster creative ideas.

5. Notes on Creativity

Considering that the designing stage requires a mix art and science, we considered appropriate to add a brief chapter to include some guidance on creativity. The first and crucial point that must be kept in mind is that in the designing stage the main purpose is to generate candidates, not to evaluate them. Judging the ideas as they arise will not allow creative thinking. It is crucial that enough time is given and that free flow of ideas are allowed during these steps. "Creating good alternatives requires receptivity, a mind expansive, unrestrained, and open to ideas. One idea leads to another, and the more ideas you entertain, the more likely you are to find a good one. Bad ideas will almost certainly emerge along with good ones. That is a necessary part of the process and something the architect should not be concerned at this point." (Hammond, Keeney, & Raiffa, 1999)

The architect and the teams need to keep in sight that: "first, you can never choose an alternative you have not considered. Second, no matter how many alternatives you have, your chosen alternative can be no better than the best of the lot. Thus the payoff from seeking good, new creative alternatives can be extremely high." (Hammond, Keeney, & Raiffa, 1999)

5.1. How to inspire creative thinking

As explained by De Bono, in order to activate our creative side we first need to understand the creativity processes and then escape from attitudes which inhibit these processes. The mind's effectiveness arises from the way it organizes information into patterns. Those patterns help increase effectiveness; however they fix us in mind sets that do not allow creativity. (de Bono, 1970) In order to foster our creativity we need to re-arrange those patterns or even find new ones. We need to escape old ideas in order to be able to generate new ones.

The key is to focus on perception. "To perceive things differently we must bombard our brains with things it has never encountered. This kind of novelty is vital because the brain has evolved for

How do senior leaders conceive and re-architect their enterprises?

efficiency and routinely takes perceptual shortcuts to save energy; perceiving information in the usual way requires little of it. Only by forcing our brains to re-categorize information and move beyond our habitual thinking patterns can we begin to imagine truly novel alternatives.” (Capozzi, Dye, & Howe, *Sparking creativity in teams: an executive's guide*, 2011)

On the other hand, there are several attitudes that can be very harmful for creativity and should be avoided:

1. **Apathy.** For example, not having the buy in from the architecting team or top management. Phrases like “we have done great with current structure, why should we change anything?” illustrates this kind of attitude.
2. **Intense Enthusiasm.** For example, expecting that the enterprise architecting process will be the solution to all the problems of the enterprise is counterproductive and not recommended.
3. **Know-all.** For example, considering there is nothing new that can be done. This is the typical case in which “management already knows what to do.”
4. **Defensive resentment** For example, taking the enterprise architecting effort as a fad that will eventually pass.

Finally, in order to stimulate the creative thinking process, we suggest using some of the techniques described below.

5.2.Creative Techniques

5.2.1. Brainstorming

Brainstorming is widely known technique that allows to quickly generate ideas and to ensure participation of everybody in the team. The intention is to reduce social inhibitions among group members, stimulate idea generation, and increase overall creativity of the group. It is important to make sure that the topic is clear and well understood, and that rules are followed. All participants should be reminded that in brainstorming all ideas are valid: this is about generating ideas, not discussing or critiquing them. Additionally, participants should be encouraged to build on ideas generated by others. We will not get in the details but just highlight the main principles of brainstorming:

1. **Focus on quantity:** enhance divergent ideas. At this point the more the better.
2. **Withhold criticism:** focus on adding and building from others ideas and withhold from judging. By suspending judgment, participants will feel free to generate unusual ideas.
3. **Welcome unusual ideas:** the more unusual ideas the better. As expressed before, they usually come from viewing things in a different perspective.
4. **Combine and improve ideas:** Good ideas may be combined to form a single better good idea. Encourage building from others points of view.

5.2.2. Carousel Brainstorming

Carousel is an alternative brainstorming technique that allows participation of all the members of the team and the generation of ideas on several related topics simultaneously.

How do senior leaders conceive and re-architect their enterprises?

Stations are created for each of the topics to be discussed. We considered that a great way to start the discussion is to take the 8 lenses views in Figure 18 below to define each of the topics. If 8 stations are too many, the most important views should be employed.

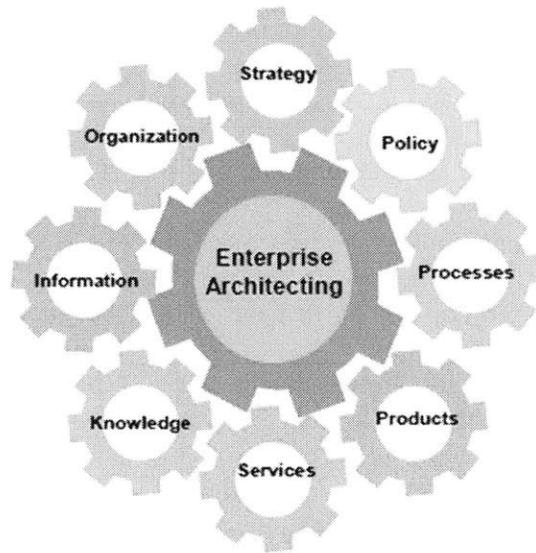


Figure 18. 8-lenses Nightingale-Rhodes

1. Each group is assigned to one station (home station).
2. Brainstorming starts. Each group has five minutes to discuss the enterprise from that specific lenses point of view. Then, they should write the ideas they came up with in the wall paper found in that station.
3. After the allotted 5 minutes, each group should rotate to the next station where they will read the new topic question and what others have written about it, discuss it with their group, and add new information. The group can also write questions about the things that previous groups have written.
4. Continue this process until each group is back to their original station.
5. The final round occurs when a group is generating ideas at their home station; they will be the last group to add ideas for this topic. The group will have the last 5 minutes to review and

How do senior leaders conceive and re-architect their enterprises?

discussed all the ideas proposed in that station. They should prepare to out brief the rest of the group.

6. Wrap up the brainstorming session by having a discussion of all the main points reviewed and a brief summary report of the session.

Carousel brainstorming is a useful technique for cooperative learning and generation of ideas. Also it allows the group to focus on more specific topics and therefore to get more concise results.

5.2.3. Brainsteering

Another way of fostering creative ideas is the brainsteering. This technique was developed by Kevin P. Coyne and Shawn T. Coyne (McKinsey) as an alternative to the brainstorming technique. They argue that using this modified technique avoids the usual stagnation and boredom of traditional brainstorming. They claim that because brainstorming sessions have no structure, little momentum builds around any of them. Based on their consulting experience they developed this method that “captures the energy typically wasted in a traditional brainstorming session and steers it in a more productive direction. The trick is to leverage the way people actually think and work in creative problem-solving situations.” (Coyne & Coyne, 2011)

Out of the seven steps proposed by Coyne we adapted it to 6 steps that can be applied to our context:

1. *Know your organization’s decision criteria*: make sure that alternatives are not beyond the scope of what the enterprise is willing to change. For example, ideas may require the implementation of a new state-of-the-art IT system in order to make the new enterprise be successful. Question like: does that system really exist? Or would the enterprise be able to afford that kind of technology? may help crystallize the decision criteria that should be used.

How do senior leaders conceive and re-architect their enterprises?

2. *Ask the right question:* As stated by John Dewey, “A problem well-defined is half solved.” For example, having a clear understanding the “motivation for change” is key to addressing the right problem. The right question should limit the conceptual space to explore without being so restrictive that it forces one outcome.
3. *Choose the right people:* the team should involve the people that can answer the questions being asked.
4. *Divide and conquer:* avoid lengthy meetings. Instead conduct multiple, discrete, highly focused idea generation among subgroups of three to five people. Meetings should be 30 minutes long.
5. *Wrap it up:* Ideas should be picked by subgroups, not by the whole team.
6. *Follow up quickly:* Try to analyze and take action as quickly as possible. Results from an idea generation exercise tend to decline quickly as time passes and momentum fades.

We suggest to use this method once the other two (brainstorming and/or carousel) have already been executed. While brainstorming and carousel techniques allow to bring a more creative and innovative process, brainsteering may be helpful to concentrate the team in more specific questions. This will allow the architect to focus and will provide more “realistic” solution to the enterprise candidates.

6. Steps for New Enterprise Candidates Generation

Once the five pre-architecting steps for enterprise architecting have been completed, the architect needs to develop a series of Enterprise Architectures alternatives that will be later evaluated. This may be the hardest part of the EA roadmap presented in chapter 3 (V Diagram), as it implies creating and defining alternatives of how will the enterprise be arranged. One could argue that one of the main sources of competitive advantage lies in its architecture; thus this step becomes critical for the Enterprise Architecting methodology. However the architect must understand that there are no perfect designs; the design selection process requires the weighing of choices and the balancing of trade-offs.

In the following steps we will provide a prescriptive approach that will help managers and architects develop valuable options for their enterprises. The steps are summarized in figure 19.

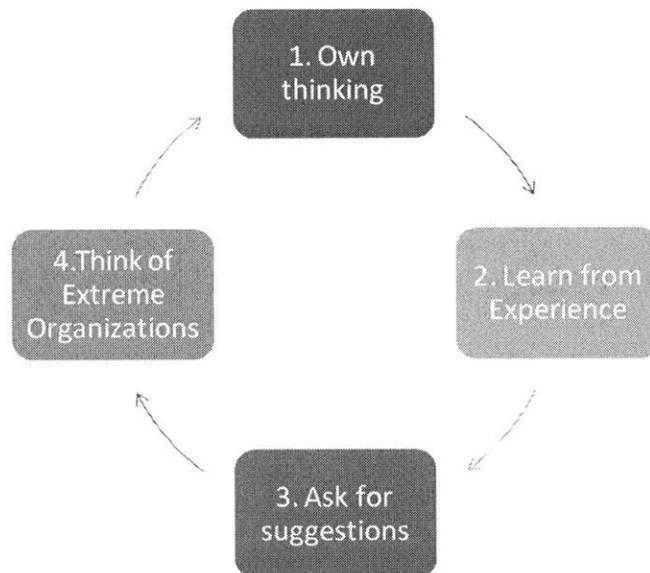


Figure 19. Steps for Idea Generation

Even though this will be an iterative process, it is important that the first cycle starts with one's own thinking (Step1). We describe each step in the following paragraphs.

6.1. Architecting Step 1: Own Thinking

6.1.1. Enterprise as a system

When doing the Enterprise Architecting, it is good for the managers and architects first to try to design the enterprise using their own thoughts. This will allow them to get an unbiased perspective of the enterprise and will avoid falling in mental models defined by others. Architects and managers should give their mind free rein. Having opinions from experts or consultants may lock architects in others' proposals. Original ideas may be suppressed if exposed to judgments before they are fully developed.

Secondly, it may be good to pause and re-think about what an enterprise really is. We suggest considering the enterprise as a system. Building on Nadler et al. analysis of enterprise as a system we can summarize the 4 main characteristics of an enterprise:

- **Stakeholder dependence:** changes in one component of the enterprise will frequently have repercussions in other components. For example, a company may decide to favor outsourcing of a certain component that results in stronger relationships with suppliers and lower cost. On the other hand, this may affect morale of current employees and create job security issues in the enterprise.
- Enterprises should have the **capacity of feedback**. Feedback allows enterprise to correct errors and even to change themselves.
- **Equilibrium of systems:** when an event throws the system out of balance, the system's response is to correct itself. To illustrate this, Nadler et al, propose the following situation: if a work group in a manufacturing plant were to suddenly increase its output, the system would be out of balance. Raw material will be short unless suppliers are able to catch up with

How do senior leaders conceive and re-architect their enterprises?

the speed change or the overachievers will have to cut back. One way or another, the system would work itself back to a balance state.

- ***Similar outputs can be achieved by different configurations.*** There is not only “one best way” and there are no “silver bullets” that will fix all problems.
- ***Successful systems are characterized by adaptation.*** Enterprises must be able to adapt constantly. Changes in environment or context can urge the enterprise to change its ways of doing business. Enterprise must be able to understand the environment and act accordingly.

“Enterprise design involves decisions about the configuration of the formal organizational arrangements, including the formal structures, processes and systems that make up an organization. The goal of the architect is to develop and implement a set of formal organizational arrangements that will, over time, lead to a good fit among all the components of the enterprise.” (Nadler & Tushman, 1997)

Thirdly, we suggest starting with these two general questions (Nadler & Tushman, 1997):

- What kind of structure best enable the enterprise to manage its work in order to meet the strategic objectives?
- How will the enterprise structure affect the culture and behavioral patterns of the main stakeholders? And in turn, how will the stakeholders influence the enterprise?

Fourthly, it is important to understand what the basic form of enterprises are. Nadler et al. suggest that strategic grouping is the most important step in the designing process. “Grouping gathers together some tasks, functions of disciplines, while pushing others apart, in essence, it focuses the organizations. People grouped together are better able to discuss, plan and perform the necessary tasks. “Grouping affects the effectiveness of the organization and also influences the information flow and processing inside the enterprise. Information becomes easier to share and process inside

How do senior leaders conceive and re-architect their enterprises?

the group boundaries but more difficult to process among groups. In summary, grouping decisions determine what the organization will be able to do well and deemphasize other work. "By providing basic coordination through common supervision, resources and systems, grouping decisions give shape to what work gets done and how." (Nadler & Tushman, 1997)

6.1.2. Grouping

There are three pure, basic forms of grouping which can be combined and modified to produce creative variations. None of these groups really exist in its pure form, however they do represent the range of alternatives available. In the following sections we will present the main characteristics of each of the groups.

Grouping by Activity

This form gathers people who share similar functions, disciplines skills, or work processes. Examples of these are enterprises that are grouped in manufacturing, sales, marketing and so on. The main feature of those groups is that goals, positions of influence, rewards, and control systems tend to be based on performance of specific tasks.

Grouping by Output

This form gathers people on the basis of the service or product they provide. The people work on the same final output and therefore the group is composed by staff of different skills, tasks and processes. The objective is the product or service and rewards, promotion, and controls are based on the integrity of the product or service.

Grouping by user, customer, or geography

In this case the grouping is done by customer, market or market segment. The group is composed by people who perform different kinds of work and produce different outputs but serve the same

How do senior leaders conceive and re-architect their enterprises?

customer, market or market share. The rewards and controls are dominated by user assessments of value and the goals of the group are driven by the user needs.

Matrix

As commented before, those groups are useful to understand the pure basic forms that the architect has to analyze. However, current enterprises require mixed groupings to manage the complexity of the business. This results in combinations of groupings that focus simultaneously on multiple strategic priorities.

In figure 20 we include a summary of the grouping options:

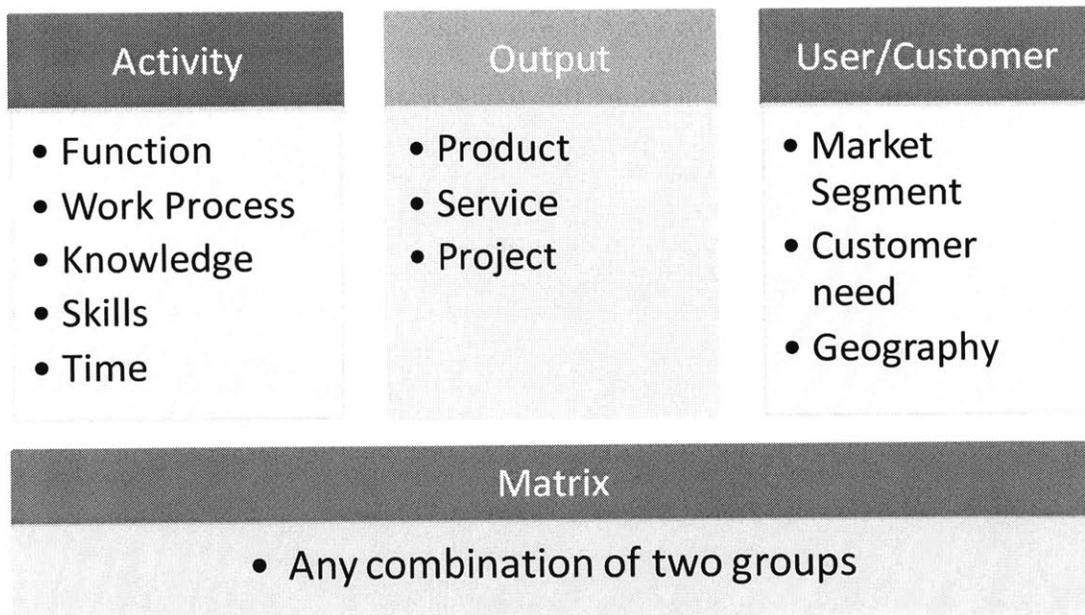


Figure 20. Grouping options

Advantages and Disadvantages of Groups

Considering that different grouping focuses the enterprise in different ways, each group implies a distinct set of advantages and disadvantages. Even though each situation must be analyzed in detail,

How do senior leaders conceive and re-architect their enterprises?

the general considerations presented by Nadler et al. can help assess the potential impact of each form of grouping.

- *Agility: how responsive will each of the groups be?* User-based organizations respond much more rapidly to changes from the market. They are quick to understand the transformation and changes that the market and or competitors may be going through and push the adjustment to its own enterprise. On the other hand, user-based organizations are less focused on innovations of the product or internal processes. Grouping by function or activity are more appropriate if innovation in the process and products is more important than market responsiveness.
- *Impact on Human Resources and Development:* activity grouping fosters the development of experts on each discipline and therefore shortens the holistic perspective of the enterprise. Additionally, activity grouping increases the sense of affiliation in groups and therefore increases the likelihood of conflict among different groups. Each group generates a sense of “protecting its own rein.” Output and user grouping allows individuals to have a broader view of the enterprise and foster the interactions with various disciplines in the organization. The negative side of these types of grouping is not having specialists and that may result in technical obsolescence. The enterprise may lack experts and therefore innovation is harder to achieve.
- *Utilization of resources:* cost minimization is usually associated with activity grouping. That type of grouping allows the maximization of resources utilization as individuals share resources, develop specialized capabilities and develop a large critical mass of expertise. The other types of groups generally result in the duplication of resources and therefore overall higher costs. Additionally, activity grouping allows economies of scale as areas perform the same function repeatedly. However, the architect must be aware that, if the size of the group

How do senior leaders conceive and re-architect their enterprises?

becomes very large, the benefits of specialization and economy of scales diminish as red tapes tend to grow, the need of supportive staff increases strongly and the group becomes slow and finds it hard to adapt.

- *Measurement and control of the enterprise:* key performance indicators are easily generated and controlled in functional and output groupings. Measures of performance for these types of groups are vastly developed and used in traditional businesses. For user grouping the controls and measurement are somehow more cumbersome. The indicators must be tailored to the unique sets of customer-based criteria. This may imply having different ways of measuring and controlling the business for different customers.

In Figure 21 we summarize the main advantages and disadvantages for each grouping.

| <i>Group</i> | <i>Advantages</i> | <i>Disadvantages</i> |
|-----------------|--|--|
| <i>Activity</i> | <ul style="list-style-type: none"> - <i>Collegueship for technical specialists</i> - <i>Economies of Scale</i> - <i>Cost effectiveness</i> - <i>Easy to measure and control</i> - <i>Innovation in processes and technologies</i> | <ul style="list-style-type: none"> - <i>Poor coordination among groups</i> - <i>Potential "silos" generation</i> - <i>Lack of holistic view</i> - <i>Decisions taken at high levels</i> |
| <i>Output</i> | <ul style="list-style-type: none"> - <i>Easy to measure and control</i> - <i>Holistic view</i> - <i>High product visibility</i> - <i>Coordination among areas for same product</i> - <i>Easy Cross-function communication</i> | <ul style="list-style-type: none"> - <i>Duplication of resources</i> - <i>Loss of "specialization" factor</i> - <i>Difficult to allocate pooled resources</i> - <i>Difficult coordination among different outputs</i> |
| <i>Customer</i> | <ul style="list-style-type: none"> - <i>Holistic view</i> - <i>High Responsiveness to customer changes</i> - <i>Easy Cross-function communication</i> - <i>Integration of the enterprise</i> | <ul style="list-style-type: none"> - <i>Lack of uniformity in measures and controls</i> - <i>Duplication of resources</i> - <i>Difficult coordination among groups with different customers</i> - <i>Loss of "specialization" factor</i> |

Figure 21. Advantages and Disadvantages of Grouping Options adapted from (Nadler & Tushman, 1997)

As discussed previously, these types of groups are the basic and "pure states" of grouping. In real life, usually a matrix structure is used in order to maximize advantages and minimize disadvantages of each group. This should allow the management of more complex environments however "it is

How do senior leaders conceive and re-architect their enterprises?

important to remember that along with complexity comes potential confusion, higher costs, and a significantly heightened potential for conflict [...] Hybrid forms must be carefully weighed against the various costs of implementing and managing their complex structures, systems and cultures.” (Nadler & Tushman, 1997)

6.2.Architecting Step 2: Learn From Experience

Once the internal thoughts have been rounded, it is good to look for other options for creative ideas. One should not restrict oneself to history but should certainly learn from it. Additionally, the architect should consider what other enterprises have done when facing similar situations. In particular, it could be very helpful to find the equivalent of what Von Hippel calls the lead user innovator. Von Hippel’s theory states that lead users are the ones that bring most of the innovations to product and services. Lead users are characterized by (Von Hippel, 2005):

- Being at the leading edge of an important market trend, and so are currently experiencing the needs that will later be experienced by many users in that market
- Anticipating relatively high benefits from obtaining a solution to their needs, and so may innovate

Empirical studies show that products lead users often develop the basis for commercial products. It is interesting to apply the same concept to enterprises:

- Who are the lead users on the kind of problem we are trying to solve?
- Which enterprises have the strongest need for a particular “ility” that needs to be developed in our enterprise?
- How do those enterprises manage their business?

How do senior leaders conceive and re-architect their enterprises?

This concept is also suggested by Capozzi et al. in their quarterly report for Mckinsey. They argue that “the most powerful overall driver of innovation was associating: making connections across seemingly unrelated questions, problems, or ideas.” (Capozzi, Dye, & Howe, Sparking creativity in teams: an executive's guide, 2011)

Forcing comparisons between one company and a “lead user”, seemingly unrelated, allows the architect to make considerable creative progress. The objective of this comparison is not to do a “copy paste” from other industry but to help generate new ideas and have a different perspective of the enterprise.

To have a better grasp of what this implies, Capozzi et al. propose the following type of questions:

- How would Google manage our data?
- How might Disney engage with our customers?
- How could Southwest Airlines cut our costs?
- How would Zara redesign our supply chain?
- How would Starwood Hotels design customer loyalty program?

Being able to find and understand the best of the class on other enterprises may be a very good starting point to bring new, fresh, proven ideas to your own architecture candidates.

6.3. Architecting Step 3: Ask for Suggestions

The third step requires bringing help from outside. Even though the previous steps tried to get the architect out of his/her own mental models, the truth is that once some ideas were conceived, it is very hard to think differently. Bringing input from others can bring a new perspective to the situation. People at a distance from a problem may see it more clearly, without the conceptual or emotional blocks the architect may have. (Hammond, Keeney, & Raiffa, 1999)

How do senior leaders conceive and re-architect their enterprises?

Additionally, bringing ideas from other fields may foster more creative ideas. During this process, it is important to keep an open mind. Sometimes the benefit does not come from others' ideas, but from the fact that you need to explain to others the proposals being done. This will require the organization of thoughts and answering of new questions.

Third party help could come from formal sources such as consulting firms, academia or from more informal sources such as one's professional network.

6.4.Step 4: Extreme Organizations

The last step of the candidate generation iteration implies going even further on the wild, creative side of the process. It can be very useful to consider options that would take the organization to an extreme situation. For example, when thinking about how the strategy should be in a certain region of the world, the proposal would be to close the office that is currently in that region. Analyzing this kind of extreme options will help understand the real value of having that office there. All the "buts" will appear and this will help reinforce the understanding of the enterprise. Wild ideas can bring common sense options.

Another way to consider extreme organizations would be to impose artificial constraints to the current business model. This type of thinking will encourage creativity and "will inject the so much needed "stark necessity" into an otherwise low-risk exercise." (Capozzi, Dye, & Howe, Sparking creativity in teams, 2011)

This kind of mechanisms will foster creative thinking as it forces the architect to get out of their comfort zone. Each case will impose their own questions or restrictions, but in order to have a better understanding of this kind of exercise, Capozzi et al. suggest these questions as a reference:

- You can interact with your customers only online.

How do senior leaders conceive and re-architect their enterprises?

- You can serve only one consumer segment.
- You have to move from B2C to B2B or vice versa.
- The price of your product is cut in half.
- Your largest channel disappears overnight.
- You must charge a fivefold price premium for your product.
- You have to offer your value proposition with a partner company.

Forcing the team to have strong restrictions or to consider wild alternatives encourages creativity.

Even though none of these options will become a real alternative, very important insights can be gained in these type of exercises.

7. Case Study

In this section, we apply the method in a real case transformation. We use this method to validate the repeatability and relevance of each the steps in the design process. For this we took the “As is” analysis previously performed by the team and went through the steps proposed before designing the EA and for the designing of the EA itself. The output is composed by alternative “To Be” architectures. Future research will use the output of this thesis in order to evaluate and select the “To Be” architecture.

The enterprise analyzed is one of the leaders in networking technology. They have sales of more than 20 Billion/year and more than 30,000 employees worldwide.

7.1.Pre-Architecting steps

7.1.1. Step 1: Embracing a Holistic View of the Enterprise

Boundaries definition

This project focuses in one business unit within the I-Software Technical Services area. In particular, our work is going to be limited to the I-software Smart Care Service Technology Group (SSTG) with especial focus on the outsourcing and partners relationship management.

I-Software SSTG’s main task is to develop software and provide the architecture that supports the Smart Care Services product portfolio, one of the Technical Services offered by the company (Figure 22).

How do senior leaders conceive and re-architect their enterprises?

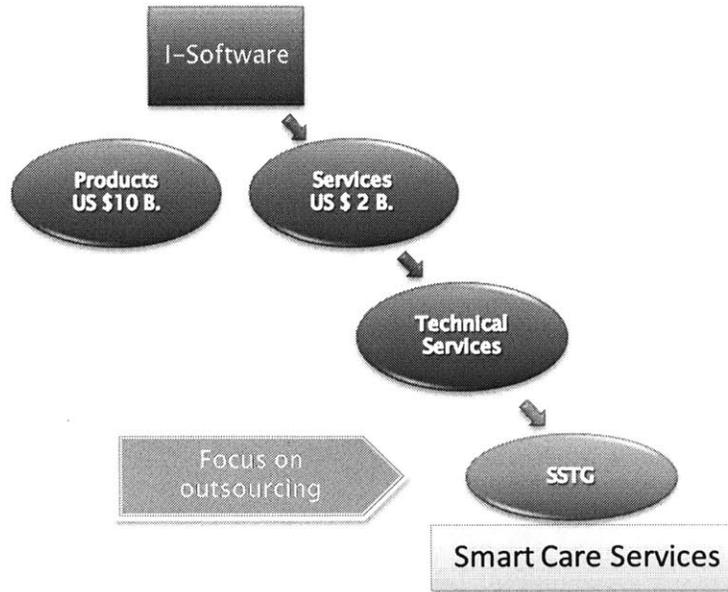


Figure 22. Boundary definition of our project

Smart Care is offered as an “additional service” to companies whenever they buy I-Software equipments. In general terms, two optional technical services are offered to companies that use I-Software products:

- **Annual Support and Maintenance:** Is an annual renewable contract (33% of the product cost) that provides the customer with product support and upgrades.
- **Smart Care Service Package:** Is an additional service (11% of the product cost) over the annual support and maintenance contract.

I-Software Smart Care Service is a collaborative network-wide service that enables an I-Software partner to deliver proactive network monitoring, health checkups, diagnostics, and software repairs, in addition to technical support for the entire I-Software customer network in a single contract. Service is delivered through a local I-Software Certified Partner who works with I-Software to deliver a consistently excellent service experience.

How do senior leaders conceive and re-architect their enterprises?

Smart Care Service is sold differently depending on the size of the customer. Companies with more than \$2 billion in revenue (Global Accounts) have direct sales teams and generate about the 40% of SSTG revenue. Major accounts (all the rest) employ regular distribution channels that are responsible for almost 70% of the BU's revenue. Finally, the internet distribution channel is very limited and only generates about 1% of SSTG revenue.

Currently this service is provided to approximately 200 companies, with revenues of about \$200 million per year.

In order to have a better understanding of the project, we include a short summary of the main problems defined by SSTG.

Originally, I-Software SSTG was interested in reducing the time to market of its software products. During 2010 they did an internal analysis and identified 14 constraints in their product development processes; one of those was related to the outsourcing process.

SSTG senior managers have the following hypothesis: their product development is costing them more because of the way they are outsourcing. They think that economies of scale can be established by having fewer partners. An enterprise architecting approach would help find the bottlenecks.

The major concerns with the current outsourcing organizations is a feeling of low productivity mainly due to lack of coordination, culture misalignment, poor communication and collaboration (ex: time zone, organization, different languages between I-Software and its partners). As a result of those issues, it is common for partners to complain on not having enough info about the product they have to produce. On the other hand, I-Software's managers spend a lot of time (up to 40% of their time) interacting with partners and explaining requirements.

This is a more detailed list of the outsourcing-related problems:

How do senior leaders conceive and re-architect their enterprises?

- I-SOFTWARE's functional structure is in independent silos: there is no communication or knowledge sharing between different teams.
- Outsourcing partners get paid by man, there are no other measures. I-SOFTWARE has no clear idea about their productivity or control over it.
- Partners have 5000/8000 employees each. While big partners might present many advantages, it might also imply that I-SOFTWARE is not getting enough attention.
- The outsourced employees would like to evolve into I-SOFTWARE. There is no way for them to do that. I-SOFTWARE is already giving its outsourcing partners money to hire/train employees to become I-SOFTWARE engineers. However SSTG has no talent management program to follow the career of those programmers. On the opposite side, I-SOFTWARE's call center organization already has a well-developed career advancement program.
- In partner organizations, leads are not paid by I-SOFTWARE, while developers are. So a low lead/developer ratio should be contractually required in order to get proper feedback.
- All outsourcing partners are inherited; there is no incentive to find new partners (mainly because of training costs).
- What usually happens is that the project ends up with 4 different partners, and huge complexity is created because of that. So the product (or sometimes only a component) is developed by 5 different organizations (I-SOFTWARE + 4 partners) with differences in quality and cost of development, which makes integration more difficult and reduces overall quality.
- Sometimes, different team managers are negotiating separately with the same partner.
- Outsourcing in I-SOFTWARE has always been about cost and time saving. Our client feels that it should also consider important strategic advantages: access to unique skill sets, technologies, and processes. So we need to look at other metrics and strategic advantages of outsourcing for SSTG.

How do senior leaders conceive and re-architect their enterprises?

- Communication problems: managers spend 40% of their time on the phone explaining to the partners what to do. Reasons can be differences in time zone, organization, and languages between I-Software and its partners. Also, there is absence of feedback or partner participation: “we spend most of the time telling them what to do, instead of them telling us how to improve the product... They are just like monkeys or sweatshops, and not bringing any strategic perspective to the project... They just do what they are asked to do, they don’t think about the product, how it can be improved, how to improve the customer experience... This is the gap that the outsourcing project is trying to close... should we only use cost, or develop other strategic parameters for outsourcing?”

Nevertheless, this current approach has advantages, because it gives the ability to work fast, to switch partners quickly, and to work with the best available partners. It provides flexibility and dynamism. A program that centrally manages outsourcing might imply delays, but our client thinks that there can be an agile outsourcing program.

Finally, let us note the gap between the current SSTG outsourcing practices and I-SOFTWARE’s strategy for partner relations announced in the public corporate overview (Figure 23):

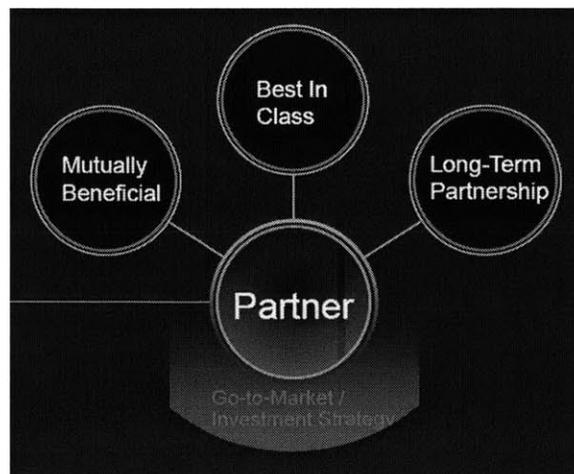


Figure 23. I-SOFTWARE Public Corporate Overview on Partner Relations

How do senior leaders conceive and re-architect their enterprises?

Holistic View

In order to apply a holistic view to this case we decided to open this step in two questions:

1. What are the current paradigms that this enterprise has?

As previously mentioned, the SSTG area has grown a lot in the last years and it has been very successful. Thus, one of the unintended causes of this ad hoc successful growth is that a good portion of the SSTG managers consider that no change is needed. Therefore, one of the first questions we need to ask is: do they really need a change? Past success can blind them on this question, however there are several signs they should take into account:

- time to market is taking too long (compared to market expectations).
- Communication with partners is becoming cumbersome
- People morale is going down (they are achieving to get the products but they are “burning out the team”)
- Competition is increasing strongly

The other important paradigm they currently have is: everything is about reducing cost. This has helped them to bring cost down and improve efficiency. However, the unintended long term consequence of this excessive cost oriented strategy is that they are losing sight of the other side of the coin: how to generate more value. It is important to look for options that can increase value in the mid-term even though they may be increase the cost in the short-term.

2. How does SSTG fit in the overall structure of I-Software?

SSTG is a relative small portion of I-software company. We need to consider how the relationship with the rest of company is. How will the decisions taken in SSTG will affect the other

How do senior leaders conceive and re-architect their enterprises?

departments? It is interesting to see that other I-Software units business units have an “out-tasking” department, headed by “partner managers”. Partner managers are responsible for:

- Identifying new partners.
- Dealing with partners’ performance issues.
- Terminating partners.
- Contracts.
- Pricing.

They are not procurement. They have a broader view of the business needs, so they do not act like procurement or a sourcing department. They are constantly (1) looking for new partners, (2) evaluating the existing partners, and (3) looking at how they can be more strategic with the current partners.

Additionally, other groups in I-Software have outsourcing Program Management Offices (PMO) who continuously manage and follow the outsourcing process from five perspectives: operational (commitment, service level, quality), financial (price), risk, strategic, and cultural (how well is the partner culturally aligned with I-Software). It is important to remark that these units work independently. There is no coordination among them. Also, in the case of SSTG, this structure has not been developed, it is rather an ad-hoc organization.

The SSTG group needs to consider that in complex systems such as an enterprise, cause and effect are usually distant in time and space (short-term vs. long-term results). Additionally, the structures and behaviors that made them successful in the past may be the ones that make them fail in the future. It will be crucial for the architecting steps to keep a holistic view of SSTG and I-Software.

How do senior leaders conceive and re-architect their enterprises?

7.1.2. Step 2: Defining the Vision

I-Software vision is captured in the following statement:

“I-Software’s strategy is based on catching market transition that affects our customers.

With the proliferation of video and collaborative Web technologies, the network continues to evolve from the plumbing of the Internet—providing connectivity—to the platform that will change the way we work, live, play and learn.” CEO of I-Software.

Within this general framework, the main core values of the enterprise are:

- **Innovation:** I-Software works to protect and extend its leadership position year after year by investing more in ongoing innovation than any of its competitors.
- **Operational Excellence** within the company.
- **Customer oriented culture**

Then, the core purpose of the enterprise is:

“To shape the future of the Internet by creating unprecedented value and opportunity for our customers, employees, investors, and ecosystem partners.”

From the statements above we see that I-Software is aligned to the guidelines proposed by our method, however we consider that it would be beneficial to define an envisioned future state for SSTG. Of course, this envisioned future has to be totally aligned to the whole enterprise vision but also needs to be “translated” to our Business Unit (SSTG).

This envisioned future state, will guide us in our next steps and will be used as a reference to define the desired attributes of the process of outsourcing within SSTG. To generate the future vision of SSTG we worked with the senior management of the unit and considered insights of four major areas: Strategic plan, Stakeholders Values and Priorities, Core Values and Purpose of the enterprise.

The envisioned future stated propose for SSTG is:

How do senior leaders conceive and re-architect their enterprises?

“To develop highly reliable, affordable and timely solutions to our customers based on operational excellence”.

7.1.3. Step 3: Understanding the Enterprise Dynamic Capabilities

In its origins, the enterprise was driven by innovation, customer experience, entrepreneurship and growth. Also, the need of speed and change management were in the DNA of the enterprise. Those dynamic capabilities allowed the enterprise to become a success in the previous decades. However, during the evolution of the enterprise some of those capabilities have mutated and changed due to the following reasons:

- Great growth: from less than 100 to more than 30,000 people in 22 years; leading to a very heterogeneous culture
- M&A: a lot of the growth was achieved by purchasing other companies around the world. Leading to a lot of “outsiders”
- Remain as market leader for a couple of decades, creating overconfidence and some dullness.

This has resulted in the loss of some of those dynamic capabilities that in fact are reflected in the particular area that we are analyzing. In the following lines we summarized the main current capabilities and their consequences:

- Ad-hoc organizations managed by entrepreneurs that allowed the fast growth but that are now facing scalability issues
- Cost driven: everything is about reducing cost but they are missing the value generation component

How do senior leaders conceive and re-architect their enterprises?

- Departmental isolation: rewards and recognition are given inside the departments and therefore are discouraging team work
- Technology oriented. This has allowed the company to be a pioneer in new technology deployment. On the other hand, it has been overused and led to lack of “human touch”. For example, meetings are held by WebEx even though people may be on the same building.
- Efficiency: people are trained to be looking for efficiency everywhere. This is good, but may be against innovation and effectiveness (doing the things right but not the right thing)
- Lack of central coordination. Every big area does things its own way. Good for growth but bad for integration and consolidation

These mutations have made our enterprise lose perspective of their past and lose sight of the future. Managers are worried only about the present. The main result is that current innovation is low, time to market is slow and the quality of the product is being affected. On the one hand, the good news is that the brand is still very strong and is allowing the enterprise to remain as market leader. However, in order to maintain its leadership in the market, the enterprise must be able to encourage and exploit its dynamic capabilities that made it grow: innovation, operational excellence and customer oriented. Also it should be able to embrace new capabilities in a positive way: efficiency, cost management considering also value generation, global coordination still allowing local entrepreneurship, and finally assure that team working is encouraged.

7.1.4. Step 4: Identifying gaps found in the “As Is”

The main issues identified in the “AS IS” analysis are:

- The outsourcing process is very time consuming
- There are communications problems among areas/departments and with outsourcing partners

How do senior leaders conceive and re-architect their enterprises?

- The current outsourcing structure is about to reach its critical capacity (scalability process)
- There is a weak strategic view of the outsourcing process (tactical decisions)
- No standardized procedures to manage the relationship with partners
- There are no metrics to evaluate outsourcers' performance
- Absence of a clear owner of the outsourcing process as a whole

Keeping in mind that the objective of SSTG is to grow at a rate around 9% a year, from our point of view, it is critical to work on these issues to achieve SSTG's growth goals.

Looking through EA lenses we found 4 views as the most relevant: Knowledge, Strategy, Process and Organization. These are the main gaps identified:

Gaps in Strategy View

- Heavily weighted toward tactical execution of outsourcing. More focus on getting things done quickly than on building long term relationships and trust with providers.
- Multiple providers in different countries that offer flexibility but add complexity to proper coordination and control.

Gaps in Process View

- Fragmented and ad-hoc outsourcing processes within the departments. Lack of standardization or alignment in current practices.
- Outsourcing decisions taken within the departments without coordination between different team leaders, or an established governance model.
- Absence of metrics or indicators to evaluate the performance of providers.
- Time consuming process for Managers due to information disclosure restrictions and lack of a communication plan.

How do senior leaders conceive and re-architect their enterprises?

Gaps in Organization View:

- Apparent weak coordination among departments on the outsourcing decisions.
- Lack of quantitative metrics and evaluators at the SSTG level to measure performance of outsourcers.
- Rigid outsourcing structure that offers scalability and complexity restrictions for future growth.

Gaps in Knowledge View:

- Lack of knowledge sharing with other I-Software Business Units
- Communication problems with partners because of knowledge heterogeneity
- No measurability of outsourcing teams' efficiency
- Potential loss of partners to competitors and therefore knowledge diffusion

7.1.5. Step5: Understanding the Environment and Context

In this section we performed the adapted Five Forces analysis in order to understand the ecosystem of our enterprise. In order to do this analysis we used the questions proposed in section 4.5.

- **Rivalry among competitors:** our company is leader in the market with around 60% of market share. The rest of the market is fragmented in other 3 competitors. Additionally the market is growing and the revenues of our business units are growing but at a slower pace compared to the market. This is mainly due to the fact that smaller competitors are able to react faster to market demands. Their product development cycles are shorter and therefore time to market is faster. Also, this is generating a lot pressure on cost and therefore eroding the profitability of the business. On the other hand, our brand is still recognized as the market leader and the most reliable product in the industry.

How do senior leaders conceive and re-architect their enterprises?

- **New entrants threat:** on one hand, the barriers of entry in our industry are low, as our main services are related to software. On the other hand, currently the software needs to be highly integrated with the hardware components of the products. This architecture makes it difficult for outsiders to offer a similar service. However, if the future generation of products changes to a more open software platform (hardware and software sold independently), competition would strongly increase in our segment.
- **The bargaining power of suppliers:** the most important supplier for our products are the third party software developers. In today's scenario, those suppliers have a relative strong power mainly due to the fragmented outsourcing strategy of our enterprise, and the size of the suppliers. Additionally, the suppliers are critical as they represent around 55% of the manpower used to develop our products. Even though there are several supplier in the market, the switching costs are high and it takes a long time to switch (know-how, training and development of communication channels). On the other hand, the supplier's dependence on our business is low as it represents less than 10% of their actual revenues.
- **The bargaining power of buyers:** our customers are very fragment and are mainly conformed by governments, information technology industry and other businesses. We identified two stages for their bargaining power:
 - Initial stage: the customer can choose from other competitors, however our market leadership and brand recognition decrease the customer bargaining power.
 - Ongoing business: once our customers have acquire our products, their bargaining power is reduced even more, as in order for them to change of supplier they would need to do a major infrastructure change. This discourages competition and therefore the power of the customer to bargain.

How do senior leaders conceive and re-architect their enterprises?

Finally, the current structure of our business does not pose any important risk of backward integration.

- **The threat of substitute products:** our services provide the state of art in the current environment, and are giving us a strong competitive advantage (cloud services). However the speed of change of technology is increasing and new ways to offer our service could become available in the short-term. At this point, we do not identify any clear potential substitute.

7.2. Enterprise Candidates Generation

7.2.1. Step 1: Own Thinking

The first step of the architecting process is to do the own thinking. In this process, discussion with I-Software management were held and Stakeholders identified. The SSTG major **stakeholder groups** are summarized in Figure 24.



Figure 24. Major SSTG Stakeholders

How do senior leaders conceive and re-architect their enterprises?

After a round of brainstorming and brainsteering we discussed what were the grouping options for the enterprise.

We agreed that the current organization main structure was “grouping by activity”. This has allowed to reduce costs and foster innovation but on the other hand, that grouping resulted in poor coordination among groups, lack of a holistic view and silos generation. Advantages prevailed in the past as the SSTG structure was relatively small, however, with the last year’s growth and projected evolution, the disadvantages will overshadow the advantages. This is especially true in all the outsourcing related activities.

The other grouping options are: by output and by customer.

The grouping by output would allow for a streamlined process that should also include the relationship with the partners. This would allow have a more holistic view of the enterprise, higher coordination and better communication among areas. On the other hand, resources may be duplicated and the size of groups may be too high to manage efficiently.

The customer grouping should give high responsiveness to the market. However, the main problem that SSTG is facing is not related to the lack understanding of the customer but to the slow deployment of new products to the market. Customer grouping could result is loss of specialization and therefore loss of internal innovation.

As expressed several times, there is not a silver bullet that solves it all, but at first hand, a combination of Activity and Output grouping seems to be the best option for SSTG. This would allow to increase the holistic view and coordination but will still aim to foster process innovation and cost effectiveness.

How do senior leaders conceive and re-architect their enterprises?

This analysis serves as the starting point for the enterprise definition. Iterations with the next steps will help us come up with the To Be candidates.

7.2.2. Step 2: Learn from Experience

Based on the size of I-software partners, one of the key elements of the organization is how to manage the suppliers. How can I-software get reliable, cost efficient, value added partners. Looking for the “lead users” on this kind of management we find the Japanese car manufacturing companies. Then the questions is how would Toyota manage the relationship with our suppliers?

In order to see the possible advantages let's first understand the main Toyota principles to manage the supply chain (Womack, Jones, & Roos, 1991):

- Japanese companies usually deal with few suppliers that are typically the same that provides products for other producers and are long-term member of the OEM
- Whole component production are assigned to 1st tier suppliers
- Suppliers assign a staff member to the development group of the enterprise. Those staff members provide continuous input from the suppliers' engineers to the supplier
- Suppliers have full responsibility for designing and making the requested product (in accordance of agree-upon performance specifications).
- Instead of negotiating “supplier cost plus” they use “market price minus” in order to agree price definition
- Cost structure of supplier is review with the enterprise to look for improvement opportunities (kaizen). Cost is expected to go down in time (not up).
- Commitment to quality: considering the Just in Time approach of these companies, quality commitment from supplier is a must. Toyota helps his supplier to understand the root cause

How do senior leaders conceive and re-architect their enterprises?

of any defects and eventually could penalize the supplier if defects rate went beyond the acceptable level.

Taking advantage of this lead user practices we are able to identify these takeaways for I-Software:

- Select a few suppliers. Invest in them (training, relationships) and think long term
- Look for profit sharing instead of cost
- Share people with suppliers: have I-software engineers at suppliers locations and vice-versa.
- Define complete packages of production. Allow suppliers make the designing and implementation of their products.
- Look for continuous improvement opportunities (kaizen) with suppliers.

The insights gathered from this comparison helped us to re-think some of the key aspects of SSTG structure. These concepts will be applied when defining the enterprise candidates.

7.2.3. Step 3: Ask for Suggestions

I-Software benchmark.

Taking from our holistic view analysis we found out that other I-Software Business Units have solved the outsourcing issues. It makes no sense to start all over again. Before re-inventing the wheel, the question we ought to ask is: could we implement the outsourcing practices that are followed in other I-software business units? The suggestion is to understand the best practices inside the company and adapt those to the needs of SSTG. Unfortunately, due to confidentiality issues, we were not granted access to the structure of the other Business Units in I-Software. Our recommendation to SSTG senior management is not to proceed with a decision without analyzing the details of the procurement areas in I-Software

How do senior leaders conceive and re-architect their enterprises?

Ideas from “outside”

As previously discussed, one of the problems of the current enterprise is that the boundaries of the organization have become fuzzy and there are no clear owners of the whole process. When reviewing similar cases in the industry and discussing with other consultants in the field, we came across a concept called “Process Owner”. The suggestion is to design organizations around the core processes that create value so companies can make the leap from process redesign to process management. For example, measurement systems should shift from unit goals to process goals. Fundamentally, managers should change the culture of the company from silos and hierarchy to teamwork and customer-oriented areas.

One of the key roles in the company is taken by the Process owner. These are “senior managers with end-to-end responsibility for individual processes, process owners are the living embodiment of a company’s commitment to its processes. To succeed, a process owner must have real responsibility for and authority over designing the process, measuring its performance, and training the frontline workers who perform it.” (Hammer & Stanton, 1999)

Having strong process owners allows the organization to be prepared for change and people are less reluctant to new environments. The process focus allows companies to adapt more quickly to the context and therefore increases the chances of survival in the world of rapid changes. Therefore, fast-growing enterprises should evaluate the importance of process owners, carefully define them and make sure the organization management is aligned with this working structure.

This idea is related to the output grouping we discussed in Step 1; however it was helpful to see the approach taken by Hammer & Stanton. We will use this idea to design one of the To Be candidates for SSTG.

How do senior leaders conceive and re-architect their enterprises?

7.2.4. Step 4: Extreme organizations

In this last step, we will consider ideas that will take the enterprise out of the comfort zone. When discussing what would be the “wild” options that could help us understand the importance of the outsourcing process in SSTG, we came up with two opposite options:

- 1- What if SSTG implemented a strong outsourcing strategy. What If they outsourced all the product development of SSTG?
- 2- What if everything was done in house? This way all the programmers will belong to I- software and therefore would avoid any conflict with the suppliers?

Of course, at first hand, none of these options were well received by SSTG management. However thinking about these alternatives allowed us to understand the importance of the outsourcing process and the implications of the strategy to be taken. The details of each options will be analyzed in the next section.

7.3.Candidate proposal

In this section we synthesize the potential To Be architectures for SSTG that we obtained by applying Steps 1 and 2 of EAMGE. In the following paragraphs we describe the five candidates at a macro level and discuss the weakness and strengths of each one.

In order to give a graphical view of the enterprise we included an architecture chart for each alternative. The format of those figures follows these guidelines: I-Software team is highlighted in blue, partners are highlighted in red and outsourcing decision-holders are represented by yellow boxes.

How do senior leaders conceive and re-architect their enterprises?

7.3.1. Overall Description of Candidate Architectures

“As Is”

The first option is to do nothing and therefore is the “As Is” (Figure 25). Considering all the points discussed in previous steps, this does not seem to be the best option. However, presenting it does help us as a reference for comparison with the other alternatives.

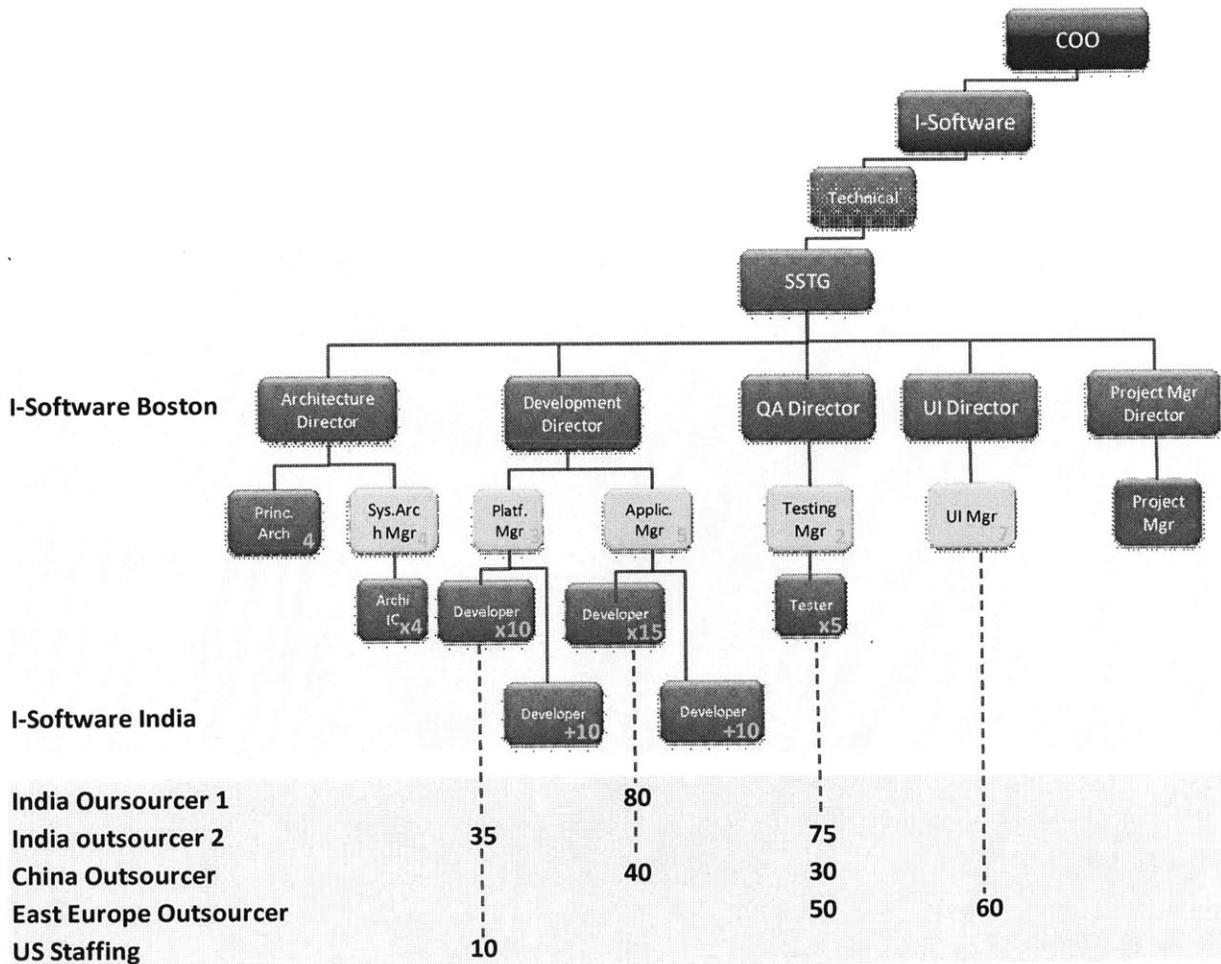


Figure 25. I-Software SSTG Functional Structure "As-Is"

Strong Outsourcing Strategy

One option for SSTG is to strengthen the role of outsourcers in their product development process. This alternative would imply a radical change in the organization because outsourcing partners would

How do senior leaders conceive and re-architect their enterprises?

take care of the whole process of engineering and testing of the projects with the objective of reducing costs and improve communication. Under this EA, only the Architecture and Project Management teams would remain within the SSTG organization. The PM team will be reinforced in order to conduct the additional coordination, evaluation and control tasks. The partners on the other side would be responsible of delivering the products for I-Software SSTG. This architecture is represented in figure 26.

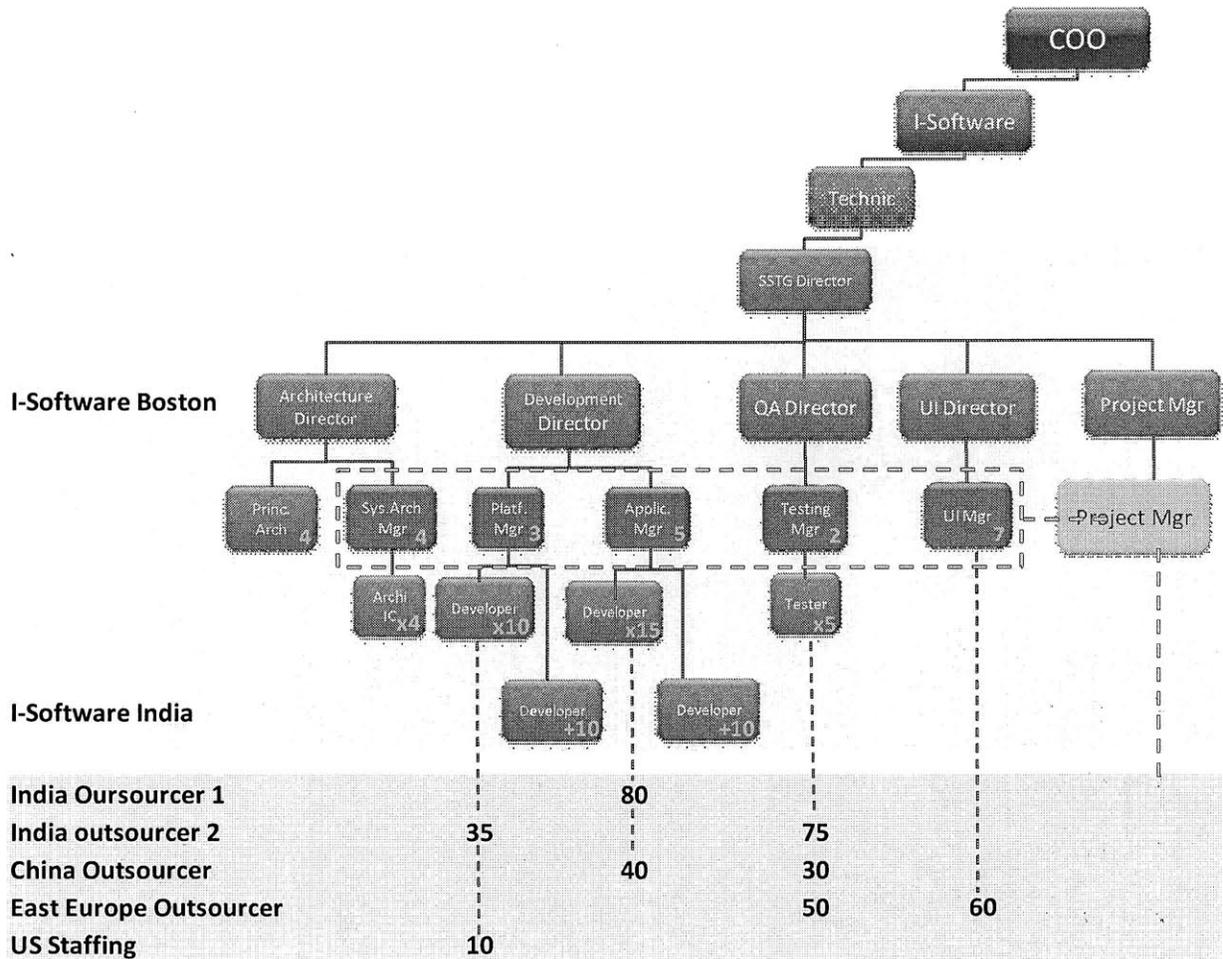


Figure 26. Functional Structure of "To-Be" Candidate - Strong Outsourcing Strategy

How do senior leaders conceive and re-architect their enterprises?

This represents an activity-based grouping and would imply economies of scale and cost effectiveness. However, taking into account that I-Software will depend even more on its suppliers, the fact is that cost and economies of scale may not be gained by I-Software but by its suppliers. In this scenario, the concepts of lead users discussed in section 6.2 become crucial. Supply chain management should follow the Toyota principles. This architecture requires building long-term relationships with fewer partners. These relationships require mutual trust and support. Additionally, prices of contracts should be managed in the “market price minus” idea and quality commitment should be a must for suppliers.

The main benefits of this alternative would be:

- Cost reduction (a shift from fixed costs into variable)
- Allow SSTG to focus on core activities
- Improve communication and cycle time
- Flexibility to adapt to market changes

On the other hand, this architecture would require major structural changes and would shrink the SSTG group considerably. Additionally, this would result in the following drawbacks:

- Loss of direct control over the process
- Reduction of bargaining power with suppliers
- Risk of losing protection of intellectual property
- Risk of fostering suppliers into becoming competitors (threat of new entrants).

Backsourcing: Produce everything in house

This option is the opposite of the previous one. It refers to the action of bringing the existing outsourcing services back to in house.

How do senior leaders conceive and re-architect their enterprises?

This architecture is represented in Figure 27.

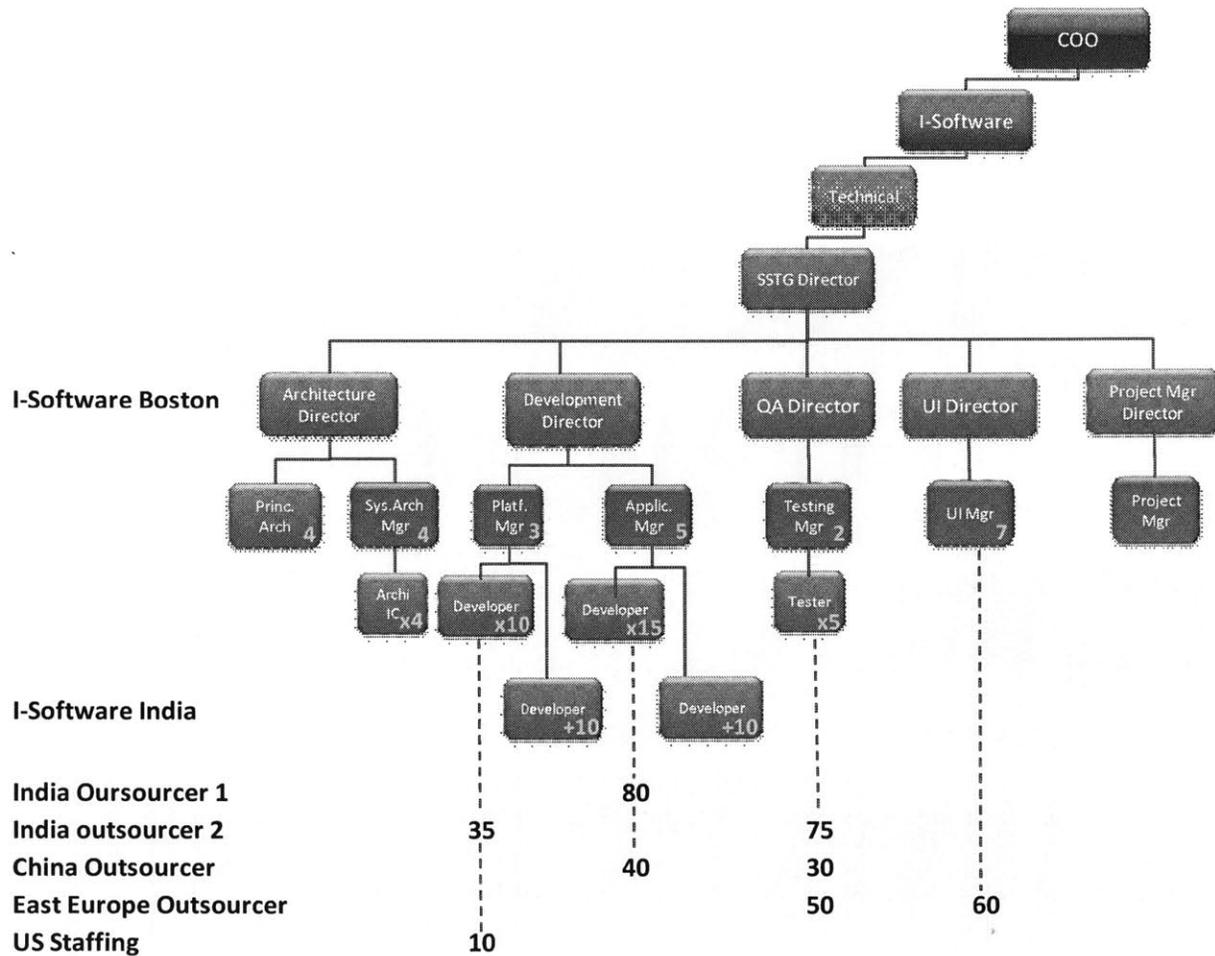


Figure 27. Functional Structure of "To-Be" Candidate –Backsourcing: Produce Everything in House

This type of enterprise would imply to cut all outsourcing activities. There would basically be two ways of achieving this:

- Acquire one or two of the current outsourcing partners.
- Gradually hire and create new teams that would be taking the task of programming and testing.

How do senior leaders conceive and re-architect their enterprises?

Incorporating these teams into SSTG's structure would bring long term benefits. The main ones are:

- Autonomy and more control over the engineers and the development process
- Less variability in resources
- Better communication channels
- Protection of intellectual property
- Avoid that suppliers become competitors
- Improve cycle time

On the other hand, this would clearly increase the cost of structure and would imply having a much larger organization. Basically it would turn a variable cost into a fixed cost. Also, it would reduce the flexibility to adapt to market changes. A decrease in demand could imply lay-offs and increases in demand may not be serviced due to lack of labor resources.

Finally, this would imply drastic change in direction for SSTG; one that will imply a riskier strategy that the company may not be willing to follow at this point.

Create an outsourcing team

Another alternative would be to create a new team/department that will be in charge of the procurement process. This would allow SSTG to centralize the expertise on contract definition, channels of communication and bargaining power. For example, with the current process, different areas could be outsourcing at the same time from the same partner and not be using the bargaining power. At the same time, this group would be able to have dedicated employees to monitor and manage the performance of outsourcers.

On the other hand, this would imply a high implementation cost and would increase the head-count of the current organization. Additionally, it will certainly add an extra-layer of people (example:

How do senior leaders conceive and re-architect their enterprises?

engineering manager, outsource manager, partner) that could lead to longer lead times at the beginning (learning curve and acceptance of new structure by employees). However, if successfully implemented, having a specialized team doing the outsourcing coordination and monitoring would give clear and strong governance to the process. This type of enterprise is represented in figure 28.

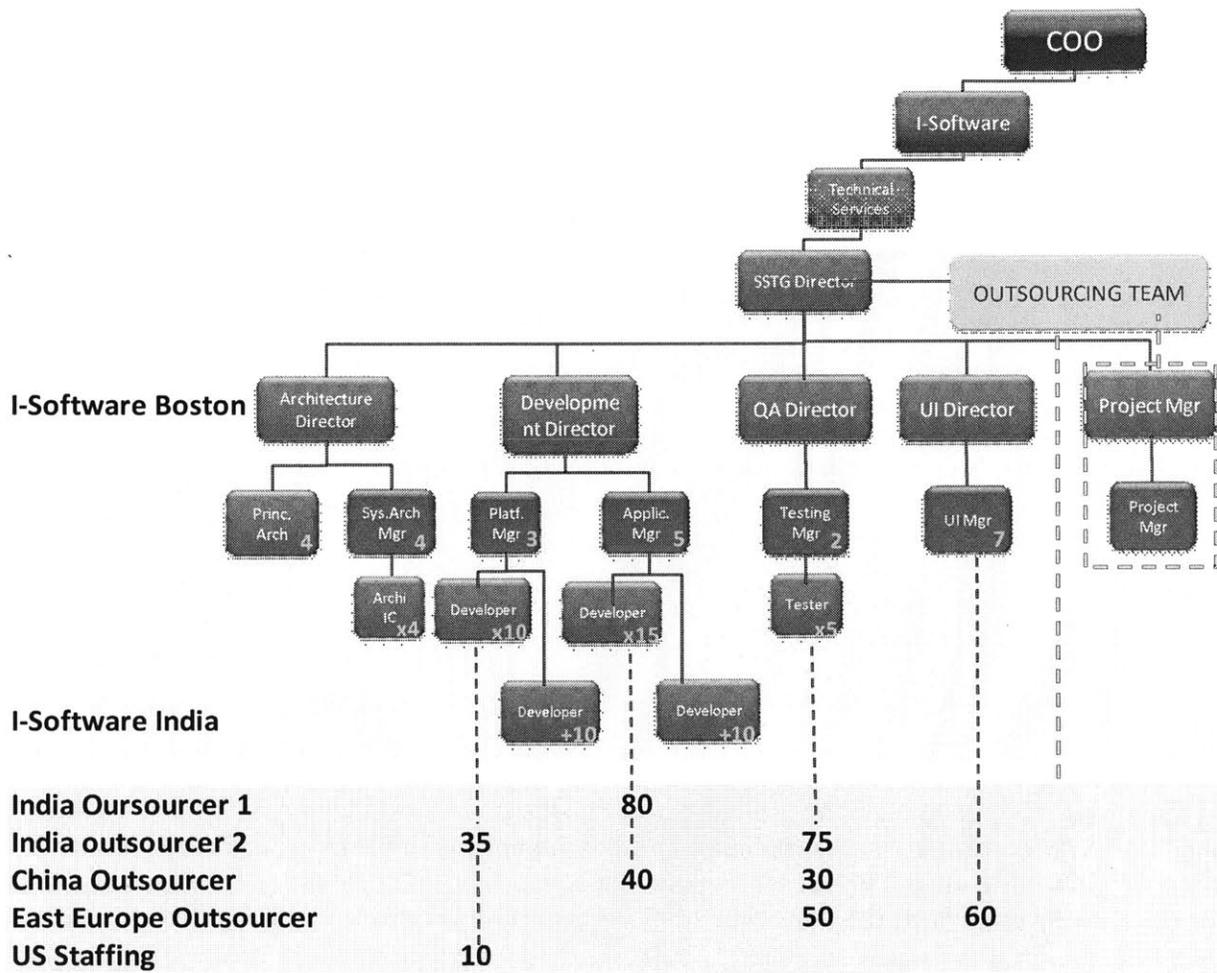


Figure 28. Functional Structure of "To-Be" Candidate - Create an Outsourcing Team

From the grouping perspective this will imply having groups by activities. This may accentuate the organizational silos and lack of holistic view already present in the SSTG organization. On the other hand, this would allow better measurement and controls of the outsourcing activities. Also this type

How do senior leaders conceive and re-architect their enterprises?

of enterprise could help with a potential cost reduction and value generation based on the implementation of better practices to manage suppliers.

Another important factor to consider is that I-Software already has procurement structures in other Business Units; however, due to the nature of products and size of the company, they are not being used for SSTG. Due to access limitations in the company, we were unable to get in contact with those other procurement teams.

Process Owner: Give a more powerful role to Project managers.

The current structure of SSTG includes a Project Managers team. Each Project Manager is responsible of the process and schedule governance through the entire product development cycle for each project. However, they are not involved in the outsourcing decisions. The main idea of this architecture is to empower the Project Managers in order to have an end-to-end responsibility and authority in the process of product development. This type of enterprise is represented Figure 29.

How do senior leaders conceive and re-architect their enterprises?

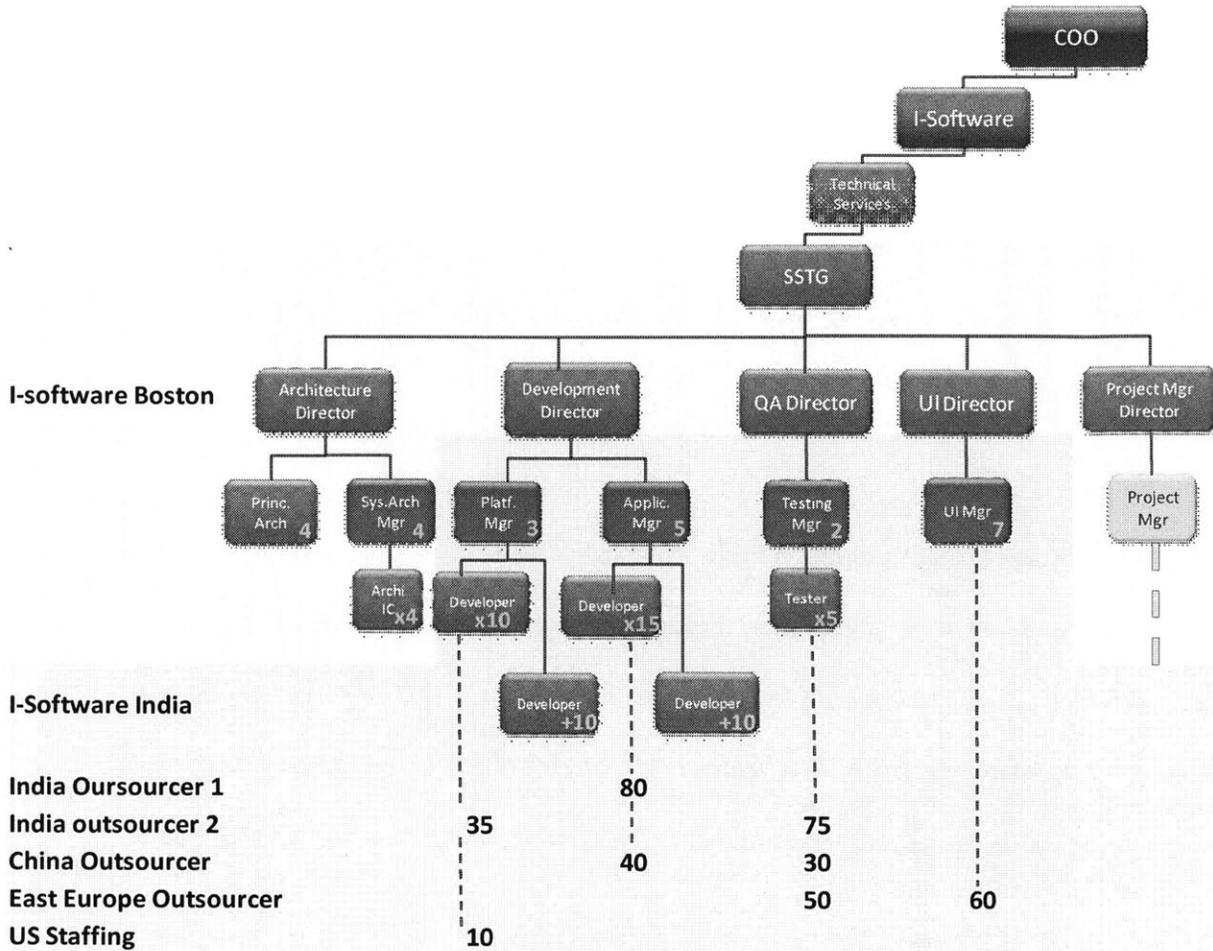


Figure 29. Functional Structure of "To-Be" Candidate - Process Owner

In this case the organizations would be designed “around the core processes that create value so companies can make the leap from process redesign to process management” (Hammer & Stanton, 1999). This implies a cultural change and would require shifting from unit goals to process goals. In particular, managers should change the culture of the company from silos and hierarchy to teamwork and customer oriented areas.

Having strong process owners allow the organization to be prepared for change and people to be less reluctant in new environments. The process focus would allow SSTG to adapt more quickly to the

How do senior leaders conceive and re-architect their enterprises?

context, therefore increasing the chances of survival in the world of rapid changes. Also, it would help align different areas and would have a holistic view of the process.

The process manager would also define and supervise the outsourcing activities. They should provide better governance of the process by having the responsibility of defining the outsourcing partners, the contracts, procedures and the resource allocation in each particular project. This would facilitate the centralization of the high level definitions of the outsourcing process and therefore would allow to have a stronger bargaining power with the partners.

This option would represent applying a Output grouping. This gives the enterprise a more holistic view of the product development process, and facilitates coordination and cross function communication among areas.

On the other hand, this change in the role of the Project Manager will increase their work load and may require transfers of people from the operative areas to the Project Management team. This could bring resistance from the other departments as they would be “losing control” over the outsourcing process. To minimize the potential resistance to change, we should emphasize that this proposal would allow operative areas to dedicate their resources on their core activities (product design) that bring value to the SSTG group.

In future work, Raby will apply the EAMGE next steps: quantification of effectiveness, effort and risk in order to evaluate each architecture and select the To Be architecture.

8. Conclusion

The purpose of EAMGE is to complement the Enterprise Architecture methodology developed by Nightingale and Rhodes. With the help of an industry expert and the application of the method to a real case, we were able to understand the value the steps proposed in this thesis convey. By no means does this method pretend to be the only available option, however, we do believe that EAMGE provides a systematic technique to guide enterprise leaders to make better decisions when deciding a future architecture along the transformation process. Additionally, the steps proposed also fosters creativity and tries to push the architects and manager out of their comfort zone in order to bring new and fresh ideas to the table. This method does not tell the users what to decide, instead it shows them how to frame the process of thinking.

At first hand, EAMGE could be applied to any Enterprise Architecting case, however it may be more useful in those cases in which the whole Enterprise is being analyzed (in contrast to a specific area or department of an Enterprise). Future field work will help understand if adaptations for each case are needed.

Future work is being done in order to complete the other steps of EAMGE: the evaluation of alternatives by quantifying effectiveness, effort and risk. We hope this work becomes a starting point to build upon a method that helps to have a more “scientific” approach in area that has been traditionally been dominated by a more “artistic” and heuristic-based approach.

Finally, we would like to remark that an Enterprise transformation requires the commitment of the senior leaders in the Enterprise. In order to do a thoughtful and useful proposal, it is crucial to have: availability of resources, information access and enterprise members buy in. If some of these requirements are not met, the Enterprise Architecting process will hardly reach a successful outcome.

How do senior leaders conceive and re-architect their enterprises?

This page has been intentionally left blank.

9. Appendix

9.1. Major Processes within SSTG

The SSTG organization is composed by around 360 people that are mainly located in the US. There is only a small team located in Bangalore, India of around 20 developers that belongs to the company. On the other hand, there are 5 different companies (or partners) where I-SOFTWARE is outsourcing the programming of products. The total number of outsourced programmers varies depending on the load, but at any time SSTG has 390 outsourced people on average working on different projects. Those partners are located in China, India, Romania and the US. A graphical view of the structure can be seen on Figure 30 and Figure 31.

The major processes within the product development cycle are as follows:

First, a product requirement document (PRD) is written by the Technology Services Product Management (TSPM), which is responsible for regularly gathering customer requirements. The PRD passes through a gate called “execute, commit”, that is composed by executives from product and function groups who decide what PRD to approve and start working on.

Five parallel work streams are then initiated simultaneously and resources are started to be allocated. Although there’s one overall product manager, he doesn’t carry out the outsourcing decisions; those decisions are made by each manager of the four teams. Those teams are:

- **Architecture Group:** Defines the high level guidelines and detailed architecture specifications for each PRD.
- **Platform Group:** Responsible for the backbone of the software (functional aspect, coding per PRD requirements). It has to be available, secure and reliable.

How do senior leaders conceive and re-architect their enterprises?

- **Business Application Group:** Responsible for the application components based on the platform.
- **Visualization/ User Interface (UI) Group:** Responsible for the surface of the functions, the part that interacts with the customer.
- **Testing & QA Group:** makes sure that the software meets standards and specifications, without defects and possible problems.

At any one time, there are multiple PRDs being worked on by these groups. They look at the availability of resources, deliverables already in process, time estimation, and work with product and the project manager to make sure the schedule is met.

The following diagram summarizes the process showing the different groups' roles and the deliverable documents.

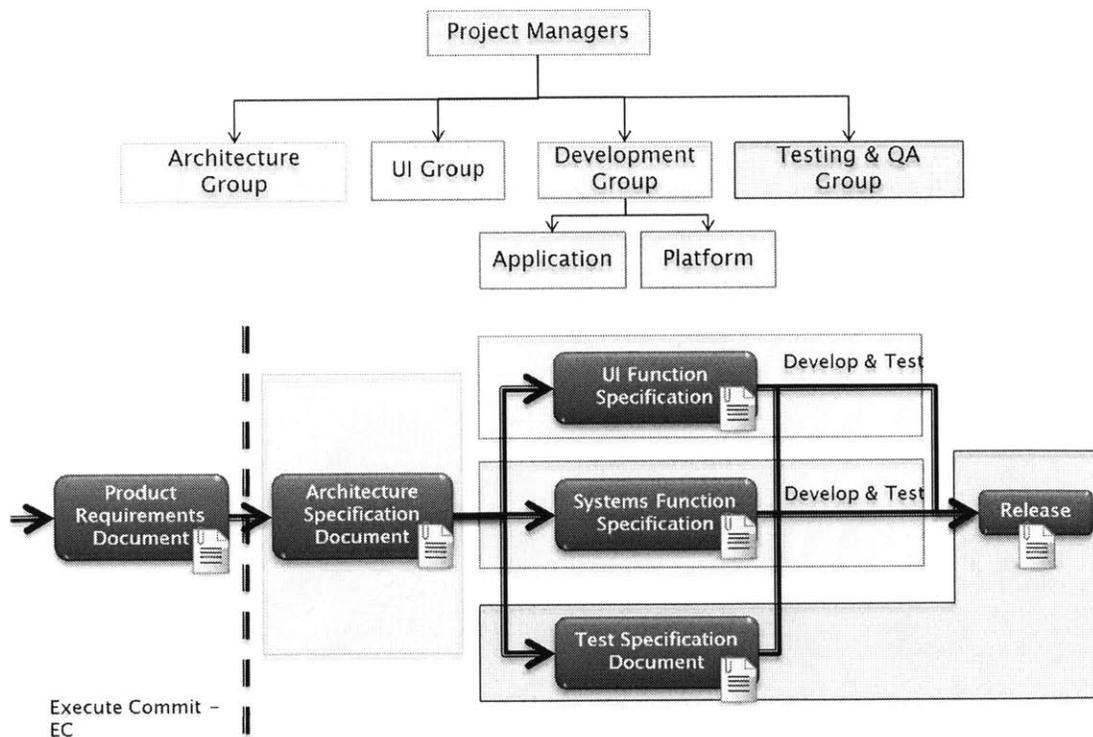


Figure 30. I-SOFTWARE SSTG Functional Structure and Processes

How do senior leaders conceive and re-architect their enterprises?

Outsourcing is a relevant part of the product development process, mainly to achieve cost objectives (typically a project HAS TO be 30-40% outsourced because of cost). Other reasons to consider outsourcing, are skills (e.g. a particular programming language) and schedule requirements.

There is no consolidation of the outsourcing process (each manager chooses partners based on his particular cost, similarity or technical skills).

The following chart shows the organization of SSTG, along with the number of employees in each group (also including the employees of major partners, relating them to the groups they usually work with).

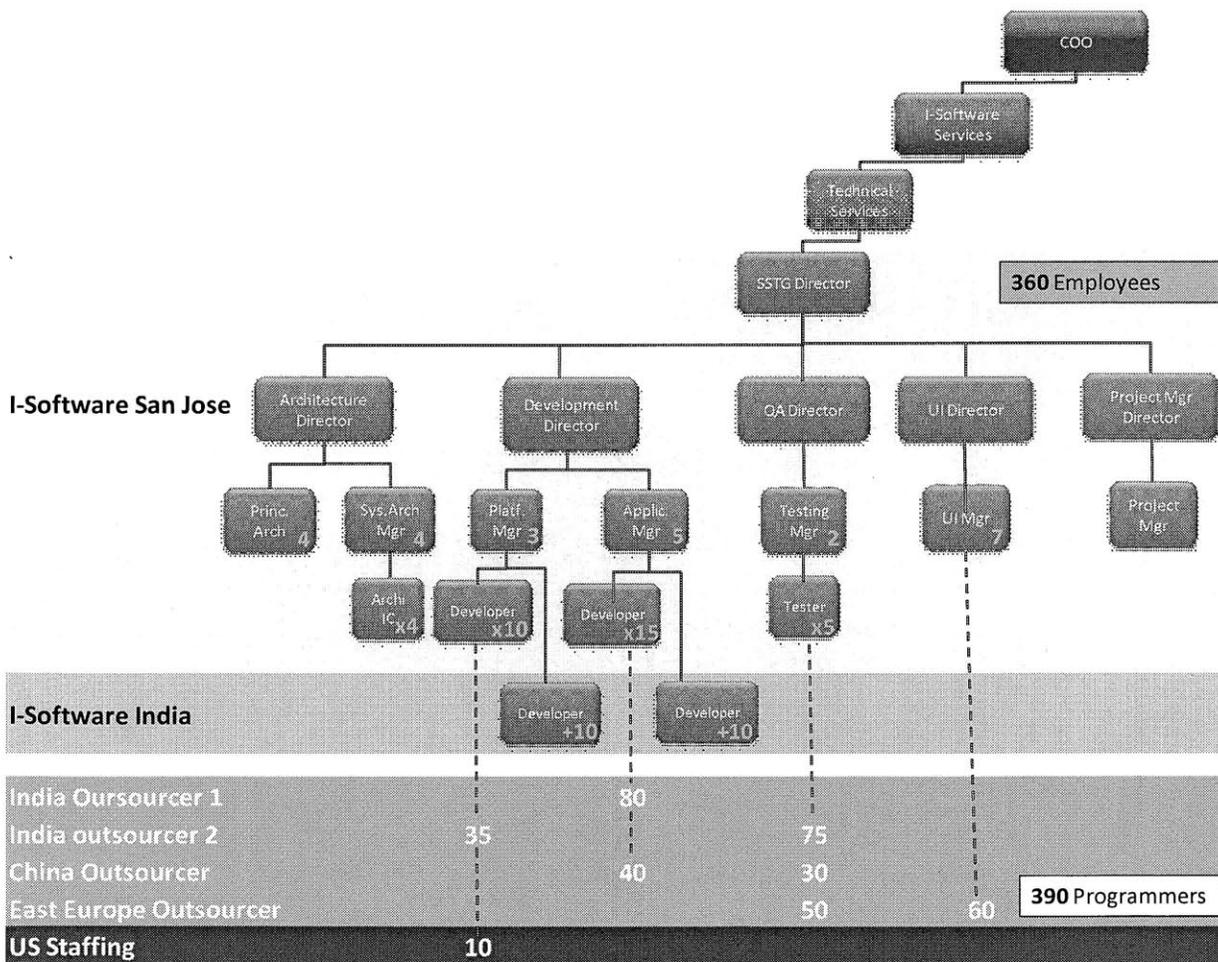


Figure 31. I-SOFTWARE SSTG Outsourcing breakdown structure

10. Bibliography

- Argyris, C. (1985). *Strategy, Change and Defensive Routines*. Ptiman.
- Capozzi, M. M., Dye, R., & Howe, A. (2011). Sparking creativity in teams. *McKinsey Quarterly*, 1-8.
- Capozzi, M. M., Dye, R., & Howe, A. (2011). Sparking creativity in teams: an executive's guide. *McKinsey Quaterly*, 5-7.
- Collins, J. C., & Porras, J. I. (1996). Building Your Company's Vision. *Harvard Business Review*, 63-77.
- Coyne, K. P., & Coyne, S. T. (2011). *Brainsteering: a better approach to breakthrough ideas*. New York: Harpen Collins.
- de Bono, E. (1970). *Lateral Thinking: a text book of creativity*. New York: Ward Lock Educ.
- Fine, C. H. (1998). *Clockspeed : Winning Industry Control in the Age of Temporary Advantage* . New York: Perseus Books.
- Hammer, M., & Stanton, S. (1999). How Process Enterprises Really Work. *Harvard Business Review*, 108-118.
- Hammond, J. S., Keeney, R. L., & Raiffa, H. (1999). *Smart Choices*. Boston: Harvard Business School Press.
- Kazman, R., Klein, M., & Clements, P. (2000). *ATAM: Method for Architecture Evaluation*. Pittsburgh: Software Engineering Institute, Carnegie Mellon University.
- Kennedy, J. F. (1962, September 12). TEXT OF PRESIDENT JOHN KENNEDY'S RICE STADIUM MOON SPEECH. Houston, TX, United States of America.
- Maier, M. W., & Rechtin, E. (2009). *The art of systems architecting*. Boca Raton: CRC Press.
- Nadler, D. A., & Tushman, M. L. (1997). *Competing by Design*. New York: Oxford University Press.
- Nightingale, D. J., & Rhodes, D. H. (2011). *Enterprise Architecting Class*. Cambridge: MIT.
- Peters, T. (2003). *Re-Imagine!: Business Excellence in a Disruptive Age*. London: Dorling Kindersley Limited.
- Porter, M. E. (1980). *Competitive Advantage*. New York: Free Press.
- Rouse, W. B. (2011). Necessary Competencies for Transforming an Enterprise. *Juornal of Enterprise Transformation*, Volume 1: 71-92.
- Sterman, J. D. (2000). *Business Dynamics: Systems Thinking and Modeling for a Complex World*. McGraw-Hill.
- Teece, D. J., Pisano, G., & Amy, S. (1997). Dynamic Capabilities and Strategic Management. *Strategic Management Journal* 18, 509-533.
- Valerdi, R. (2011). Heuristics for Sytems Engineering Cost Estimation. *IEEE Systems Journal*, 91-98.

How do senior leaders conceive and re-architect their enterprises?

Von Hippel, E. (2005). *Democratizing Innovation*. Cambridge: MIT Press.

Womack, J. P., Jones, D. T., & Roos, D. (1991). *The machines that changed the world*. New York: Harper Perennial.