Master's Thesis

AN INSTRUMENT TO ASSESS ORGANIZATIONAL CHANGE CAPABILITIES FOR e-BUSINESS TRANSFORMATION

By

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A Thesis

Submitted to the Faculty

Of the

WORCESTER POLYTECHNIC INSTITUTE

In partial fulfillment of the requirements for the

Degree of Master of Science

In

Manufacturing Management

December 2000

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Abstract

This thesis investigates organizational change strategies for e-business transformation. It proposes an instrument to measure the strength of a company's organizational change capabilities to make this transformation.

Most "brick and mortar" business in the year 2000 are faced with a massive wave of change associated with the Internet. It is impacting the fundamental rules of business and changing their relationship with customers, suppliers and how work gets done. Firms that successfully make an e-business transformation will be rewarded with growth and strong returns. Many of those who are unable to change will not survive in the long run.

A fundamental issue in e-business transformation is disruptive organizational change. A review of the academic literature identifies ten dimensions of organizational change capability that can increase the probability that a company can make a successful disruptive organizational change. These include: emotional unifying vision; use of symbols; enabling the free flow of emotions; providing a transition to the past; creating a playful environment; change infrastructure; first line supervisor buy-in; project management; training; and the reward system.

An expert panel was surveyed to get their opinion on the dimensions. Dimensions were added and altered based on these opinions. An instrument was proposed to uncover these dimensions. It was reviewed by an expert panel, and then was then edited based on their feedback.

It was found that the opinions of the expert panel were highly correlated with the dimensions identified in the academic literature. The instrument has a reasonable chance to measure the strength of an organization's change capabilities to make an e-business transformation. Further research could apply this instrument with a representative group of companies to determine the strength of each dimension.

Preface

As the year 2000 draws to a close, e-business continues to be a hot topic for the global economy. After the shakeout of many dot.com start-ups throughout the year 2000, there is an increasing interest in e-business transformation for existing "brick and mortar" companies to "bricks and clicks" type businesses.

The majority of the literature on the subject of e-business focuses on the nature of the Internet change, on specific information systems strategies, or on strategies to help companies be more effective on-line.

There is very little literature that focuses on a fundamental issue: the disruptive organizational change that is needed to make a successful transformation. There is a great deal of literature on the subject or organizational change. This thesis applies these principles in the context of e-business transformation.

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1. Introduction

 "Brick and mortar" businesses are facing a massive wave of change associated with the Internet and e-business. It is impacting the fundamental rules of business and changing their relationship with customers, suppliers and how work gets done. For those that are successful, it promises more value to customers, lower costs, higher earnings, and higher stock valuations.

Companies cannot control these changes in the environment. They can only change themselves to adapt to the changes and to take advantage of the new opportunities that they present. When the change is discontinuous, this is a very difficult task.

Existing companies with strong corporate cultures that have been built over many years, have powerful control systems for adapting to incremental changes in the environment. A strong analogy can be made to an electromechanical control system. When an aircraft is hit by a gust of wind, its sensors tell the navigational computer that there is a difference between the current direction and position and the desired direction and position. The powerful control computers calculate the change needed to correct the course, order a change in the actuators controlling the fins, and within a few milliseconds, the aircraft is back on target.
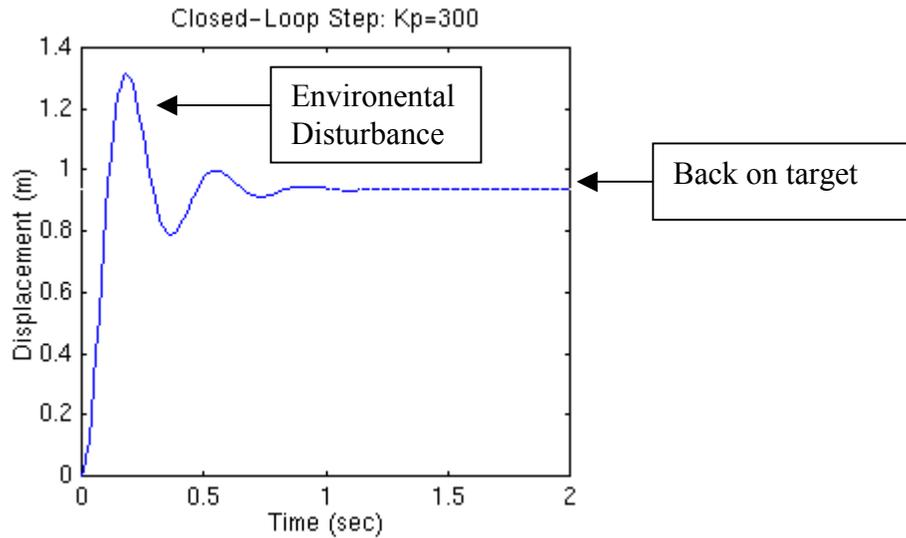
Figure 1: Controlled system response to an environmental disturbance

 Like these powerful navigation and control computers, powerful corporate cultures in existing organizations have the ability to quickly adapt and change to incremental changes in the environment because their values, processes, and resources are finely tuned for this environment. Within a very short time, they adapt to incremental change, and are back on an optimal course to hit their growth targets.

But existing companies with strong corporate cultures are historically unable to adapt to discontinuous change. The electromechanical control analogy is when an aircraft is hit with powerful wind sheers. The change is greater than the dynamic range that the control system was designed for and an aircraft can roll into a tailspin and crash.

Likewise, many companies fail when faced with a discontinuous change in the environment. As the literature search shows, entire industries have been wiped out because companies with values, processes, and resources finely tuned to hit business targets in an existing environment are unable to adapt when the fundamental rules and underlying assumptions of the environment change. The massive wave of discontinuous change is too large for their systems to adapt.

Extending the control system analogy, a controls block diagram is shown below to represent the system.

The Internet   **Corporate Culture**   **Organizational Change Capabilities**

Disruptive Wave of Change   Inertia   Controller
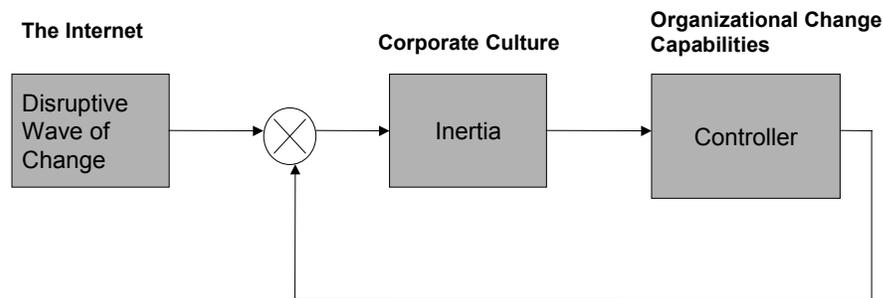
Figure 2: Block diagram of organizational change dynamics with a classic control system

The literature shows that most major change programs within corporations fail. Although most management teams do a good job of assessing the resources necessary for a change, they often fail to consider whether the change is possible given their current processes and culture.

When managers attempt well resourced changes to adapt to discontinuous technology using processes based on older business rules, they fail. Likewise, when they attempt to adapt their organizations to an external wave of change that requires a new set of beliefs, new business rules, new definitions of what is important in the organization or not, they bump up against powerful deep rooted cultures that preserve the status quo and reject the change. The electromechanical analogy is the inertia of a large system. A Boeing 747 jet moving through the atmosphere at 600 mph takes a long time to turn around.

Culture and processes take a long time to change. In the short term, they impose limits on what change is possible. Managers need to understand these limits if they want to initiate change in the short term. They also need to be able to access whether they have the tools to begin a major culture and process change that gives them a reasonable probability of success.

The popular literature on e-business readiness gives managers a comprehensive list of the resources that they need to change their

organizations into e-businesses. There are also many sources available to discuss how relationships with customers, suppliers, and even how people work must change. However, accessing how well equipped the organization to attempt a discontinuous change to its culture and processes is not considered in e-business literature.

Fortunately, there is a great deal of academic research on the organizational change process. This thesis proposes an instrument to provides a means of measuring how well equipped a company is to attempt a major culture and process change to adapt and thrive as an e-business.

This thesis attempts to answer the following question:

What organizational change capabilities (management, culture, processes, or structure) are most likely to help companies make discontinuous organizational change as they attempt to become e-businesses.

Companies that strengthen these organizational change capabilities in effect build adaptive control systems for that can better respond the disruptive change, despite the inertia of their strong corporate cultures. The new system in effect replaces the company's current controller or weak organizational change capabilities with a new adaptive controller or strong organizational change capabilities that is better equipped to respond to the Internet's massive wave of change. The resulting system diagram is shown below:
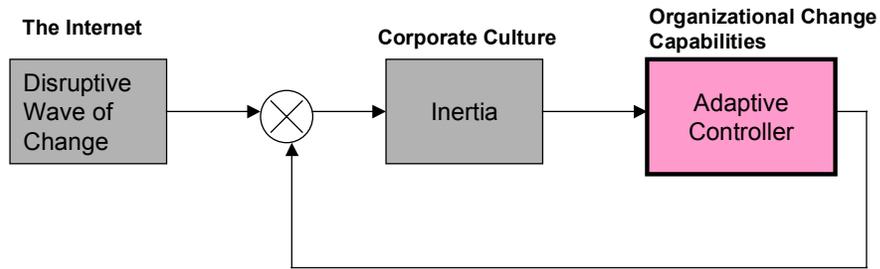
Figure 3: Block diagram of organizational change dynamics with an adaptive control system

An instrument to measure a company's readiness for the discontinuous organizational change that is needed for e-business. It uses the factors identified in the academic literature and verified by an expert panel as a basis.

Organization of the thesis

Section 1.1 of this introduction establishes the need for organizations to examine their organizational change capabilities and processes as we enter the era of e-business.

It establishes that the Internet is a massive wave of change that is currently facing every business worldwide. It examines how this is changing business rules, how it's creating new value streams, and how these changes are impacting company's relationships with customers, relationships with suppliers, and how people work.

Section 1.2 of this introduction examines corporate inertia. It also establishes that companies are often too slow to adapt to change because of their processes and culture.

Section 2 is a review of the current academic literature on the organizational change process. It establishes the power of corporate culture to resist

disruptive change. It defines disruptive change and receptivity to change. It establishes nine dimensions of organizational change capability, each with a hyothesis to be tested.

In Section 3, Methodology, the hypotheses are summarized into a set of nine dimensions. An expert panel then tests the dimensions. Finally an instrument is proposed to measure these nine dimensions of organizational change capability within companies.

1.1 A Massive Wave of Change

After establishing this need, a review of the current academic literature on organizational change is considered in section 1.2. This defines disruptive change and receptivity. It then establishes a set of success factors that can significantly increase the probability of a successful organizational change.

The Internet is a massive wave of change that is impacting every part of "brick and mortar" businesses. In fact, it is fast becoming a new channel of commerce in a wide range of businesses, much faster than would have been predicted even two years ago. This section focuses on the nature of this disruptive change.
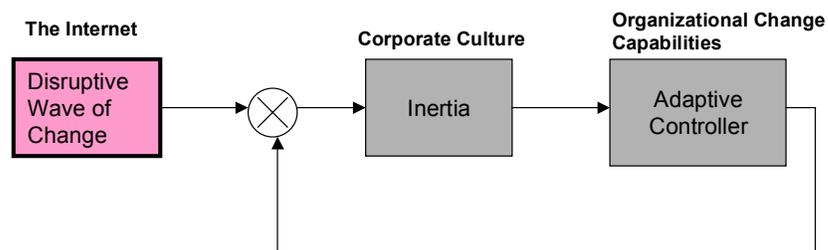
Figure 4: Block diagram of disruptive change on organizational system dynamics

In examining the nature of this disruptive change, this section establishes the following:

- The Internet is a massive disruptive technological change that is impacting every business worldwide

- It is changing the nature of value and fundamental business rules

- It is changing company's relationships with customers and suppliers.

- It is changing the nature of work

Figure 5: Summary of the changes the Internet is causing

The Internet poses a difficult challenge for established businesses. The opportunities are clear: interactive relationships with customers, links to anyone anywhere anytime, and the possibilities of providing new products and services at very low cost. Established businesses that over decades have carefully built brands and physical distribution relationships risk damaging all they have created when they pursue commerce in cyberspace. And because e-commerce is so new with lots of uncertainties, executives at most companies, new or old, have difficulty deciding the best way to use the channel. And it is even more difficult for them to accurately estimate the returns on any Internet investment that they make. (Ghosh, 1998)

This is no simple or continuous change. It is a wave of change so massive that it threatens the existence of entire industries, creates major new industries, and will significantly restructure most businesses. Business and commerce has not been faced with such a massive wave of change since the Industrial Revolution.

In 1781, William Murdoch, an assistant to instrument maker James Watt, developed a gearing system called "sun and planet" which converted the piston motion of Watt's powerful new steam engine into rotational power to drive a shaft. One of the most powerful applications of the Watt engine was a new process for producing wrought iron, invented by Henry Cort in 1782, that was 15 times more productive than previously possible. The result was that it was suddenly more economic to build structures of iron rather than

wood, setting off an explosion in the construction of buildings, machinery, bridges, and in time, railroads. After the 1781 patent of Murdock's system, every indicator in the British economy begins a sharp upward curve. (Burke, 1985)

This combined with breakthroughs in power technology resulted in the Industrial Revolution. It was the most massive restructuring of mankind since the advent of agriculture 7,500 years earlier. The new structures impacted every part of everyday life – businesses, governments, families, cities, language, art and even sense of time. (Davidow & Malone, 1992).

The Industrial Revolution represented one order of magnitude change in efficiency (A 15x improvement in the process of producing wrought iron). The current information age represents several orders of magnitude of changes in efficiency in several new technologies: computing power, mass storage, software, and telecommunications.

In 1970, Gordon Moore discovered that by plotting the increase in computer memory and processing power on a logarithmic scale, the power doubled every 18 months. Since that time, computer memory and processing power have increased nine orders of magnitude with no end in sight. In 1950, ENIAC cost $250,000 (1950 dollars) for one thousand instructions per second of computing power. (1 MIP). Today, RISC chips are available for $10 per MIP. This is several orders of magnitude increase in efficiency.

In 1956 it was possible to store 4 MB in a space the size of a washing machine. Today, it is possible to fit 10 GB in a space smaller than your hand. Software has changed from assembly language, through higher order languages, to object oriented software that can take advantage of today's powerful computing power.

Finally, advanced in both telecommunications technology and software have made the Internet possible. It is perhaps the most far-reaching part of this

wave of change. It is creating some of the biggest changes facing businesses. It is also being adopted more rapidly than any other previous technology.

Years to Spread to 25% of the Population	
Product	Years
Electricity	46
Telephone	35
Automobile	55
Airplane	64
Radio	22
Television	26
VCR	34
Microwave Oven	30
Personal Computer	16
Cellular	13
Internet	7

Figure 6: Years for an innovation to spread to 25% of the population

Today, households accounting for two-thirds of the purchasing power of the domestic economy are connected to the Internet (IDC, 2000). By the year 2005, one billion people will be connected to the Internet (D.O.C., 1998).

The historical examples cited strongly suggest that the status quo can be dramatically altered when a technological breakthrough produces an order-of-magnitude change in efficiency. This is because something that had previously not been economically possible suddenly becomes possible, changing the business rules and the economic value equation. Today's massive changes in computing, telecommunications, and software technology

are making new business models possible. In the next section, we examine how the Internet and these technologies have changed the fundamental nature of value underlying many business models.

The Changing Nature of Value

Not only is this wave of change massive and far reaching, but it is changing some of the fundamental rules and assumptions of modern business. This section examines four dimensions of the changing nature of value:

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- Bits have become worth more than atoms

- Knowledge based products and services

- The Law of Digital Assets

- Virtual value chains

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Figure 7: Summary of the changing nature of value

The first emerging dimension is that bits have become worth more than atoms. The information revolution has changed the very nature of value in business. Tapscott (1999) argues that the main assets of companies today are intellectual, not physical. Negraponte (1996) describes how value in the age of the Internet has migrated from atoms to bits. The implication for the new management agenda is that information about an asset has become more valuable than the asset itself. Gordon Moore (2000), argues that the more information that you have, and the better and faster your analysis, the greater the probability that you will make winning investments with returns much higher than buying and selling the physical assets.

In many industries, the sources of competitive advantage have become information based instead of asset based. American Airlines used its SABRE reservation system to achieve higher levels of capacity utilization. SABRE has since been separated from American Airlines and has a market value of

$7.8 billion compared with American Airlines market value of $11 billion with all of its planes, terminals, repair facilities and other assets. Priceline.com, an Internet marketplace for airline tickets whose losses are three times its revenues, was valued at $10 billion in April, 1999, which was greater than the combined market values of United, Northwest and Continental airlines at the time. (Evans & Wurster, 2000).

Walmart exploited its EDI links with suppliers and the logistical technique of cross-docking to achieve dramatic increases in inventory returns, giving it significant competitive advantage. (Stalk, Evans, & Shulman, 1992).

Even a heavy asset business like the trucking industry that seems very distant from the information revolution has been transformed in recent years. Independent truckers and trucking companies today have dial-up Internet connections and GPS in their trucks to new sites like truckstop.com, America's load online, loadmatch.com, and hundreds of other new sites provide real-time information about the nearest load and exact load size to the current location. The result has been massive increases in efficiency.

The second dimension is the emergence of knowledge based products and services. Davis & Botkin (1994) argue that the next wave of economic growth is going to come from knowledge based businesses. Businesses that are based on providing information to customers will do better than those who do not, and businesses that know how to convert information into knowledge will be most successful. However, awareness of the value of knowledge is exceeding the ability of many businesses to extract it from the goods and services in which it I embedded. How can a business extract knowledge from a pair of socks, a home mortgage, a utility bill, or a foreign exchange credit? Those who can figure it out will derive a lot of power and profit.

A third dimension is a phenomenon that can be described as the Law of Digital Assets. Rayport & Sviolka (1995) state that digital assets unlike physical assets are not used up in their consumption. Companies that create

value with digital assets can reharvest them an infinite number of times. The variable cost of using digital assets approaches zero.

Companies with physical products can have a difficult achieving the same return on assets as companies selling products with almost no variable costs. The law of digital assets enables investments to be very highly leveraged after the breakpoint on fixed costs is reached. This makes very powerful business models possible.

For example, if a research firm invests $20,000 to create a research report and then sells it electronically to interested companies for $5,000 a copy, there is almost zero variable cost. The value can be reharvested as many times as the research firm can sell the study.

The law of digital assets becomes most powerful when knowledge can be sold to broader markets, sometimes leveraging traditional product businesses. All companies in all industries have knowledge that can be converted into digital assets that could potentially be leveraged and sold. In many businesses, the knowledge of how to apply technologies or how to more efficiently use products and services is worth more than the products and services themselves. Businesses who can figure out how to create and leverage their knowledge have potentially powerful business models.

The fourth dimension is the emergence of virtual value chains. In the mid-1980s, futurists began to describes new virtual business models that would soon become possible because of advances in information technology. Davidow & Malone (1992) described emerging business models that "appear almost edgeless, with permeable and continuously changing interfaces between customer, supplier, and customers. From inside the firm the view will be no less amorphous, with traditional offices, departments, and operating divisions constantly reforming according to need."

Earl Hall (1991) described a "change in the nature of product that will cause blurring of functions which are now understood to be manufacturing, design, delivery, finance, marketing – indeed, a new meaning of 'company'. The complex markets of the twenty-first century will demand the ability to quickly and globally deliver a high variety of customized products. These products will be differentiated not only by form and function, but also by the services provided with the product, including the ability for the customer to be involved in the design of the product. A manufacturing company will not be an isolated facility of production, but rather a node in the complex network of suppliers, customers, engineering, and other 'service' functions."

The model began to become more of a reality in the 1990s with the emergence of the Internet. Suddenly there was a low cost, global means of linking a virtual corporation with standardized software. Today, new economies of scale are now possible with virtual value chains of Internet linked companies. Small companies can now achieve low unit costs for products and services in markets dominated by big companies. (Rayport & Sviolka, 1995)

In the traditional value chain model of analyzing the value creation process, information is a supporting element. For example, managers use the information they capture on inventory, production, or logistics to help monitor or control these processes. However, this information is rarely used to create "new" value for the customer.

The new e-business economy has created a new value chain in virtual space that runs parallel to the products and services value chain. Creating value in any stage of the virtual value chain involves five activities: gathering, organizing, selecting, synthesizing, and distributing information. Just as someone takes raw material and refines it into something useful – as in the sequence of tasks involved in assembling an automobile on a production line – so a manager today collects raw information and adds value through these steps. (Rayport & Sviolka, 1995)

Change in Customer's Relationships

The Internet is significantly changing customer relationships. It presents tremendous opportunities to grow new business and to serve customers better. At the same time it threatens existing distribution channel and product structures that provide the majority of the margins today. This section examines four changing dimensions of customer relationships:

- Reach vs. Richness

- Enables personalized information

- Global vs. Local

- Auctions and on-line marketplaces

Figure 8: Summary of the changes in customer relationships

The first change is that the Internet has enabled a major change in the traditional trade-off between reach and richness. Richness refers to how much information can be customized, how interactive the information is, how reliable, how secure, and how current the information is. Reach refers to amount of information and the number of people that receive the information.

In the old economics of information, there was a trade-off between richness and the reach of information. An advertisement on television could reach a national audience, but was far less customized than a personal sales pitch. Dialogue was possible in a small group, but to reach millions the message had to be a monologue. The most reliable information was shared among a trusted group of individuals, but not a large group. The most sensitive information was kept in closed-door meetings. And salespeople would often bring the very latest information about products to customers, because printed material became outdated the day it was printed. (Evans & Wurster, 2000)

In the new economics of information, both richness and reach is possible. This has been driven by the explosion of connectivity and by the explosion of information standards. They allow advising, alerting, authenticating, bidding collaborating, comparing, informing, searching, specifying, and switching with a richness that is only limited by underlying standards and with a reach that is limited only by number of players connected and using that standard. (Evans & Wurster, 2000)

A second major change is that the Internet enables personalized information. The possibilities of this capability present exciting opportunities, but at the same time they have raised the bar of customer expectations. Customers demand an on-line experience that is quick and easy and does not waste their time. They want companies to remember who they are, not having to repeat information for service that they just gave to a company's sales department, whether off-line or interacting with people. They expect companies to make easy for them to order products and services, with everything working simply and easily the first time. They want the service to delight them. And they want the products and services customized especially for them. (Seybold, 1998)

The Web enables companies to interact with customers – even millions of them – as individuals. Companies can let customers specify and modify their profiles. Then they can custom-tailor information presentation and offers based on customer's profiles and needs. They can give customers access to their transaction histories. And companies can encourage customers to leave something of them behind on the site, giving them a sense of ownership and emotional attachment to the individual experience. (Seybold, 1998)

A third major change is that the Internet is global and cannot be restricted to geographical boundries and is causing major changes in global and international business. Today, most "brick and mortar" companies have distribution channels that are organized geographically. Although most companies claim to be global, their operations are really multi-national or at best transnational.

In their internationally acclaimed book, Managing Across Borders (1998), Christopher Bartlett and Sumantra Ghoshal describe how the world's largest companies are in flux. New pressures have transformed the global competitive game, forcing these companies to rethink their traditional worldwide strategic approaches. The new strategies, in turn, have raised questions about the adequacy of organizational structures and processes used to manage worldwide operations. (Bartlett & Ghoshal, 1998).

The Internet is one of the major sources of these "new pressures". Peter Drucker (1993) states that in the new information economy, "Knowledge knows no boundries". With knowledge becoming the key resource, there is only one economy, even though the individual organization operates in a national, regional, or local setting. (Tapscott, 1996)

On the Net, orders can be placed worldwide. Advertisements and catalogs can be seen worldwide. If goods can be represented digitally – for example, reports, information, games, pictures, software, or music – they can be shipped over the Net immediately. (Martin, 1998).

A bigger issue for global structures is global pricing. Before the Internet, multi-national companies could easily charge different prices for the same products in different markets. International trading firms could buy products in one country and ship them to another, but often required a 20% difference in price before it became economically attractive to do this. Internet sales reduce this friction significantly. Shipping charges, regulations, and local support still provide "friction" which prevent perfect competition in global markets. However, the e-commerce significantly reduces this friction, causing companies to reexamine global structures and organization to deal with this change.

A fourth major change is that the Internet has enabled companies to build new communities of loyal customers. The Internet enables customers to interact with one another in addition to the company. By providing this on-line

capability, businesses can build new and much deeper relationships with customers with increased customer loyalty and generate strong returns. (Hagel, 1997).

These electronic communities meet four different sets of customer needs. There is a need for communities of transaction, to provide an easy marketplace for people to buy and sell goods and services. There is a need for communities of interest, where participants can interact with others who share their interests and passions. There is a need for communities of fantasy where participants can exercise their imagination and indulge in their need for fantasy. And finally, there is a need for communities of relationship around certain life experiences that are often very intense and can lead to the formation of very deep personal connections. (Hagel, 1997)

All of these needs are met today by other means. Hagel argues that companies that are best able to meet all four needs with on-line communities have the highest possibility of increasing customer loyalty and generating higher rates of return.

Change in Supplier Relationships

By now, the monolithic factory was supposed to give way to the virtual factory. Today, connectivity has been achieved the problem is the establishment of standards. This is driving new changes in customer relationships.

Today's factory connectivity is primarily based on three technologies: Electronic Data Interchange (EDI), Groupware (like Lotus Notes), and Wide-Area Networks. The problem is that there is incompatibility between different standards, enabling only superficial links between companies.

A virtual factory must be able to incorporate partners at any stage of the relationship, at all levels of information technology sophistication, and provide all of the required functionality.

The emergence of new standards will make this possible. Open standards based on TCP/IP and XML will enable information to be shared across networks without incompatibility. Additionally, cheap abundant computing, abundant bandwidth, new forms of security will enable all players, large and small to fully participate. Finally accumulated expertise will enable companies to apply this expertise to create virtual factories. (Upton & McAffee, 1996)

Changes in How People Work

The Internet is also significantly changing the way that people work. Some of the emerging changing include:

- The dawn of the e-lance economy

- Developing products in Internet time

- New skills are needed

- Changes in organizational power and influence

Figure 9: Summary of the changes in how people work

The first change is the emergence of an e-lance economy. With the introduction of powerful personal computers and broad electronic networks the economic equation of how work is coordinated can change. Because information can be shared instantly and inexpensively among many people in many locations, the value of centralized decision making and expensive bureaucracies decreases. Individuals can increasingly manage themselves, coordinating their efforts through electronic links with other independent parties. The recent example of the Linux operating system and how it was

developed by hundreds of independent developers is an example. (Malone & Laubacher, 1998)

This idea is supported by Weinberger (2000) who has found that the Internet's influence is killing traditional business structures and allowing human hyperlinks to organize business. These motivated, committed hyperlinked teams keep the business closer to the customer.

One example of this is Western Digital. Customers who e-mail customer support have their questions posted on the public Web site. Often the answer comes from another user rather than the technical support group. (Weinberger, 2000).

Hagel (1998) argues that virtual communities aggregate an enormous collective expertise that could not possibly be matched by any individual expert, no matter how well trained or experienced.

The second change is that products can now be developed in Internet time. The rapid change associated with the Web and rapidly evolving Internet technologies means that product requirements can now change radically – even as a product is under development. This has created the need for flexible development processes that allows designers to sense customers needs, to test alternative technical solutions, and to integrate the acquired knowledge into a coherent product design. This flexible process continues throughout the development process. (Iansiti & MacCormack, 1997)

A third change is that as companies move to e-business, there are three scarce resources against which companies can balance three plentiful resources.

Scarce Resources	Plentiful Resources
Time	Money
Talent	Computing
Management Attention	Service Providers

The objective is to use plentiful resources in place of scarce resources whenever possible. (Moore, 2000)

At the individual level, we will see a rise in demand for "intrapreneurs", e-lancers, and individuals with the skills to coordinate themselves based on common rules in a less structured network. (Malone & Laubacher, 1998)

Communications skills will become increasingly important. Individuals will need to have the ability to communicate across networks and gain the trust of others on the network. (Weinberger, 2000)

A fourth change is the Internet is changing organizational power and influence. The power of information technologies will increase over time with electronic business. In the 1970s, IT was a staff function called data processing. In the 1980s, took on a more important staff role like finance as was called Management Information Systems. In the 1990s, the replacement of many mission critical systems led to a new title for the top IT manager – Chief Information Officer (CIO). With e-business IT moves from being a staff function to a true line function with the top title Chief Technology Officer (CTO). In the age of the Internet, IT is no longer about the business, it *is* the business. (Moore, 2000)

Summary

This section establishes that the Internet is a massive wave of change in the business environment that is impacting all companies.

Rapid changes in information technologies have changed the efficiency of information processing and communications by two orders of magnitude. The Internet has created a whole new space for creating value that is information based. This information is often worth more than the physical products themselves. The digital assets produced are highly leveragable and create business models with very high rates of return. This has caused a shift in the nature of value.

The new business rules are changing company's relationships with their customers, their suppliers and how people work. This is causing rapid change in the business models of most existing "brick and mortar" businesses.

The nest section examines corporate inertia and how this inhibits an organization's ability to respond quickly to disruptive change.

1.2 The Intertia of Corporate Cultures

Not only do most businesses today need to find ways to adapt to the massive wave of change of the internet, but many are large organizations with strong corporate cultures that are very difficult to change. These cultures have tremendous inertia. The inertia initially buffers them from the full effects of the wave of change, like a large aircraft handles air turbulance compared with a small aircraft. But this same inertia is why it is so difficult to change the direction quickly. This inertia which must be considered when developing an adaptive control system that enables organizations to effectively respond to disruptive change.
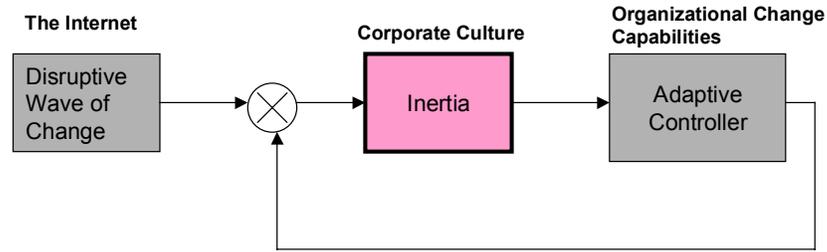
Figure 10: Block of organizational change dynamics highlighting corporate inertia

This section examines the two strongest reasons why corporate inertia inhibits organizational change: Process limits and Organizational culture limits.

Process limits for handling discontinuous technology

Sustaining innovations are nearly always developed and introduced by established industry leaders. These are innovations that result increases the performance of products for mainstream customers. But those same companies never introduce or cope well with disruptive innovations. These are innovations that initially have lower performance for mainstream customers, but are typically cheaper, smaller, easier to use and initially serve a niche of customers with unique needs.(Christensen, 2000)

In Section 2 we have established that rapid advances in information technology and the Internet represent the most disruptive change since the Industrial Revolution. These changes are impacting the very nature of value, relationships with customers, suppliers, and how work is done. This is a very disruptive wave of change.

Recent history has shown that existing market leaders tend to miss disruptive change. IBM dominated the mainframe market, but missed the emergence of minicomputers. Digital dominated the minicomputer business with the VAX, but missed the emergence of the PC business. Goodyear, Xerox, and Bucryus-

Erie- all leading companies – all failed to stay at the top of their industries when technologies or markets changed rapidly. (Bower & Christensen, 1995)

The table below shows a list of industries where leading firms have rapidly lost market position.

Industries in which Leading Firms Rapidly Lost Market Position	
Watches	Food Processors
Automobiles	Microwave Ovens
Cameras	Athletic Equipment
Stereo Equipment	Semiconductors
Medical Equipment	Industrial robots
Color Television	Machine tools
Hand Tools	Optical equipment
Radial Tires	Consulting services
Electric Motors	Computer hardware
Photocopiers	Textiles
Ship Building	Airlines
Software	Financial services

Figure 11: Industries in which leading firms rapidly lost market position (Source: Tushman & O'Reilly, 1997)

The second table shows the product class leaders who lost their dominant position.

Product Class Leaders Who Fell Victim to their Success	
ICI (chemicals)	SSIH (watches)
IBM (personal computers)	Oticon (hearing aids)
Kodak (photography)	Bank of America (fin. services)
Sears (retailing)	Goodyear (tires)
General Motors (automobiles)	Poloroid (photography)
Ampex (video recorders)	Bausch & Lomb (vision)
Winchester (disk drives)	Smith-Corona (typewriters)
U.S. Steel (steel)	Fuji Xerox (typewriters)
Syntex (pharmaceuticals)	Zenith (TVs)
Philips (electronics)	EMI (CT scanners)
Volkswagen (automobiles)	Harley-Davidson (motorcycles)

Figure 12: Product class leaders who fell victim to their success (Source: Tushman & O'Reilly, 1997)

In each of these cases product classes were being transformed and market opportunities expanding. The companies had the technology to succeed, but were unable to lead innovation and change.

There are several factors that contribute to this inability to adopt and change with disruptive technologies:

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- Performance curves favor disruptive technologies

- Company processes are not properly assessed

- Initial market size is unattractive

- New markets can't be analyzed

- New technologies have lower margins

- New technologies don't appeal to existing customers

- Theory of resource dependence

</div>

Figure 13: Factors inhibiting the adoption of new technologies by market leaders

One reason that companies miss disruptive technologies is that these
technologies often emerge as smaller and lower cost, but also at lower
performance than mainstream technologies. Over time, both mainstream
technologies and disruptive technologies improve their performance. At a
critical point, the disruptive technology has "enough" performance to satisfy
mainstream markets, while the mainstream technologies have more
performance than is needed at a higher price. At this point, mainstream
markets change to the disruptive technology. (Christensen, 1997) In fact, the
cycle is predictable. Disruptive technologies are first developed within
established firms. Marketing personnel seek reaction from their customers and
do not get a positive response. Established firms step up the pace of existing
technologies. New companies are formed based on the disruptive

technologies. The new entrants move upmarket. And finally, established firms jump on the bandwagon to defend their customer base.

A second reason is that disruptive innovations occur so intermittently that no company has a routine process for handling them. Company processes fail when they try to apply a process efficient for one product to another (e.g. applying FDA drug processes to medical devices). Companies don't have the processes that are optimized for the new product and have too much inertia to identify the need for a new process and to change the company in time. (Christensen, 2000)

Unattractive initial market size is a third reason. As companies become large, they lose the ability to enter small, emerging markets. (E.g. a $40 million company must buy a $10 million company every year to grow 25%. A $40 billion company must buy a $10 billion company each year. Small emerging market opportunities don't make enough impact) (Christensen, 2000)

Difficulty in analyzing new markets is a fourth reason. In existing markets, companies have well established processes to research and plan for new markets. However, when disruptive technologies emerge, the same analysis techniques cannot be applied and when they are, they often lead to incorrect decisions. (Christensen, 1997)

Disruptive products are also often smaller and cheaper. They promise lower margins and not greater profits which makes it unattractive to the existing business. (Christensen, 1997)

Another reason is that new technologies don't appeal to existing customers. A leading firm's most profitable customers generally don't want, and indeed initially can't use, products based on disruptive technologies. The least profitable customers in a market initially embrace disruptive technologies. (Christensen, 1997)

Finally, adoption of new technologies is sometimes restricted by a phenomenon known as resource dependence. The theory of resource dependence states that while managers may think they control the flow of resources in their firms, in the long run, customers and investors do. The highest performing companies have developed systems that have been optimized for shutting off any investment for products that customers do not want. As a result, these companies never are able to invest enough in new technologies until their customers want them. By then it is too late and they are overtaken by new competitors. (Pfeffer & Slancik, 1978)

Implications

The impact of all of these factors, is the incumbents are seriously at risk when there is a disruptive technological change and they are likely to be displaced by new upstarts. Examining the change in the market share rankings of companies in the semiconductor industry since 1955 illustrates the affect.

Semiconductor Industry, 1955-1995

1955 Vacuum Tubes	1955 Transistor	1965 Semiconductors	1975 Integrated Circuits	1982 VLSI	1995 Submicrons
RCA	Hughes	TI	TI	Motorola	Intel
Sylvania	Transitron	Fairchild	Fairchild	TI	NEC
General	Philco	Motorola	National	NEC	Toshiba
Raytheon	Sylvania	GI	Intel	Hitachi	Hitachi
Westinghouse	Texas	GE	Motorola	National	Motorola
Amperex	GE	RCA	Rockwell	Toshiba	Samsung
National Video	RCA	Sprague	GI	Intel	TI
Rawland	Westinghouse	Philco	RCA	Philips	Fujitsu
Eimac	Motorola	Transitron	Philips	Fujitsu	Mitsubishi
Lansdale	Clevite	Raytheon	AMD	Fairchild	Philips

Figure 14: Changes in semiconductor industry after disruptive technology introduction (Source: Foster, 1996)

Foster (1996) describes the problem. "Of the 10 leaders in vacuum tubes in 1955, only two were left in 1975. There were three variants of error in these case histories. First is the decision not to invest in the new technology. The second is to invest, but to pick the wrong technology. The third variant is

cultural. Companies failed because of their inability to play two games at once: To be both defenders of what quickly became old technologies and effective attackers with new technologies."

Organizational Culture Limits on Rapid Change

Companies develop processes in their early-mid stages for successful problem-solving and decision making. Eventually this becomes "culture" enabling employees to act autonomously but causes them to act consistently. As long as the organization continues to face the same sorts of problems these processes and values were designed to address, managing the organization can be straightforward. However, these values and processes also define what an organization can not do. When these processes and values become embedded in culture, change can be extraordinarily difficult. (Christensen, 2000). This is the challenge for most established businesses today as they try to adapt the discontinuous change of the Internet economy.

There are at least three major reasons why strong corporate cultures limit a company's ability to adapt to disruptive change.

- Incorrect "rules of thumb" become part of corporate values

- The inertia of corporate culture and politics

- Departments are not incented to introduce innovation into mainstream markets

Figure 15: Corporate culture factors limiting disruptive change

One negative side effect of strong cultures is that incorrect "rules of thumb" become part of corporate values. Many times companies establish internal rules such as "do not accept margins below 40% " - that keep them from succeeding in lower margin opportunities. (Christensen, 2000). The PC business, for example, was a much lower margin business than the

minicomputer business making it seem unattractive when applying the rules of the minicomputer business.

A second drawback is that it is extremely difficult to change corporate cultures because of their tremendous inertia. When Jack Welch took over GE, his ideas were brushed off initially by his senior managers who had heard many new CEO speeches, had seen many CEOs come and go, and somehow nothing ever changed. Top down change is often misunderstood or someone in each layer finds a way to resist the change. (Tichy & Sherman, 1993)

The culture can be so strong that it extinguishes all possibilities of change. Power can be subtly coercive when the organization exerts influence on sense making and meaning interpretation. Values and preferences are shaped so that organizational members cannot visualize any better alternative than the status quo, and learning and exploration of alternatives are bounded. The organization maintains order party through emotional underpinnings such as fear, guilt, or embarrassment. (Lukes, 1974)

Organizational politics can play a role in preventing change. A failure to engage in play-acting skills and to display representative emotions is read as an act of insubordination or a sign of incompetence in strong cultures (Flam, 1993). In front of powerful persons, individuals are likely to restrict the range of displayed emotions to mainly positive expressions. (Morris & Feldman, 1996). Negative displays of emotion towards change could be interpreted as cynicism or detachment (Van Maanen & Kunda, 1989).

Another third problem with disruptive change is the inherent values of existing functional departments within a company. Engineering is interested in doing "cool engineering" in the innovator stage of the product life cycle, but is not so interested in the difficult work of creating the whole product solutions needed to get the mainstream to adopt new products. Operations is most interested in mature businesses where they excel at running a tight ship. Sales is most interested in the high growth stages that follows mainstream adoption

of a product, but sells very little when trying to "Cross the Chasm" and move an innovative product into the mainstream. Finance is most interested in the predictable earnings of a mature business and the "numbers aren't there" when trying to move a new technology into the mainstream. As a result, the subcultures within functional groups within a company resist the change and investment needed to establish a mainstream market for new products. (Moore, 2000)

Summary

This section established that companies are slow to respond to change because of organizational inertia. The literature showed that most companies miss disruptive technological change because of process limitations. It also showed that strong corporate cultures can provide powerful resistance to new ideas that change fundamental assumptions and beliefs.

Section 2 is review of the academic literature on organizational change. It proposes the idea of an adaptive control system to handle disruptive change for a system with lots of inertia. A review of current academic literature on organizational change is used to identify the most important dimensions of organizational change capability.

2. Literature Review

This section is the basis of this thesis – that an adaptive control system can be developed to handle discontinuous change and overcome organizational inertia by strengthening organizational change capabilities in nine dimensions.

This section begins by defining discontinuous or disruptive change and receptivity. It then identifies a set of nine dimensions from the academic literature that can significantly increase the probability of a successful organizational change when faced with a disruptive change in the environment and strong organizational inertia.

The factors identified here become the basis for an instrument to measure a company's ability to handle disruptive organizational change as they prepare for e-business.

2.1 Definitions

Discontinuous change

Discontinuous or disruptive change is significantly different from continuous change. Kuhn (1970) makes the link between the technological/strategic definitions and the organizational change definition by stating that the discontinuous change in the philosophy of one person or an organization is analogous to a "paradigm shift" in scientific revolutions. Reger, Gustafson, DeMarie, & Mullane (1994) define disruptive or radical change as a discontinuous change in the basic philosophy of one person at the individual level or of the shared identity of members of the organization at the organizational level. Huy (1999) defines discontinuous change in the perspective of how difficult it is to radically change organizations because it alters core perspectives and values and often necessitates wide mobilization throughout an organization. This requires a great deal of emotional energy.

Receptivity

Receptivity denotes a person's willingness to accept change. At the organizational level, receptivity refers to organizational members' willingness to consider individually and collectively proposed changes and to recognize the legitimacy of such proposals. Receptivity to change can be characterized by varying degrees of willingness to accept the proposed change from resigned passive acceptance to enthusiastic endorsement. Resistance to change ranges from moral outrage (leading to sabotage) or cynicism or passive resistance. (Huy, 1999)

Judson (1991) finds that change has a spectrum of reaction to change from enthusiastic acceptance to active resistance. In between are passive resistance and indifference. Coetsee (1999) uses a model where acceptance of changes is in four levels. The first stage is characterized by a positive attitude toward the change. "Support" means saying that you are "willing to throw your weight behind it", implying one is in favor of change and will vote for it. But one doesn't really do anything to actively promote the cause. Prerequisites for gaining support of people are most probably information, some knowledge, and creating the opportunity for them to obtain one or another form of reward/recognition for being supportive of the change. Lawler (1992) describes involvement, meaning "doing", which is a big step from a positive attitude toward the change.

Lazarus (1993) describes a two-step evaluation process that individuals and organizations go through before deciding how receptive they will be to a change.

2. They evaluate the significance of a new event to their own well being. If change recipients evaluate the potential consequence as harmful, they will be non-receptive. If they construe it as an opportunity or a challenge, they will be better attuned.

3. Individuals evaluate their own resources for dealing with the problem. If they believe they have the resources, they will respond more actively. They are only motivated to act if they perceive they can bridge the gap between goals and performance.

2.2 Organizational Change Success Factors

"The brutal fact is that 70% of all organizational change initiatives fail" (Beer and Nohria, 2000). Change with a high probability of success begins with a management analysis of whether change is within organizational capabilities. Systematic change involves a set of tools and processes to improve performance (Sink and Morris, 1995).

Most managers consider resources. Assessment of organizational values and process are even more important (Christensen, 2000). Systematic change aligns customers, products/services, processes/tools, structure, and skill mix (Kotnour, 1999). Managers who consider resources only and do not consider the process changes needed or the culture changes needed, often fail. Some change requires process and cultural changes that are beyond the capability of the organization.

If managers are able to manage their current organizational change capabilities, they are more likely to make good decisions about whether a change is likely to succeed in the short term. They can also know better what they need to do to strengthen their organizational change capabilities so their organizations can be more adaptable in the future.

Using the electromechanical analogy, the dynamics of the situation can be express in a control systems block diagram as follows:
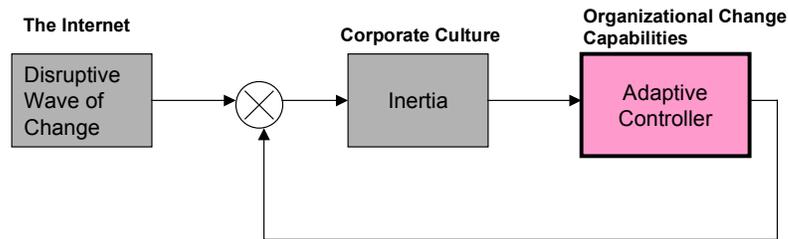
Figure 16: Block diagram of organizational change with adaptive control system

A disruptive wave of change impacts a corporate culture. The culture has its own dynamic properties and inertia that enable it to respond to most changes, but does not respond well to disruptive change. An adaptive control system is introduced to the system in the form of strong organizational change capabilities, which enables the organization to adapt to the change.

This section focuses on defining this adaptive controller. It identifies nine key dimensions of organizational capability that can increase the probability of successful discontinuous organizational change.

This thesis proposes that:

> P: A company that strengthens its organizational change capabilities
> in nine key organizational change dimensions will be able to make
> the disruptive organizational changes needed to become an e-
> business more successfully than organizations that are weak in
> these nine dimensions of organizational change capability.

Current academic literature is used as the primary source of these dimensions. A proposition is proposed around each of the nine dimensions, which will be tested and then be measured in Section 4. These dimensions are summarized in the table below:

Dimensions
LEADERSHIP
• Create an emotional, unifying vision
• Use symbols, ceremonies, and stories
• Enable the free flow of emotions
• Provide a transition from the past
• Create a playful environment
ORGANIZATIONAL
• Create a change infrastructure
• Get the active support of first line supervisors
• Assign project managers to manage the change
• Provide training
• Reward system

Figure 17: Dimensions of organizational change capability

The literature shows that first five dimensions of organizational change capability are actions that the business unit manager should take directly to lead the change. The second four dimensions of organizational change capabilities involve organization for successful disruptive change.

1. Creating an Emotional Unifying Vision

The first dimension of successful disruptive organizational change is the business unit manager's ability to create an emotional, unifying vision. There is a very broad base of current literature to support the importance of this dimension.

A disruptive organizational change is a very big challenge for senior leadership. The success of a disruptive organizational change, according to

Amason (1996) demands adherence to the spirit of the change goals, rather than just to the letter. This is necessary to overcome unforeseen complications and necessitates deep understanding of the change rationale and commitment that minimizes inconsistencies in operation. Dutton & Duncan (1987) find further that mobilization requires organizational commitment and effort devoted to change actions, which is contingent on adequate receptivity to the proposed change.

This process can be quite challenging. According to Argyris (1993) double loop learning occurs when there is a change in the underlying assumptions, which will then lead to change in behaviors, and this activates strong emotions. Organizational learning and change, therefore can be facilitated by the enactment of specific emotional dynamics Huy (1999) finds that radical change often involves major uncertainty. The consequences of different alternatives are difficult to evaluate fully. During such periods, too much analysis may breed increasing doubts and paralysis. Warm emotionality has to supercede cold irrationality to enable coherent collective action. Brunnson (1982) says the main problem in implementing radical or massive change is not in choosing cognitively, but in taking collective action. This type of action calls for "irrationality". Strong motivations and commitments promote strong efforts to complete the action in spite of great difficulties. Kantner (1983) says an important change requires a leap of faith into the unfamiliar.). The higher the level of emotional experiencing, the higher the level of receptivity to a proposed change will be (Huy, 1999). And Barnard (1968) finds an emotionally unifying purpose serves to minimize large divergences in groups.

Pascale (1984) having people committed to a vision is more important than a well thought out strategy. Larwood, Falbe, Kriger, & Miesing (1995) state that wide acceptance of the proposed vision accelerates the change process. And Miller (1993) finds that concentration and passionate dedication are necessary to achieve distinctive competence and success.

Based on this research, we can expect the following relationship:

P₁: Business units whose leader creates a unifying, emotional vision to become an e-business are more likely to succeed in changing their organizations than business unit managers who do not do this.

This is further supported by other researchers. Conger (1989) found that during periods of turmoil, people crave a charismatic leader capable of fulfilling their emotional need for psychological safety – they crave assurance of a safe path to the future. The followers anxieties are projected onto the leader in exchange for hope (Kets de Vries, 1990). These leaders express themselves in an intensely emotional manner to capture their audience (Goleman, 1995).

Hope refers to the belief that one has both the will and the way to accomplish one's goals. When people believe that their actions will lead to positive results, they will be more likely to initiate difficult or uncertain tasks. Optimism promotes persistence. (Staw et al, 1994)

Starbuck, Greve, and Heedberg (1978) find that the most important work for top managers is not "strategy making", its "managing ideology". Managers can shape an ideological setting that encourages enthusiasm, nurtures courage, reveals opportunities, and thus, brings new hope and life to their organization.

2. Use of Symbols, Ceremonies, and Language
Executives do not make change by the operational activities they do themselves. They use symbols, ceremonies, and images to implement culture. (Peters, 1978). Their symbolic activities are used to signal cultural values to large numbers of employees. (Trice & Beyer, 1987). These are used because culture is hard to change by conventional means. (Dandridge, Mitroff & Joyce, 1980). "Managerial work can be viewed as managing myth, symbols, and labels…because managers traffic so often in images, the appropriate role for the manager may be evangelist rather than the accountant." (Weick, 1979)

This leads a second proposition on this dimension of organizational change:

P$_2$: Business unit leader who use symbols, ceremonies, stories, and slogans to implement their vision of an organizational change to e-business are more likely to succeed that leaders who do not use these tools.

Rites and ceremonies are the elaborate, planned activities that make up a special event and are often conducted for the benefit of the audience. Rites of passage facilitate the transition of employees into new social roles. Rites of enhancement create stronger social identities and increase the status of employees. Rites of renewal reflect training and development activities that improve organizational functioning. Rites of integration create common bonds and good feelings among employees and increase commitment to the organization. (Daft, 1988)

Stories are narratives based on true events that are frequently shared among organizational employees and told to new employees to inform them about an organization. Some stories are considered legends because they are embellished with fictional details. (Daft, 1988). Other stories are considered myths because although they are consistent with the values and beliefs of an organization, they are not supported by facts. (Trice & Beyer, 1987).

Symbols can encompass ceremonies and stories. Symbols can also be physical. If the physical symbols are consistent with the ceremonies, stories, and values, they can be a powerful facilitator of culture. (Daft, 1988).

Slogans are effective ways of communicating culture because they can be used in a variety of public statements by chief executives. Slogans enable the chief executive's philosophy to be disseminated widely. "IBM means service", "The 11th commandment is never kill a new product idea" (3M), and "Everybody at Northrup is in marketing" are slogans used in organizations. Each symbolizes what the company stands for both employees and for people outside the organization. (Daft, 1988)

3. Enabling the free flow of emotions

The content of emotions (negative versus positive) is not as important as how leaders deal with them. Leaders who deny emotionality in the workplace will also block the emergence of new ideas from the base of the organization at a time when creativity and contextual knowledge are most needed to realize radical change. Organizational members should be encouraged to express their full range of emotions, without fear of reprisal (Duck, 1993). The higher the level of encouragement, the higher the level of mobilization to a proposed change will be (Huy, 1999). The higher the level of freedom for organization members to display authentic emotions during radical change, the higher the level of learning will be (Huy, 1999).

This leads to the following proposition:

> P_3: Managers who allow the free flow of emotions during a disruptive organizational change are more likely to be successful than those who restrict the free flow of emotions.

Restricting negative emotional display is correlated with poor performance. This type of restriction works with slow evolutionary change, but with radical change it restricts collective learning that is needed for success. (Jehn, 1997)

Controlling the variety of emotions expressed in the organization during discontinuous transition periods may well lead to emotional acting, risk aversion, cynicism, and covert resistance to the proposed change. Cynical members might withhold the tacit knowledge necessary for organizational learning. The more covert the resistance, the more chaotic the change process will be, as resistors become indistinguishable from friends or the loyal opposition. (Huy, 1999)

4. Providing a Transition from the Past

It is unlikely that one can initiate cultural change by dismissing a basic constituent assumption as wrong. A new synthesis has to be found that will retain both the old and the new (Schein, 1992). The more the proposed change

can be framed and accepted by the recipients as an addition or an expansion of existing values, the more continuity is perceived to exist between the past and the future (Huy, 1999). To the extent that radical change does not require a complete destruction of the past, the stronger the level of the identification with the organization and the longer the organizational members tenure, the higher their level of learning will be (Huy, 1999).

This leads to the following proposition:

> P_4: Managers who provide a transition from the past while driving their companies toward becoming an e-business are more likely to be successful than managers who do not.

Furthermore, the popular literature shows that people and organizations must be given time to mourn the past. (Huy, 1999) found that the portion of valued elements in the past that must be "deleted" should be mourned to facilitate transition. And mourning of past abandoned values has to be organized (Albert, 1984). Also, the higher the level of identification with the organization, the lower the level of receptivity will be to any proposed change perceived to threaten the organization's identity. Thus, more resources will be required to increase receptivity. (Huy, 1999)

5. Creating a Playful Environment

The higher the level of playfulness, the higher the likelihood of learning will be (Huy, 1999). At the organizational level, the dynamic of playfulness refers to the ability of an organization to create a context that encourages experimentation and that tolerates mistakes during radical change. A relatively safe and protective work environment has to be created to allow experimentation and to test new organization identities without premature lock-in (Ashforth, 1998). This leads to the following proposition:

> P_5 Business unit leaders who create a playful environment are more likely to be successful in implementing disruptive changes than leaders who do not.

To counter a tendency towards fear and paralysis, humor can be used to facilitate organizational learning. Laughter represents a form of emotional release that comes from the juxtaposition of paradoxes. Playfulness allows safe experimentation and, like jokes, institutionalizes disorder within order, expression of taboo issues within a legitimate form, and surfacing of the repressed without extreme discomfort. (Weick and Westley 1996)

From a neurophysiological perspective, a feeling of elation permits the rapid generation of multiple images so that the associative process is richer. A happy person indulges more often in creative and exploratory behavior. In contrast, sadness slows image evocation (Damasio, 1994)

6. Change Infrastructure

There is a need for an infrastructure to drive the change (Sink and Morris, 1995). (Huy, 1999) argues that the ability to mobilize hinges on the availability of adequate resources (finances, time, and human resources), support structures, and systems, but most important the necessary commitment and skill sets to cooperate during the change process.

The infrastructure must also have involvement down the hierarchy ensures multiple, diverse perspectives are integrated into the change process. Horizontal involvement across functions helps ensure the change process is conducted from a holistic perspective and not an individual sub-organization perspective. (Kotnour, 1999)

> P_6: Business unit leaders who invest in a change infrastructure that has involvement throughout the hierarchy are more likely to be successful in implementing disruptive e-business changes than leaders who do not.

Simonin (1997) finds that mobilization also requires collaborative know-how – the organization-wide capacity to implement change that cuts across departments, individuals and time. Active collaboration among team members that goes beyond simple agreement or compliance.

Christensen (2000) however, argues that some change infrastructures require a separate organization. Creating new capabilities internally in heavyweight independent teams. Sometimes capabilities can be created through a spin-out organization (only when the new opportunity requires lower margins and/or is a smaller niche) Capabilities can also be created through acquisitions.

7. The Role of First Line Supervisors

The psychological proximity of first line supervisors highlights their influence as the most salient representatives of management actions and policies (Kozlowski & Doherty, 1989). Support of first line supervisors is crucial to effecting change at the level of employees (Krein, 1984). For a successful change, an organization needs to disperse involvement and leadership throughout the organization (Dotlich and Noel, 1998).

First line supervisors, however, can sometimes be the strongest opponents to change. When they don't buy into a change or do not actively support it, the change will often fail despite having all of the other change strategies in place.

Stewart and Maniz (1997) recommend a three-step approach to overcome supervisor resistance. First, create dissatisfaction with current supervisory behavior. Next, help supervisors see a gap between their current behavior and optimal behavior. Finally, provide a psychologically safe environment to facilitate behavioral change.

The proposition is:

> P_7: Senior managers who take a systematic approach to gain the support of first line supervisors to implement a disruptive organizational change are more likely to be successful than managers who do not.

Aldefer (1977) suggests addressing the concerns of supervisors through an organizational development intervention consisting of a communications group. By providing a legitimate and overt process to address supervisor concerns, unfreezing of supervisory behavior can be facilitated.

8. Project Management

Major change must be carefully managed to ensure commitment and coordination from individuals and groups involved in the process (Nadler & Tushman, 1990). Project management has been defined as a critical success factor to ensure successful change. It helps ensure the transformation's goals and objectives are being met in a timely fashion (Grover, 1999).

The proposition is:

> P_8: Senior managers assign project managers to systematically manage the change are more likely to be successful than managers who do not assign project managers.

Planning the transformation involves defining transformation goals and objectives, stakeholders and risks, integrating tasks, responsibilities, and timelines, and establishing an infrastructure. (Kaufman, 1992)

9. Training

The majority of organizations use some sort of training as part of their change efforts (Hackman & Wageman, 1995). Many organizations make the assumption that change occurs as a consequence of training and education. They assume that training and education can change individual attitudes and behaviors and can also be a stimulus for changes in organizational practices. Coyle-Shapiro (1999) argues that this is a bad assumption and that in most cases training and education alone are not powerful enough to elicit the desired change.

The proposition is:

> P_9 Organizations that provide training as part of a disruptive organizational change towards e-business are more likely to be successful than those that do not.

Learning does provide the real-time knowledge needed by the organization to adjust to the changing environment. (Kotnour, 1999) Change also involves

educating and training the workforce in successful transformations (Sink and Morris, 1995)

But training goes further than this. Some training tasks include developing leadership (Kotter, 1996) Other change learning involves the organization's own experience (Argyris and Schon, 1978)

Literature support for dimensions identified by experts

After these nine dimensions were identified in the initial literature search, an expert panel identified three additional dimensions. The academic literature supporting these and their corresponding propositions are described below.

10. Reward system
One key to implement organizational change is to use the pay system. Pay system change can have a major impact during a discontinuous change for two reasons. Rewards effect motivation when they are effectively tied to performance and significant amounts of reward are given. The second impact is in the labor market which impacts the company's ability to attract and retain the "right" employees. However, changing the reward system only is rarely adequate. All key elements of organizational effectiveness including the reward system must be changed simultaneously. (Lawler, 2000).

Zingheim and Schuster (2000), find that pay and rewards accelerate the communication of a new business strategy to the workforce. It helps extend their line of site and translates a more distant strategy into terms people can understand and make real. Nicholas Aquino (1994) also finds that in implementing organizational change managers must reward new employees undergoing change.

This leads to the following proposition:

P_{10} Organizations that align the reward system with the desired change throughout the organization are more likely to successfully implement the change vs. those companies that do not do this.

Section 3 discusses the methodology to develop and instrument to measure these nine dimensions of organizational change capability.

3. Methodology

The capability of an organization to successfully implement discontinuous change is an important issue as managers prepare their organizations for e-business. This thesis proposes an instrument to test the strength of organizational capabilities to implement organizational change.

The instrument was created using the following methodology.

Steps:

1. Determine instrument dimensions based on literature search

2. Determine instrument dimensions based on expert panel

3. Find literature support for new dimensions identified

4. Generate sample questions

5. Test the instrument with an expert panel

6. Modify the instrument

Step 1: Determine instrument dimensions based on literature search

The dimensions of the instrument were determined through the academic literature reviewed in Section 3. The most important organizational capabilities influencing a successful discontinuous organizational change process were identified. The results are summarized in Section 4: Results.

Step 2: Determine instrument dimensions based on expert panel

An expert panel gave their opinion on the dimensions of organizational change capabilities. Each expert was asked the following question by telephone:

"What dimensions of organizational change capability are most likely to increase the probability that a company will make a successful disruptive organizational change"

The experts were given the context of "brick and mortar" companies who would like to make a disruptive organizational change to become e-businesses.

None of the dimensions or results of the literature search was shared with the expert panel. This was an attempt to get an unbiased opinion on the dimensions.

The results are summarized in the Section 4: Results. Details on the responses are listed in Appendix A.

Step 3: Find literature support for new dimensions identified

The expert panel identified several new dimensions of organizational change capability. To support these dimensions, additional academic literature was reviewed to attempt to find support for these dimensions in previous research.

Only one of the three major new dimensions that the expert panel identified could be found in an initial search of the academic literature. This one dimension was added to the literature review and an additional proposition was added.

The expert panel identified two other key dimensions that could not be found in a second literature search. These dimensions are discussed in the results section and two new propositions are added there.

Step 4: Generate sample questions

A series of sample questions to measure these dimensions was created. These questions were based on the nine dimensions of the literature search and the additional dimensions from the expert panel. The sample questionnaire is shown in Appendix B.

Construct Validity

Construct validity examines the degree to which a scale measures which it intends to measure. Different researchers have identified differing components of validity. Garver (1999) claims that construct validity is comprised of numerous sub-dimensions, all of which must be satisfied to achieve construct validity. These dimensions of construct validity include: content validity, unidimensionality, reliability, convergent validity, discriminant validity, and predictive validity.

Sethi (1993) argues that the following validity components are necessary: internal consistency of operationalization (reliability and unidimensionality), convergent validity, discriminant validity, and predictive validity.

However, Bagozzi (1980) is used in this paper because of the detailed description of five components for validity shown in the table below:

Component of Construct Validity

| Theoretical Meaningfulness of Concepts |
| Observational Meaningfulness of Concepts |
| Internal Consistency of Operationalizations |
| Convergent Validity |
| Discriminant Validity |
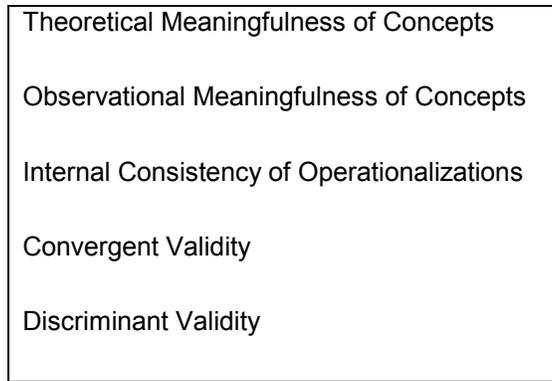
Figure 18: Components of construct validty

Note the nomological validity is not used to validate this instrument because we are not trying to predict a specific action on the part of those surveyed based on their attitudes. Instead, we are trying to predict what results a company will achieve based on actions by its management.

Theoretical Meaningfulness of Concepts

The theoretical meaningfulness of a concept refers to the nature and internal consistency of the language used to represent the concept (Bagozzi, 1980). He quotes Lachmeyer (1971) who outlines four linquistic problems when we try to convert a concept into words: vague, ambiguous, opacity, and contradiction. An expert panel reviewed the wording used in the questionnaire in Appendix A to check for these four dimensions.

Internal Consistency of Operationalizations

According to Bagozzi (1980), the observational meaningfulness of concepts refers to the relationship between theoretical variables (which are unobservable) and their operationalizations (which are observable). The difficulty is that theoretical concepts contain only logical terms and unobservable constructs and must be tied, directly or indirectly, to observable concepts if one hopes to develop theoretical laws and propositions with explanatory content.

The survey used to measure the theoretical propositions mostly uses a Likert scale to indicate attitudes. These observations are equated with the concept. The partial interpretation model (Bagozzi, 1980) not only equates observations with concepts, but also acknowledges that the connection is dependent on the context or manifestation of particular test conditions. In the case of this survey, initial qualification questions are used that do not use a Likert scale. The questions set a context of a change to e-business which according to the partial interpretation school of thought, should be taken into consideration when equating the results with the propositions.

Convergent Validity

Convergent validity refers to the degree to which two or more attempts to measure the same concept through maximally different methods are in agreement (Sethi, 1993). To achieve this, the question "Compared with most companies that I know about, my company has made a very rapid transition from being a traditional "brick and mortar" company to an e-business" was asked. High ratings on the individual questions measuring the propositions must converge with this question measuring the overall change achieved by the company.

The second question "My company has implemented the following:" also helps achieve convergence by directing the respondents to give specific measures of change in the direction of e-business. This must converge with the values measured in the propositions.

Discriminant Validity

Discriminant validity is the extent to which the measures included in the scale to measure different constructs are not highly related to each other (Bacharach, 1989; Loiacono, 2000). A widely adopted procedure for scrutinizing discriminant validity is the multi-trait / multi-method matrix (Campbell & Fiske, 1959). In the questionaire, at least two questions/methods are used to measure each proposition to give the possibility of achieving discriminant validity.

Step 5: Test the instrument with an expert panel

The expert panel evaluated the sample questions generated in the first draft of the instrument. Each expert was sent a copy of the questionnaire by e-mail. Experts were asked their opinion of whether the questions are likely to accurately measure each dimension.

Applying part of the research on construct validity, the expert were asked whether the questions were vague, ambiguous, difficult to understand, or had contradictions.

The results of this feedback is discussed in Section 4: Results.

Step 6: Modify the instrument

Based on the feedback from the expert panel, the instrument was modified. The resulting instrument can be found in Appendix C. The results are discussed in Section 4.

4. Results

The results of each six step outlined in the Methodology are summarized in this section.

Results of Step 1:   Literature Search Dimensions

The literature search resulted in an identification of nine dimensions of organizational change capability. These are summarized in the table below:

Dimension	Description of Concept	Major Literature References
Emotional Unifying Vision	Top management communicates an emotional unifying vision to become an e-business.	Amason, 1996 Argyris, 1993 Barnard, 1968 Brunnson, 1982 Conger, 1989 Dutton & Duncan, 1987 Goleman, 1995 Huy, 1999 Kantner, 1983 Kets De Vries, 1990 Larwood et al, 1995 Miller, 1993 Pascale, 1984 Starbuck et al, 1978 Staw et al, 1994
Use of Symbols	Top management uses symbols to communicate the importance of e-business	Daft, 1988 Dandridge et al, 1980 Peters, 1978 Trice & Beyer, 1987 Weick, 1979
Enabling free flow of emotions	Top management enables employees to freely express their emotions and ideas as they go through the discontinuous change	Duck, 1993 Huy, 1999 Jehn, 1997
Providing transition to past	Top management provides a transition from the old ways to the new ways of e-business.	Albert, 1984 Huy, 1999 Schein, 1992
Creating a playful environment	Top management creates a fun atmosphere that enables emotional release and the ability to experiment with new ideas.	Ashforth, 1998 Damasio, 1994 Huy, 1999 Weick & Westley, 1996

Dimension	Description of Concept	Major Literature References
Change Infrastructure	The company invests in creating an organization without line responsibilities to implement the change to become an e-business.	Christensen, 2000 Huy, 1999 Simonin, 1997 Kotnour, 1999
First Line Supervisors	The company focuses on gaining the commitment of first line supervisors to e-business	Aldefer, 1977 Dotlich & Noel, 1998 Kozlowski & Doherty, 1989 Krein, 1984 Stewart & Maniz, 1997
Project Management	The company assigns a project manager to the e-business transition and organizes the changes like a project with tasks, responsibilities, and deadlines.	Grover, 1999 Kaufman, 1992 Nadler & Tushman, 1990
Training	The company invests in training to enable employees to successfully do their new jobs and new tasks.	Argyris & Schon, 1978 Coyle-Shapiro, 1999 Hackman & Wageman, 1995 Kotnour, 1999 Kotter, 1996 Sink & Morris, 1995

Figure 19: Nine dimensions of organizational change capabilities [Structure adapted from (Loiacono, 2000)]

Results of Step 2:   Expert Panel Dimensions

The expert panel gave the following information when asked their opinion on what organizational change capabilities are most likely to increase the probability of a successful disruptive organizational change. The results are summarized in the table below. Detailed responses can be found in Appendix A.

Blue Bold = the dimension identified by the expert correlates with the literature, but has some slightly different ideas.

Bold Red = the expert identified a dimension which was not found in the literature search.

Expert	Dimensions specified	Correlation with literature dimension
Boreczky	-Management team has e-business mindset	**-No dimension identified (expert management)**
	-Leadership builds trust	**-Free Flow of Emotions (P3)**
Celuch	-Leadership communicates WHY	**-Emotional unifying purpose (P1)**
	-Leadership is positive	**-Emotional unifying purpose (P1)**
	-Leadership has active listening skills	**-Free Flow of Emotions (P3)**
	-Leadership tells success stories	**-Use of symbols (P2)**
	-Reward structure	**-No dimension identified**
Curry	-All levels of leadership must buy-in	**-First line supervisors (P7)**
	-Management communicates goals and mission	**-Emotional unifying purpose (P1)**
	-Training	**-Training (P9)**
	-Reward structure at all levels supports change	**-No dimension identified**
Dale	-Leadership must engender confidence	**-No dimension identified (expert management)**
	-Organization is accustomed to change	**-No dimension identified**
	-Leadership must build trust	**-Free flow of emotions (P3)**
	-Next tier management support	**-First line supervisors (P7)**

Expert	Dimensions specified	Correlation with literature dimension
Elms	-Clear sense of core purpose	**-Emotional unifying purpose (P1)**
	-Tolerance for failure	**-Enable free emotional flow (P3)**
	-Expert management	**-No dimension identified (expert management)**
	-Willingness to experiment	**-Create playful environment (P5)**
	-Senior management communication – clear and directive	**-Emotional unifying purpose (P1) & use of symbols (P2)**
	-Middle management involves people in consultative way	**-First line supervisors (P7)**
Hunter	-Top management leads culture change by example	**-No dimension identified (related to expert management- e-business mindset)**
	-Ability to change organizational structure	**-No dimension identified**
	-Trust	**-Free flow of emotions (P3)**
	-Top management sets goals and gives focus	**-Emotional unifying purpose (P1)**
	-Reward system	**-No dimension identified**

Figure 20: Correlation of expert panel organizational change dimensions with literature search

It should be noted that the results of the expert panel was highly correlated with the literature search. The dimensions that were not found in the initial literature search can be summarized into three new dimensions: Reward system; Expert Management; Organization is accustomed to change. This led to the next step, where a second literature search was conducted to find support for these new dimensions.

Results of Step 3: Find literature support for new dimensions identified

Additional literature research identified support for the dimensions identified by the experts. This research is summarized the table below.

Dimension	Description of Concept	Major Literature References
Reward System	The reward system can facilitate organizational change	Lawler, 2000 Zingheim & Schuster, 2000 Aquino, 1994

Figure 21: Correlation of literature with reward system dimension identified by expert panel

Because there was a great deal of academic literature and research on this dimension as it correlates to organizational change, it was added to the literature search. A proposition was also added.

However, the panel also identified two other dimensions that could not be found in a second literature search. These included:

Dimension	Description of Concept	Expert Source
Expert Management	-Management team has an e-business mindset	-Boreczky
	-Leadership engenders confidence	-Dale
	-Management team knows what they are doing	-Elms
	-Top management changes culture by example	-Hunter
Organization is accustomed to change	-Reorganizes often. People are used to it	-Dale
	-Ability to restructure	-Hunter

Figure 22: Expert panel organizational change dimensions not easily found in academic literature

Results of Step 4: Generate sample questions

The set of sample questions can be found in Appendix B.

Results of Step 5: Test the instrument with an expert panel

Two of the six experts responded with detailed opinions on how to change and restructure the instrument. Chick Kasouf also contributed heavily with opinions on how the instrument should be changed.

Results of Step 6:   Modify the instrument

Almost all of the opinions on how to change or modify the instrument were accepted and implemented. The opinions were only rejected in two small cases where there was stronger supporting evidence for a contrary method.

The results of the final instrument are shown in Appendix C.

5. Conclusions

Based on the primary and secondary research conducted in this thesis, we can conclude the following:

- The massive wave of change associated with the Internet will have a big impact on "brick and mortar" businesses

- Strong organizational change capabilities are likely to be key success factors in successfully implementing e-business transformation.

- The instrument proposed in this thesis has a reasonable probability of: 1) measuring the strength of an organization's organizational change capabilities; 2) correlating these with e-business progress.

The underlying question that is not answered is how important are each of these organizational change capabilities when attempting an e-business transformation. The following additional steps are necessary:

1. Test the instrument with a small sample

2. Modify the instrument based on the results

3. Use the instrument with a large sample

4. Analyze the results

This could be the basis of follow-on research.

Limitations

This proposed instrument and the research supporting it has several
limitations. These include:

- The link between e-business success and the measurement of
  organizational change capabilities

- How to accurately measure progress in e-business

- A complete list of organizational change capabilities

The link between e-business success and the measurement of organizational
change capabilities is the biggest weakness. Because there has not yet been a
great deal of organizational change research in the context of e-business, there
is no academic research presented in this paper which provides strong
evidence of this link. The expert panel, which had experience in the e-business
area, supported this link. Given time for further research, the instrument itself
could be tested on a large sample and validate this link by correlating the
strength of organizational change capabilities with progress in e-business.

This leads to the second limitation. The questions in the instrument used to
measure e-business progress are supported by popular e-business literature
and by the expert panel. However, a participant's opinion on their company's
e-business progress is subjective and very sensitive to bias and incomplete
information.

A third limitation is that there is no guarantee that the organizational change
capabilities that are tested in this instrument are the most important
capabilities for e-business organizational change. Although the literature
search was very complete, it was not exhaustive. It is possible that there are
other important capabilities not considered. A larger or different expert panel
may have also identified some additional parameters. Finally, in the context of

e-business there might be some completely new organizational change capabilities that could become important.
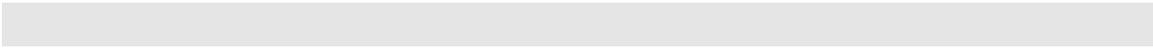
Appendix A: Expert panel dimensions of change

The following describes the detailed results to telephone interviews with an expert panel. Each expert was asked "What dimensions of organizational change capability are most likely to result in a successful disruptive organizational change". Each expert was asked to answer these questions in the context of a "brick and mortar" company trying to make disruptive organizational change to become an e-business.

Eric Boreczky

1. **Young management team with an e-business culture and mindset**
   –durable goods managers think in months & years vs. e-business managers think in terms of days and weeks

   –must be comfortable with the electronic world (all e-mail/phone mail vs. paper documents). Must be comfortable with e-tickets vs. traditional

   –Managers with e-business mindset are clustered below 35 years old. The majority of managers over 35 have the paper mindset

   -Managers with the e-business/electronic mindset prompt change around them.

2. **Leadership must build trust within the organization**

   -information workers must be nurtured and valued to stay (no hired guns who change jobs every 2-3 years)

   –people must feel valued for their relationships, expertise, and their willingness to be a supporter of the company rather than the information that they control to move to a culture where information is shared

   -Leaders must show that they trust the employees

3. **Companies need systems to validate information before making decisions**

   -Separate facts, good judgement, rumor, gossip

Kevin Celuch

1. **Leadership communicates detailed explanation of WHY we need to do this**

2. **Leadership remains positive despite negatives**
    –does no react to a negative with a negative
    –has a good editor; says the positive thing

3. **Leadership has active listening skills**

4. **Leadership SHOWs where it has been done before successfully**

5. **Reward structure**
    –is changed to reward and reinforce the desired behaviors

Kathy Curry

1. **Complete leadership structure must buy into the change**
    –Need someone with lots of influence to set the direction
    -Top managers must buy in
    –Middle management in all of the affected areas must buy in
    –Informal leaders and influencers must buy in

2. **Management communicates goals and mission**
    –Everyone must clearly understand the goals and mission associated with the change
    –Everyone must understand the norms and values of the change

3. **Training**
    –Using an outside firm to explain organizational change helps
    –Training to explain the change helps

4. **Reward structure must match the change**
    –Reward structure must extend through the complete management chain because there is often competing resources
    –There must be clear metrics and controls over sabotage

Note: Reengineering does not work
–Completely wiping the slate clean does not work

–There must be continuity with the past
–Recent dot.com failures and the success of "bricks and clicks" provides proof.

Mike Elmes
1. **Top management communicates a clear sense of core purpose**
   –Employees must also understand what the company is about.
   -If the company is pulled and pushed by the changes, a company can lose its center or the core of what it is about.

2. **Tolerance for failure**
   –Encourage people to take risks
   –People must be allowed to make mistakes without punishment
   –There is a tendency to contract or become more cautious during discontinuous change. To counteract this risk taking must be encouraged.

3. **Expertise**
   –Management knows what it is talking about
   –Hire the right people
   –Do not become totally dependent on consultants

4. **Willingness to experiment**
   –Management must make thoughtful experiments (reasonably sound risk-taking)
   –There must be recognition that this is new territory

5. **Senior Management Communication**
   –Senior management must tell people what's going on and what they are doing
   –They must communicate in a clear and directive way
   –Communication must occur regularly
   –Communication is important to overcome the anxiety that the people in charge are lost.

6. **Middle Management Role**
   –Middle managers must involve people in the change
   –People must be involved and have a stake in the change
   –Middle managers must be consultative

Jim Dale

1. **Leadership must engender confidence**
    –people must have confidence in the leader

2. **The organization must be accustomed to change**
    –Some organizations are constantly changing and people learn to live with the uncomfortable feeling of change.
    –Some organizations do not change often and have strong cultures that resist all change.

3. **Trust**
    –people must trust the leader (no hidden agenda)
    –are they making a good judgement (typically a conservative or aggressive estimator) – especially important when there are few hard numbers.

4. **Next tier managers / supervisors**
    –will make it happen (where all of the weeping and knashing of teeth occurs)
    –make the change process pervasive

Lisa Hunter

1. **Leaders make cultural change by example**
    –leaders must articulate and exemplify the changes they seek

2. **Capability to change organizational structure**
    –from functional to cross functional teams
    –from individuals to teams

3. **Trust**
    –Leaders must follow through on commitments to gain trust
    –Employees must practice teamwork to learn to trust one another

4. **Top management must set goals and give focus**
    –based on this focus, employees must feel empowered to act within the focus/goals

5. **Reward system**
    –change in the reward system help solidify new organizational values

Please answer the following questions. For each question, circle the number which best corresponds to your opinion:

7 Strongly Agree
6 Agree
5 Agree Somewhat
4 Neither Agree nor Disagree
3 Disagree Somewhat
2 Disagree
1 Strongly Disagree

Each is displayed in the scale below:

1	2	3	4	5	6	7
Strongly Disagree						**Strongly Disagree**

Questions

1. Compared with most companies that I know about, my company has made a very rapid transition from being a traditional "brick and mortar" company to an e-business.

1	2	3	4	5	6	7
Strongly Disagree						**Strongly Disagree**

2. The top manager of my company has clearly communicated an e-business vision.

1	2	3	4	5	6	7
Strongly Disagree						**Strongly Agree**

3. I am confident that the top manager in my company believes in the need to change to e-business.

1	2	3	4	5	6	7
Strongly Disagree						**Strongly Agree**

4. The top manager of my company uses symbols to communicate the vision of e-business for my company

1	2	3	4	5	6	7
Strongly Disagree						**Strongly Agree**

5. The top manager of my company uses slogans to communicate our e-business vision.

1	2	3	4	5	6	7
Strongly Disagree						**Strongly Agree**

6. The top manager of my company often tells success stories of people or departments who are achieving the e-business vision.

1	2	3	4	5	6	7
Strongly Disagree						**Strongly Agree**

7. The top manager of my company has set up special ceremonies to help communicate the importance of e-business to my company.

1	2	3	4	5	6	7
Strongly Disagree						**Strongly Agree**

8. It's OK to openly express a different opinion about how our company should be achieving its e-business vision.

1	2	3	4	5	6	7
Strongly Disagree						**Strongly Agree**

9. People in my company feel free to openly vent their concerns when my company is introducing major changes.

1	2	3	4	5	6	7
Strongly Disagree						**Strongly Agree**

10. The top manager of my company has not let us forget the company's roots.

1	2	3	4	5	6	7
Strongly Disagree						**Strongly Agree**

11. After a big change or reorganization in my company, management gives employees some time to mourn the past.

1	**2**	**3**	**4**	**5**	**6**	**7**
Strongly Disagree					**Strongly Agree**	

12. We laugh a lot in my company during a typical work week

1	**2**	**3**	**4**	**5**	**6**	**7**
Strongly Disagree					**Strongly Agree**	

13. I feel free to experiment with new ideas while my company is implementing changes to become an e-business

1	**2**	**3**	**4**	**5**	**6**	**7**
Strongly Disagree					**Strongly Agree**	

14. My company has assigned people to e-business initiatives on a full time basis.

1	**2**	**3**	**4**	**5**	**6**	**7**
Strongly Disagree					**Strongly Agree**	

15. Representatives from all major are part of the team involved with e-business changes.

1	**2**	**3**	**4**	**5**	**6**	**7**
Strongly Disagree					**Strongly Agree**	

16. Representatives throughout the management hierarchy are part of the team involved with e-business changes.

1	**2**	**3**	**4**	**5**	**6**	**7**
Strongly Disagree					**Strongly Agree**	

17. The top management of my company is taking the time to convince managers at every level that becoming an e-business is critical to my company's future success.

1   2   3   4   5   6   7
Strongly Disagree   Strongly Agree

18. Most first line supervisors in my company are committed to helping my company become an e-business

1   2   3   4   5   6   7
Strongly Disagree   Strongly Agree

19. Management at my company has tried to get buy-in from informal leaders on their e-business vision.

1   2   3   4   5   6   7
Strongly Disagree   Strongly Agree

20. The change to e-business in my company is being managed like a project in a systematic manner.

1   2   3   4   5   6   7
Strongly Disagree   Strongly Agree

21. A project manager has been assigned on a full-time basis to manage the e-business change process.

1   2   3   4   5   6   7
Strongly Disagree   Strongly Agree

22. Training is an important part of management's plan to transform our company into an e-business.

1   2   3   4   5   6   7
Strongly Disagree   Strongly Agree

23. Our company's reward system matches our e-business vision and goals

1   2   3   4   5   6   7
Strongly Disagree   Strongly Agree

24. The reward system has been changed throughout the management hierarchy so that the priority is clear when there is a conflict of resources.

1   2   3   4   5   6   7
Strongly Disagree   Strongly Agree

25. In the past three years, how many times has your company reorganized? _____

26. Although change is uncomfortable, most people in my company have grown accustomed to reorganizations and it is not a big deal.

1	2	3	4	5	6	7
Strongly Disagree						**Strongly Agree**

27. The average age of the top management team in my company is about _____years.

28. Which of the following best characterizes the top management team of my company:

__Prefers documents to be faxed instead of e-mailed

__Has used an e-ticket in the last year

__Prints out documents received electronically before reading them

__Prints documents and keeps them in filing cabinets

__Is very computer literate

__Has purchased an item more expensive than a book on-line

__Considers electronic information (e-mail, voicemail) as something valuable

27. My company has implemented the following:

____ My company has at least two of the following on our web site: brochures, catalogs, price lists or employee telephone numbers

____ Customers can get on my company's web site and ask, demand, or dictate the kind of value that needs to be delivered

____ My company enables at least one of the following transactions on-line: selling product, procuring supplies, process expense reports

____ My company is selling its mainstream products using on-line auctions as one way to sell products or services

____ My company is able to plan, execute, and aggregate buyers and sellers in a virtual arena.

_____ My company has created a community of interest on-line that closely links various partners in the value chain.

28. How many employees are in your company? _____

29. How many employees are in your business unit? _____

30. My company has been in business since _____

Appendix C: Modified Instrument based on Expert Opinion

Please circle the response to each factor using the following scale:
1 = Strongly Disagree
2 = Disagree
3 = Neither Agree nor Disagree
4 = Agree
5 = Strongly Agree

#	Question	Opinion
1	Compared with most companies in my industry, my company has made a very rapid transition from being a traditional "brick and mortar" company to an e-business.	1 2 3 4 5
2	The top manager in my company has a clear e-business vision.	1 2 3 4 5
3	Most people in my company understand the company's e-business vision.	1 2 3 4 5
4	I am confident that the top manager in my company believes in the need to change to e-business.	1 2 3 4 5
5	The top manager of my company often tells success stories of people or departments who are achieving the e-business vision.	1 2 3 4 5
6	The top manager of my company has set up special stake-holder meetings to help communicate the import of e-business to my company.	1 2 3 4 5
7	It's OK to openly express a different opinion about how our company should be achieving its e-business vision.	1 2 3 4 5
8	People in my company feel free to openly vent their feelings when my company is introducing major changes.	1 2 3 4 5
9	The top manager of my company has not let us forget the company's roots.	1 2 3 4 5
10	After a big change or reorganization in my company, management gives employees time to mourn the past.	1 2 3 4 5
11	We laugh a lot in my company during a typical work week	1 2 3 4 5
12	I feel free to experiment with new ideas related to our e-business initiatives.	1 2 3 4 5
13	My company has assigned dedicated people to e-business initiatives on a full time basis.	1 2 3 4 5

#	Question	Opinion
14	Representatives from all major departments are part of the team involved with e-business changes.	1 2 3 4 5
15	Representatives throughout the management hierarchy are part of the team involved with e-business changes.	1 2 3 4 5
16	Top management takes time to convince managers at every level that becoming an e-business is critical to my company's future success.	1 2 3 4 5
17	Most first line supervisors in my company are committed to helping my company become an e-business	1 2 3 4 5
18	Management at my company gets buy-in from informal leaders on their e-business vision.	1 2 3 4 5
19	The top manager of my company uses a symbol to help represent my company's e-business vision.	1 2 3 4 5
20	The change to e-business in my company is being managed like a project with regular meetings, Milestones, and project management.	1 2 3 4 5
21	The people assigned as e-business leaders are traditional change agents by business personality.	1 2 3 4 5
22	A project manager has been assigned on a full-time basis to manage the e-business change process.	1 2 3 4 5
23	The top manager of my company uses a slogan or saying to help keep our e-business mission at the top of people's minds.	1 2 3 4 5
24	Training is an important part of management's plan to transform our company into an e-business.	1 2 3 4 5
25	Our company's reward system matches our e-business vision and goals	1 2 3 4 5
26	Most people in my company have grown accustomed to reorganizations and do not consider it a big deal.	1 2 3 4 5

27. In the past three years, how many times has your company reorganized? _____

28. The average age of the top management team in my company is about _____years.

#	Question	Opinion
29	Which of the following best characterizes the top management of my company	
a.	Prefers documents to be faxed instead of e-mailed	1 2 3 4 5
b.	Has used an e-ticket in the last year	1 2 3 4 5
c.	Prints out documents received electronically before reading them	1 2 3 4 5
d.	Prints documents and stores them in filing cabinets	1 2 3 4 5
e.	Is very computer literate	1 2 3 4 5
f.	Has purchased an item that cost more than $100 on-line	1 2 3 4 5
g.	Considers electronic information a valuable asset	1 2 3 4 5

30. My company has implemented the following:

_____ My company has at least two of the following on our web site: brochures, catalogs, price lists or employee telephone numbers

_____ Customers can get on my company's web site and give their feedback on our company's products and services.

_____ My company enables *at least one* of the following transactions on-line without paper: selling product, procuring supplies, process expense reports

_____ My company is selling its mainstream products using on-line auctions.

_____ My company is able to plan, execute, and aggregate buyers and sellers in a virtual arena.

_____ My company has created a community of people with a similar interest on-line that closely links various partners in the value chain

31. How many employees are in your company? _____

32. How many employees are in your business unit? _____

33. My company has been in business since _____

Appendix D: Bibliography

_____, *"Value Networks and the Impetus to Change"*, Harvard Business School Note 5-698-086, 1998.

Albert, S., "A delete model for successful transitions", In J. Kimberly and R. Quinn (Eds.), *Managing organizational transitions*: 161-191, Homewod, IL: Irvin, 1984.

Amason, A.C., "Distinguishing the effects of functional and dysfunctional conflict on strategic decision making: Resolvoing a paradox for top management teams*", Academy of Management Journal*, 39: 123-148, 1996.

Anderson, Neil R, and Fiona Patterson*, "*Organizational Culture Change: An inter-group attributional analysis", *Journal of Organizational and Occupational Psychology,* Leicester, March, 1999.

Aquino, Nicholas R., "Managing change", *Business and Economic Review*, Oct-Dec 1994.

Argyris, C*., Knowledge for action: A guide to overcoming barriers to organizational change*, San Francisco: Jossey-Bass, 1993.

Argyris, Chris and Donlad A. Schon*, Organizational Learning: A Theory of Action Perspective*, Addison-Wesley, 1978.

Ashforth, B.E., "Becoming: How does the process of identification unfold?" In D.A. Whetten & P.C. Godfrey (Eds), *Identity in organizations: Developing theory through conversations*: 7-22, Thousand Oaks, CA: Sage. 1998.

Bacharach, S. B., "Organizational theories: Some criteria for evaluation*", Academy of Management Review*, 14(4):496-515, 1989.

Bagozzi, Richard P., *Causal Models in Marketing*, New York: John Wiley & Sons, 1980.

Barnard, C.I., "The Functions of the Executive", Boston: Harvard University Press, 1968.

Bartlett, Christopher A., and Ghoshal, Sumantra, *Managing Across Borders: The Transnational Solution*, Harvard Business School Press, 1998.

Beer, Michael and Nitin Nohria, "Cracking the code of change", *Harvard Business Review*, Boston, May/June 2000.

Beer, Michael and Nohria, Nitin, "Cracking the code of change*", Harvard Business Review*, Boston, May/June 2000.

Bernardez, Mariano L., "Start small, change big", *Management Review*, New York, 1997.

Bloodgood, James M. and J.L. Morrow Jr., "Strategic organizational change within an institutional framework", *Journal of Managerial Issues*, Pittsburg, Summer, 2000.

Bower, Joseph L., & Christensen, Clayton M., "Disruptive Technologies: Catching the Wave", *Harvard Business Review*, January-February, 1995.

Bower, Joseph L., "*Disruptive Technologies: Catching the Wave*", Harvard Business School, 1994.

Brunson, N., "The irrationality of action and action rationality: Decisions, ideologies, and organizational actions", *Journal of Management Studies*, 19: 29-44, 1982.

Burke, James, The Day the Universe Changed, Boston: Little, Brown & Co., 1985.

Chase, Larry, *Internet World: Essential Business Tactics for the Net*, Wiley Computer Publishing, 1998.

Campbell, D.T., and Fiske, D.W., "Convergent and discriminant validation by the multitraint-multimatrix method", *Psychological Bulletin*, 1959, 56(2), 81-105.

Christensen, Clayton M*., The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*, Boston: Harvard Business School Press, 1997.

Christenson, Clayton M. and Michael Overdorf, "Meeting the challenge of disruptive change", *Harvard Business Review*, Boston, Apr/Mar 2000.

Churchill, Gilbert A., *Marketing Research: Methodological Foundations*, Fifth Edition, Chicago: The Dryden Press, 1991.

Coetsee, Leon, "From resistance to commitment", *Public Administration Quarterly*, Randallstown, Summer, 1999.

Conger, J.A., *The charismatic leader*, San Francisco: Jossey-Bass, 1989.

Coyle-Shapiro, Jacqueline, "Employee participation and assessment of an organizational change intervention: A three-wave study of total quality management*", The Journal of Applied Behavioral Science*, Arlington, December, 1999.

Daft, Richard L., *Organization Theory and Design*, St. Paul: West Publishing Company, 1988.

Damasio, A.R., "Descartes error emotion, reason, and the human brain", New York: Putnam, 1994.

Dandridge, Thomas C., Nitroff, Ian I., and Joyce, William F., "Organizational Symbolism: A Topic to Expand Organizational Analysis", Academy of Management Review, 1980, pp. 77-82.

Davidow, William H., and Malone, Michael S., *The Virtual Corporation: Structuring and Revitalizing the Corporation for the 21st Century*, New York: HarperCollins, 1992.

Dent, Eric B. and Susan Galloway, "Resistance to Change: A limiting perspective", *The Journal of Applied Behavioral Science*, Arlington, March, 1999.

Dotlich, David L., and james L. Noel, *Action Learning*, JossetBass (1998).

Drucker, Peter F., *The Post Capitalist Society*, HarperCollins, New York, 1993.

Duck, J.D., "Managing change: The art of balancing", *Harvard Business Review*, 71(November-December): 109-118, 1993.

Dutton, J.E. and Duncan, R., "The creation of momentum for change through the process of strategic issue diagnosis", *Strategic Management Journal*, 8: 279-295, 1987.

Evans, Philip and Thomas S. Wurster, Blown to Bits*: How the New Economics of Information Transforms Strategy*, Harvard Business School Press, 2000.

Farley, John U. and Howard, John A., *Control of "Error" in Market Research*, Toronto: Lexington Books, 1975.

Flam, H., "Fear, loyalty, and greedy organizations" In S. Fineman (Ed.), Emotion in organizations, 58:75 London: Sage, 1993.

Foster, Richard N., *Innovation: The Attacker's Advantage*, New York: Summit, 1996.

Garver, Michael S. and Mentzer, John T., "Logistics research methods: Employing structural equation modeling to test for construct validity", *Journal of Business Logistics*, 1999.

Ghosh, Shikhar, "Making Sense of the Internet", In Tapscott, Don (Ed*.), Creating Value in the Network Economy*, Harvard Business Review Book Series, Boston, 1999.

Goleman, D., *Emotional intelligence*, New York: Bantum Books, 1995.

Grover, Varun, "From Business Reengineering to Business Process Change Management: A Longitudinal Study of Trends and Practices*", IEEE Transactions on Engineering Management*, 46:1 (February, 1999), pp 36-46.

Hackman, J.R. and R. Wagman, "Total Quality Management: Empirical, conceptual and practical issues", *Administrative Science Quarterly*, 40, 309-342.

Hagel, John and Arthur G. Armstrong, *Net.Gain: Expanding Markets through Virtual Communities*, Harvard Business School Press, 1997.

Hall, Early, Interview: 1991 in Davidow, Willam H. and Malone, Michael S*., The Virtual Corporation*, Edward Burlinggame Books, 1992.

Hartman, Amir, and Sifonis, John, Net Ready: Strategies for Success in the E-conomy, McGraw Hill, 2000.

Huy, Quy Nguyen, "Emotional capability, emotional intelligence, and radical change", *The Academy of Management Review*, Mississippi State, April, 1999.

Iansiti, Marco, and MacCormack, Alan, "*Developing Products on Internet Time*", In Tapscott, Don (Ed.), Creating Value in the Network Economy, Harvard Business Review Books, 1999.

International Data Corporation Web site: www.idc.com

Jehn, K., "A qualitative analysis of conflict types and dimensions in organizational groups", *Administrative Science Quarterly*, 42: 530-557, 1997.

Kantner, R.M., "The Change Masters", New York: Simon & Schuster, 1983.

Kaplan, Soren M., "Discontinuous innovation and the growth paradox", *Strategy & Leadership*, Strategic Leadership Forum, Mar/Apr 1999.

Kaufman, Roger S., "Why Operations Improvement Programs Fail: Four Managerial Contradictions", *Sloan Management Review*, 34:1 (Fall, 1992), pp. 95-100.

Kets de Vries, M.F.R., *Prisoners of leadership*, New York: Wiley, 1990.

Kinnear, Thomas C., and Taylor, James R., *Marketing Research: An Applied Approach*, New York: McGraw-Hill, 1983.

Klein, J.A., "Why supervisors resist employee involvement", *Harvard Business Review*, 62, 87-95, 1984.

Korper, Steffano and Juanita Ellis*, The E-Commerce Book: Building the E-Empire*, Academic Press, 2000.

Kotnour, Tim, Jean Matkovich, and Rob Ellison, "Establishing a change infrastructure through teams", *Engineering Management Journal*, Rolla, September, 1999.

Kotter, John P., "Leading Change", *Harvard Business School Press*, 1996.

Kozlowski, S.W.J., and Doherty, M.L., "Integration of climate and leadership: Examination of a neglected issue", *Journal of Applied Psychology*, 74, 546-553, 1989.

Kuhn, T.S., *The Structure of Scientific Revolutions* (2nd ed), New York: Wiley, 1970.

Lachenmeyer, C.W., *The Language of Sociology*, New York: Columbia University Press, 1971.

Larwood, L, Falbe, C.M., Kriger, M.P., & Miesing, P., "Structure and meaning of organizational vision", Academy of Management Journal, 38: 740-769, 1995.

Lawler, Edward E., "Pay can be a change agent*", Compensation & Benefits Management*, Summer, 2000.

Loiacono, Eleanor T., Watson, Richard, and Goodhue, Dale L.*, WebQual™: A Web Site Instrument*, Worcester Polytech, December, 2000.

Lukes, S., *Power, A Radical View*, New York: MacMillan, 1974.

Malone, Thomas W., & Laubacher, Robert J., "*The Dawn of the E-Lance Economy*", In Tapscott, Don (Ed.), Creating Value in the Network Economy, Harvard Business Review Books, Boston, 1999.

Miller, D. and Chen, M., "The simplicity of competitive repertoires: An empirical analysis", *Strategic Management Journal*, 17: 419-439.

Molinsky, Andrew L., "Sanding down the edges: Paradoxical impediments to organizational change", *The Journal of Applied Behavioral Science*, Arlington, March, 1999.

Moore, Geoffrey A., *Living on the Fault Line: Managing Shareholder Value in the Age of the Internet*, HarperCollins, 2000.

Morris, J.A., and Feldman, D.C., "The dimensions, antecedents, and consequences of emotional labor", Academy of Management Review, 21: 986-1010, 1996.

Negroponte, Nick, *Being Digital*, Vintage Books, 1996.

Pascale, R.T., "Perspectives on strategy: The real story behind Honda's success", California Management Review, 26(Summer): 47-72, 1984.

Peters, Thomas J., "Symbols, Patterns, and Settings: An Optimistic Case for Getting Things Done", *Organizational Dynamics* , 1978.

Pfeffer, Jeffrey and Salancik, Gerald R*., The External Control of Organizations: A Resource Dependence Perspective*, New York: Harper & Row, 1978.

Rayport, Jeffrey F., & Sviokla, John J., "*Exploiting the Virtual Value Chain*", Don Topscott (Ed.), Creating Value in the Network Economy, Harvard Business Review Books, 1999.

Reger, R., Gufstason, L., DeMarie, S., and Mullane, J., "Reframing the organization: Why implementing total quality is easier saind than done", *Academy of Management Review*, 19: 565-584, 1994.

Schein, E.H., *Organizational culture and leadership* (2nd ed.), San Francisco: Jossey-Bass, 1992.

Schwartz, Evan I., *Webonomics: Nine Essential Principles for Growing your Business on the World Wide Web*, Broadway Books, 1997.

Sculley, Arthur B, and W. William Woods*, B2B Exchanges: The Killer Application in the Business-to-Business Internet Revolution*, ISIpublications, 1999.

Senge, Peter M*., The Fifth Discipline: The Art & Practice of Learning Organization*, New York: Doubleday, 1990.

Sethi, V., "Developing measures for assessing the organizational impact*", Decision Sciences*, Atlanta, Jul/August 1993.

Seybold, Patricia B., *Customers.com: How to Create a Profitable Business Strategy for the Internet and Beyond*, Random House, 1998.

Simonin, B.L., "The important of collective know how: An empirical test of the learning organization", Academy of Management Journal, 40:1150-1174, 1997.

Sink, D. Scott and William T. Morris, "By What Method*?", Industrial Engineering and Management Press*, 1995.

Stalk, George, Phil Evans, & Lawrence Schulman, "Competing on Capabilities: The New Rules of Corporate Strategy", *Harvard Business Review*, March-April, 1992.

Starbuck, W.H., Greve, A., and Hedberg, B.L.T., "Responding to crisis", *Journal of Business Administration*, 9(2): 111-137, 1978.

Staw, B.M., Sutton, R.I., and Pelled, L.H., "Employee positive emotion and favorable outcomes at the workplace", Organization Science, 5: 51-71, 1994.

Stewart, G.L. and Matiz, C.C., "Understanding and overcoming supervisor resistance during the transition to employee empowerment", In R.W. Woodman and W.A. Pasmore (Eds.), Research in organizational change and development, (Vol 10, pp 169-196), Greenich, CT: JAI, 1997.

Tapscott, Don, *Creating Value in the Network Economy*, Harvard Business Review Book, 1999.

Tapscott, Don, *The Digital Economy: Promise and Peril in the Age of Networked Intelligence,* McGraw-Hill, 1996.

The Emerging Digital Economy, U.S. Department of Commerce, 1998, p. 7.

Tichy, Noel M., & Sherman, Stratford, *Control Your Destiny or Someone Else Will*, Doubleday, 1993.

Trice, Harrison M., and Beyer, Janice M., "How and Organization's Rites Reveal Its Culture", *Organizational Dynamics*, Spring, 1987, pp. 5-24.

Tushman, Michael L. and O'Reilly, Charles A., *Winning Through Innovation: A Practical Guide to Leading Organizational Change and Renewal*, Boston: Harvard Business School Press, 1997.

Upton, David M., and McAffe, Andrew, "*The Real Virtual Factory*", In Tapscott, Don (Ed.), Creating Value in the Network Economy, Harvard Business Review Books, 1999.

Van Maanen, J. & Kunda, G., "Real feelings: Emotional expression and organizational culture" In L.L. Cummings & B.M. Staw (Eds), *Research in organizational behavior*, vol II: 43-104, Greenich, CT: JAI Press, 1989.

Weick, K., & Westley, F., "Organizational learning: Affirming an oxymoron", In S.R. Clegg, C. Hardy, & W. Nord (Eds), *Handbook of organizational studies*: 400-458, London: Sage, 1996.

Weick, Karl E., "Cognitive Processes in Organizations", in B.M. Straw, ed, *Research in Organizations*, vol 1, (Greenwich, CT: JAI Press, 1979), p. 42

Weinberger, David, *The Cluetrain Manifesto: The End of Business as Usual*, Pegasus Books, 2000.

Zingheim, Patricia K., and Schuster, Jay R., "Total rewards: Pushing the pedal to the metal", *The Journal of Business Strategy*, Boston, Jul/Aug, 2000.