INFORMATION TECHNOLOGY: ATTITUDES AND IMPLEMENTATION

by

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ABSTRACT

This thesis attempts to answer three questions associated with the implementation of Information Technology (IT) in firms. The three questions include: What enables some companies to formulate their business concept using IT?, Does innovation as a value need to be present in an organization for the organization to successfully formulate their business concept using IT?, What are the process characteristics of successful IT implementations?

Interviews were conducted with fourteen senior executives in four companies in different industries. The companies were selected from a sample pool of companies which had participated in a previous structured thesis project in which the CEO's of these firms were typed as having similar attitudinal views towards IT.

It was concluded that there are a number of driving and enabling factors and conditions that shape a firms' ability to formulate their business concept around IT and that while a value on innovation was found in all companies it is only one of many influences.

This thesis was carried out as part of a structured thesis titled "Innovations in IT and CEO Attitudes 1987-88" supervised by Dr. Edgar H. Schein. There is a relationship between this structured thesis and one titled "Implicit Assumptions About IT of Chief Executive Officers 1986-87", also supervised by Schein, and a much larger research undertaking at MIT known as the "Management in the 1990's Program".

Thesis Supervisor: Edgar H. Schein
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To Sloan Fellows Ronald Schuff, Paul Homer and Steve Buzzard I also extend my appreciation for their willingness to listen, the experiences and ideas that they contibuted and the fraternal support provided throughout this year.

To the fourteen Senior executives, who through the generosity of their time and ideas, allowed me to learn a great deal on this subject and many others, I am grateful.

To my sponsor AT&T, for giving me the opportunity to personally grow through attendance of the Sloan Fellows Program and whom without their support I would not be here, I am deeply appreciative.

And finally to my wife Cindy, and my sons Bryan and Scott who provided me with the emotional support and every reason in the world to do my best, thank you for being there!

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PROLOGUE

In the highly developed economies the business environment is undergoing nothing short of a transformation.

John Naisbett's observation in his 1982 book "Megatrends", that our society is facing a "megashift from an industrial to an information society" (1), establishes one of the principle trends that are reshaping this environment. If this is in fact true, and I believe it is, then the implications are enormous.

At the same time global competition is forcing firms to become more efficient and to find an increasing number of ways of differentiating themselves. Thomas J. Peters and Robert H. Waterman Jr. captured the essence of this need in their book, "In Search of Excellence" (2). In their analysis these two writers called largely for a "return to basics". This return to basics includes focusing on innovation to improve on things that you are good at as well as creatively developing and implementing new ideas and concepts. Further, they included having a solid understanding of your value system.

Michael E. Porter reshaped many of the ideas about corporate strategy in his books titled "Competitive Strategy" (3) and "Competitive Advantage" (4). Focusing on "industry structure" and the "value chain", Porter identified many ways of creating competitive advantage through the use of information technology since he also believed that "information" is an underutilized asset in many business concepts.

John Wyman of AT&T points to a "technological myopia", concerning information technology specifically, in his 1985 Sloan Management Review article titled "Technological Myopia - The Need to Think Strategically About Technology" (5). In this article Wyman explicitly discusses the need for firms to recognize the value of information and therefore the need to look upon resources allocated to information technology as a "priority investment" rather than an "expense to control".

Field research completed by MIT, attempting to understand the information technology adoption process and the wide range of implications brought on by the technologies suggest that these are key concerns of many executives.

Add to this my observations with respect to the bevy of articles that blend these subjects together, the number of conferences and symposiums hosted and attended by the private

and public sectors and the burgeoning number of educational opportunities being offered by academe to all sorts of paying customers aimed at making the practicioning community more effective at making information technology work for them. Undoubtedly, this subject area will be of critical importance as a factor in the business environment for years to come and this thesis is a small attempt on my part to understand it better.

CHAPTER 1

INTRODUCTION

A widely accepted fact is that almost every aspect of the business environment has been in some way affected by the introduction and evolution of Information Technology (IT). What remains less understood is what factors or conditions enable some firms to strategically apply this technology creating sustainable competitive advantage.

It is precisely, the desire to understand these factors and conditions that is the central focus of this thesis.

This thesis has three affiliations with other work that has been undertaken at MIT. First, this thesis is part of a structured thesis project supervised by Dr. Edgar H. Schein and is titled "Innovations In IT and CEO Attitudes 1987-88". Second, this structured thesis is actually a follow-on effort to another structured thesis undertaken by members of the Sloan Fellows and Management of Technology Programs in the Class of 1987. In this previous effort, which was also supervised by Schein, a definition of the values and implicit assumptions of CEO's concerning IT was developed. Finally,

all of these works fall under an umbrella program known as the "Management in the 1990's ", which is a cooperative research undertaking by MIT, nine major corporations and one public sector entity. "The purpose of this Program is to illuminate the nature of the changes and the implications brought about by information technology on all organizations."

KEY CONCEPT QUESTIONS

Three key concept questions were designed to shape the scope and efforts of this thesis. They are as follows:

Question #1 - What enables some companies to formulate their business concept using Information Technology?

Question #2 - Does innovation as a value need to be present in an organization for the organization to successfully formulate their business concept using Information Technology?

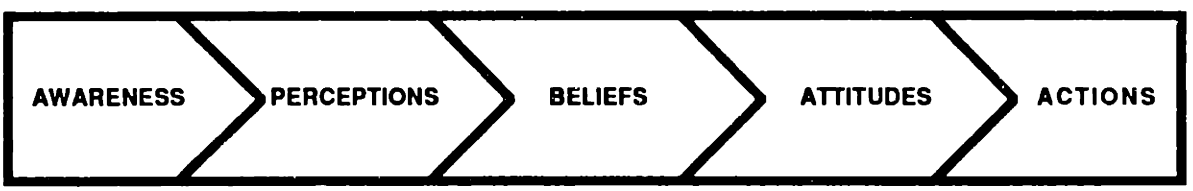
Question #3 - What are the process characteristics of successful Information Technology implementations?

Working from these three questions and an assessment that this problem could be broadly characterized as one of organizational behavior a simple behavioral model was developed.

THE PRIMARY MODEL

The purpose of the primary model is to develop a testing device for answering questions 1 and 2. This model is conceptually underpinned by a superstructure which is based in the principles of learning theory and organizational behavior. The following chart displays these principles and their relationships.

Chart: Conceptual Underpinning of the Model



Working from this conceptual underpinning a high level model was developed which attempts to describe the linkages between the source and beliefs on innovation with attitudes towards IT of key executives and IT implementations in their firms. The following chart and table attempt to graphically and verbally articulate each of the modules in the model.

Chart: The Model on Innovation Beliefs and IT Attitudes

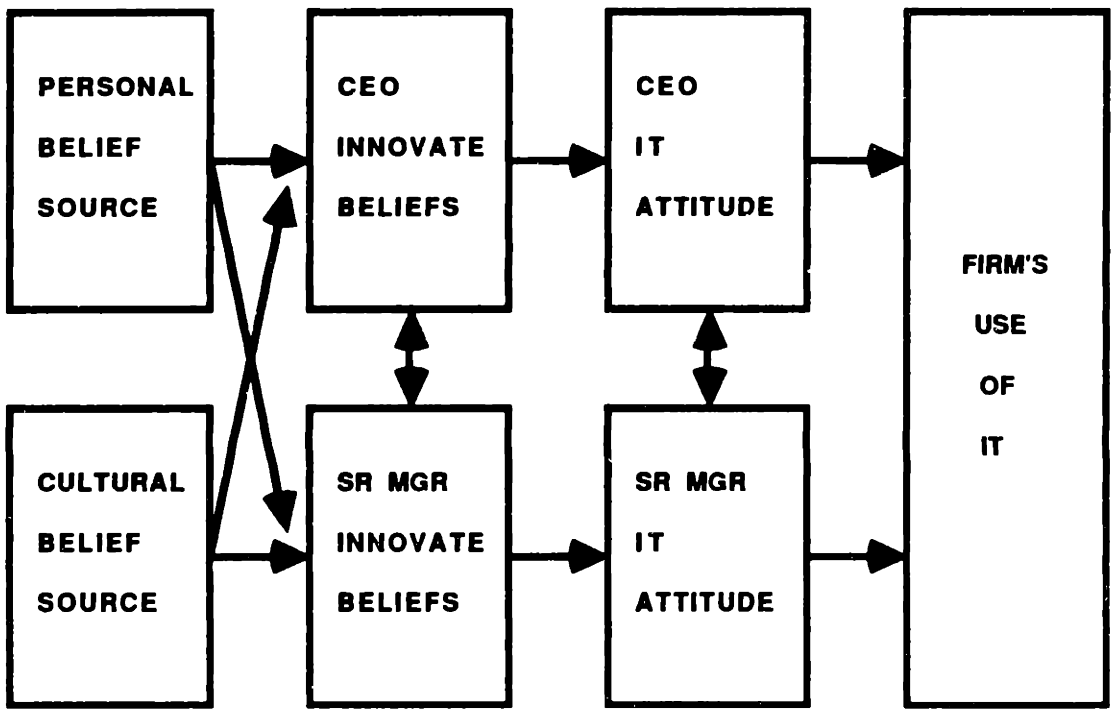


Table: Model Element Definitions

Working from the left to the right side of the chart:

- **Personal Belief Source** - This module is meant to represent the values and underlying assumptions that are held by the individual. They have been formed by a variety of life experiences and while not mutually exclusive of the corporate culture Belief source, they are not necessarily mutually dependant either.

- **Corporate Culture Belief Source** - This module is meant to represent the organizational values and underlying assumptions that are part of the corporate culture of the organization. As individuals join an organization, if they are fully acculturated these values and assumptions may become indistinguishable from their own. In my experience however, there are often mavericks who don't always accept these values.

- **CEO Innovation Beliefs** - This module represents beliefs of the CEO with regard to innovation. As a cognitive component of attitudes, understanding whether CEO's believe innovation to be a critical ingredient and place an extraordinarily high priority and effort on it from a personal point of view in the scheme of the overall firm's success.

- **Senior Manager Beliefs** - This module represents beliefs of the senior management with regard to innovation. Similar to the CEO's, where this group of managers comes out is equally important.

- **CEO Attitudes** - These attitudes tend to dictate the actions of these CEO's in terms of their direct involvement, degree of personal support, or views on innovation. In this model a positively disposed attitude is more prone to take a positive action.

- **Senior Management Attitudes** - these attitudes tend to dictate the actions of the senior managers in terms of their direct involvement, degree of personal support, or views on innovation.

- **Firm's Use of IT** - This module represents demonstrated uses of information in the firm.

> Examples here would indicate applications of the technology to increase or shift value in the overall "value chain", increase efficiency, in the operation or develop some form of differentiation.

In this model I hypothesize that these modules are serially dependant on each other.

To organize and facilitate the use of the data collected in the interview process four typologies were identified. These typologies correspond to the model and include a Belief Source Typology, an Executive IT Attitude Typology, an IT Application Level Typology, and a Strategic Value of IT Typology. Descriptions of these typologies and their sources may be found in Appendix A - Methodological Approach.

THE SECONDARY MODEL

This model will be used as a testing device for question 3. Developed by Dr. Edward Roberts and presented in his article titled "Generating Effective Corporate Innovation" (6) he suggests that there are four critical areas and five key staff roles that must be attended to if innovative ideas are to be generated, developed, enhanced, commercialized and moved foward in an organization.

While these ideas were formulated by Roberts' in connection with his work with research and development programs carried out by technology-based firms I share a belief with Sloan Fellow Ronald Schuff that these principles may apply to the use of innovative IT solutions in firms as well. Mr. Schuff has made the testing of a derivation of Roberts' model the central focus of his thesis.

A brief description of Roberts' four areas and five roles are included in the following table and will be used as a framework to develop an understanding of the process characteristics of successful IT implementations.

Table: Areas and Roles Associated With Technological Innovation

Areas

- The staffing of technical organizations must provide for the several key functions necessary to achieve successful innovation.

- The organization must be structured to enhance the flow of technical and market information into research and development.

- The organization's structure must also assure strong links with marketing, to assure innovations effectively move forward into commercial success.

- The company must establish strategic planning methods that improve integration of top management's

technical plans with overall dimensions of corporate strategy.

Roles

- o The creative scientist or engineer, the source of creativity within the organization.
- o The entrepreneur who pushes the technical idea forward in the organization toward the point of commercialization.
- o The project manager, who can focus on the specifics of the new development and indicate which aspects will go forward, which can be economically supported, and which may be deferred and who can coordinate the needed efforts.
- o The sponsor, the in-house senior individual who provides coaching, back up and large skirts behind which entrepreneurs and creative scientists can hide. His role is that of protector and advocate.
- o The gate-keeper, who brings essential information into the technical organization.

THE APPROACH

Following this concept design, model and typology definition the tasks associated with sample identification, sample solicitation, interview protocol development and testing, the data collection process and the analytical approach were all determined and completed. Detailed explanations and substantiation for the choices made can be found in Appendix A - Methodological Approach.

The following four chapters document the results of the field work associated with this thesis and the final conclusions are in Chapter 6.

CHAPTER 2

This chapter will be devoted to the first of four companies researched as part of this thesis. It will provide the reader with a brief description of the industry, the company, the organization structure, the roles of the individuals interviewed, documentation of the information gathered from the interviews, followed by a typing of the individuals on Scheins CEO attitudinal typology scale, a typing of the belief source on innovation and general conclusions formed on the company.

DESCRIPTION OF THE INDUSTRY

Company A participates in the microelectronics design and manufacturing industry. The key functions of this industry are to make devices which capture information, miniaturize it, process it, and translate it so that the result can be understood. Within this semi conductor industry companies generally make either digital or linear circuits. Digital circuits are used in computers. Linear circuits, also referred to as analog circuits are components which process traditional analogue or linear current.

This industry can be further segmented into companies who make their components to meet exacting standards for accuracy and reliability or by producing less expensive, less exact versions of the same product.

The industry can be characterized as highly competitive, very internationalized, most often very price sensitive, extremely short product "s" curves, human resource dependent and volatile.

DESCRIPTION OF THE COMPANY

Company A is in the business of designing, manufacturing and marketing high precision, highly reliable microelectronic components, subassemblies, and micro processor based systems. The precision microelectronics products made by this company are used in the conditioning and conversion of analog signals found in computer related applications such as robotics, factory automation, automatic test equipment, industrial control, aerospace systems and healthcare systems.

The company's products are marketed through direct sales offices and independent representatives in the US and wholly owned sales and distribution subsidiaries in nine European

countries and Japan. Foreign sales account for the majority of the companies total sales.

The company's roots were established in 1956 as a research company and it was later re-incorporated in 1963 as a research, design manufacturing and marketing company. The company has been active in a variety of minority investments over the years often buying within various technology and marketing rights. One of the original founders still actively participates in the business and functions as the Chairman. The firm is a public company.

In 1986 Company A had $113 million in sales, employed approximately 1500 people, assets of $114 million, over 750 different products and sold to more than 18,000 different customers in an extremely diverse range of markets.

In the firm's strategic plan it has established some very challenging financial objectives which include sales growth of 25% to 35% per year, return on sales of 10%, return on assets of 12% and return on equity of 20%. Falling short of all of these in 1986 the firm is still considered well positioned by industry observers and doing quite well.

The above information was collected largely from Standard and Poors, Moodys and and various publications distributed by Company A.

DESCRIPTION OF THE ORGANIZATIONAL STRUCTURE

Company A maintains a decentralized organizational structure to help keep profit responsibility focused and to allow each unit to react to changing conditions as quickly as possible. Operating business units are pulled together into strategic groups for supervisory purposes maintaining profit responsibility at the Divisional level. Costs associated with overhead support functions are allocated back to the cost structures of each Divisional unit on a variety of schemes dependent on the functions. Divisions tend to be product focused, who share manufacturing centers and sales *channels and whose ccsts are allocated back on established* allocation principles.

COMPANY PRINCIPLES

As an artifact of Company A values and underlying assumptions they have a published a "Corporate Philosophy" which I found

widely displayed and very top of mind. It was often referenced with passion and conviction, paraphrased and directly quoted in the course of discussion. The following table presents a direct copy of it:

Table: Company A Corporate Philosophy

CORPORATE PHILOSOPHY

Corporate Purpose

The fundamental purpose of our business is to provide something of value to mankind. Through the operation of our business we hope to add to man's economic and social progress.

Principles and Assumptions

1. People are, in general, intelligent, rationale beings who want to be productive.

2. In an exchange, value should be given in return for an equivalent value.

3. An individual's progress should be based on an evaluation of the merit of the individual's contribution.

4. All persons should act in their own enlightened, long-term self-interest.

5. All activities must be conducted with integrity, honesty, and with respect for the dignity of everyone involved.

6. Communication must be open, free, and honest.

7. Our prime responsibility to ourselves and to the community is to perform our jobs in a manner that assures a healty, profitable company.

ROLES OF INTERVIEWEES

Five individuals were interviewed in Company A and can be broadly categorized as individuals charged with the responsibility and accountabilities that I was seeking as outlined in Chapter 3, namely individuals responsible for corporate or business planning and those responsible for profit and line operations.

In this company, strategic planning was largely the responsibility of the Group level managers who were also officers of the firm. The Divisional managers participated in planning at the product level and input into Group and Corporate Strategy but essentially were held responsible for generating profit from already committed to business lines.

In this regard, I spoke with two individual group executives and three division managers, two from one group and one from the second.

All interviews were held at the company's corporate headquarters some in the individuals office and other in a shared conference facility.

INTERVIEW #1

The first interview was with the Vice President - Systems Business. In this capacity this individual was responsible for one of Company A's strategic groups. Included in this group were its systems businesses, 3 companies that had been launched on an intrapreneurial basis and the European operations of the firm.

Demographic and Biographic Profile

This Vice President had joined Company A within the last six months and had had a wide variety of experiences in the industry, having been a Managing Director in Europe for another industry participant, a Contract Consultant, and an entrepreneur who had started and sold a company in the industry.

This manager was a graduate from one of the Military Academies and served as a commissioned officer in the Armed Forces. At the time of the interview he was fifty-eight years old.

Source of Beliefs - Innovation

This manager was able to offer a unique perspective of Company A. Having a tenure of approximatley six months he took more of an outsiders view looking in, using the term they when referring to Company A rather than we. It was obvious that he had not yet assimilated into the culture and firm.

To prcvide insight into this interviewees response to my question about the culture of Company A, I will offer a series of quotes which I believe capture the essence of his overall response. He began by stating, "This is a thirty-five year old company that runs like a $14 million dollar one even though sales are approaching $116 million". It was further described as a place where "doing your own thing was important and valued, a lassaiz fare type of approach". Individuals are given great amounts of responsibility and the workload to go with it. Management was spread extremely thin. He described the organizaiton as "unique" one with a certain amount of "anarchy" which is fostered, stimulated and supported by the principles outlined in the "Business Philosophy". When asked how the anarchy was dealt with the answer was simple "We tolerate it". Further,it was described

as an informal working atmosphere, something that "people were proud of".

In describing the culture, another observation by this manager included, "I have observed and worked with our CEO and his style is this companies style...he is quite laissaiz fare". He went on to describe him as, "a very idealistic leader, helpful when trying to stimulate creativity, a man who doesn't discipline because he believes it stems growth".

Of the COB, one of the original founders, "he is the researcher ... very determined, when he gets an idea he's like a pit bull". Other ascriptions to the COB included, "forcing outselves to compete against each other breeds strength, therefore we fund competing projects". Further he described the COB as a real believer in taking responsibilit. He went on to explain that in this environment there was a lot of "doing" and very little "managing".

In many respects this manager saw problems with some of these traits, that were very much the strengths of the company. He believed that they served to "dilute the central thrust" and "create a lack of discipline", particularly in the managerial area.

Artifacts, such as the intrapreneurial ventures were held up as a testatment to the business philosophy and principles. Formed generally in situations where the concept or idea was far enough outside the primary business interests of the firm but supported with the strong convictions of an individual, they would fund these concepts to the point of establishing them as subsidiaries and offer the individuals financial "put and call" options on the business to protect each others interests.

In response to the question on personal approach this manager offered that he believed that, "an autocratic approach is inappropriate in the technology products industry". That the "light touch" is what was called for, "jaw boning" as he called it. He suggested that he had approached this position differently than others he had held and found himself "functioning more like a teacher", asking questions like "what do you guys want to inherit". In summary he saw his role as gently bringing a little business discipline to bear on the situation.

Attitudes Towards IT

In describing information technology this manager focused on technology utilized to "move, manipulate and analyze information". He defined IT in the broadest set of terms.

He described himself as an "information technology fiend". Having only recently been addicted to it he described his addiction as a forced one since he took on this job. In terms of personal use of aplications, he is a heavy user of electronic mail applications and analytical PC based packages. With terminals in each of his several homes and office he described using them for several hours a day. He indicated that he had been introduced to these tools by observing the heavy usage patterns of the CEO and being forced into it somewhat by the shortage of staff and referenced the "doing" culture rather than managing. He was very clear that he didn't see this as work for managers at his level, but seemed to get some sense of personal satisfaction from it.

The Business Concept

The business concept was described as the designing, manufacture and distribution of highly reliable and accurate linear microelectronics with a primary business focus on automation. They did not try to compete on price.

Critical success factors included having technology that was "good enough" coupled with a value added distribution system. Underlying both of these critical success factors are "people resources". Having the talent in both the design and sales staffs was deemed to be critical and as a result a tremendous amount of emphasis is placed on training.

An explicit role was seen for IT in achieving these critical success factors. In the engineering functions computer aided Engineering and Design, in the Distribution area an Inbound Calling Customer Services Center for technical support had been established and in Human Resource Development innovative training approaches with satellite feeds to allow them to function as remote sites for courses and curriculums being offered at several academic institutions located in that area of the country. Other applications included a worldwide order entry system, manufacturing monitoring technology and other executive support systems.

In general, all of these applications were fostered or pursued by the divisions or groups. While there is a central MIS organization, this manager did not view it as an initiator of activities. For details on these projects I was referred to his division managers.

INTERVIEW #2

This interview was with the General Manager of one of three Systems Divisions which reports to interviewee #1. In this capacity this manager has profit and loss responsibility for his division and has functional responsibility for product design, manufacture and customer support. While not having supervisory responsibility for sales or other staff functions these are accounted for in the P&L on a fully distributed cost basis.

Demographic and Biographic Profile

This manager has two years of tenure in his current position. He left this firm for a period of time to start a business for a major industry player returning to his current position in a division that needed to be turned around. His dominant skill set is design engineering and has developed a strong interest in manufacturing.

His was 40 years old at the time of the interview, holds a BS-EE and has completed all of the course requirements for an MS-EE but does not hold the degree. He was characterized by his supervisor as a strong manager who "runs a tight ship".

Belief Source - Innovation

When asked about Company A's culture this manager immediately referred to the company's "Corporate Philosophy" and then proceeded to articulate it with a series of statements and examples all focusing on high importance of the individual. He began by stating "If you know what you want to do, and you have the motivation to do it, and if you ignore everyone that stands in your way, then this is the only company I know will let you do it!". He went on to say that, " even when you run into a block wall, you can go directly to the President, make your case and if you are convincing enough, having demonstrated your personal conviction, things can go so far that you may end up being spun off to create a separate subsidiary". This was considered to be very socially acceptable and while you didn't always have the blessing of your direct manager it was your right and privilege.

In referencing a story about his engineers, it became abundantly clear that respect was very much a part of the reward system here. You earned your respect as an engineer by introducing a new product. Until you did so, you were not really respected. There were no formal recognition systems providing for bonuses or prizes for individual

accomplishments, such as a product introduction. Instead the engineer got the pride of his own accomplishment supported by the company wide respect. As such, there are high emotional attachments between people and products and keep in mind they currently market 750 products.

Recognizing that this manager returned to his firm confronted with a challenging turnaround situation I probed him on his approach. His response was through openness, decisiveness and participation.

One of a number of difficulties was killing products that long ago should have been discontinued. He referenced the above mentioned emotional attachments, the personal extensions that their products represented. The question became how do you kill the product and not kill the person? Part of the answer rested in the nature of the reward system. Reward was based on the creation of the product and not the products longevity. By describing the facts, sharing his conclusion and retraining the focus to "where do we go now", this manager was able to captivate the interests of the team and focus them on developing new product lines. He saw his role as telling them how he saw it and deciding that they could no longer pursue that course, all without predisposing

the answer of what they had to do next. The engineers took it from there.

This division was so autonomous that they had developed their own mission statement, which interesting enough was printed on the back of this managers business card. Even the divison's name was an acronym created from values that they held and wanted to convey to their customers.

The mission statement follows.

Table: Company A - Division 1 Mission Statement

The mission of Division 1 is to profitably satisfy the customer's need, to remain competitive in the marketplace by enhancing their ability to acquire, process, and act on data and information in real time.

This will be accomplished through the innovative advancement of electronic technology and manufacturing processes and the pursuit of excellence in worldwide marketing, sales and product support.

Attitudes Towards IT

This manager defined IT as the information needed to run the business, how you get it, classify it, and anlayze it". As an individual he was not a personal user of IT for any

particular applications. He was the receiver of outputs of a variety of applications that were utilized to manage and monitor his functional responsibilities. While not personally accessing this information directly from systems he was a strong proponent for using these technologies and applications throughout his division. He did not see how personally utilizing the technology added any value.

Description of Business Concept

In his division he defined the busines concept as designing and building a quality product, that was delivered on time, at a cost that will allow both he and his customer to make a profit.

As critical success factors he articulated quality and cost and then through discussion and example described effective and complete communications between the customer and the engineer, the engineer and the manufacturing type, the salesman and the engineer, the salesman and the customer. Great emphasis was placed on the quality of the design not only in terms of its functionality and appeal to the customers but in its producibility and manufacturability at a profit.

The quality and cost success factors were being supported by a series of information technology applications that included statistical processing control, shop floor control system, cost information packages, inventory management system and time and attendance personnel management systems.

While there were not data networked applications designed to support the communications success factors, voice communications by telephone were widely used. Potential was seen for CAD interfaces and value chain connections to supplies and customers but were not being pursued due to do internal priorities.

Case Example

As a case example this manager cited the Inventory Management System that had been deployed. The idea generator was this manager himself who had developed an objective of increasing inventory turnovers. In effect he was also the champion but interesting enough worked to sell this idea to his operations manager so that he could play the sponsor role rather than the champion. An engineer was assigned as the project manager and a team of floor personnel was formed to implement the project. The "gatekeeper" function for the inventory

management aspect of the concept was the division manager and the technical role for the support hardware and software was a team engineer. The CEO did not have any direct influence but in this case the division manager was for practical purposes the CEO. Success was measured by inventory turns.

The final note on this interview involved an unsolicited set of comments of the central MIS staff and MIS groups in general. They were largely held in low regard, for reasons based largely on their perceived distance from reality, the burden they place on P&L centers through direct and indirect cost allocations, and the perception of little to no value added.

INTERVIEW #3

Interview #3 was with the Vice President of Components. This manager reports directly to the CEO and has three divisions reporting to him. Interview #4 and #5 will be with two of his Division heads. This manager has a consolidated P&L for his group and is also a member of the Executive Committee which is responsible for corporate strategic management decisions.

Demographic & Biographic Profile

This manager has had fifteen years of professional experience all in the semiconductor industry. He has worked for three industry participants including Company A. He has been with Company A for three years and has had his current responsibilities for the last two.

Source of Beliefs - Innovation

In describing the culture this manager referenced a key statement by the active founder that is often repeated and utilized as a guiding principle. "Our purpose is to do

something interesting, not frivolous, but something with a benefit to mankind, which contributes to the productivity of mankind as a whole." There was a special emphasis placed on the word "productivity". Financial success was necessary but secondary to this stated purpose. It was after all a "necessary means to achieve the stated purpose".

Direct reference was then made to the Corporate Principles by referencing to "this is how we do things, this is what we always reference back to when in need of some additional specifics to guide our actions. He suggested that being "people oriented" was a special hallmark of this company along with a recognition that everything stems from the individual, particularly the individual designer. When probed on this arrangement of creating spin-offs, this manager referred to principle #4, "All persons should act in their own enlightened, long term, self interest". He went on to say that we encourage this by offering "both a procedure and process for person to go about getting help". These approvals were conditioned by three factors identified as: the idea must have merit, it must be synergistic to the business, and must not be being pursued somewhere in the firm now, the range of possibilities were quite open. The process was simple and straight forward with easy access to both the Officers and Board for advice and consultation coupled with a

venture capitalist approach to funding sources complete with a set of buy-out options for both parties.

One of his divisions launched 80 new products last year along and continuously has 120 or better in the development cycle which supported his belief that these cultural values and artifacts were critical to their ability to accomplish these activities.

Also characteristic of this organization is the fact that everyone "understands that a key value is that it is our objective to "create a high value product". This broad, deeply understood objective is the underpinning of this managers approach because he sees his responsibility as the removal of obstacles and communications. He guides himself on four principles which he articulated as, "high communications, no punishment, an expectation that subordinates will have a proposed solution to every problem they present, and a need for high group participation". He openly encouraged his staff to have opinions, to express them, and to be in a position to defend them. To quote, "get excited, get mad, speak your piece" and described his working sessions as "controlled chaos". While supportive of participation in this environment, he was not a believer that decisions had to be reached by consensus. It was his opinion

that over 80% of the decisions could not be reached in this manner given the underlying principle of individual freedom and opinion he encouraged.

He saw his role then to lead the group to decisions and often to make the decision himself, expecting everyone to accept this decision and focus their energies on successful implementation.

He also recognized infallibility and was comfortable with admitting error expecting his troops to quickly regroup and execute the decision process once again.

Attitude Towards IT

This manager described information technology as "the use of computers and communications technologies to improve productivity".

He suggested that he was a heavy user of these technologies first by citing extensive use of voice communications particularly conference calling and second, more computationally oriented uses. His personal uses in this area were made both at home and in the office, involved

spreadsheets, information retrieval from commercial data bases, E-Mail and database management packages. He believed that technologies employed within the technical communities to generally be more effectively implemented than in the business community citing that financial and administrative systems seems to lack the architectural integrity and integration of the technical systems.

The Business Concept

The business concept was described as, "creating a product that is state-of-the-art, very precise, with high perceived value that could be applied in the productivity marketplace". Being constantly at the state-of-the-art and focusing on niche opportunities was perceived to be the sources of competitive advantage and differentiation.

As to critical success factors there were three: know and communicate objectives, R&D efforts get priority and focus on the individual.

The first of these was sufficiently outlined in the Belief Source section. Two quotes are helpful in grasping this managers perception on the other two and understanding how

these success factors were managed. With regard to R&D, "It is impossible to judge, exactly, financially, what is going to be returned on a never developed before product or process". He differentiated the way R&D, as opposed to other investments were viewed and that it was in fact an investment and not an expense. Secondly with regard to the individual, "It is impossible to schedule creativity." He also described the individual as, "the way we make the whole thing work".

In describing the means used to achieve these success factors he highlighted communications. He saw the need for the necessary environment to allow "individuals to evolve their own creative ideas". He cited proximity to other creative individuals and the appropriate ergonomics of the environment as critical factors. He viewed growth and multiple locations of design staffs as inhibiting factors to their creativity because of the impediment to the exchange of ideas and support structure. He did believe however, that there was a role for IT, and despite the data entry barriers he saw value in electronic bulletin boards more as a place to place questions for response rather than as a repository for information.

He voluntarily cited opportunities for enhancing relationships with suppliers and customers by being

electronically linked in the value chain. To date they have not pursued these opportunities but distinctly saw the potential.

Case Examples

When posed the question on examples, we instead got into the issue of the role of MIS organizations and some insightful thoughts were generated. This mangers' view was that the appropriate role for MIS organization was one of architecture, expressed as, "make sure that everything links" and that the system functionality, both design and development, should be the responsibility of the user group.

INTERVIEW #4

This interview was with the General Manager of the Linear Division who reports to the Vice President - Components. His responsibilities are similar in nature to the previously described General Managers responsibility and P&L accountability but with one principal difference. This manager did not have direct manufacturing responsibility but was responsible for a much larger portion of the firms revenue stream and even larger share of the profits. Functions under his responsibility included, design, product management, direct and indirect responsibility for manufacturing and sales. He was measured on P&L with fully distributed allocations and new product innovations. He has held these responsibilities for the last year and a half.

Demographic and Biographic Profile

From an experience perspective this manger saw his dominant skill and principal interests to be in the area of design engineering management. He had spent most of this time in this field and was genuinely interested in it. He took on the job of Division Manager and has simultaneously maintained

his responsibilities of Design Manager. He is 37 years old and holds a BS-EET and an MS-EE.

Source of Beliefs - Innovation

When asked about the culture of Company A, this manager initialized his comments by stressing that Company A was one made up of multiple communities and due to this each had developed somewhat differently. He did offer however, that in composite this was an engineering type of company, that engineering decisions dictate and these decisions tend to be product based. He characterized his own division by describing it as a group often engaging in "almost mock conflict", advocated by him, encouraging direct, open, candid exchanges on points of view and solutions to problems. He characterized the environment as one that was built on individual accomplishment because he believed launching products as they do it is largely an individual effort where each design is the work of a talented, craftsman like engineer, and "after all launching products is what this firm is all about".

He further characterized the culture as one which worked to remove impediments from individual progress or at least one where getting over roadblocks by any means was a good thing.

In this firm the position of Design Engineer is a position of status and everyone recognizes this however, it is new product introductions that bring with them the respect and personal recognition that they seem to thrive on up to and including the President.

He described their way of working as an "intercommunity team, not a working team" which meant that dependencies were based in information and knowledge transfer but not functional or responsibility dependency.

This individual seemed to have a good grasp on the psyche of an engineer and what made a good one tick. Company A had a very low turnover rate which he attributed to "understanding that a good engineer likes to be productive and comfortable and that means designing, not moving roadblocks or running into block walls".

With this as a back drop he articulated his personal approach as, "encouraging this direct and professional confrontation, testing his people for their advocacy to their beliefs and opinions". He said "If I think something should be done differently, I will push the person, to see how committed they are, if I'm convinced I step aside". In many ways this supported his belief in pushing decision making down.

When asked where he spends most of his time on the job the answer was crisp..."staffing". A substantial amount of his time was spent on the college campus looking for the best engineers, with good grade points and a clear ability to stand up to the rigor of his technical interview to prove as he said, "that they really understood what they were taught". This manager spoke with great commitment on all of the above-mentioned points and it was clear that it was in this style that he preferred to be dealt with as well.

Attitudes Toward IT

This manager defined IT as the "methods and technology employed to communicate". In his view this encompassed everything from the highest of electronic technologies all the way down to good old reliable "sneaker-net". A euphmism for walking around and talking with people.

He can be described as a heavy user of managerial and technical engineering IT applications. Personally taking advantage of E-mail, word processing, spreadsheet, in-process control, and engineering design systems both at home and work. He also expressed a great deal of pride in the fact

that his division was seemingly first in bringing on many of these applications particularly E-Mail, CAE and CAD.

The Business Concept

In describing the business concept this manager chose to describe the concept of his division. He described it as "designing, manufacturing and marketing of a top end, high performance components for selected niche industries. The products that we select to launch are products that are small enough in volume or hard enough to make so as to discourage competitors".

The critical success factors associated with this concept were intra division communications, the individual design engineer, training and knowing what the customer needed.

I believe the means that this manager utilized to insure attainment of the first two critical success factors were outlined in the Personal Approach Passage, namely encouraging confrontation and advocacy. While potentially dangerous they are means of encouraging more communications. His personal

involvement in recruiting and staffing was one of the many means of insuring that they had the right type of individual. Their reward and recognition system promoted having the right motivation. By emphasizing the matching of the personality and ability of an individual to the project, he worked to insure having the right person, in the right place, at the right time. Through their training philosophy and approaches coupled with their use of new design technology, they worked to insure that their engineers had the right tools.

On the role of IT as a means of supporting these critical success factors, this manager saw little substitute for proximity in the design function. He believed strongly that the subtle, informal and indirect communications that take place in a group, such as overhearing conversation, taking a bit of an idea from this person and through the use of a synectic like process, whole ideas evolved. In this regard he saw growth of the design staff as a problem, looking to the days of remote design staffs, etc.

He saw computer networked bulletin boards as a poor substitute because of the barrier associated with data entry. Open wire voice configurations didn't provide the visual

dimension and in conclusion the best answer in his mind was "sneaker-net" or proximity.

In terms of supporting the individual both through the provision of state-of-the-art design tools and training the discussion was very rich with potential.

In discussing tools for the individual he was very proud of the CAE systems that they had successfully deployed. Claiming to be one of the early users he believed the simulation capability provided through these systems had effectively created competitive advantage on a number of fronts. The downside was that the technologies were moving so fast and the time to acquire proficiency was so long, that if one tried to keep up with the technology as it was introduced you would find yourself caught in a "do-loop" of churn. As a result you are forced to play a game of "leap frog" hoping that you choose to jump at the right time but never being quite sure. Productivity and profitability improvement figures resulting from these technologies were elusive largely due to the intrinsic nature of the way these technologies were employed in their business concept.

This was also largely true for the training systems that were utilizing information transport technologies such as

satellite feeds, electronic blackboards, video storage mediums etc., but he felt they were critical to supporting the individual engineer.

Case Example

In discussing the CAE system, which was a project taken on and wholly managed within the division, this manager offered a number of comments on the corporate MIS group. He comically referred to them as "MIS...SING". As a group, they were generally held in low regard, looked upon as a burden and out of touch.

With respect to the CAE project itself the ideas for it came largely from the founder and the engineers. Note: the founder is an active designer. As such he was largely the champion but it was also closely held by the other design engineers themselves. There was a project manager assigned who was a design engineer. The gate keepers tended to be all design engineers given the nature of their work. While the CEO was not directly involved he is very supportive of advances in this area. Success levels to be measured indirectly through the broader business measures on the P&L and the number of product launches.

INTERVIEW #5

This interview was with the General Manager of the Advanced Products Division who reports to the Vice President of Components. This Division is, as the name implies, responsible for the design and marketing of highly complex products that tend to be jointly developed with a lead user in the hopes of broader commercial possibilities down stream. The unit operates on a P&L basis with all allocations for both sales and manufacturing reflected in the statement. This unit contributes about 25% of the firms overall revenues and a smaller number, as would be expected given its nature, in terms of profit.

Demographics & Biographics

This manager has spent his entire career, which covers fifteen years, with Company A. He has held his current position for the last three years. He holds both a BS and MS in Electrical Engineering and progressed from the position of a design engineer, through design management to the general management function.

Source of Beliefs - Innovation

This manager described the culture as one of "an engineering company, you make your points here on a technical basis". He offered that almost everyone, designers and managers, were engineers and that made it "nice". I believe he was referring to the ability to relate to one another and appreciate the subtleties of the skills and abilities of each other. He emphasized that the culture was based on "people and providing them the opportunity and freedom to pursue the things that they want to do". He referenced himself and some of the individuals who had pursued venture interests as examples. He also emphasized the relative autonomy and freedom that he had with his own division and the latitude he had been given in defining its charter. He believed that the challenging technical aspects of the company's product line and the advanced products division were particularly harmonious with the interests of top design engineers who wanted to discover and create, unencumbered with roadblocks and diversions to designing.

In describing his personal approach to the job, he believed strongly in giving people as much responsibility as possible and particular to his division, allowing his designers to

interface directly with customers as much as possible. He believed that by creating this direct bond communications would flow easier and the psychological commitment of the designer would be established. This commitment then acts as the prime driver in the motivation of the designer. He also emphasized that managerial control was established largely through the "construction of the project in such a way that, as much as possible, they require very little management, because it is almost obvious what the goal is". His dominant role in this process then became the facilitation of the "finding each other" of the customer and the designer. In support of this his marketing managers reported directly to him and the designers to a design manager. This is an exact contrast to his peer running the component division, and for fitting reason given the difference in the success factors as will be pointed out later.

Attitudes Towards IT

This manager defined IT as "the way I derive information in my day-to-day decision making, to do my work". In his mind this included everything from magazines to advanced computerized systems.

From a personal perspective he made use of limited applications although he did have a networked PC at home. The prime applications that he made use of were E-mail and some of the circuit design systems in the office. This manager did not reference voice telecommunications or have any data terminal equipment in his office.

The Business Concept

This manager chose to describe the business concept for his division. He articulated it as, "the design of complex new products, for new markets, that supported the innovative image of Company A and constituted a substantial part of Company A's new business development effort".

Having a large number of new products was deemed the critical success factor which was accomplished by several means. The included the effective management of the design organization, tending to the needs of the individual and staying close to the customer. In many respects these were all mutually dependent. Getting the engineer close to the customer served both to identifying new opportunities and established the motivation and commitment of the engineer. Tending to the needs of the individual by providing the goal, the attitude,

the tools, the training and the lack of barriers enabled him to produce and get closer to the customer. All of this constituted managing the design process. The key here was an operating assumption that was described as "solving the problem for these end users means you've probably solved it for 80% of the world" providing broader commercial opportunity.

Roles for IT in these critical success factors involved CAE/CAD for the designer and training but at this point little emphasis had been put on using it to tighten up the value chain or cause shifts in it.

ATTITUDINAL IT TYPE OF THE INDIVIDUAL

The attitudinal typing of the managers in Company A is based specifically on the section of the interview targeted at establishing the managers definition of IT and their personal usage. The decision was augmented by other elements of data collected in other modules of the interview that reflected the managers views on the benefits and drawbacks associated with IT.

Table: IT Attitude Types

(Planning)	Interview #1	VP-Systems	- Utopian Idealist
(Operations)	Interview #2	GM-Systems	- Realistic Utopian
(Planning)	Interview #3	VP-Component	- Utopian Idealist
(Operations)	Interview #4	GM-Component	- Utopian Idealist
(Operations)	Interview #5	GM-Adv.Prod.	- Realistic Utopian

Table: Source of Beliefs

(Planning)	Interview #1	VP-Systems	- Personal
(Operations)	Interview #2	GM-Systems	- Indeterminate
(Planning)	Interview #3	VP-Components	- Indeterminate
(Operations)	Interview #4	GM-Components	- Ideterminate
(Operations)	Interview #5	GM-Adv. Prod.	- Indeterminate

COMPANY A CONCLUSIONS BASED ON MODEL

The summary section will be comprised of four assessments. They will include an assessment of innovation as a value present and its source, an overall attitudinal assessment on IT, a typing of the implementation of IT solutions and finally a general assessment assimilating all of the data compiled together.

Innovation as a Value

There is no question that innovation is a value in this firm's culture. Using Schein's labels described in Chapter 2 my assessment is that this cultural value has by and large reached the level of an underlying assumption.

With an attribute of culture as dominant as this one is, in this firm, it was exceedingly difficult to differentiate a personal value from a Company A culturally adopted one. Only in the case of the short tenured officer was this not a central theme in the interview. However, in this individuals case there were hints in his background, namely his start up of two ventures personally, that lead me to conclude that innovation is a deeply rooted value in this individual.

Attitudinal Assessment on IT

As a group this group indexes towards the top end of Shein's Executive Attitudes toward IT typology outlined in Chapter 1. Openly enthusiastic towards the technology and in a sense an industry participant, these individuals while not PC hackers, demonstrated an enlightened view about the technology.

This "enlightened view" perception is not based largely on personal work habits as much as it is on comments that were reflective of the potential and power of the technologies if the applications, the designs, the configurations could be properly matched to the situation.

The CEOs attitude from last years' study was Typed as a Realistic Utopian which attests to the fact that there is a strong similarity among the leadership of this firm in the vision, outlook and given their common basis as professional engineers I might even go so far to say, their way of thinking.

Case Example Classification

Multiple examples of IT implementations were cited during the interviews. Using the classification scheme outlined in Chapter 3. I assess this company's efforts above the incremental but below the radical level. The basis for this typing is that there has been no fundamental reformulation of Company A's business concept resulting from their use of IT. However, they have been rather clever in enhancing their competitive advantage by using IT development such as CAE and CAD early on in their introduction and by pursuing IT to support the primary asset of their concept, the individual with creative training techniques demonstrated by setting up extended classrooms from academic institutions to support their engineers. There were no examples of value chain linkages with customers or suppliers either being seriously developed or under consideration.

SUMMARY

In summary I would describe the business concept of Company A as one that aims at delivering a high volume of new product introductions, of complex state-of-the-art, high-quality, components and systems aimed at productivity applications,

using a development system that has the individual designer at its foundation.

In using Wyman's Strategic Value referenced in Chapter 1, I would assess this company as at the "necessary investment" level of IT utilization, tactically using the technology in support of both their Strategic Plan, and the critical success factors of their business concept.

While both a cultural value and obvious personal values on innovation were present in this firm along with a relatively high rank on the IT attitudinal typology no evidence was cited in this case to suggest that this value played a role in driving a reformation of their concept or in their original concept for that matter. I do believe, however, if there is an idea sparked on how to reformulate that this value and underlying assumption will serve them well in facilitating the necessary experimentation to find a workable formula.

CHAPTER 3

This chapter will be devoted to the second of four companies researched as part of this thesis. It will provide the reader with a brief description of the industry, the company, the organization structure, the roles of the individuals interviewed, documentation of the interview, followed by a typing of the individuals on Schein's CEO Attitudinal Typology scale, a typing of the belief source on innovation and general conclusions formed on the company.

DESCRIPTION OF THE INDUSTRY

Company B participates in the broadly defined manufacturing industry. The industry can be more precisely described as original equipment manufacturing of metal worked components to be used by other manufacturers and assemblers of products.

The industry can be characterized as price and quality competitive. Quality can be broken down into product and service level. At the product level exacting tolerance and performance standards are the criteria. At the service level the most important attribute is on time delivery. To achieve

price competitiveness a substantial amount of volume has been originating from overseas production facilities to take advantage of lower wage scales and tax benefits. The industry in many respects has become globalized, given the characteristics of the product, namely the fit, form, function and finish which travel across international borders well. The level of technology and the process of manufacture are low enough technology to not be of major concern to the defense agencies since many of the customers are defense contractors. Rivalry can be characterized as moderate with most manufacturers focusing on niche markets. While historically a very fragmented market by country and product type recent times indicate global players are gathering up these individual players through acquisition, focusing their individual efforts, recapitalizing their plants, cutting costs and globalizing their market horizons.

DESCRIPTION OF THE COMPANY

Company B is in the business of designing, manufacturing and marketing of high precision, highly reliable, metal worked components for the original equipment manufacturers market. Its products are largely sold to the aerospace, office automation and machine tools industry.

The company currently has sales of $160 million, employs approximately 1500 people, has assets of $162 million and participates in three major product categories with extensive model listings in each. They serve approximately 1300 customers.

Product is typically produced to order therefore, inventory is largely in raw materials, work in process and completed work waiting to ship on a specific order. The firm has operated at a loss for the last several years. However, these losses have been stemmed and the firm will probably show a profit this year.

Located in a rural New England location the business was started in 1946 and remains essentially in the same business and locations today as it was then. In 1985, after extensive review by the Department of Justice for antitrust concerns and the Department of Defense for technology and supplier sourcing conditions, the company was wholly acquired by a Japanese firm. This Japanese firm previously participated in the industry through other holdings. Bringing with their stock offer a pledge of significant capital infusion the acquisition was friendly, and while oversight has been provided relationships are portrayed as healthy and strong.

The management team at the company is entirely American and the senior staff, including the President and CEO have all joined the firm since the change in ownership. The Board of Directors are largely Japanese.

THE ORGANIZATION STRUCTURE

As a wholly owned operating subsidiary of the Japanese parent, Company B essentially uses an operating division structure based on product, with a centralized marketing and sales organization and centralized staff support for functions such as finance and personnel. Division managers are measured on a P&L. They have five manufacturing sites and seven sales offices. They have also recently acquired a small subsidiary unit with sales less than $8 million which operates as a stand alone unit.

Operating divisions are not grouped as strategic groups and all division managers report directly to the President and CEO.

COMPANY PRINCIPLES

As an artifact of Company B's values and underlying assumptions they have a published a statement known as "Our Mission". While widely displayed and only recently crafted I did not sense a significant degree of internalization of its content in the individuals I met with. It was more of a thing to have and was not referenced with the passion that I sensed in other firms when referring to theirs in similar discussions.

The following table presents its content directly.

Table: Company B's Operating Principles

"OUR MISSION"

TO SATISFY THE NEEDS OF OUR
CUSTOMERS THROUGH EXCELLENCE IN
EVERYTHING WE DO, RESULTING
IN CONTROLLED, PROFITABLE GROWTH, AND
THE POSITION OF LEADERSHIP IN
THE DOMESTIC MARKETS WE SERVE.

ROLES OF THE INTERVIEWEES

Four individuals were interviewed in Company B and can be broadly categorized as individuals charged with the responsibilities and accountabilities that I was seeking as outlined in Chapter 3, namely individuals responsible for corporate or business planning and those responsible for profit and line operations.

In this company strategic planning was largely the responsibility of the President and CEO, the CFO and the VP of Marketing. They do use a process that involves the participation of a broader range of executives including the general managers and other support staff types. At the President's suggestion I interviewed the CFO and a Marketing individual both of whom the President had charged with the responsibility of developing the Strategic Plan.

Following the President's lead I spoke with two of the Division Managers both of whom had P&L responsibility and significant line operations.

Interviews were held at corporate and division headquarters locations.

INTERVIEW #1

The first interview was with the CFO. In this capacity he is the key planning officer for the firm, in addition to managing its financial affairs and central data processing requirements.

Demographic and Biographic Profile

This manager has had a variety of managerial responsibilities having worked for two other manufacturing firms in his career. The positions that he has previously held include marketing, sales planning, financial controller, and general management experience as the director of a joint venture he was responsible for establishing and as a group operations manager.

He joined Company B approximately thirteen months before this interview and assumed his current responsibilities. This manager is forty three years old and holds a B.S. in Engineering and an MBA.

Source of Beliefs - Innovation

In describing the culture of Company B this manager prefaced his comments by explaining that this was a company in transition. The entire senior management team has recently been brought on including the President who at this point had been there just about a year. I will quote him to capture the essence of his perception and feelings. "By and large you can describe the culture here as Arkansas Hills, incestuous stuff, cut off from the outside world from things like innovation, process improvements....just about anything, and we're trying to change it! This company is plagued by functionalitis, where each function or a department is a world onto itself." He offered that what they were trying to do was establish an environment that is customer focused, the key they believed to their success. Their goal was to become more externally focused than internally. Bringing about this cultural or attitudinal change was viewed as the absolute hardest thing to do and by far the most frustrating. Getting the employee body to understand even the concept of "change" was seemingly an insurmountable task. He believed the top management was together, but then again they all came from the outside and only recently.

The mission statement was referenced, and suggested that there was general buy in at the top but below that it was looked on as being top managements' ideas and not necessarily everyone else's. Historically the management approach was totally autocratic, opportunistic and the place seemed to operate on a hand to mouth basis. From this manager, "these guys literally told everybody exactly what to do and then that's what got done and that's all".

This discussion was filled with frustration, passion and a determination that change was going to occur because they had no choice.

This manager conveyed that he arrived on the job with an action plan in mind. The plan had as its basis a model that he had operated from in his previous employment. His first significant move was to drastically downsize his own department and reorient its focus from an entity onto itself to one whose primary basis for existence was to support manufacturing, "After all that is what this company is all about".

He described his personal approach as extraordinarily hands on which was why he only needed several staff members versus the previous thirty or so. He also offered that he preferred

handling most matters face to face and spent a great deal of time at the divisions as a result.

ATTITUDES TOWARDS IT

When asked to describe IT this manager responded, "information systems should fit with the plan of how you want to run the business". He went on, "We are a manufacturing company, therefore our systems should tie together in support of manufacturing, allowing the process to run better and more efficiently".

He described frustration with the fact that there was no architecture, and very poor fragmented systems where they existed at Company B.

On a personal basis he described himself as an avid user of some aspects of the IT family. Most use was made at home completing planning and analysis using a variety of of packages commercially available for quantitative analysis as well as a CAD application which he utilized to keep in touch with his engineering skills. Given the preference for a hands on style, he viewed being familiar and in some cases

proficient with techniques and tools as a key to effective management.

The Business Concept

This manager was able to crisply state the business concept of Company B. He viewed it as, "High customer design support, high quality, high precision, low volume metal working". This concept constituted the core of their operations. However, they do have a portion of their business devoted to a more commodity like metal worked product.

Critical to the success of their core concept were two factors in his mind. First, "Engineering Design - we need this expertise up front if we are ever going to get to the second which involves Process aimed at getting high quality and high tolerance machining."

His view of the "means" to go about achieving Engineering Design expertise was to get closer to the customer by allowing the engineer to become more a part of the consultative sale. With a sales cycle of one to two years the relationship with the customer was critical and must involve a technical respect for each other at the working

level. Supporting the engineers with the appropriate CAE/CAD systems is a necessity but he emphasized that having these systems must be part of the larger whole, which he referred to as "Group Technology" based systems which he believed they needed to survive.

This led us into the discussion on the next factor, the "process" because in his view it was this "group technology" based approach that could really facilitate the whole machining process aimed towards efficiency. In a business where lot sizes of production runs were small, set up time was a killer especially when each job had peculiar modifications associated with it.

His view was that this presented an ideal opportunity for them to develop a competitive advantage through IT. He described his version of group technology as essentially a relational data base structure, based on a part number, that linked customer information, with orders, routing, standards, tooling requirements, gauging, fixtures etc. Rather than making every job a one time, ground floor design and process, his view was that they were a series of modifications on a core design. Successfully implementing this approach would cut costs, increase on - time delivery, all leading to greater customer satisfaction.

Case Examples

Two examples of significant IT implementations were cited. The first involved a financial system to support accounting and payroll. While not in itself terribly innovative it was a fundamental requirement for successful operation and turn around of the business. It essentially serves the primary purpose of being their scorecard.

The Group Technology briefly described above had been launched as a project and proved to be fertile ground for discussion. This manager had recruited a person with market planning background to head up the DP organization. The selection was based on his view of the need to get close to the customer in everything they do. The idea for this GT system originated with this newly recruited individual and to a large degree the interviewee who took on the role of champion. The project was assigned to the DP manager for management and there were two sponsors, the CFO himself and one of the division managers. An engineer in one of the divisions acted as the technical gatekeeper. The CEO had established a tone in the executive ranks that put value on IT largely through two other systems aimed at MRP and cost

management that he had spearheaded. Success is largely measured on asset management indicators.

Since the project is still in the preliminary stages and not implemented, they have a long way to go. However, some of tough lessons have been learned already. In one of the divisions the division manager and the entire management team were very senior in their tenure. While the division manager recognized and truly believed they had to change he could not convince his team. In this case the CFO tried to take the initiative with the agreement of the division head. The attempt failed miserably, exacerbating the insider - outsider feelings creating undesired friction and animosity. The next approach that they were all about to try, was to infiltrate this team with an outsider and hope to bring about change by demonstrated peer leadership. All of this is supported by the division manager who sees only two other alternatives, his departure or the wholesale replacement of his team. We'll see how it works.

INTERVIEW #2

This interview was with the Marketing Manager who reported to the Vice President of Marketing. He was acting on behalf of the Vice President who had to be away unexpectedly. The role of marketing in this company was to work at the Strategic Marketing level attempting to determine new business opportunities, significant industry trends, pricing strategy support to the product managers who work in the divisions, advertising and distribution policy.

Demograpic and Biographic Profile

This manager had previously been employed by another industry participant and worked in the distribution part of the business before joining Company B. He had been with this firm for about ten years now and had spent most of that time as a product manager in one of the divisions. He assumed his current responsibilities approximately fifteen months before the date of this interview.

He holds a B.S. in Business Administration and is forty years old.

Source of Beliefs - Innovation

In describing the culture of Company B this manager referred to it as "dominantly a manufacturing company with a strong engineering orientation." As a result he believed the "manufacturing attitude dominated". He defined this as essentially, "a cost plus approach with little to no incentive to be competitive." He saw a significant need to change, to refocus towards the customer and to bring to life the mission statement to which he referred. From his marketing perspective they either had to do this or die.

In describing his personal approach this manager characterized himself as a "doer". He viewed his role as more of a facilitator and a support function, leaving the drive to the operating divisions. I sensed a degree of discomfort with this role. Here was an individual who was essentially an insider working closely with the new management team and as I perceived it he seemed to be caught between a "rock and a hard place" and as a result was trying to serve multiple masters.

Attitudes Towards IT

This manager defined it as the hardware and software involved with the collection, movement, and processing of information.

On a personal basis he was just beginning to utilize a networked PC for spreadsheet analysis and commercial purchase of data from various information services. He was very optimistic and enthusiastic about his experiences thus far and had a strong bias that there were many benefits to be gained in business through the use of IT.

The Business Concept

In defining the business concept this manager referred me to the mission statement and highlighted customer focus, and the characteristic of a niche market.

In his mind the success of their concept was pinned on two things, a quality mind set and delivering a high level of customer service.

He defined quality largely in terms of meeting of all standards and insuring that the appropriate standards existed. He saw a role for IT in meeting this critical success factor and cited techniques such as statistical quality control programs. In referencing customer service he included pre-purchase consultation, on time delivery, product free of defects as promised, a bill that was timely and accurate and strong post sales customer support as key characteristics. Since they operated principally through their own direct sales force, be saw the creation of a positive attitude in the sales people critically important, coupled with the IT support systems to fill the other characteristics mentioned above. He felt that currently they did not derive any competitive advantage from any of the existing order entry, billing, or post sales customer support services.

Case Examples

In support of the sales force this manager referenced one IT project that was collecting dust on the shelf. The concept was to equip their direct sales force with lap top networked terminals that would allow order entry or status checks with out having to follow up through an order entry operator. Presented as an idea by a consultant who had originally been

brought in to develop sales training, this manager became the internal champion and sponsor. A DP person working with the consultant were assigned as co-project managers and a prototype was developed. The consultant performed the role of technical gatekeeper as well. The project essentially died because there was no internal sponsor and the champion was probably in the wrong organization. If the individual had been in sales this probably would have been better. This individual portrayed a fair amount of frustration indicating that timing probably had something to do with it, suggesting that they had more fundamental issues to face at the moment.

This individual was relatively junior in rank compared to others I was visiting at this firm and I suggest his perspective was reflective of this fact.

INTERVIEW #3

This interview was with one of the three division general managers. Reporting directly to the President, this manager was measured on a P&L basis. Included in his responsibilities were product management, marketing, engineering design, manufacturing design and operation, and support functions including personnel and controller. Two facilities were operated in this division the second being quite a small one.

Demographic and Biographic Profile

This manager assumed his current responsibilities approximately 2 years ago. However, there were major changes in the last year which gave him authority over product decisions and pricing. This manager has been with Company B for thirty five years and has largely been in the operations area his entire career. He was fifty nine years old at the time of the interview and has a high school diploma and has attended numerous managerial courses throughout the years.

Source of Beliefs - Innovation

This manager prefaced his thoughts on Company B's culture by stating: "In my case I believe that the corporate and personal values are the same". "I believe everyone has an opportunity to contribute". In his view equal emphasis was put both on "what" was produced and "how" it was accomplished. There was a fair degree of emphasis placed on the "how" favoring a more harmonious, cohesive approach. Being a manufacturing company there is also a value placed on what was described as a "get it done" mind set.

In describing his personal approach this manager pointed to staffing. "I get the strongest most qualified people, I find people who compliment my weakness and I look for people who can cohesively fit in my team". He described his style as hands on and felt that, that fit his personality and experience. He did offer however, "if the job were to be refilled today, there is no question in my mind that the individuals background should be entirely different". He believed, "communications processes are different today, along with information and analytical techniques down on the floor". In sum this manager saw a need for change but also recognized his own personal limitations. Cohesiveness was once again reinforced as a highly desirable attribute.

Attitudes Towards IT

This manager defined IT as "those things we do, pass on, communicate to others, to ourselves, the technology, the way we do it or how we accomplish it". While generally supportive of systems and recognizing that they represent a vast untapped potential this manager had no personal uses directly other than the telephone. He was dependent on his ability to scan and perceptively pick out deviations in paper performance reports. Recognizing that these are always historical this manager believed the only thing a successful manager could do was be out on the floor looking for conditions that might lead to undesirable situations and correcting them before these situations occurred.

The Business Concept

This manager described the business concept behind his division and also offered that it applied to Company B in almost all respects as well. He described it as, "low volume, high precision and quality, high service content metal worked products". Pricing was becoming more of an element of the

concept as days of "cost based" pricing were becoming a thing of the past as customers solicited vendors on a much wider basis. Therefore market or value pricing was becoming much more the norm driving more emphasis on cost.

Critical success factors are the overall quality, high precision and customer service components. Having the parts delivered on schedule and defect free were critical. To deal with these factors this manager believed that the emphasis has to be placed at that point where the actual responsibility for the work step was involved. He believed by creating an understanding of why its important and creating an understanding of the customers expectation in the mind of the operator you could stand a fighting chance of succeeding. This put the burden on interpersonal communications and hence the need for a cohesive environment.

He also believed they needed better or more advanced equipment, an effort the new Japanese owners had stepped up to with their capital infusion promise. This advanced, multi step equipment was pushing their overall engineering and manufacturing process and was requiring a complete rationalization of it. This manager was also looking forward to the installation of CAE/CAD systems to support his design

staff and a discussion in this area took us into a brief value chain discussion.

This division was involved in contracts with customers that he referred to as "controlled process". While he could see value in more tightly linking steps in the value chain be was genuinely concerned by the potential power shift in the relationships. He suggested that even today in these controlled contracts he was constrained from varying the milling operation or cutting tool on a particular approved job. This was a deterrent, he believed, to opportunities to make efficiency or capacity utilization improvements. He believed that these linking efforts needed to be governed be reasonable principles that protected the interests of all participants.

Case Example

This manager referenced the "Group Technology" project as did the CFO and described it as a project that exposed them to some of their key weaknesses, namely the difficulty they were having getting their employees to accept change or even recognize the need for it.

He stated, "I don't have anyone on my team who is willing to change as quickly as technology will allow. They are entrenched because they have been around too long". He believed his largest pocket of resistance was his engineering group and that this fear was largely the fear of the unknown. He believed that it was a perfect example of the conflict faced between the "new philosophy and a mindset driven by engineers who have no sense of urgency".

In discussing the plan, that he and the CFO had put together, of infiltrating his group by staffing his controller position with an outside type who was also well versed in these information technology, he described his expectations as, "I'm hoping this new manager will be successful in getting the group to take this new direction by peer leadership, to follow the direction and philosophy of the corporate group". As I said earlier, only time will tell.

INTERVIEW #4

Interview #4 was with the General Manager of another of the operating divisions in Company B. This individual reported directly to the President and was responsible on a P&L basis for the operation of a division that serves the aerospace industry. This division has five basic product families and runs its operations from a facility located about seventy miles from the headquarters location.

Demographic and Biographic Profile

This manager has approximately twenty one years of service with Company B and while his experience was dominantly in manufacturing he had also spent time in materials management and MIS.

He has held his current responsibilities for the last three years, holds a high school diploma with numerous college and management courses over the years. At the time of the interview he was forty three years old.

Source of Beliefs - Innovation

When probed on the culture of Company B he responded with, "We are working to develop an attention to customer need, complete with the ability of being able to say no because, often when you forget to say no at the appropriate times you find yourself in more trouble than you like". He also described a need to develop an attitude where people believed change was good, that it could be made, that they can make it happen and go and do it. Finally, a reorientation for the engineers to understand that their role was to support manufacturing. This manager felt that his division was generally ahead of the company as a whole but, never the less he saw a long way to go particularly with the "attitude towards change".

He described his personal approach as being extremely results oriented, a demanding boss who tried to clearly articulate the objectives, "forcing the issue and then getting everyone together to figure out how the group is going to get there". He believed he was extremely hands on, had ideas on how to do things and really liked to get involved.

Attitudes Towards IT

This manager described IT as the "computerization and interfacing of these systems, in the manufacturing environment, i.e. CAE, CAD, MRP, SOE, to communality, in other words all driving to the same end and trying to get away from the islands of information".

In terms of personal uses, this manager currently did little, either at home or in the office. He pointed out that in previous years he had really been heavily involved particularly with CAD and MRP systems. He did not make personal use of the technology because he did not use most of the information currently available to do his job. There were no artifacts such as terminals in this managers office.

The Business Concept

The business concept of this division was developing on the trend of specialty job shops which he saw as affecting other divisions of Company B but not to the same degree as it had affected his to date. It can be further described as a "make to order", low volume, consultatively engineered, high

quality, with process documentation required on each part produced.

Critical success factors include quality, pricing, delivery and consultative engineering. Quality of the product was characterized as a threshold for participation. Without it you can't even play in the game. Quality also surfaced in other success factors such as delivery, specifically as an impediment to being on time. Delivery on time was largely dependant as well on capacity utilization which was driven by their production planning and scheduling approaches. The consultative engineering factor is driven by the attitudinal set of the engineer, the methodology and process employed.

On the use of IT this manager felt there was "a great deal of fertile ground to utilize IT". On quality, while they have focused on what he referred to as "internal quality in the process through statistical quality practices supported by IT resulting in higher yields, higher efficiency and lower costs". These efforts also served to increase on time delivery as well.

He also spoke very enthusiastically about the "Group Technology" project referred to in other interviews and cited that his division was the primary partner with MIS on this project. He envisioned this overall approach as shortening delivery cycles, thereby increasing output, giving greater flexibility to capacity utilization allowing smaller lot sizes and in a essence providing an enabling factor to a business confronted with a market requiring increasing specialization every day.

He viewed the integration of his CAE/CAD systems into this GT as the means by which he could "sell". His comment, "this linking will help us directly sell our strengths with less involvement of others". What he envisioned was a direct CAD to CAD tie between he and his customers that allowed mutual manipulation of the specifications to develop routings, setups, etc., interfacing directly with costing, pricing, and scheduling tables to provide a more real time response to customer responses. While working with internal MIS on the GT modules, he was leading with the internal CAD issues and was just beginning to figure out how to establish rudimentary images using E Mail technology to transfer drawings with a few customers. His view was that this would get the engineer closer to the customer, cut the sales cycle, cut the cost of

sales overhead and develop preference for him as a supplier. After all as he said, "you have to have your name on that customers drawing in order to even have a prayer of getting the order, I don't know a better way of doing it". He also tried the "lap top" sales support into this discussion as well.

Case Examples

Four excellent case examples were offered. They included the GT project, customer links, CAE/CAD and the sales support tool.

In the interests of time and to avoid redundancy we took the CAD Project. Being the first division in the company with the technology there was a fair amount of pride in this effort. Faced with the specialization trend and the resulting wider variation of products, a group of engineers had explored the use of CAE/CAD technology about 5 or so years ago. After returning to the division after his stint in MIS this manager discovered that the project had fallen by the wayside. Picking it back up he then became the "champion" personally. An engineer was selected as the "project manage " and provided with a significant amount of training

in this technology enabling him to be the "gate keeper" as well. When his proposal on implementation was philosophically different than this manager's he was replaced by an outsider with experience in this area. "The CEO was supportive generally", not the same one as in office now, "but did not really understand what this was all about and was anxious because he anticipated short run cost savings." When asked what he would do differently the answer was simple, "have chosen a different project manager".

This example brought to light additional issues which are technology and implementation related. At the time they were condsidering their approach alternatives, mini CAD, PC based systems were being introduced. Since they were uncomfortable with these they went with the larger mini computer based approach. In retrospect, since there was so much learning from a strategy point of view he thinks they should have gone with the smaller approach and looked at it as an experiment. The issues as focused here, knowing when to buy, given the short "S" curves associated with IT and the incremental, experimental approach versus the "go for it" more radical approach.

SUMMARY - ATTITUDINAL IT TYPE OF THE INDIVIDUAL

The attitudinal typing of the managers in Company B is based specifically on the section of the interview targeted at establishing the managers definition of IT and their perceived usage. The decision was augmented by other elements of data collected in other modules of the interview that reflected the managers views on the benefits and the drawbacks associated with IT.

Table: IT Attitude Types

(Planning)	Interviewee #1	CFO	Realistic Utopian
(Planning)	Interviewee #2	Mgr-Marketing	Utopian Idealist
(Operations)	Interviewee #3	Genr'l Mgr	Utopian Idealist
(Operations)	Interviewee #4	Genr'l Mgr	Realistic Utopian

Table: Source of Beliefs - Innovation

(Planning)	Interviewee #1	CFO	Personal
(Planning)	Interviewee #2	Mgr-Marketing	None
(Operations)	Interviewee #3	Genr'l Mgr	None
(Operations)	Interviewee #4	Genr'l Mgr	Personal

COMPANY B CONCLUSIONS BASED ON MODEL

This summary section will be comprised of four assessments. They will include an assessment of innovation as a value present and its source, an overall attitudinal assessment on IT, a typing of the implementation of IT solutions and finally a general assessment assimilating all of the data compiled together.

Innovation as a Value

My assesment was that innovation as a value was not part of this company's culture. I don't believe that it is part of the prescription of culture that this new management team is trying to implement and is definitely not part of its current culture. The basis of my assessment comes from my observation and study of their mission statement, a planning document, discussions on their recognition and reward systems and recent examples of behavior that was rewarded. Their rural isolation, the lack of new blood until recently and low rivalry which characterized this industry prior to the last ten years have probably all contributed to this.

While these senior managers recognize the need to change my assessment is that the employee body has not been shocked or unfrozen to the degree necessary to facilitate an easy change of mind set. The divestments that were made were probably not perceived by those who remain as potential outcomes for themselves as much as maybe even an easing of some burdens. I believe the change of leadership to be helpful, and without substantiation can only speculate on what might have happened if emphasis had been placed on innovativeness, included in the new philosophy, reinforced by a strong process aimed at achieving buy in and recognition and reward systems that promoted this behavior. With less than two years under their belt with their current approach, I believe the "shock" of leadership change has been absorbed and a significant window of opportunity has passed them by in this regard.

The sources of belief in innovation as a value were most pronounced in Interview #1 and #4. My assessment was based on their overall characteristics and suggest that they might be viewed as an explorer and tinkerer respectively. The sources of this value are "personal" as I assessed it, largely due to its presence but lack of any indication that it was being fostered as part of the corporate culture.

Attitudinal Assessment on IT

As a group, this group indexes towards the top end of Schein"s Executive Attitudes Towards IT typology outlined in Chapter 1. The combination of managers who have detailed knowledge of manufacturing, a good sense of emerging critical success factcrs to their business, a feeling of personal responsibility to figure out the "how to' coupled with an appreciation of the potential and capabilities are truly enabling forces within this firm.

Supported by a relatively hands off but financially supportive parent and a President who himself was typed as a Utopian Idealist this firm has many factors going for it.

Case Example Classification

Multiple examples of IT implementations were cited throughout these interviews. Using the typology for typing these implementations, I asses those already implemented as incremental however, those that they have set their sights on such as GT and value chain ideas such as those outlined in Interview #4 as radical.

While these projects are far from being successfully implemented and certainly involve overcoming many obstacles before they begin to realize payoffs, I asses them as strategic in the long term competitiveness of this firm.

SUMMARY

In summary I would describe the general business concept of this firm as a cooperatively engineered, low volume, high precision, high quality, design and manufacturing company in the metal worked industry.

Using Wyman's Strategic Value Matrix referenced in Chapter 3 I asses this company as one who has successfully implemented at the "Necessary Expense" level and is trying, largely through management change out, to think and behave at the "Priority Investment" level. My assessment is based on what I perceived the ability to be of several key managers to think strategically about their business concept and information technology simultaneously.

Given the cultural factors that must be addressed along with other impediments such as their location, they have a significant challenge ahead of them to pull these ideas off successfully.

CHAPTER 4

This chapter will be devoted to the third of four companies researched as part of this thesis. It will provide the reader with a brief description of the industry, the company, the organization structure, the roles of the individuals interviewed, documentation of the information gathered in the interview, followed by a typing of the individuals on Schein's Executive Attitude Typology scale, a typing of belief source on innovation and general conclusions formed on the company.

DESCRIPTION OF THE INDUSTRY

Company C participates in the air transportation industry and also in what some might broadly describe as the marketing services industry. The dominant thrust of this company and hence these interviews focuses on the airline industry.

This industry has faced significant and radical change in the last ten years. Deregulated in 1978, barriers to entry were significantly reduced allowing a whole host and variety of new participants to enter, fragmenting the industry as they

chose to compete on a wide variety of business concepts. The energy situation has oscillated and being a significant factor in the overall cost structure presents industry participants with one more constraint to deal with over which they have no control. The air traffic control situation is one more condition which is worsening due to the PATCO strike and the general system overload. Other conditions which have served to destabilize this industry include environmental concerns, terrorist activity, merger mania, route restructure and intense price competition all of which have resulted in pressures on cost structures, whole sale confusion of customers and growing disatisfaction. These forces are stimulating increased talks of government intervention in a number of areas which the industry participants generally see as undesirable.

DESCRIPTION OF THE COMPANY

Company C has as its primary holding an air transportation company which forms the nucleus of its business. The firm operates a number of other subsidiaries, most of which are related in some way to the airline industry. The firm recently divested itself of two major holdings, one in the

energy area, and one in the food catering area and has refocused its efforts on air transportation and the information management service business which is a reflection of their revised corporate strategy.

As one of the major American trunk carriers this firm has a broad domestic route structure serving approximately 45 states and has extended its operations overseas in recent years. With sales of $6018 million in 1986, and assets of $7527 million, they had a good year showing earnings of $279 million but not their best in recent history. Major programs underway include continued cost improvement, fleet restructure, route expansion, employee satisfaction, new business opportunities and innovative marketing.

The above information was collected largely from Standard and Poors, Moodys,and various publications distributed by Company C.

DESCRIPTION OF THE ORGANIZATIONAL STRUCTURE

At the airline company the organizational structure utilizes a functionalized approach. Each of the following functions

are headed by a senior officer of the company and include finance and planning, operations, information systems, international, personnel resources, marketing, government affairs, legal, employee relations, and corporate communications.

Each of these officers reports directly to the Chairman, President and CEO, who also holds the same title for the parent company. With the Airline company so central to the parent the senior officers also function as Vice Chairman and have additional responsibilities in the parent company corporate organization. These additional responsibilities include the oversight of other business interests such as the Information Services Company.

COMPANY PRINCIPLES

As an artifact of this company's culture and value system one of the interviewees told me that their "Corporate Principles" were built on the following four points.

Table: Company C's Corporate Principles

"Corporate Principles"

"We will deliver a product of only the highest quality"

"The customer is always first in our interests"

"Safety is #1 in the critical path of our activities and is never to be violated"

"Treating people and employees as we individually like to be treated"

ROLES OF THE INTERVIEWEES

Three individuals were interviewed in Company C and can be described as individuals charged with the responsibilities and accountabilities that I was seeking in Chapter 3, namely individuals responsible for corporate or business planning and those responsible for profit and line operations.

These three individuals represented three of the four Vice Chairman of the parent company, the one not interviewed being their corporate counsel. Each of those held functional responsibilities in the airline as well and included Finance and Planning, Operations, and Information Services.

Interviews were held at Corporate Headquarters and the Information Service Companies headquarters site. Abbreviated discussions were also held with their VP of Corporate Communications and are not included in this text.

INTERVIEW #1

The first of this series of interviews was with the Senior Vice President of Operations who in addition was one of four Vice Chairman of the firm. Reporting directly to the Chairman, President and CEO this manager had responsibility for all aspects of general operations for the airline, in addition to CEO responsibilities for two other units that he ran which involved a cargo business and a small feeder airline. The functions in his position included flight operation, pilot training, fleet maintenance, hub management, fleet selection and safety. His responsibilities, with the exception of the two smaller business, units were run largely as a cost center with an operating budget of greater than $5 billion dollars and 40,000 people. A series of operating indices concerning dependability, completeness, maintenance and safety are closely monitored. Even though he was responsible for the day to day management of the company's assets, asset management itself, in terms of ROA was the responsibility of the CFO and Planner who developed routes and schedules. His responsibility for asset utilization was to execute those flights on those planned routes.

Demographics and Biographics

This manager has been with Company C for approximately twenty years and had held functional responsibilities in all parts of the firm. His father was a low level manager with the airline as well. He holds a BA and an MBA degree and was forty three years old at the time of the interview.

He has held his current responsibilities for approximately two and a half years.

Sources of Beliefs - Innovation

This manager described that the culture in this firm had "gone under a great deal of change and stress as a necessity to change over the last seven to eight years since industry deregulation". He described it as a very results oriented group, that was highly committed to quality stating, "I don't think we could produce a lousy product and feel very good about it. Our people, our tradition and our history would not permit us to produce a second rate product and stick with it very long.....we would destroy ourselves". He said they

were a highly analytical and quantitative group of people, "we do very little intuitively, often and sometimes too often, and too long study a problem or opportunity and the alternative solutions so that when we succeed or fail we can look back on our actions, figure out what we did and learn from it". He believed they were very people oriented and offered that, "there are very few businesses that have a high asset concentration and a high people concentration". This characteristic was also the same in their information services business and he believed it to be a "modern look" in business.

When I probed directly on the role of innovation in their culture I got an unexpected answer. He stated, "In the old days under regulation, the only way to differentiate yourself was by enhanced service features and as a result we were involved in a host of product feature innovations. Since deregulation, the traditional tools of price and route structure became available, the emphasis has gone here and not to trying to be rocket scientists. Cost competition, which drives price competition, was developed such that there is not a great reward for innovation in the product line, so be careful, innovators get arrows in their heads". At the same time Company C's move to be first to offer frequent flyer, one stop check in and advanced reservations systems,

considered to be of the most innovative in the industry. According to this manager the emphasis all went back to their four principles which were outlined above.

In describing his personal approach, he saw his role as that of a conduit for information and direction to the people below him from the people above, a developer of those people below him and a source of resources. While involved he would not describe himself as hands on, recognizing his own abilities. He offered, "an airline needs lots of parts to work but it doesn't all come together on an assembly line like a car, so the role of the manager is to facilitate much like that assembly line does for the car". I thought this a useful concept because it applies to a great number of service business concepts especially the information services businesses that they were also involved in.

People are rewarded for their results. While, "how they went about it" is considered, it is the results that end up counting. "In the long run the autocrat can't survive here because there are so many dependencies".

Attitudes Towards IT

This manager described IT in their business as, "communications, we have a tremendous need to communicate and it all starts as voice, then it turns to data because in our view data is all powerful, if you have the data then you can make the decisions".

On a personal basis this manager was a heavy user accessing real time monitoring systems all the time. He also directly accesses packaged, historical outputs as well, utilizes teleconferencing extensively, E Mail, graphics and other PC based applications. He did say that executives at this company were not generally at a point where they were collectively working off networked PC'S and administering a significant degree of their work this way.

The Business Concept

The business concept behind this airline was described as a transportation system, with an impeccable safety record, whose product was high quality from a customer point of view relative to the competitors, operating at a return on invested capital exceeding that of their competitors.

This manager articulated that the critical success factors are changing because the environment is changing. At this time he believed there to be three key success factors: people, alertness to the environment and decision making.

In speaking to the people factor, he believed this was dimensionalized by a participative style necessary to avoid labor disputes, evolving the organization to more of a "family" status, being communicative, having a positive and committed attitude to allow them to provide a quality product and keep their costs in line. They achieved this by a series of Presidential forums, MBWA, profit sharing etc. "Alertness to the environment" is critical in a market that is constantly shifting due to any number of externalities, competitive or otherwise. Their success largely was dependant on having the right asset in the right place at the right time. Their reservations systems and a host of other market information sources and analytical routines that run on the data were also key to supporting this function.

Their emphasis on data and information was referenced in the discussion on decision making. He described it as,"Being extremely careful when you bet the company. In a business that forces you to make capital investment decisions that put

us in a position of committing about five times your net worth due to the twenty year life span of an aircraft, you better be sure. Hence our analytical, quantitative nature."

A brief discussion on strategy was also included. In recent times they had divested themselves of an energy company and a catering services company and launched several new information services companies. In reference to these moves this manager stated that, "We don't believe that as general managers we can manage anything. We know how to run an airline and what it takes to do it. To the degree that there are some functions which are intrinsic to the airline operations that we can build a business opportunity around, then fine, that's what we will do and how we will keep our focus. To run an airline we had to run a reservations operation, we got pretty good at answering phones and so now were hoping to do something like it for the hotel industry. We see little difference in making a reservation for an airplane seat versus a space in bed. Capitalizing on this know how is the basis of our current approach".

Case Examples

Time did not permit us to go into detail on any IT implementations specifically but we did take a few minutes to discuss an "in flight - flying plan revision system" that this manager was interested in. The benefits of the system would be cost savings and on time performance and he envisioned it using state of the art worldwide mobile communications technologies and computational power which would be aircraft and land based enabling them to make in flight flying plan modifications to compensate for adverse weather conditions. This was an idea that was seemingly in the embryonic stages and I couldn't help but believe I was talking to the idea generator!

INTERVIEW #2

The second interview was held with the Senior Vice President of Finance and Planning for both the airline and the Parent company. In these capacities he also serves as a Vice Chairman of the firm. This manager reports directly the the Chairman, President and CEO.

This manager's responsibilities include all of the typical finance functions of a firm and it is on the planning side that things are atypical specifically for an airline. This set of responsibilities includes strategic planning at the corporate level for the parent company, business planning at the airline level and route structure and scheduling at the operations level. To support these responsibilities this manager has an operations research group which has begun to do external consulting and a small planning methodology staff that supports planning as an activity throughout the firm.

In a typical airline, the operations planning is usually found with the marketing organization and in days gone past it was the same at Company C. This changed with the succession of the Chairman and the individual currently in these capacities, viewing the deregulated environment as a critical externality, increasing the importance of operations planning

chose to have the function report directly to him. When this manager joined the senior team it was added to his responsibilities. Since the financial evaluation portion of planning was so critical in their business operations they found this a very "comfortable" fit which has delivered many unexpected benefits.

Demographics & Biographics

This manager has held these responsibilities for a little more than a year at the time of the interview, having left another airline where he was President and CEO. Prior to that he was with Company C where he had been a Senior Vice President and Controller.

This manager holds a BA in Economics and an MBA. He is forty one years old.

Sources of Beliefs - Innovation

This manager began our discussion on culture by describing Company C as a "very quantitatively oriented company, we don't do anything that we don't run the numbers on and that's

not generally true in the industry. We value managers who synthesize vast quantities of data and we try to turn that data into information, this is an information oriented company. I believe this value is a rub off of the people running the company, the leaders are this way, and as a team we came together because of it". He also stated that they were not suffering from an identity crisis as some industry participants, "we are in the airline business, not the travel business or something else". He described their airline as, "a good efficient airline....a stainless steel airline. If we decided to do something other than deliver a good product we would have a hard time making our people do it. To the efficiency we are trying to add warmth and friendliness". Another characteristic that he suggested they were trying to evolve was participation. They have recognized that they can only be successful if their people are with them and believe they are promoting behavior change in their management style. He also suggested that they operate from a bias that automation is good, supporting their value in efficiency and that from a more macro perspective, "technology is often a solution".

As for personal approach, a major effort to broaden spans of control was a major initiative. In many respects he believed technology made this more viable by making information more

accessible. As a result he found himself spending more and more of his time on the people related aspects of his job. Staffing, coaching, succession planning were some of the key areas. Expecting decisions to be rigorously studied and thought through, he saw a key role to be testing, challenging the analysis of data used to support decisions in operating the business. First to insure that the decision was good but second to maintain the rigor and credibility of the process. While people are, by and large, rewarded for results they were constantly finding opportunities to reward managers for leading people rather than driving them. This was viewed as critical to making the whole thing work.

The Business Concept

This manager did not feel comfortable articulating their business concept into a brief set of descriptions or statements. He also believed that it was not generally helpful to identify some reasonable number of success factors and focus on those.

Instead he described it this way, "This business is one of incredible detail management. It is a business characterized

by extraordinary dynamics such that it requires a multiplicity of indicators that when studied suggest patterns. These characteristics require us to have centralized management".

Case Examples

Working from the above description, we launched right into a discussion of a Monitoring System Project that he had taken the lead on developing in his organization.

Each Monday for about two hours the four key officers including the President hold an Operating Performance Review for the previous weeks operations. They review statistics like on time departures and call answering results from their reservations centers. They believe this hands on approach at the detail level to be critical to their success.

This monitoring system was the direct idea of this core management team and the primary champions are the President and this manager. Assigning a young MBA type who had finance and some systems background as the project manager, she is designing this system from an information point to view to satisfy the users. Working largely from paper and a PC the users are beginning to develop reports and analytical

techniques. They are hoping to have an executive workstation prototype working by year end. The Senior Managers are in effect the internal sponsors and the technical gatekeepers since at this point the technical knowledge is not hardware or software but instead what's important in running an airline. This manager felt strongly about the approach they had taken, described as having the user craft a working model, before handing it over to DP to develop into its final form. If it were not done this way then it would be impossible to overcome all of the necessary bureaucratic aspects of running a major DP organization.

Another trait, or artifact of this company's culture seen through their application of IT is evidenced in their overall implementation pattern. Their efficiency based value is the basis for finding some of the most state the the art "operating systems" in use. This manager said, "this company was on the forefront of wanting information, and using technology to do their job better, hence the strong operating systems. Slowly things are being married together". Only recently have they begun to do two things, systematically and strategically link these systems together, i.e. the Monitoring System and secondly capitalize on the "know how" that they have developed at the operating level by developing a

"corporate nursery that uses our skills and knowledge to create profit opportunities". The term nursery was used to refer to a number of young fledgling businesses that they had recently launched.

INTERVIEW #3

The third and final interview at Company C was with the Senior Vice President of Information Services for the airline who is also a Vice Chairman of the parent. This individual had three primary areas of responsibility and included: supporting the operation of the airline with the appropriate information technology, supervising the use of technology as a business, as they had in their reservation business and thirdly the management of a portfolio of "allied" businesses that they have launched and now number eight. Given the responsibilities of this individual the focus of the interview was modified slightly to put more emphasis on trying to understand the rationalization of their strategic reorientation and the process that guided their decision making in launching these new businesses. This firm is touted by many who have studied both the strategic and tactical use of IT as one of the best and the interview was with one of their key people.

Demographics and Biographics

This manager has held his current responsibilities for the last two years returning to Company C after spending time at

another company in a different industry but generally in the same functional area. He, like the CFO was re-recruited back to the firm by the current Chairman. He has worked for four other major US corporations including one other industry participant.

This manager holds a BS and Masters Degree and is in his early forties.

Source of Beliefs - Innovation

In speaking about the culture at Company C this manager described it, "from a product perspective it is very much an airline. It's a company that has a tremendous feeling for being the best, having quality and serving customers with a real customer orientation". He went on to describe the role of the individual and the individuals characteristics at length. Individual responsibility and accountability was a cornerstone, because as he saw it, it is individuals who do things. The environment is conditioned by an assumed way of doing things which is based in the idea of freedom in the way of doing things as long as the results are delivered. Value is placed on the use of judgement, good calculated judgement. Collectively described as a group of overachievers this

manager offered, "this company is not a good company for people who don't feel good about themselves, we are much more apt to criticize and find bad things, than to pat each other on the back". He went on, "It's a challenge....you can't sit on your laurels for long".

He described himself as a hands on manager, particularly in areas of technology where there is not a high degree of expertise in his ranks. Speaking of the new ventures in his responsibility, he finds himself acting as a coach or a protector, "lifting the burden of absolute precision on forecasts and the things that this culture is use to having in the airline side". Overall he believes in providing substantial latitude to his managers based on their own abilities, and reinforces this by putting emphasis on staffing.

Attitudes Towards IT

This portion was more indirect than direct as it was in the others. For definitional purposes this manager referred to IT in a broad sense encompassing all of the communications technologies, the computational, software, and storage mediums as well. He made a wide variety of uses from both a

terminal and PC but fell short of being a hacker by a substantial margin.

The Business Concept

In this portion of the interview we discused the strategic considerations involved in launching the new information service businesses. After confirming the basis of the corporate strategy as that outlined in previous interviews we focused on the criterion used.

This manager outlined the strategic criteria as: automation based businesses where the basic function is intrinsic to the operation of the airline, specifically they should be inquiry/response automation type systems; be essentially vertical markets - defined as markets where a single application can be applied on a cross industry basis i.e. reservation systems in car rental, lodging, airlines; require a high skill level to execute; and they must have high transaction volumes to allow the realization of economies of scale.

Once passing these screens the analysis is undertaken on the

"business formula" looking at volume, revenue and cost projections. In addressing the markets, efforts are made to find alternatives to the way markets currently work that they can execute. Very often the human element is a factor in the consideration in the way markets work that they are considering and they believe their experience here is an advantage. Several examples were cited which for proprietary reasons can not be described here.

Once the decision to launch is made there are several conditions that this manager outlined that must be present. First there must be commitment by top management to be patient and willing to see these opportunities through for three to five years before you really know what you've got. Second, one must recognize that these new businesses may not be able to defend decision making to the "precision" standards that are normative in the core business. Both of these considerations must be dealt with if one of these ventures will have a chance at succeeding.

ATTITUDINAL IT TYPE OF THE INDIVIDUAL

The attitudinal typing of the managers in Company C is based specifically on the section of the interview targeted at establishing the managers definition of IT and their personal usage. The decision was augmented by other elements of data collected in other modules of the interview that reflected the managers views on the benefits and drawbacks associated with IT.

Table: It Attitudinal Types

(Operations)	Interviewee #1 SVP-Oper	-Realistic Utopian
(Planning)	Interviewee #2 SVP- CFO	-Realistic Utopian
(Plan/Oper)	Interviewee #3 SVP-IS	-Realistic Utopian

Table: Source of Beliefs - Innovation

(Operations)	Interviewee #1 SVP-Operations	- Cultural
(Planning)	Interviewee #2 SVP-CFO	- Cultural
(Plan/Oper)	Interviewee #3 SVP-Info Svcs	- Cultural

COMPANY C CONCLUSIONS BASED ON MODEL

This summary section will be comprised of four assessments. They will include an assessment of innovation as a value present and its source, an overall attitudal assessment of IT, a typing of the implementation of IT solutions and finally a general assessment assimilating all of the data compiled together.

INNOVATION AS A VALUE

Determining the presence of innovation as a value in this company was probably the most difficult assessment of all the companies I visited. The alternative I faced were to conclude that it was not present based on several statements made or to conclude that it had taken on the status of such a deeply held value that it had become an underlying assumption.

My assessment based on observed action, programs and methodologies is that innovation is an underlying assumption in this company. As a value however, I believed it has some operating constraints as it appears here. For example, this company values efficiency and has historically looked for

ways to do things better, hence the highly sophisticated operations support systems. The focus is therefore on doing "what they have to do" better. I contrast this to Company A where new product and technology development was their key to success.

Another way of thinking about this is that Company C focuses on process innovation rather than core product innovation. This company has numerous examples of incremental product enhancements such as being the first to have frequent flyer programs or one stop check in. Their list of process innovations is however, much longer and substantial beginning with their reservations systems, data entry operations, and some of their new information services businesses.

I believe that this deeply held value emanates largely from their culture. While their culture is certainly evolving as they deal with deregulation and the leadership change over, it will be difficult for a business who had their roots established in the regulated days to lose values, particularly ones that serve them well in both environments, such as process innovation. My assessment is that this value was developed in the regulated days largely because I see a similar characteristic from my own experience in the Bell System.

ATTITUDINAL ASSESSMENT ON IT

As a group this one indexes towards the top end of Schein's Executive Attitudes towards IT typology. Since I have typed them all the same, as Realistic Utopians, I believe them to be quite close together in their attitudes. This is based on their broad range of managerial experiences which have brought them in direct contact with the technology from a managerial planning and operations perspective.

As individuals and as a group they can see the potential in the technologies and in the constraints that it can offer. I believe that the similarity in their typing and the commonalty in shared views allows them to take advantage of IT more effectively.

CASE EXAMPLE CLASSIFICATION

Multiple examples of IT implementation were cited throughout these interviews and the numerous studies on this company. I assess many of the implementations as radical because they caused fundamental change in the way markets work. At the

same time this company has a proliferation of implementation cases that are incremental by type and often enhance existing processes. One final thought is that the overall effect of this collage of incremental applications has a cumulative effect of being radical, in that, over time collectively they create sustainable competitive advantage.

SUMMARY

In summary, I would describe the general business concept of Company C as highly efficient, process innovative, high quality air transportation company who has found ways to capitalize on it application of information technology in its own operations.

Using Wyman's Strategic Value Matrix referenced in Chapter 3 I asses this company as one that is into the Priority Investment category with regard to information technology. There are other artifacts which are supported by Wyman's work as well which include the role of information technology in the strategic plan of the firm and the use of a chief technology officer whose main task as Wyman puts it is "to develop the firms strategic use of information technology, and when

information is viewed in this context it becomes very valuable, something to be treated as a priority investment equal in importance to labor or capital". I think this passage fits Company C very well.

CHAPTER 5

This chapter will be devoted to the last of four companies researched as part of this thesis. It will provide the reader with a brief description of the industry, the company, the organization structure, the roles of the individuals interviewed, documentation of the information gathered in the interview, followed by a typing of the individuals on Schein's Executive Attitude Typology, a typing of the source of beliefs on innovation and general conclusions formed on the company.

DESCRIPTION OF THE INDUSTRY

Company D can be broadly identified as a participant in the manufacturing industry. If the manufacturing industry can be thought of in terms of high technology, medium technology and low technology, this company would fall into the medium technology segment.

Domestically the manufacturing industry has been under attack by foreigners and particularly those from the Pacific Basin over the last decade. Attaining competitive advantage early

on through lower wage scales, these foreign competitors have added to this advantage through the development and use of a wide variety of advances in manufacturing technology. These advantages have given them cost, price, and quality benefits which appeal to their global base of customers.

These circumstances have created substantial pressure on domestic manufacturers in the medium and low technology sectors. Many of these manufacturers have followed a finite number of courses which include selling out to foreign firms, moving up the technology sector scale through acquisition and diversification, harvest what was left for them often ending in either restructuring or bankruptcy. Few have been able to regain a competitive advantage and restrengthen themselves to compete once again. All of this has led to a call for the need to invest in our manufacturing sector to provide the nation with the fundamental basis for it's own economic health. This call has been made by government, academe and the industrial sector itself.

DESCRIPTION OF THE COMPANY

Company D manufacturers and markets a wide variety of medium technology products for use in consumer, industrial, and

military markets. The company operates through eight subsidiaries in over eleven countries.

The company's basic business areas include controls and components for gas and electric appliances, low power rotary and other switches, quartz crystal oscillators and frequency control units, cable television communications equipment and railway maintenance equipment.

The company established its roots in 1922 in Illinois as a controls company in the radio industry. Company D has a long history of acquisitions and divestments that follow the evolution of radio, to television, to cable TV and recently to even broader fields.

The company is currently in a turnaround situation after having followed a strategic track that took it deep into the cable TV and entertainment business in the late 1970's and early 1980's, which turned out disastrous. Recovering from a number of investigations by a variety of agencies and constituencies, the management team was replaced and the turnaround initiated.

The turnaround strategy was based in divestiture and acquisition coupled with debt restructuring. Company D while still

very much in the turn has relieved itself of significant debt, has made several acquisitions and divestments which appear to give them a fighting chance.

For 1987 Company D has reported sales of $182 million and net income of $8 million working with assets of $175 million. Looking towards 1988, Company D has its focus on ongoing cost control, aggressive marketing of existing products, the identification and development of new product opportunities and the acquisition of profitable cash generating companies.

The above information was collected largely from Standard and Poors, Moody's, and various publications distributed by Company D.

DESCRIPTION OF THE ORGANIZATIONAL STRUCTURE

This firm utilizes a parent and subsidiary approach to managing it's operations. The structure has been designed such that the heads of each subsidiary report to a single corporate officer who in turn reports to the Chairman. At the time of the interview, the position of this Corporate Operating Officer was vacant. His duties were being filled by the

Staff Vice President.

The management system employed by this firm is probably as important as it's structure. This firm tends to use an "ITT" type approach which is based in "standardized administrative practice". This "practice" involves business planning, financial and operational measurements combined with relatively close supervision by the Operating Officers and Chairman. The parent brings value to the subsidiary through the disciplines of the practice, the accessibility to greater General Management expertise and in their case the potential synergy and cross pollination of process and manufacturing methodologies that can be transported from subsidiary to subsidiary through a process called "observational engineering" as expressed by the Chairman.

Corporate Planning is executed by the Chairman personally and while it largely involved strategic direction with regard to Divestment and Acquisition it also included involvement in the business plans of each of the subsidiaries as well. Each Subsidiary maintained a full set of financial statements that were consolidated on a corporate basis.

This company is a public company and as such operates with a Board of Directors.

COMPANY PRINCIPLES

A major aspect of this company's turnaround involved a reformulation and reinforcement of their "Principles". This firm has had to face a very public and very serious set of charges dealing with management and operating improprieties. As mentioned before, a new management team was brought in and through the strong leadership of their new Chairman the "Company D Corporate Values" were formulated. Through personal discussions with the Chairman, he conveyed that he believed this was a critical first step in restoring the pride and self-esteem of Company D's employees who remained. Even though still gainfully employed, they had lost face in their communities even though they themselves were not personally involved in the improprieties. Restoring that face and self-esteem was a challenging task upon which everything depended.

The new Corporate Values of Company D are in the following table.

Table: Company D Corporate Values

Corporate Values

Company D has a mission to manufacture and/or distribute high quality products to valued customers whom we try to retain by providing first-class service at competitive prices.

In fulfilling this mission, Company D believes and acts upon the following principles:

1. Company D will operate with integrity in all aspects of its businesses.

2. Company D will manage and operate its businesses in a way that is beneficial to its shareholders, customers, and employees.

3. Company D believes that the free enterprise system and profit motive are the best resources available for producing a highly profitable enterprise that will provide the appropriate rewards for its shareholders, customers, and employees.

4. Company D management is encouraged to be aggressive and to take calculated risks aimed at forwarding the progress of the company.

5. Company D will continually strive to serve its valued customers with high-quality products at competitive prices, and first-class service.

6. Company D will endeavor to maintain a fulfilling and enjoyable working environment by being aware of and sensitive to the needs of its people and by rewarding their accomplishments through many forms of recognition.

7. Company D will strive to merit the confidence and loyalty of its employees to serve as the basis for mutually satisfying, productive and lasting relationships. In so doing, employees will be provided with opportunities for participation in decision-making at appropriate levels, with special emphasis in the areas where they have expertise and, in general, with an invitation for participation in the development of ideas throughout the company.

8. Company D will encourage its employees to be concerned with the welfare and continued progress of one another and to be ready to help each other realize our full potential.

9. Company D will be a responsible corporate citizen in the communities where it operates by contributing to, and encouraging employees to contribute to, the needs of those communities.

10. Company D will keep all relevant publics properly informed on matters of common interest.

11. And finally, all Compoany D personnel will demonstrate a commitment to excellence in all their endeavors. The company will, in its everyday operation and in its planning for the future, endeavor to be among the best-managed companies in the world.

ROLES OF THE INTERVIEWEES

The roles that the interviewees had for the purposes of this thesis were that of the Chief Planning Officer and Chief Operating Officer.

Given this company's current situation however, these roles were held by the Chairman and the Vice President of Human Resources. The title of VP of Human Resources could potentially be a bit misleading to the reader. The manager in this position operated as the "right hand man" to the Chairman. Their relationship precedes their employment at this firm, actually having its origin roughly ten years ago at another firm in which the current Chairman also held the top

slot. This firm was a major Fortune 500 firm and this manager was viewed to be one of it's young rising stars.
each had gone separate ways over the years and reunited when the Chairman invited him to join him at Company D and was the first key officer he brought on.

While this structure of responsibilities is slightly unconventional in the formal sense, they were in fact practical and met my needs as a result.

INTERVIEW #1

The first interview was with the Chairman speaking from the position of the Planning Officer.

Demographic and Biographic Profile

This manager has long been the member of executive suites having been the past Chairman of another major US corporation. He has also served as the Chairman of a bank and a country club which he started. Long enjoying a career in the retail industry, and mentored by the late J.C. Penny this executive attributes many of his values to this legend in the retailing industry.

He has held his current responsibilities for the last two years, having served as a Board member for several months prior to being asked to take the helm. At approximately sixty five years of age and holding a BA degree this manager has accumulated the equivalent of several degrees in business through his practical experience.

Source of Beliefs - Innovation

As mentioned earlier, this Company is in a turnaround situation and this was referenced complete with a history in this part of the discussion. A significant effort is underway to restore the self respect and credibility of both its employees and the firm. After the shock of the investigations and the cleaning out of the management team, the new team quickly developed its new set of values which have a heavy emphasis on ethics. This manager viewed these values as "things we must do as a company to move forward in a way that it is acceptable in every way".

Bringing life the these "central" corporate values in a very decentralized arrangement of subsidiaries which tend to operate somewhat autonomously was a challenge for this new officer team. They tended to view these operating principles as one more of the things that they had to offer the subsidiaries. They viewed it in much the same way as the administrative practice or process improvements plans referenced in the section under organizational structure. When offered to their subsidiaries and particularly newly acquired ones they were shared on the basis that the assumption is "that this is the way you are behaving already and we will expect you to continue".

Specifically on the value of innovation, the emphasis seemed to be on "delivering a better way of doing the function" that might be transferrable. This value was very much evidenced in our discussion on their business concept and less so in the discussion on culture.

In describing his personal approach this manager described himself as very hands on. In the early days he was confronted with all sorts of debt problems which totally involved him in a very direct way. During this period of "crisis" he spent little time with the subsidiaries. These days he personally visits each subsidiary monthly conducting business reviews and following up on committed to action plans by these managers. It is through these sessions that much of this so called "observation engineering" takes place.

Attitude Towards IT

This manager believed IT included all aspects of the technology including telecommunications, data processing, and software. While not making extensive use of the technology

personally other than telecommunications, he saw it as an integral part of the operations of business.

The Business Concept

This manager described their business concept on two planes. First, he saw it as mid tech, OEM suppliers, cooperative development, in businesses where methodology and process technology improvements can be shared between units. On a second plane he described their concept as operating from a portfolio approach bringing "administrative practice" along with managerial resources to relatively small $10-15 million dollar businesses helping them to grow and then selling them off or spinning them off to the shareholders as separate entities.

Defining the critical success factors on the first plane, namely that of OEM manufactures, this manager described the critical success factors as anticipating the needs of your customer, having high quality, on time delivery, continuous cost consciousness, and continually generating ideas on how to do it better.

He offered several examples of how he went about managing to these success factors from both a corporate and business unit

point of view. Being close to the customer was deemed to be an essential ingredient and accomplished by having the customer in your facilities continuously, both demonstrating your capabilities and looking for suggestions. Also they have in several situations begun to establish electronic linkages between themselves and their customers to cooperatively design and engineer, cutting cost and time.

Through their "observation engineering" they have borrowed and transported from one unit to the next manufacturing process technologies, an example being a process control system. What they in effect are doing is cutting down the learning curve and amortizing the initial implementation and learning costs by their approach.

Through this combination of getting closer to the customer by philosiphically focusing in that direction and then looking for good ideas and transporting them throughout the firm, they are developing the basis of competitive advantage for each business unit and the corporation as a whole.

Case Examples

At least three case examples of successful IT implementation were offered. The Production Control Reporting System, an Inventory Turnover System and Crystal Evaluation System.

Note: The Crystal Evaluation System is a computer based system which analyzes the physical molecular structure of the crystal material before the process of cutting it begins. This analysis allows the cutter to select a cutting pattern which optimizes the crystal yield. Crystal is a costly element in the construction of their components.

In each of these cases the work was pioneered by the subsidiary and implemented there. Typically these types of projects are reviewed as part of the Capital budgeting process and implementation targets are negotiated with corporate. Once implemented and successful operation has been achieved then the transfer process begins to take place. Sometimes this is facilitated by a technical type from corporate, more often it is supervised through a set of MBO's back to corporate by the sending and receiving organization.

INTERVIEW #2

This interview was briefer than any of the others due to a situation that developed at the office on the day of the interview. As a result I chose to focus the interview on the first two modules which involved the Source of Beliefs and Attitudes Towards IT.

This manager held the title of VP-Human Resources but in practicality his true responsibilities encompassed a broader perspective. He reported directly to the Chairman and was his key aide.

Demographics & Biographics

This manager has worked for three firms prior to his joining Company D. His functional experience includes human resources and sales. He holds a BA degree in Liberal Arts and has partially completed the requirements for a Masters degree in Industrial Relations. This manager was thirty-five at the time of the interview and had been at Company D for about two years.

Source of Beliefs - Innovation

In responding to the question on culture this manager responded that generally he felt it was a very informal environment. He stated "as attributes our culture is one of high integrity, entrepreneurial flair and teamwork, but I would have to add that moral values transcend economic values". On the attitude of entrepreneurial flair and contrasting previous management he offered, "We are looking to make more waves in our revival process here because that is the only way we are going to prosper". In responding to questions regarding how they foster that entrepreneurial flair he offered, "most of the encouragement comes in the monthly Forward Planning Sessions. In these sessions it is clear that one of the things that we expect from a subsidiary management team is the generation of new ideas and creative approaches. We have been extremely careful in the way we have responded to these ideas even the bad ones, because that is the behavior we want. However, managers do not have the authority to pursue all ideas unless they are approved here". He went on to explain that while their acquisitions are typically $10-15 million dollar companies they are always previously owned by parent companies and were often ignored

subsidiaries. The basis of the decision authority being retained at corporate was the need for management and decision making development at the subsidiary level. Corporate tries to provide this through a close supervision and authority control process. Once decisions are made subsidiaries are expected to implement them without direct corporate involvement. He also offered, "that by listening to their ideas and acting on them we are working to create the environment they want".

In approaching his job this manager offered that, "given the small size of the corporate office he finds himself often reacting, from situation to situation. Being flexible, resourceful, and not being afraid to personally do whatever it takes to deal with the situation was his approach. He described himself as very hands on.

Attitudes Towards IT

This manager defined IT as data processing, communication and systems used to process and deliver information.

He himself was a user of all sorts of telecommunications services and was dependent on a PC and various analytical

packages to complete his responsibilities. He was a user at home as well as the office.

Due to an event beyond our control the interview was terminated here.

ATTITUDINAL TYPE OF THE INDIVIDUAL

The attitudinal typing of the managers in Company D is based specifically on the section of the interview targeted at establishing the managers definition of IT and their perceived usage. The decision was augmented by their elements of data collected in other modules of the interview that reflected the managers views on the benefits and drawbacks associated with IT.

Table: It Attudinal Type

(Planning)	Interviewee #1	CEO	- Realistic Utopian
(Operations)	Interviewee #2	VP-HR	- Realistic Utopian

Table: Source of Beliefs - Innovation

(Planning)	Interviewee #1	CEO	- Personal
(Operations)	Interviewee #2	VP-HR	- Personal

COMPANY'S CONCLUSIONS BASED ON MODEL

This summary section will be comprised of four assessments. They will include an assessment of innovation as a value present in the culture and its source, an overall attitudinal assessment on IT, a typing of implementation on IT implementations and finally a general assessment assimilating all of the data compiled together.

Innovation as a Value

My assessment is that innovation as a value is part of the culture in this firm. The basis of my assessment comes from a variety of sources. First, this corporation is actually made up of a series of smaller companies which have been acquired. Being small and by and large growing, business innovation is a trait that I believe is intrinsic to this type of business. Secondly, as articulated by interviewee #2, entrepreneurism is a characteristic that they are trying to cultivate. This is also supported by comments offered by Interviewee #1.

I do believe however, that there is a question in terms of the degree that innovation is a trait in this culture. I

asses that it is nowhere near uniform throughout the subsidiaries and is not an underlying assumption. The emphasis on innovation in this company seems to be largely on process innovation as opposed to new product development. This reinforces their overall business concept and is then a critical ingredient to their success.

Attudinal Assessment on IT

I assessed these two managers as Realistic Utopians using Schein's typology. Given their business concept and their process of "observation engineering", I believe these two things combined together would suggest that they would have a good eye for applications of information technology that could pragmatically be applied across their subsidiaries. I do not believe however that as individuals they will drive IT implementations. The basis for this last assessment is their corporate structure and management system.

Case Example Classification

Several examples of IT implementations were cited in these discussions. My general assessment of them as a group, using

the implementation typology is largely incremental with ideas that if implemented would tend to be more radical.

Summary

In summary I would describe the business concept of this firm as a family of small, manufacturing, medium technology, OEM businesses, supported by a small core of experienced senior managers, disciplined administrative practice, who use an "observation engineering" process to capitalize on good ideas generated in many parts of the firm. This is a very complicated concept to execute in a complex, global business environment.

Using Wyman's Strategic Value Matrix referenced in Chapter 2, I asses this company as one who has successfully implemented at the "necessary expense" level of value. Without specific emphasis on Information technology in any of the business units at at the corporate level I am uncertain of their ability to establish enough momentum to have them create sustainable competitive advantage from it. Their structure and management system may potentially be the impediment on a broad scale although not necessarily a limiting factor in the case of any specific subsidiary.

CHAPTER 6

This chapter will bring this thesis to a conclusion by synthesizing the findings made during the field work and the references identified in the process of secondary research.

GENERAL ASSESSMENT OF THE MODEL

Simply stated the model hypothesized that the presence of innovation as a value, either as a characteristic of the organization's culture, or as an element in the personal value set of an influential individual when coupled with a positive attitude towards Information Technology would tend to enable the organization to successfully implement more radical uses of the technology set, formulating their business concept to allow the achievement of greater competitive advantage.

The emphasis of this work was to verify the accuracy of the assumptions and linkages that supported this hypothesis and model. It was not intended to precisely develop the strengths or weakness of relationships at the linkages. Since the set of four companies and fourteen interviews do not establish a sample that would withstand the rigor of

statistical rules, particularly when the sample set was drawn from a segmented pool based on CEO Attitudinal Profiles, the resulting data can only subjectively be used. With these qualifiers this assessment can be made and be taken in the proper context.

My general assessment is that the model is helpful in understanding two of what I now believe to be many enabling forces that must be present for an organization to be able to successfully identify opportunities and then to be successful in overcoming the many impediments encountered during the implementation process involving information technology. These two enabling forces are the presence of an innovation value and a positive attitude towards the technologies by key executives.

This is generally supported by the field work, where innovation as a value was found to be present in all four companies. In two of these it was a strong cultural characteristic and in two it appeared to be more of a personal value held by key individuals. Finding direct supporting evidence in secondary research proved to be difficult. While several references found might be indirectly construed to support the hypothesis and the role of innovation as a value, they are in fact more implied than direct.

The subject of innovation by organizations is one that tends to be researched as a process or by type, i.e. technological or administrative, rather than as a value. This in itself may be suggestive as to why it continues to remain as an ambiguous topic today. On the other hand, if innovation as a term is more descriptive of a process, then possibly it is underpined by a set of values more discreet than I have assumed for purposes of this thesis.

Having found what I assessed as the presence of innovation as a value in these four companies, the model was further supported by the outcomes of the typing of the senior managers with regard to their attitudes towards IT. The final typing outcome categorized as all Utopians, two Realistics for each Idealistic, further fitting the hypothesis. Since I had no individuals typed as Ambivalent, Realistic Skeptic, or Idealistic Skeptic further confirmation of all linkages in the model is impossible. While successful IT implementations were plentiful, which in itself supports the hypothetical model, the degree to which I was able to accurately type them as radical versus incremental was difficult. This is further explained in the assessment on typologies.

As a predictive tool that might be used to determine whether or not a company might be successful at IT implementation, I do not believe that this model will be helpful or necessarily accurate. The basis of this conclusion is that holding innovation as a value may only be an enabling force and not a driving one. As was offered by the senior managers interviewed for this thesis, there are a number of forces and conditions that shape the motivation and ability of an organization to successfully implement an IT application. The fact that successful implementation is a multifaceted managerial challenge is supported by many pieces of literature written on the subject. I will reference several of these as I develop the answers to the key concept questions.

The value then of this model and this work is the inclusion of innovation as a value to the already established and proven set of conditions or characteristics that have been found to exist in successful companies that have implemented IT applications. While requiring additional and more rigorous testing to be as supportable as the evidence identified in the study of "Implicit Assumptions About IT of CEO's", the inclusion of this characteristic might help to provide additional insight into an extremely complex behavioral situation.

GENERAL ASSESSMENT OF THE TYPOLOGIES USED

Innovation Belief Source

I developed this typology simply to classify the source of beliefs relative to innovation as they appeared in the situation being observed. The typology was composed of four segments: Personal, Cultural, Indeterminate between personal and cultural and Not Present.

Generally the typology worked well with its greatest weakness surfacing when used in an organization where innovation appeared to be present as an organizational cultural characteristic. Under these circumstances it was difficult, given the methodology used, to make a determination between personal and cultural sources. In these cases the individual was coded as "indeterminate". It is possible that with additional focusing questions, a determination could have been arrived at. In this case these additional questions were not asked because the primary interest was in determining the presence of innovation as a value and only secondarily its source.

Executive Attitudes Towards IT

This typology developed by Schein generally worked quite well. This typology utilizes a five segment structure labeled as Idealist Utopian, Realistic Utopian, Ambivalent, Realistic Skeptic, and Idealist Skeptic.

No interviewee was assessed as an outlier to this typology which further serves to validate it. Based on the descriptions I found it relatively easy to codify the interviewees using the typology after having become familiar with the distinguishing characteristics of each segment.

Level of IT Application

I chose this typology because of what I viewed as it's simplicity. Insight is required to properly understand how it was utilized. Essentially the terms "Radical" and "Incremental" were used to type examples of successful implementation. "None" refers to organizations that had not achieved success in their implementations. An application was considered radical when its successful implementation, using a CEO's terms from the Johnston and Carrico study, "changed the rules of the game" (7), or in McFarlan's, "IT

Changes The Way You Compete" article, "changes the basis of competition" (8), or as one interviewee put it, "the way the market works is changed". Other implementations that fell outside of these conditioning statements were considered to be incremental.

While I found the typology useful the difficulty was in making the determination on each of the successful IT applications. From the perspective of the interviewee, which contains a certain amount of bias, many of these implementations probably tend to be credited with more than they deserve. Secondly, since the companies researched involved several industries and many markets I found it difficult to be precise based on my rather limited knowledge of these industries.

Strategic Value Level

This typology was developed by Wyman in his article, "Technological Myopia-The Need To Think Strategically About Technology" (9). It was based on a four segment structure labeled as Priority Investment, Necessary Investment, Necessary Expense and Expense to Control. The typology

provided a way of gauging a firms overall perspective and degree of strategic use of IT.

Generally, I found the typology easy to use and a good tool in which to frame the overall perception of a firm. I found no outliers in this study with regard to this typology which serves to further its validation.

Tabulated Findings

I have tabulated the findings utilizing the four typologies. They are organized by company and the total sample.

Table: Tabulated Findings

	Company A	Company B	Company C	Company D	Total
INNOVATION SOURCE					
Personal	2	2		2	6
Cultural			3		3
Indeterminate	3				3
Not Present		2			2
ADDITUDINAL TYPE (SR MGR/CEO)					
Ideal Utop	3	2/1**			5/1
Real Utop	2/1**	2	3/1**	2/1*,**	9/3
Ambivalent					-
Real Skept					-
Ideal Skept					-
LEVEL OF APPLICATION					
Radical	2	2	4		8
Incremental	1	2	1	2	6
None					-
STRATEGIC VALUE LEVEL					
Priority Inv.			C		1
Necessary Inv.	A	B			2
Necessary Exp.				D	1
Exp. to Control					-

* Contains the CEO represented twice, once as the CEO and once as the officer responsible for planning

** Attitudinal Type - # of SR. Mgrs./CEO

QUESTION #1

In this section I will attempt to answer the first of three questions. "WHAT ENABLES SOME COMPANIES TO FORMULATE THEIR BUSINESS CONCEPTS USING INFORMATION TECHNOLOGY?"

The simple answer to this question is "a lot of things". First, I believe, is the ability to think strategically. As one executive I interviewed put it, "to think strategically you need perspective". To have perspective means to understand how markets and industries work. What is the interplay of forces that establishes a set of conditions that creates an opportunity for a market to exist? The ability to answer this kind of question indicates perspective.

I also believe that one needs to have the same kind of perspective over a number of markets or industries, so that concepts may be borrowed from one and lent to another. This process of borrowing and lending was described by J. Bronowski in his published works titled "Science and Human Values", which I was exposed to in the spring of my Sloan year. In these works he described this same process in discussing science. He wrote, "all science is the search for unity in hidden likeness" (10).

Johnston and Carrico refer to this as "vision", Porter calls it "the strategic approach that will give you an advantage over your competitors", and still others refer to it as having "external focus". Whatever your choice of words or tactical approach to the concept, what is needed is the ability to think at the abstract and conceptual level.

Coupled with this thinking ability comes the recognition of the idea that technology in its many forms may be a source of advantage. Recognizing this possibility, McFarlan, Wyman, Porter, Crescenzi, Johnston And Carrico all point to the need to search for the opportunities to utilize IT on a conscious basis. Each has also offered something of a formula on how to approach it.

In their study, Johnston and Carrico suggest there are key industry environmental factors that affect the strategic use of IT as well as key internal conditions that are generally present in firms that have been successful in their implementation efforts. In their article they offer the following as key industry environmental factors: "significant information content in key relationships in the value chain, businesses built around products or services that have a limited life, i.e. airline seats and an increase in competitive pressure within the industry". The internal conditions that support

strategic use of IT that they found include, "leadership by senior management, integration of IT and strategy functions in the corporation, direct contact between the IS function and line divisions, business acumen in the IS function and mechanisms for line influence on IT such as budgeting and priorities".

I believe McFarlan adds to this with a statement in his article titled, "Information Technology Changes the Way You Compete" which says, "Achieving advantages requires broad IS management and user dialogue plus imagination" (11). Adam Crescenzi, of Index Corporation in his article, "Implementing Strategic Information Systems" suggests, "the successful companies adroitly managed the organizational implications their innovative systems would have on system developers and users. At the user level they understood how such systems can disrupt the delicate balance between the three elements necessary to accomplish any organizational work task: Process, people and tools. Most of all, the successful companies avoided changing all their elements at once. They saw the need for actively managing the human element when they transferred tools and processes" (12).

Finally Wyman suggests that "the biggest obstacle to overcome is culture" (13), which is supported by Johnston and Carrico

who offer, "the key insight in these companies, is that achieving competitive advantages from IT meant basic changes in business practices and culture. Therefore they developed and managed initiatives as a change process" (14). This is further supported by a quote in the October 1985 Business Week article titled "Information Power" in which R.L. Norton of Nolan, Norton, and Co. stated, "I would spend only 20% of my time on the value chain and 80% creating the culture to make it happen" (15).

To all of this I would suggest adding or reinforcing a value on innovation to the culture, supported by the necessary recognition and reward systems. This inclusion might further enable both the opportunity identification stage of the process and the implementation stage as well.

Some of the substance for this idea is supported in an article published by J.R. Galbraith titled "Designing the Innovative Organization" where he offers, "It is my contention that innovation requires an organization specifically designed for that purpose, that is, such an organizations structure, processes, rewards, people, must be combined in a special way to create an innovating organization"(16).

In summary, success can only be achieved by thinking of this as a strategic problem requiring integrative thinking and problem solving across a broad number of managerial dimensions. This set of technologies can be employed as an asset, and understanding that due to their nature they can be intrusive, can be valuable to a manager in thinking through the challenge of putting them to work in an organization.

QUESTION #2

The second question proposed: DOES INNOVATION AS A VALUE NEED TO BE PRESENT IN AN ORGANIZATION FOR THE ORGANIZATION TO SUCCESSFULLY REFORMULATE THEIR BUSINESS CONCEPT USING IT?

My answer to this question will be more tentative than either of the other two. The field work would suggest that the answer to this question may be yes. However, due to this study's acknowledged limitations I am not in a position to make that statement.

Instead, I believe there is reason to believe that the presence of this value may be a mobilizing and enabling force. I find it difficult to conceive of a situation where this value

would ill serve an organization trying to implement an important IT project. As a value it is supportive to all of the processes and characteristics pointed out in the answer to question #1.

Based on the field work though I can offer that where the value was seemingly held by only a few selected individuals, influential as they may be, progress on successful implementations seemed to have come with a great deal more frustration, difficulty and time. While I'm certain there are other factors involved in these few cases such as process used, communication, etc., there did seem to be a detectable difference in both the success and frustration level concerning major IT implementations.

QUESTION #3

The last question of the set: WHAT ARE THE PROCESS CHARACTERISTICS OF THE SUCCESSFUL IT IMPLEMENTATION?

My field research was essentially designed to test the applicability of Roberts' ideas regarding the facilitation of innovation in corporate organizations as developed for re-

search and development, to the IT innovation process. These ideas were laid out in Chapter 1.

Since all of my field research was done principally from the users point of view rather than that of the IS manager the references will be made largely from that perspective.

Critical Area Findings

Roberts' asserts that there are four critical areas that must be focused on to facilitate innovation success in Corporate R&D. They are: the staffing of the technical organization, the development of a structure that facilitates the flow of technical and market information, an organizational structure with strong links to marketing and a strategic planning methods that improves integration of technical plans with other strategic plans. If these ideas were reduced to statements regarding staffing, organizational structure and strategic integration, then my field research findings offer support for the criticalness of these areas.

From the line managers perspective, on the subject of staffing, their general view was that there was not enough business acumen in the possession of the

MIS/Telecommunication organization for them to appreciate the real factors for success from a P&L perspective. Criticisms included: no sense of urgency, no considerations for costs, no feel for what we need, being an entity onto themselves. On the positive side they were referred to as partners or as an asset to the team.

The key to bridging these polar views does seem to be staffing. Staffing may be the way to insure that there is a critical mass of business acumen resident in the MIS organization and an equal amount of appreciation for the capabilities and potential of the MIS/Telecom group in the line organizations. Conditions seemed to be the best in those companies where key managers had been rotated across departmental lines. The resulting respect and thrust that was seemingly developed, went a long way in successfully finding ways to take advantage of IT.

In one situation an outsider with an experience background that included MIS and P&L was brought in the head that department. This seemed to be better than nothing but was encumbered by other social organizational acceptance issues that minimized the effectiveness. When confronted with a need to make a radical change however, as this company was, this may be the only feasible alternative.

I found secondary research support for these ideas as well. Two key references will capture the essence of these. The first from Crescenzi's article on "Implementing Strategic Information Systems", "unless business and IS managers form a partnership that is strongly backed by top management the implementation of potentially strategic systems will fail" (17). The second from Johnston and Carrico's article "Developing Capabilities to Use Information Strategically", "capability in the IS function is greatly enhanced when some IS people have a strong business acumen based on quality experience in key line functions or strategic business units of the company" (18).

Structure importance can also be supported by findings in my field research and secondary research as well. From my field research the subjects of role, responsibilities and measurement were all closely related. No one argued that there should not be a centralized MIS group of some shape or form. The debate seemed to be along the three dimensions outlined above. Generally, the executives I interviewed thought that the role of this organization should be to primarily support the profit centers. As to responsibilities, there were a variety of opinions which included: act as a full service support center, as a driver of IT strategy and implementation, or as the overall strategic architect and

protocol integrator to insure system capabilities leaving the application development to the line organizations. Most believed priority establishment and budgeting should be controlled by the profit centers thereby minimizing what may be perceived to be the development of systems with little value and unreasonable allocations to their P&L's.

All agreed that interdepartmental links were extremely important particularly on a cross functional basis, i.e. MIS to manufacturing, MIS to marketing/Sales. This is evidence that information technology is having unavoidable widespread impacts on all business functions.

Secondary research supports these ideas as well. In an article authored by J.M. Thompson, Index Group Vice Chairman titled "Winners and Losers in Channel Warfare", he offers, "the excitement is not in the "strategic system", but in changing the way you go to market. This means a close partnership between IT managers and their marketing/sales colleagues. In many organizations no such partnerships exist and marketing/sales people resist both IT and changing the way they go to market" (19). On the issue of structure, Johnston and Carrico offer, "Direct contact between the IS functions and line divisions is more highly developed when

those responsible for IT report directly to line management rather than to another staff function, i.e. finance" (20).

I believe an organization has to rationalize their own structural approach to fit their business concept and critical success factors. The right structural approach is then an answer tailored to fit the particular needs of the firm.

I found overwhelming unanimity on the subject of strategy integration. Managers that I visited strongly supported the development of an information technology strategy that was supportive and synchronized to their business strategy. In some cases it can be debated which of the two strategies should follow which. These discussions brought to mind the debate and discussion we enjoyed in our Strategic Management course in the Fall of my Sloan year when we discussed the relationships of strategy and structure. The bottom line of that discussion as well as this one I believe to be the same. It doesn't matter which is first as long as they are integrated and supportive. The key implication here is the need for information technology strategy and issues to become key elements in the corporate and business planning discussions of top management.

This is supported by a number of pieces of secondary research. Johnston and Carrico suggest that an integration of IT and strategy functions in the corporation is one way of assuring that this issue is addressed. Wyman, in his article, "Technological Myopia" offers, "Successful solutions are the product of an enlightenment process that links technological applications to business strategy" (21).

I believe that there is good evidence to support the criticalness of these three areas and would only offer that organizational culture as an area be added. This suggestion is based on my belief that culture, its values and underlying assumptions shape the behavioral context of an organization.

Five Key Staff Role Findings

Roberts outlined five key staff roles in the innovation process. these included the idea generator, the entrepreneur, the project manager, the sponsor, and the gate keeper.

Generally, I found these definitions helpful in attempting to decipher how a key project came to be implemented. There was some difficulty in crisply using these definitions all the time. This was due to the nature of smaller organizations

where often it is the same person playing multiple roles at the same point in time. It was obvious in several of the discussions regarding case examples that had not reached full success, that there were breakdowns or roles that were noticeably absent. My assessment therefore is that using this framework to recognize the potential need for these roles, while in the planning and implementation stages of an IT innovation would be helpful, more so then using it as a tool to assess the success or failure of IT implementations.

APPENDIX A

METHODOLOGY APPROACH

APPENDIX A

APPROACH AND METHODOLOGY

This appendix will lay out the approach and methodology that I employed in this thesis project.

ORGANIZATION

In my approach to this project I developed an overall Thesis Work Plan to guide and track the activities that would be required for successful completion.

There are five major modules associated with the Work Plan and were labeled as follows: Concept Design, Field Work Preparation, Field Work, Analysis and Write Up.

The following table depicts how the project was organized within these modules:

THESIS WORK PLAN
D. B. CAREY

CONCEPT DESIGN

CONTEXT FORMULATION
- 0 C&R Material on Innovation
- 0 C&R Material on Info Tech
- 0 C&R Material on Phase I
- 0 C&R Material on 90'S Project
- 0 C&R Material on BVA
- 0 C&R Material on Bus Pln Model

MODEL DEVELOPMENT
- 0 Identify Key Components
- 0 Develop Linkages
- 0 Identify Area of Concentratio

GOALS AND OBJECTIVE FORMULATION
- 0 Develop Primary Research Question
- 0 Develop Secondary Research Questions

RESEARCH INSTRUMENT DEVELOPMENT
- 0 Develop Instrument Questions
- 0 Review Study & Instrument Design w/Expert

FIELD WORK PREPARATION

SAMPLE SELECTION
- 0 Develop Criteria for Sample Selection
- 0 Select Sample
- 0 Select Alternate Sample Candidates

SAMPLE SOLICITATION
- 0 Develop Solicitation Letter and Send
- 0 Complete Basic Research on Each Company
- 0 Follow-up w/ Telephone Contacts for Appts

INTERVIEWING MATERIALS & TECHNIQUE
- 0 Develop Job Aid of Instrument Questions
- 0 Develop Job Aid for Data Capturing

FIELD WORK

ADMINISTRATION
- 0 Develop Schedules
- 0 Develop Confirmation Letters
- 0 Develop Thank You Letters

EXECUTION
- 0 Conduct Interviews

ANALYSIS

QUANTITATIVE ANALYSIS
- 0 Structure Quantitative Approach
- 0 Complete Analysis
- 0 Draw Conclusions

QUALITATIVE ANALYSIS
- 0 Structure Qualitative Approach
- 0 Complete Analysis
- 0 Draw Conclusions

WRITE UP

OUTLINE FORMULATION
- 0 Develop Preliminary Outline
- 0 Develop Abstract

DRAFT DEVELOPMENT
- 0 Develop and Submit Chapter

FINAL COPY DEVELOPMENT
- 0 Revise and Create Final Copy

COMPLETION APPROVAL
- 0 Advisor's Approval
- 0 Readers Approval
- 0 Program Director's Approval

APPROACH

Overall I would generally describe my approach to this investigation as more qualitative and exploratory than quantitative and conclusive in nature. Having developed the basic context and conceptual model described in the preceding chapters, an on site, face to face interview approach was chosen for data collection, followed by the determination of the sample pool, the individual specimen company selection, solicitation of samples for participation, development and testing of the interview protocol, development of the analytical approach and the completion of a substantial amount of secondary research from existing periodicals and journals.

I will briefly describe each of the steps to enable the reader to gain some insight into the logic and reasoning that substantiates each of the choices made.

DATA COLLECTION APPROACH

Early on in the project a decision was reached to employ an on site, face to face data collection approach sometimes referred to as a key - informant research technique. In this

arrangement visits were made to the interviewee's work location by the Sloan Fellow who would administer a previously designed interview protocol. The value in this approach is that it offers a great degree of flexibility to the interviewer allowing him to pursue subtle hints with follow-up questions retrieving answers often left on the table with more rigid non face to face techniques. Secondly, by casual observation of artifacts in the environment it becomes possible to spontaneously develop lines of questions that allow the interviewer to get closer to understanding the value and underlying assumption associated with it. Further, impressions gathered during these visits fostered largely by environmental conditions and behaviors by other location inhabitants can add a very valuable piece to the puzzle, provided that these impressions are substantiated with some reasonable form of data. Impressions alone can often lead to erroneous observations and conclusions.

Other reasons for on site visits included allowing the interviewee the comfort and confidence of being on his own turf, to facilitate easy access to other individuals resulting from a referral and to facilitate ease of observation of case examples or working prototypes that interviewees might use to convey their ideas.

DETERMINATION OF THE SAMPLE POOL

Due to the inherent nature of the particular interests of this study and the relationship of this investigation with the 1986-87 Sloan Fellows Study on Executive Assumptions Concerning IT, it was decided to establish our sample pool as a subset of companies involved with the above mentioned work. Several companies were eliminated from the 1986-87 pool based on their involvement as study specimens in other MIT related research projects.

The second major reason for the use of this sample pool was to ease access to interview candidates. It was believed that because CEO's from these companies were previously involved that this could be leveraged to gain access to additional people in the firm.

The pool included fifty four companies from a variety of industries and company sizes. These companies tended to represent the insurance, electronics, telecommunications, aerospace and transportation industries.

For purposes of organization these companies were divided into three segments by the faculty advisors based on the

attitudinal typing of the CEO's of these firms from the 1986-87 Sloan Fellows Study. As researchers of this years study, we were not told the type until after the data gathering had been completed.

SAMPLE SELECTION

Each project participant then selected five to six specimen companies from within a group based on some profile of personal interest. In my case I was particularly interested in interviewing smaller companies, since I anticipated it would be easier to develop a more complete understanding in an atmosphere where size, complexity, and multiplicity of business interests were minimized, and also service companies due to my previous work experience in this field.

My selections represented small manufacturing and service companies. It was felt necessary to interview four to five companies and a number of senior executives in each so that the total number of interviews would fall in the twelve to fifteen range for each thesis. As a group we would cover sixteen to twenty companies and forty-eight to sixty executives.

SAMPLE SOLICITATION

With the sample now selected our solicitation strategy was developed. Key aspects of this strategy involved aiming our point of entry at the CEO's, clearly establishing a linkage with MIT's Management in the 1990's Program, referencing the CEO's participation in the 1986-87 effort, articulating the linkage of this years project to that of last year and a message of appreciation for their consideration of involvement.

Each of us developed our own solicitation letter working from these agreed upon strategy points adding to it any specifications that were particular to our individual interests.

In my case I requested the opportunity to interview individuals who had the responsibility for corporate or business planning and those responsible for profit center or division management. I intentionally excluded Management Information System or Data Processing types because of a

preconception that I came with which involved the idea that a prime reason for unsuccessful implementation and use of information technology solutions was less than a total understanding of the technology by the user, of business principles and concepts by the MIS and DP types, and the fact that the responsibility and accountability for long term success of a firm was typically held by business planners and operating managers.

From an administrative viewpoint I also believed the CEO or Administrative Assistant would be helpful in identifying the best individuals for me to talk with rather than trying to make these determinations myself off organization charts or other publicly available materials.

Each CEO of a sample selection was then mailed a solicitation letter via overnight delivery (see example in Appendix B) and a follow-up telephone call was scheduled for the second day after delivery. Where possible an attempt was made to talk directly to the CEO so that verbal persuasion might be employed.

Once concurrence for the companies participation was received an internal coordinator was sought out, such as a lead secretary, to assist in working with demanding schedules and

finding a mutually convenient date and set of times when all of the key people could be visited. Once established a confirming letter was sent to each interviewee confirming the appointment. (see example in Appendix C)

A total of fourteen interviews in four companies were confirmed and carried out for this thesis. Only one of the soloicited companies refused participation.

INTERVIEW PROTOCOL

The interview protocol was developed to facilitate the interviews themselves. Several goals were established for the interview protocol. First, the protocol must be designed to facilitate putting the interviewee in a comfortable position establishing the tone quickly. Second, it needed to be flexible enough to be accommodating to the natural flow of the discussion, which we felt most appropriate for this exploratory type of research. Third, the protocol had to provide enough structure to faciltate the downstream analysis in the process. And finally, the protocol had to be able to conform to the time constraints which were largely self imposed in an attempt to be respectful for the individuals donated time.

With these parameters in mind I began developing a protocol to facilitate eliciting the information I believed I needed for this project. The protocol was developed into four topical sections. The four main sections were the Introduction, Personal Attitudes, the Business Concept and Case Examples. There were two primary sections in the instrument, The Personal Attitudes module and the Business Concept. In total there were eighteen main questions in the instrument and a wide variety of questions surrounded each response in an attempt to tickle out additional insights, experience and information.

An "Interview Note Sheet" was developed for each interview along with a general "Interview Flow" sheet to assist in managing the interview flow. The following chart displays the Interview Note Sheet as it was used in the interviews and the Interview Flow can be found in Appendix D.

THESIS INTERVIEW NOTES
COMPANY: COMPANY A
INTERVIEWEE: MANAGER A
DATE: FEBRUARY 19, 1988

INTRODUCTION

- O SLOAN AND ME
- O 90'S, PHASE 1, PHASE 2
- O FOCUS POINTS
- O RESPONSIBILITIES AND WORK HISTORY

- O EDUCATION AND AGE

PERSONAL ATTITUDES

O SOURCE OF BELIEFS - INNOVATION

- O DESCRIBE THE CORPORATE CULTURE
- O DESCRIBE YOUR PERSONAL APPROACH

O ATTITUDES TOWARDS INFORMATION TECHNOLOGY

- O HOW WOULD YOU DESCRIBE IT?, WHY?
- O WHAT PERSONAL USES OF IT DO YOU HAVE, WHY?

BUSINESS CONCEPT

O DESCRIBE YOUR BUSINESS CONCEPT

O WHAT ARE THE CRITICAL SUCCESS FACTORS ?

O WHAT MEANS DO YOU USE TO ACHIEVE THESE ?

O DO YOU SEE A ROLE FOR IT ?

CASE EXAMPLES

O COULD YOU GIVE ME A CASE EXAMPLE ?

O WHERE DID THE IDEA COME FROM?

O WAS THERE A CHAMPION FOR THIS IDEA?

O WAS THERE A PROJECT MANAGER ASSIGNED?

O WAS THERE AN INTERNAL SPONSOR?

O WERE THERE GATEKEEPERS, TECHNOLOGY/MARKET?

O DID THE CEO HAVE ANY DIRECT INFLUENCE?

O HOW DO YOU MEASURE SUCCESS?

O WHAT WOULD YOU DO DIFFERENT?

ANALYTICAL APPROACH

As work on this thesis progressed I began to realize that the nature of my special interests and this project in general would tend to lend itself to more of a qualitative analytical approach versus quantitative.

To organize and facilitate the use of data in this qualitative analysis a set of four typologies were identified. These included: Innovation Belief Source Typology, Executive IT Attitude Typology, Application Level Typology and a Strategic Value of IT Typology.

I developed the Innovation Belief Source Typology and the Application Level Typology for the purposes of this study. The Executive IT Attitude Typology was developed by Dr. Edgar H. Schein as part of the 1986-87 study "Implicit Assumptions About IT of Chief Executive Officers". The Strategic Value of IT Typology was developed by John Wyman and is actually a component of a larger Strategic Value Matrix that he presents in his article titled "Technological Myopia - The Need to Think Strategically About Technology".

I will briefly describe each of these typologies to provide the reader with a saliency for their use. A chart which graphically depicts these typologies follows this section.

INNOVATION BELIEF SOURCE - This typology provides the user with a method of categorizing the source of beliefs relative to innovation.

Table: Innovation Belief Source Typology Definitions

Personal

Is meant to describe a situation where the individual believes strongly in the positive aspects of innovation but in many respects stands alone in his organization with regard to his beliefs.

Cultural

Refers to those situations where their exists a belief and value on innovation that is widely held throughout the organization and has become part of the cultural fabric of the group.

Indeterminate

Refers to the situation where there appears to be a positive belief and value on innovation but the source cannot be determined to be either personal or cultural.

Not Present

Indicates a situation where no positive belief or value appears to be present.

EXECUTIVE IT ATTITUDE TYPOLOGY - This typology provides the user with a method of typing the attitudes of Senior Managers towards Information technology.

Table: Executive Assumptions on IT Typology Definitions

Utopian Idealist

The CEO sees nothing but benefits deriving from the increased use of IT in all areas of his business and personal life. He may not see all these benefits in actual use, but he believes firmly that in time all the benefits will be realized.

Realistic Utopian

The CEO sees great potential benefits in IT, but is not sure that they will all be realized because of hidden costs, resistances in others, and/or various other sources of difficulty that are not inherent to IT, but in its implementation.

IT Ambivalent

The CEO sees some benefits in some areas but sees potential harm in other areas and/or perceives that the costs may in the end outweigh the benefits; therefor, he is ambivalent in the sense of wanting to push ahead, but being cautious and doubtful at the same time.

Realistic Skeptic

The CEO is doubtful about the benefits of IT, short-term or long-term, but realizes that the appeal of the technology will bring much of it into organizations anyway; given this reality the CEO must control carefully what is introduced so as to minimize potential harm or excessive cost.

Utopian Skeptic

The CEO believes that IT is primarily harmful in that it undermines other effective managerial processes. it is not merely excessively costly, but actually harms organizational effectiveness by encouraging the use of tools, categories of information, and processes of doing work that are less effective than what is presently in use or potentially possible in terms of other managerial models; he therefore sees his role to be to minimize the harm that IT can do, and to control its costs to the utmost degree.

LEVEL OF APPLICATION - this typology provides the user with a method of categorizing the level of impact that an IT application has had.

Table: Level of Application Typology Definitions

Radical	An application was considered to be radical when it effectively changes the way a market or industry works providing the firm with a source of competitive advantage.
Incremental	An Incremental application tends to benefit the firm with additional efficiency or product and service enhancements without significantly affecting the way markets work.
None	Indicates situations where no successful IT implementations have been realized.

STRATECIC VALUE OF IT TYPOLOGY - This typology provides the user with a method of characterizing the overall attitude of the firm towards information technology.

Table: Strategic Value of IT Typology Definitions

Priority Investment

At the Priority Investment level the firm views information and information technology as a strategic asset, integral to their business plans and allocates resources accordingly.

Necessary Investment

At the Necessary Investment level the firm views information and information technology as a tactical asset in support of the firms goals. Information management plans are not integrated.

Necessary Expense

At the next level resources allocated to information technology are not viewed as investments but instead as expenses. These expenses are viewed as a necessary cost of doing business and are budgeted for accordingly.

Expense to Control

At this level the expenses tend to be viewed as relatively low in priority and are managed purely on a budgetary basis. data processing, office automation and telecommunications are viewed as separate areas and are managed accordingly.

Use of these typologies individually and collectively provide a method of organizing the data from which qualitative assessments can be drawn from each element of the model and its overall validity.

SECONDARY RESEARCH

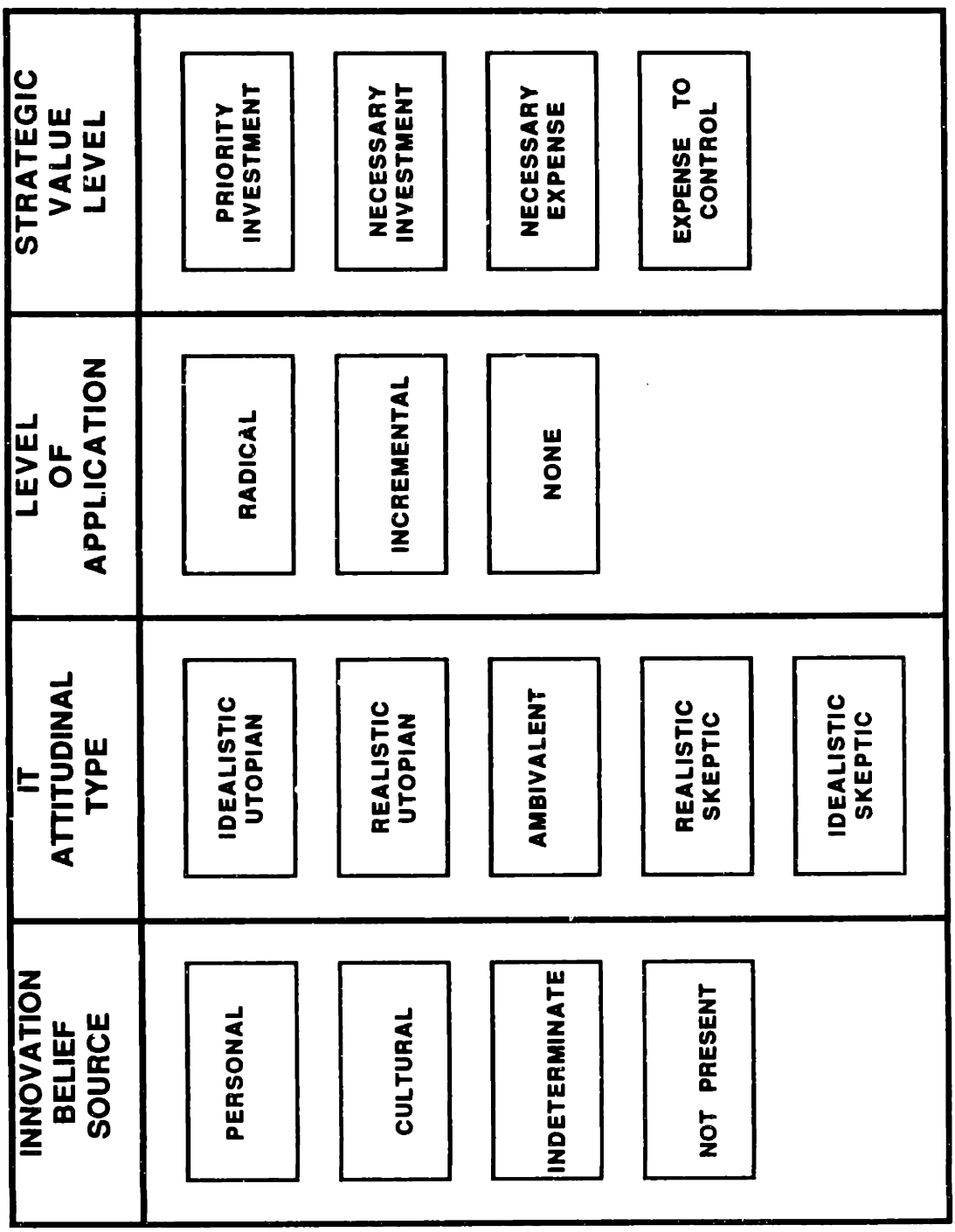
Secondary research was conducted for this thesis on both a manual and an electronic basis. Topical areas of research included: CEO's attitudes towards information technology, information systems management as a profession, organizational culture, information technology and human resources, innovation, the innovation process, the impact of information technology on organizations, information technology and business strategy, individual industry and company background searches and general trends in the business environment.

Numerous articles and references were studied to develop a context for this work and some of those will be cited as specific references to support points of view that will be developed.

One of the things that I found is that there are numerous sources of information on the information technology area. They are written from a wide variety of perspectives spanning every aspect of life in general as well as business. I believe this to be just one more indicator of the enormity of influence that this technology set is having and will

continue to have over our working and leisure lives as time goes on.

Chart: Typologies and Segments Display



APPENDIX B

OTHER SIGNIFICANT FINDINGS

OTHER SIGNIFICANT FINDINGS

Prototype Versus Full Scale

Most of the successful IT innovations were preceded by prototypes often designed and built by the user using a "hodge podge" of pieces to make it work. In some cases these were simply paper operating systems at their first introduction. The willingness and commitment by upper management of the user organization to dedicate the resources and time to this development approach was seen as a critical factor in the long term success. Only after the prototype was tested and the potential benefits were at a point where they could be evaluated was the project turned over to MIS for professional system engineering design and broad scale implementation. This approach had a number of benefits. First, the feature functionality was what the user wanted, there was pride in ownership which diminished the acceptance issues. Later, the MIS organization was handed a "harder" specification vis a vis the working example, which enable them to engineer the solution into their overall architecture preserving its integrity. Another benefit was that for those prototypes that failed, precious design and implementation resources were not wasted allowing better overall results for all concerned.

IT Technology "S" Curves

With the rapid technological advances in performance, price, and capability of the information technology set I found some managers somewhat "gun shy" of decision making in this area.

The dollars represented by these IT applications can by very significant. These same investments which hold as their promise competitive advantage, are extremely vulnerable to the technology leaps which can evaporate the advantage or diminish it significantly. Add to this the stark realization by many that they cannot absorb, either financially or humanly, the current rate of technical advancement.

The learning curves associated with the introduction of the most sophisticated of these IT applications tend to be quite long, which cause these managers to assume that there will be technological advances that will supercede them. Knowing then when to make the next change over becomes a function of predicting the price, performance, and capability curves of the technology in question or asking themselves just how lucky they feel coupled with an assessment of the benefits that they have received to date.

I project this issue will get more attention as a greater number of applications are successfully implemented and second and third generation decisions find their way to the planning tables.

APPENDIX C

SAMPLE INTERVIEW REQUEST LETTER

January 7, 1988

Mr. John Doe
Chief Executive Officer
Sloan Corporation
Industrial Parkway
Cambridge, Massachusetts 02121

Dear Mr. Doe,

I am a MIT Sloan Fellow in the class of 1988 and am sponsored by AT&T. As you may recall you were interviewed last year by Roger Smith, Sloan Fellows Class of 1987, as part of MIT's research program entitled "Management in the 90's". Specifically your discussion with Roger involved information technology (IT).

This aspect of the 90's Project was initialized by interviews with over 80 Chief Executives with the goal of developing an understanding of their personal perceptions about IT and its affect on the organization. With the final analysis due out in several months, preliminary reviews indicate a great diversity of attitudes and patterns of utilization which seem to be influenced by the perception of the managerial job.

I am one of five Sloan Fellows who have agreed to take on the second phase of this project as our Master's Thesis. Our objective is to study the attitudes and patterns of utilization of IT amongst the next level of executives in firms previously contacted. I am therefore requesting your approval and support to interview several key members of your team. I would be particularly interested in speaking with selected executives responsible for corporate or business planning and several of those responsible for operations. As with work done last year neither the company or individual names will be tied to any specfic interview discussion in the thesis, as the objective is an analysis of attitudes rather than company strategy.

I will contact your office within the next several business days to receive your response, and if positive to schedule time directly with those individuals whom you recommend. I expect the interviews to take one hour or less and hope to schedule them prior to the end of February 1988.

Thank you for your consideration!

Sincerely,

David R. Carey
MIT Sloan Fellow

APPENDIX D

INTERVIEW CONFIRMATION LETTER

February 5, 1988

Mr. John Doe
Chief Executive Officer
Sloan Corporation
Industrial Parkway
Cambridge, Massachusetts 02181

Dear Mr. Doe,

The purpose of this correspondence is to express my appreciation for giving me the opportunity to speak with you and to confirm our appointment on February 26th at 1:00pm.

As a Sloan Fellow at MIT, the project that I am working on is part of a major research undertaking by the Institute entitled "Management in the 90's". My specific focus deals with the attitudes of senior executives towards information technology and its role and impact on the organization and business concept.

As I indicated in my introductory letter, complete confidentiality will be kept as all reports will be on a summary basis and not be identifiable by company.

Once again, thank you for your cooperation and I look forward to meeting with you!

Sincerely,

David R. Carey
Sloan Fellows Program

APPENDIX E

SAMPLE INTERVIEW APPRECIATION LETTER

February 18, 1988

Dear Mr. Doe,

I want to personally express my appreciation to you for the time that you took out of your busy schedule and the thoughts that you shared with me on Friday.

The time with you and the rest of the team provided me with a plethora of substantive answers to my questions. While each set of answers was personalized there were many consistent themes which really does seem to be the essence of what Sloan Company is all about.

I've attached several of the articles that I mentioned during our discussion. I hope you find them helpful.

Thanks once again and best of luck in your new position.

Sincerely,

Mr. John Doe
Vice President - Systems Operations
Sloan Corporation
Industrial Parkway
Cambridge, Nassachusetts 02181

APPENDIX F

INTERVIEW FLOW OUTLINE

INTERVIEW APPROACH

INTRODUCTION

- O THANK YOU UP FRONT
- O 1 HOUR COMMITMENT

I THOUGHT I MIGHT TO START BY SHARING OBJECTIVES

OUTLINE

- O MY AFFILIATION WITH MIT
- O BACKGROUND ON THE PROJECT

THEN, I WOULD LIKE TO MOVE INTO THE INTER & W/ YOUR PERMISSION

- O COLLECT SOME DEMOGRAPHIC DATA ON YOU
- O PROBE VIEWS ON INNOVATION AND IT
- O EXPLORE HOW YOU SEE YOUR BUSINESS CONCEPT & HOW YOU OBTAIN COMPETITIVE ADVANTAGE
- O AS WE GET INTO THE DIALOGUE IT WILL BE SALTED W/EXAMPLES

ASK PERMISSION TO FOLLOW UP

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BIBLIOGRAPHY

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