Changing the way of doing business – Electronically Enabled Organizations

by

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Submitted to the Sloan School of Management
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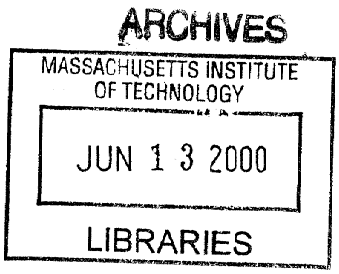

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Abstract

Several forces are forging a new business environment. Among them are dramatic increase in communications, globalization of markets and supply chains, focus on customer needs, increased speed and competition. Companies adapt to this new, more challenging environment by changing their business model. The latest development of technology has enabled the creation of new business models, as well as forged radical changes in traditional ones.

This thesis examines an organizational form, the Electronically Enabled Organization (EEO), which enables companies to implement a model that leverages technology in order to sense customer needs and respond quickly and effectively. Companies with successful implementation of the EEO concept have enjoyed both lower costs and higher customer satisfaction.

The design of an EEO structure must align with other four elements: strategy, technology, people and processes and it is only limited by top management's traditional focus toward conventional business models and organizational structures. The real difficulty comes from the implementation, particularly where it affects people and their operating habits. Therefore large and well-established companies are at a disadvantage compared to smaller and younger organizations.

Thesis Supervisor: Michael S. Scott Morton – Jay W. Forrester Professor of Management

Table of contents

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Professor James Short was also kind to devote some precious time to be interviewed for section 2.

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Finally, my sincere gratitude to my family. My wife has been a great support during the long hours spent on the books, taking care of the kids and myself. My children were patient enough to share their dad with MIT.

Introduction

The aim of this thesis is to explore how information technology has enabled the creation of new business models in response to a new business environment, and how it affects the ability of a company to respond to customers needs and create value. The analysis is based on the framework developed at MIT by Professor Michael Scott Morton and presented in the article "Emerging Organizational Forms: Work and Organization in the 21st Century" (Scott Morton, 1995).

The main idea behind this work is that there are some forces like globalization, increased competition, and communications that are changing the business environment. This new environment is more challenging than ever for companies because it is changing at a speed never observed. Companies that want to succeed must put in place new business models that enable quick reactions, not only at the operations level but also at the strategic one. Information technology plays a big role in enabling companies to implement new and ever-changing business models. Implementing them though, affects the way companies organize themselves. This work analyses one of the emerging organizational forms, namely the Electronically Enabled Organization (EEO).

The overall logic of the thesis is shown in fig. 1.

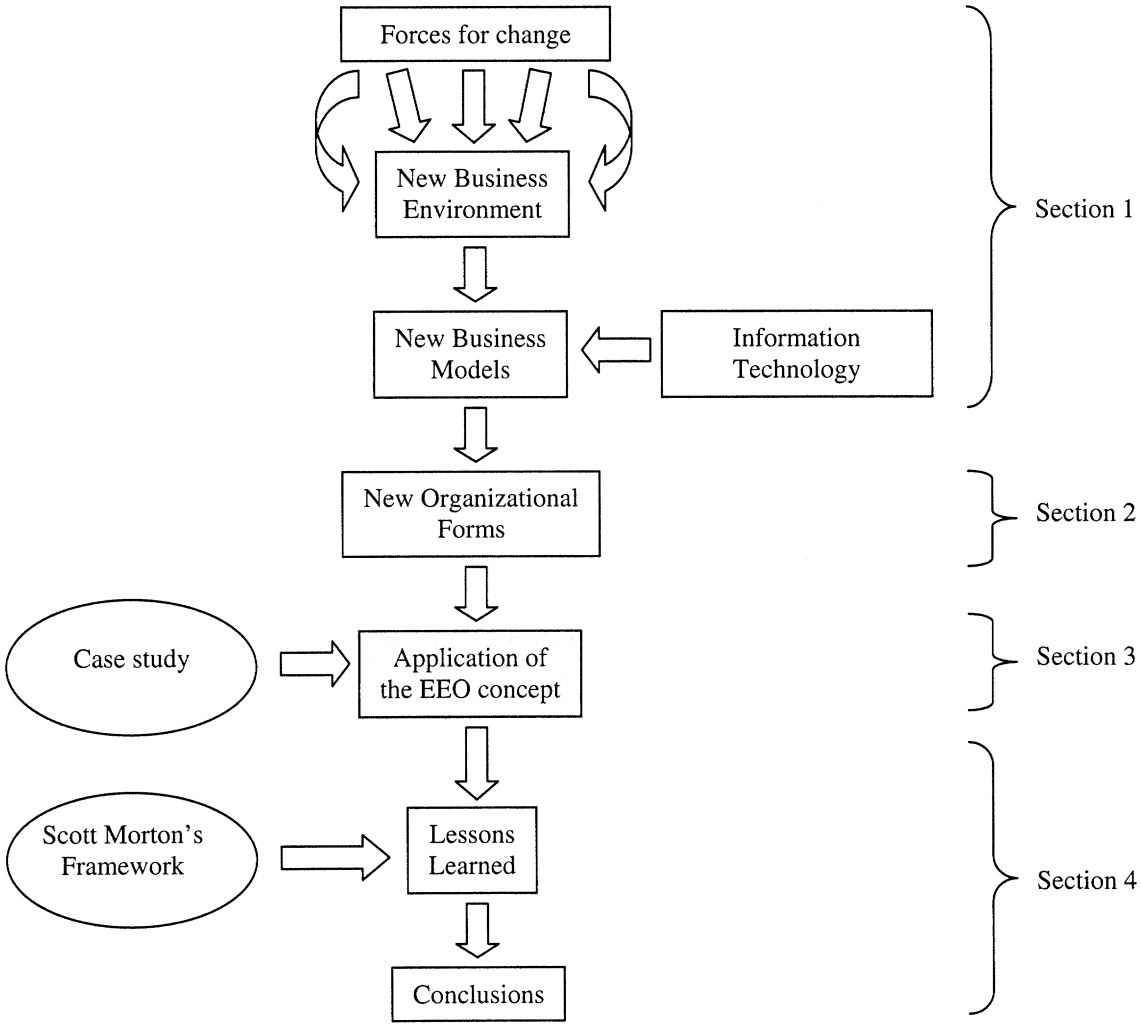

Figure 1 - Logic of the thesis

The first section analyzes the forces that impact and forge the new business environment. In this part, I will present what are the major drivers of the new economy

and how companies typically react to them. While many companies have tried to adopt new technologies to basically automate their current operating processes, others have leveraged the opportunities offered by the technology to create new ways of doing business. The last few years have seen the growth of completely new organizational forms that have been given different names. They are still on the frontier, with very little understanding, and few studies and publications, on how they work. Therefore, the second section of this work is devoted to defining two of these models, namely the electronically enabled organization and the e-business with the help of Professor Michael Scott Morton of MIT Sloan and Professor James Short, Visiting Professor at MIT Sloan. The aim of this section is to put order and to frame the confused arena of the "e" world for the purpose of this work. In fact, the novelty of the phenomenon, together with the pace of its change, has not allowed the creation of a set of definitions that can be recognized as milestones for their study. The third section analyzes a case study of a company that has implemented the concept of EEO, with the aim of observing the practical issues that this implementation raises. Finally, in the last section, I draw lessons from this case and provide recommendations on how to apply the model to any company interested in the transition from a traditional model to the new one, using Professor Scott Morton's framework (Scott Morton, 1995).

1. The New Business Environment

The last few years have seen the emergence of several forces that have changed the way companies do business. Undoubtedly the Internet plays a big role in this scenario, but many other forces are working together to boost the change. This section presents the new business environment. I start by presenting briefly the major forces that have an impact on the redefinition of the business environment. Although the order in which they are presented attempts to draw a logical interrelation as a cause-effect chain within these forces, in reality they interact among each other, leaving to each of them the role of both cause and effect of another force.

In the second part of this section I discuss how companies have reacted to the new environment created by those forces. Successful companies have reacted by creating new business models and different structures that allow them to be responsive to the new market place. I also show some living examples of companies that have developed new business models leveraging the power of web-based technologies. Those examples are chosen among many available, on the basis of their uniqueness and level of innovation. Uniqueness and innovation do not necessarily mean the creation of a completely new product: some companies, as we will see, have been successful in applying new business models to existing products.

1.1 Forces for Change

One force for change is the dramatic increase in communications in general. The increased ability to communicate has connected more people in more efficient ways. For example, the fax has become very popular and is now present not only in businesses, but in many households, too. Another area of communication that has improved a lot and is becoming very popular, particularly in Europe, is the cellular phone (Anonymous, 1998)[1]. Cellular phones have changed the concept of "reachability," since they enable almost immediate worldwide connections between people. For example, I am carrying a cell phone with an Italian phone number; this number has been available for the last four years and allows many people from all over the world to make contact in any location. In addition, digital technology enables the creation of several information services that can be delivered over the phone, such as email and database query.

However, the explosive growth of communication is not without its drawbacks. The ability to access so much information leads to an excess of information that can disorient people during their decision-making processes (Olofson, 1999). This effect has created a completely new market opportunity for aggregators, filters and software agents. Here I would simply acknowledge the problem of the proliferation of information and the necessity to deal with it in the future by filtering the information on the basis of their quality (Miller et al., 2000). A related issue at the business level is that companies have to deal with a much more transparent environment, one that discloses much of the strategy the company is following and consequently increases the level of competition.

Another important force is the growing awareness that customer data is a company asset. The evolution of database technologies has enabled the merging and analysis of different customer data. Data mining techniques enable companies to extract data and to draw very sophisticated customer profiles, which in turn allow companies to target their customers more efficiently and with lower costs. The drawback of these techniques to the general public is the resulting lack of privacy. The public is concerned about this extraordinary ability to analyze customer data. This issue is much more felt in Europe where the European Commission has recently regulated the treatment of personal data, giving personal ownership to data and forbidding companies to treat data without explicit permission. In the USA the situation is looser but is no longer being ignored by the public. In addition, US companies that are working in Europe have had to comply with the European rules. So far the problem is latent but it is likely to become a major issue in trading relationships between the USA and the EU.

Globalization is another force for change. The word itself is a buzz word and sometimes it is also misleading, but if we look at the business world, globalization of value and supply chains is a reality. In the business-to-business area, large companies create value by leveraging their ability to operate without borders with their global customers. On the supply side, they have a similar global capacity. Information and communication technologies are crucial for doing business with global customers and global suppliers because they allow companies to coordinate activities along the value and supply chain. This issue of coordination is central and involves the operational

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[1] Anonymous, E-Commerce, European Style, 1998

processes of the company, as well as those of its customers and suppliers. The next section of this work will discuss the problem of coordination in greater detail.

Along with globalization, another force that is shaping the way companies are structuring their business is the need to take care of customers' local needs. This is an apparent contradiction, but it represents a very important reality that companies have been facing in the last few years. The need for economies of scale and for world wide value chain management, together with the need for local and differentiated products, has been summarized with the motto "think globally, act locally." General Motors has even created a new word to express the concept: "glocal."

Because of the flow of information and the improvement in levels of education, customers are becoming more conscious of their needs and more sophisticated in their requests. Mass production has been forced out of the market except for a very few, basic products. Customers ask for highly customized products because of different local needs and cultural diversity. Companies have responded by creating products with several options in order to be able to customize as much as possible, a process called mass customization. In addition, technological growth has enabled new features that are usually immediately translated by the customer into new expectations. The result is an increased complexity of products, complexity that can be managed only with sophisticated information systems (Slywotzky et al, 2000).

As a result of the ability of markets to be more efficient by connecting companies with customers (both on the business and the consumer side), comes the decreasing role of the middle-man: online brokers (great examples are the financial brokers) have acted

as substitutes for the traditional brokers but more and more companies are offering product and services directly (cars, airlines..).

Another relevant force that has shaped the business environment is the increased speed resulted from the high competition among companies and the need to satisfy the customer with better product features than the competitor's. This in turn means that the processes must be faster. An example is the application for a credit card: till some years ago, an application would have taken several weeks to be processed. In the last few years the process has been progressively shrinking and now a regular application is processed online in a matter of seconds. The speed required to companies nowadays is probably one of the most discussed and evident drivers to change. According to BusinessWeek, some fast-paced companies have adopted a weekly revision of their strategy (Stepanek, 1999). Although this could appear extreme, it is representative of the need to react quickly even at the strategic level.

All these changes have also impacted the relationship between the company and the employees, defining the end of the "work for life" era. Even the more traditional companies have had to abandon this concept, in order to be more flexible. Professor Malone observes the creation of a new form of employment that he calls "connected freelance" (Malone, 1999) in which workers free-lance to sell their expertise to one or more companies, interacting with the organization through many different channels that do not necessarily imply the physical presence of the worker in the organization. The connected free-lance can be involved in different tasks, increasing the need for coordination. Where the traditional relationship lasts, employees which might have once

looked for work for life now look for employability for life. This in turn has increased the need for continuous education, and education has become one of the most powerful ways for companies to attract and retain employees.

One more characteristic of this changing environment is that the high valuation of Internet-related companies in the US has increased the ability of these companies to compete with traditional players, sometimes putting those players nearly out of the market or, at least, weakening their position. This is the case, for example, of the US travel industry where online companies such as Yahoo! or Travelocity are eroding market shares against American Express. The profitability of these companies has still to be seen but the market cap may indicate that this is the route. For example, Amazon.com, the leading business-to-consumer e-commerce web site (Kane, 2000) has shown amazing figures in terms of customer-base growth but it is still in the red in its balance sheet and yet, its valuation – even if very volatile – is very high. The inability of the market to fully evaluate the new business world created by web technologies is reflected in a very volatile market valuation of web-based companies (Goad, 2000). The chart below shows Amazon's valuation compared to the S&P index. According to the chart, the value of Amazon's stock has been much more volatile than the market portfolio.

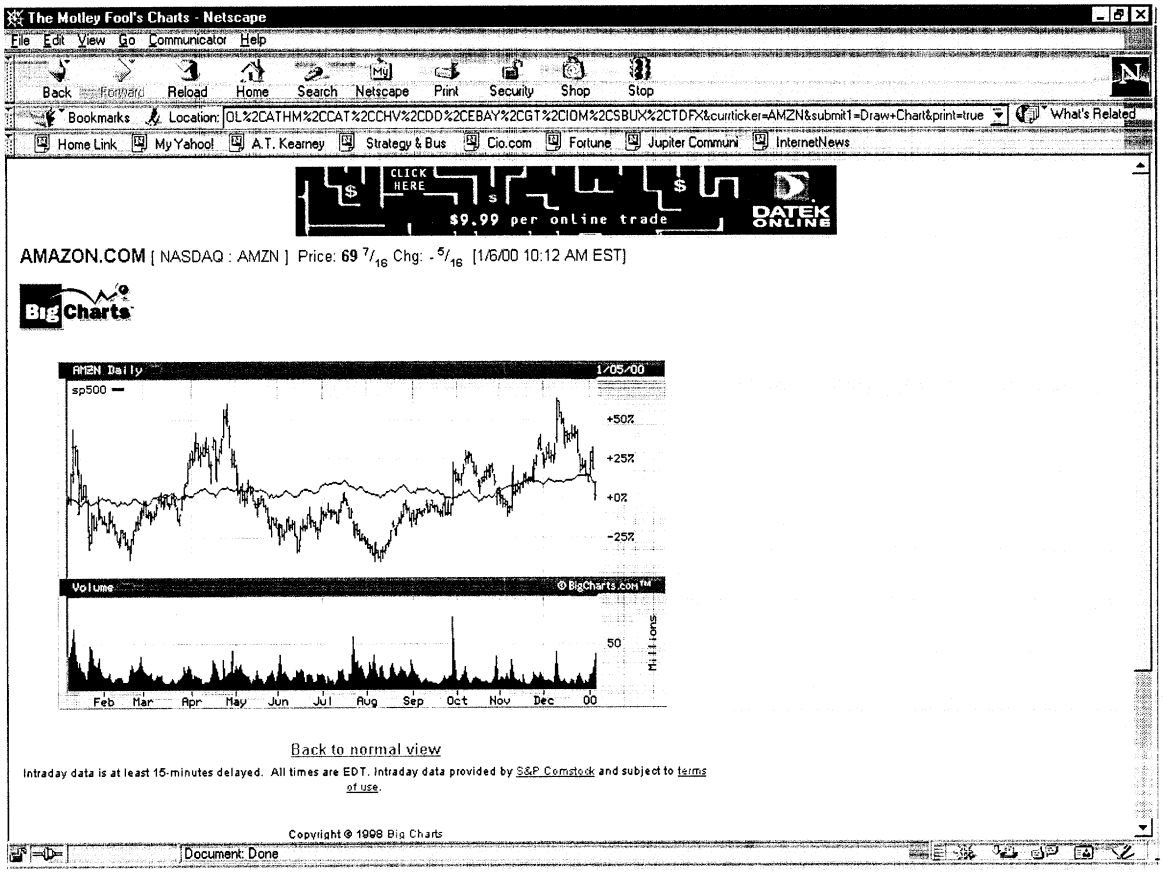

Figure 2 - Amazon.com stock valuation

In Europe, the valuation of Internet companies is cautiously following the US but, according to a recent article by Red Herring (Cukier, 1999), European companies will follow a different path, based on large investments from the major traditional industrial groups, rather than from venture capital. The result could be a less volatile, more measured industry. The results of the last holiday season show that even in the US, despite the success of pure online actors such as Amazon, the sites of traditional retailers

have done very well (Kane, 2000). This could mean that the brand name of traditional retailers has still a great appeal to customers.

Last, the effect of the changes on the business environment and the growing diffusion of the Internet lead to the "Americanization" of businesses. As a result, the growing importance of the bottom line and of the market forces implies the need for higher efficiency and cost reduction. Cultural and social effects of this phenomenon are out of the scope of this work, but the point is that European companies that traditionally have more regulations to follow, could be at disadvantage in competing with American firms in the global market place. What is relevant to this work is the need for non-American countries to find other models to achieve cost reduction, therefore increasing the pressure on companies to find different and innovative structures that can comply with EU regulations.

1.2 Reactions of Companies

All these forces have put companies under pressure. Some of them have reacted quite quickly to the changing and more competitive environment, sometimes by simply trying to decrease their costs, others by creating new products or, indeed, by inventing new business models.

By looking at the literature, I found several examples of different reactions by the companies. Among them, I chose those which I consider more representative of the new type of companies that will succeed in the future.

One reaction to the highly competitive environment has been a wave of mergers and acquisitions on a large scale. This natural response to the competitive environment is not at all innovative: the objective is to cut costs by reaching economies of scale(Harari, 1999). However the advantage of cutting costs does not last long; competitors will do the same soon. The trend seems not to stop while the real advantage of mega-mergers has to be proved. Certainly acquisitions have boosted the terrific growth of some companies that have adopted this practice as a way to grow (e.g., Cisco). Whether acquisitions have the objective of reaching better economies of scale, or they are pursued as a growth strategy, they imply and require the ability to integrate processes (if not, why merge?) and to really take advantage of the economies of scale and the value of putting together competencies.

Companies are also putting in place new relationships with customers, suppliers, and competitors. The necessity for a better understanding of customer needs and the willingness to create new value both lead to offering products that tend to bond the company with its customers. On the supplier side, large companies have abandoned the old relationship based on their power to join a new concept of partnering with their suppliers in order to be able to decrease the stock of material, respond more quickly to customer changes and decrease the cost of searching for suppliers. From the supplier point of view, partnering with companies is the best way to decrease sales cost and create the bonding discussed earlier. With competitors, companies have tried to establish relationships that move beyond the historical model of competition as a battle (Hax, 1999). The buzz word is "co-opetition" that means that sometimes two companies are in

competition, sometimes they cooperate. It can also happen that two companies are cooperating on one product or market while competing in another.

One more way of responding to the new environment is what Professor Van Maanen calls "no frills" organizations. In the attempt to lower costs and increase the ability to respond quickly to customer needs, companies are becoming flatter. Flatter organizations need better coordination, since the lack of a middle layer does not provide the necessary coordination among the lines and between the lines and the top.

In terms of processes, the trend is for reducing and streamlining them in order to speed up the throughput and respond to the customer. Production of goods is definitely going toward the "built to order" concept as opposed to the former "make to sell" one. The implication again points toward a need for better coordination. Building to order means that the entire supply chain must be integrated because of the need for flexibility. One solution to this need is the network organization, in which different companies come together to work on a project in a seamless structure that provides the customer with the final product. In order for the network organization to work properly, the need for each company to open its processes to other entities is very high. Web-based technologies, as we will see in the next section, are the enabling means to integrate different actors' processes.

Indeed, the need for sensing and responding to customer needs implies that the decision-making process must get closer to the customer. This in turn implies that the front line must learn to sense the customer needs and respond directly. Therefore employees need relevant information and, at the same time, a different set of skills.

Knowledge has become an important asset and companies have worked to capture both explicit and implicit knowledge in order to replicate the best practices and increase their flexibility.

Technology, as we will see, has been and will be the enabler of these transformations. As a result of the interactivity with the customer, companies are eventually able to perform one-to-one marketing and to get closer, actually "intimate," with the customer. Companies can now detect and store customer preferences: online polls are available but the most important asset is preference expressed by web site visitors. Web technologies allow the personalization of the offer to the customer through software agents that track customer preference and suggest pre-defined offers (rule-based filters) or infer preference of customers based on their choices while surfing the company's web site and comparing those choices with choices of other customers (collaborative filters). Those preferences then, can be stored in a file (cookie) in the customer's local disk and read every time that customer accesses the company's web site.

For the first time in history, the classic economic theory that considers the price defined in the market by matching demand and supply becomes a reality. The theory in fact is based on frictionless markets with irrelevant cost of transactions, and complete availability of information. The Internet has allowed the reduction of transaction costs at a level that can be very often considered irrelevant and has enabled producers and consumers to collect information at irrelevant cost. For example, the cost of collecting information about characteristics and prices of new cars was quite relevant till few years ago. Now the Internet enables customers to compare technical characteristics and price

simply by visiting different web sites or, indeed, by using software aggregators and agents that allow instantaneous comparisons. For example, mysimon.com enables the customer to compare prices among different merchants and to visualize the price history (Fig. 3).

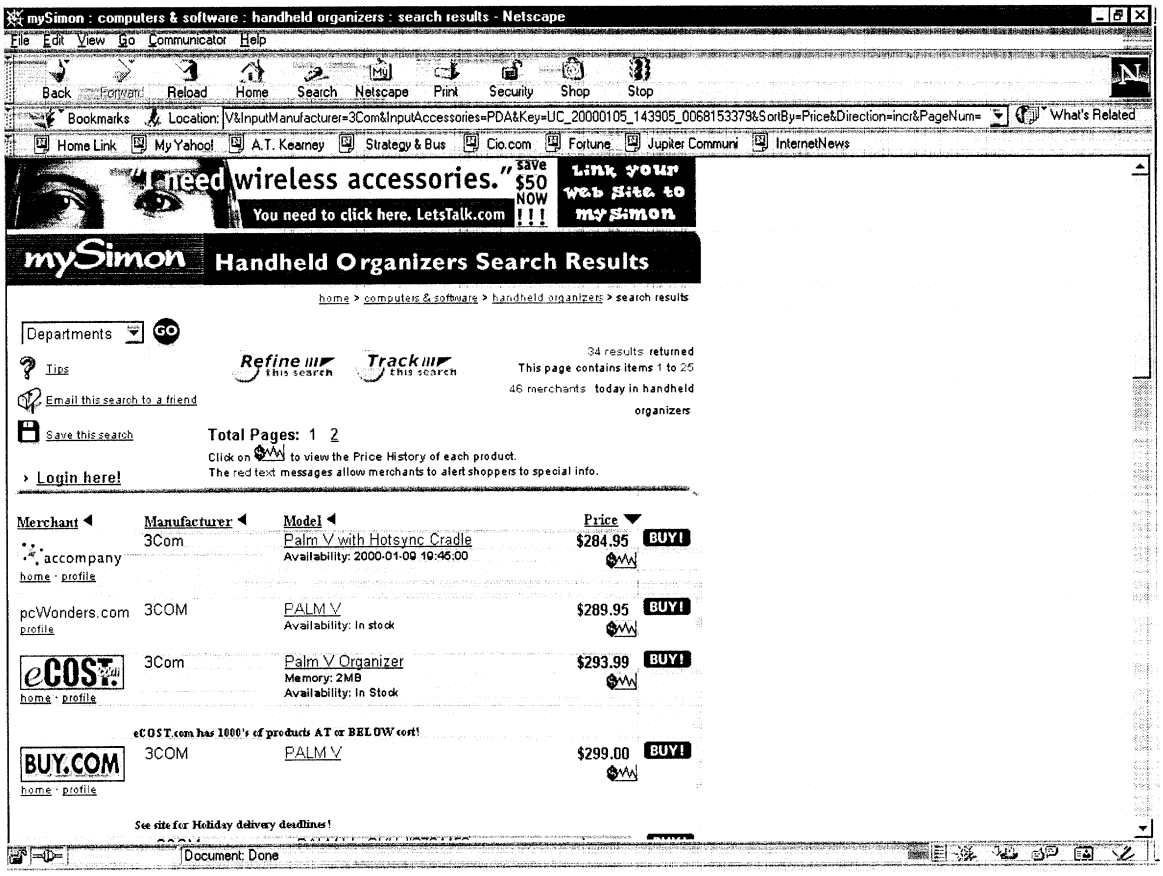

Figure 3 - Shopping aggregator

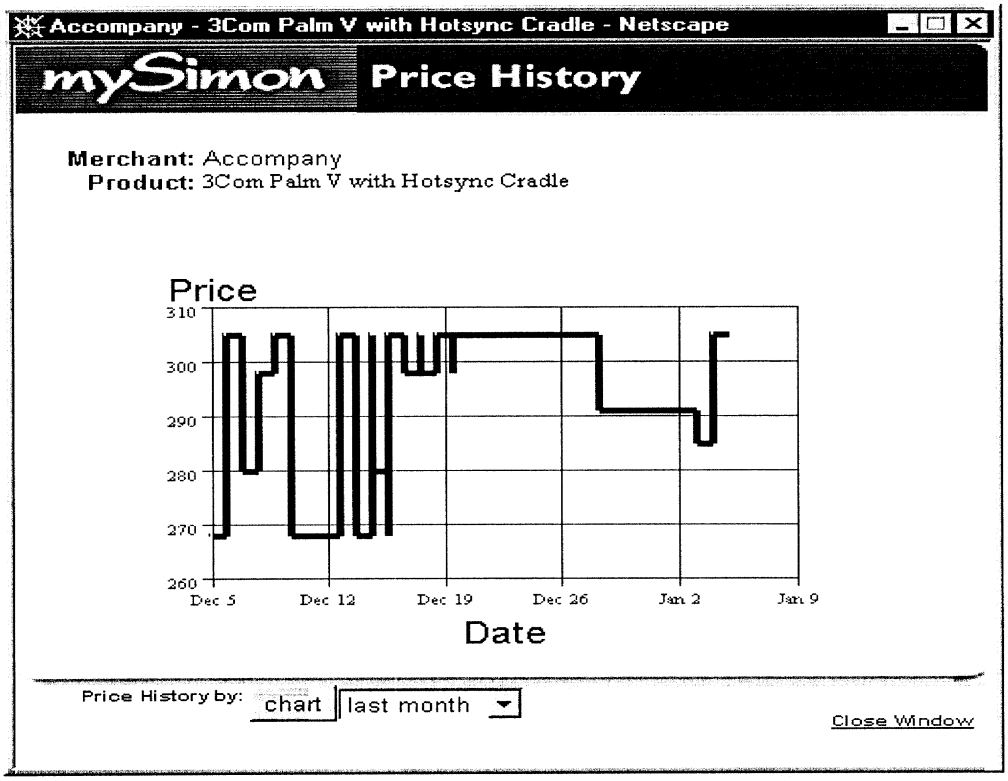

Figure 4 - Price history for a product

Fig. 4 shows a great volatility of the price, particularly during "hot" periods such as the holiday season. Companies are able to adjust prices on the spot, based on the market demand and on competitor reactions.

A new phenomenon allowed by web technologies, that confirms the trend toward more efficient markets, is the emergence of auctions as a normal way of transacting (Ubois, 1999). As is happening in general in the Internet world, the most important applications take place in the business-to-business environment. Auctions are no

exception, with some large companies using them for their procurement processes; GE with its TPN exemplifies this (Fig 5).

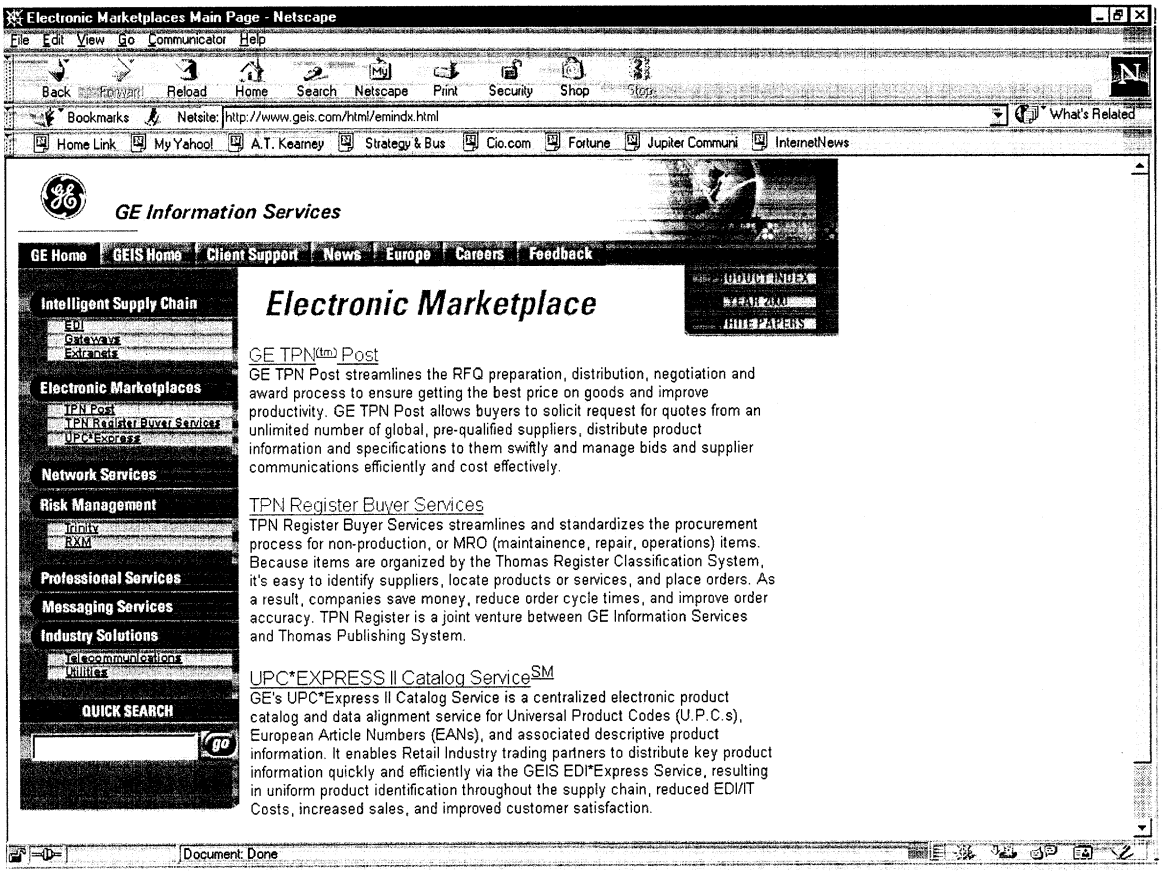

Figure 5 - GE TPN web page

However, on the consumer side, some growing web sites either sell through auctions or host third parties auctions. An example of the latter is eBay.com (Fig. 6). Auctions are a good example of how the Internet enables new ways of transacting between parties.

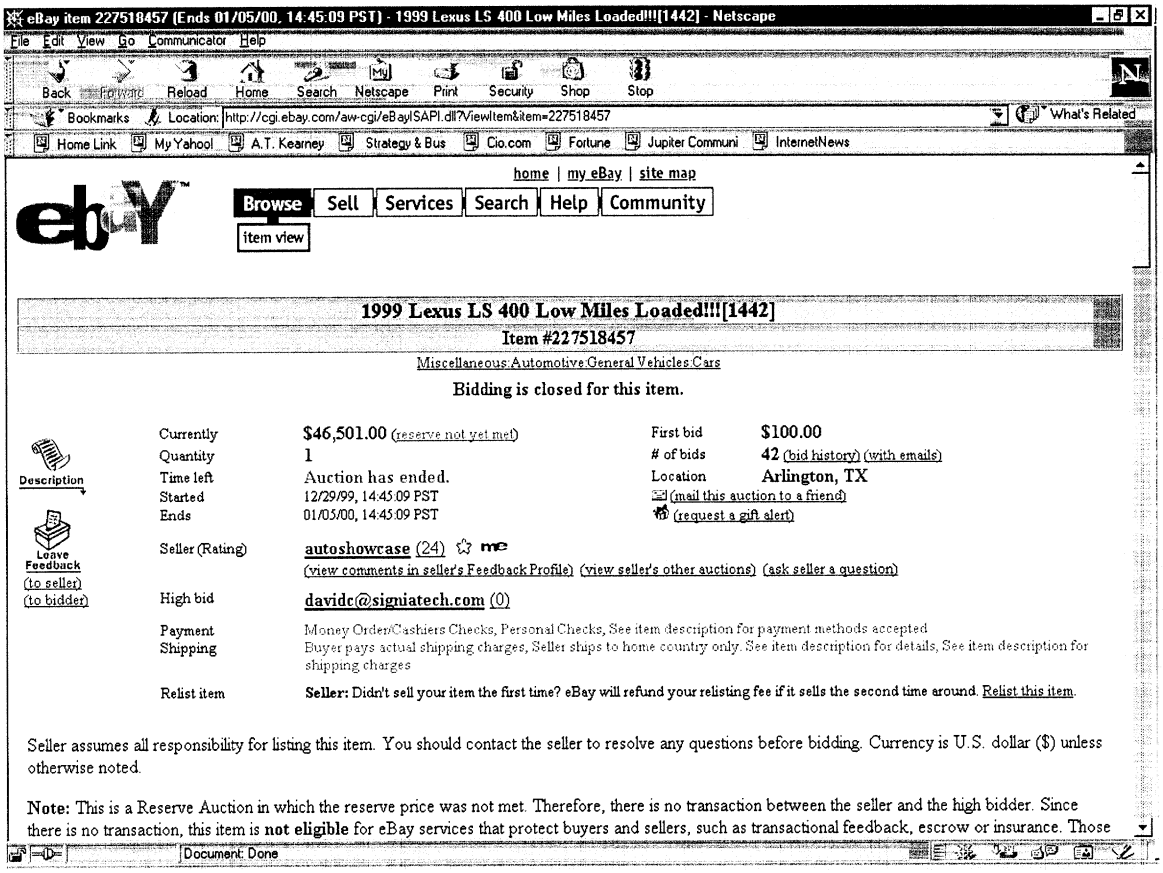

Figure 6 - eBay. An example of auction

Another new business model enabled by web technologies is the one created by Priceline.com (Walker et al, 1999). This model is so original that it has been given a patent. Priceline asks customers to name the price they would be willing to pay for a product or service and look for that product among the inventory of participating sellers. Priceline will earn the difference between the price named by the customer and the cost the company could obtain from the seller or, in other cases, a flat fee for using its services. So far, the company has been quite successful selling airline tickets. Whether

this model will work with small products, such as groceries, still has to be proven, but it is a good example of a new business model enabled by web technologies. (Fig. 7)

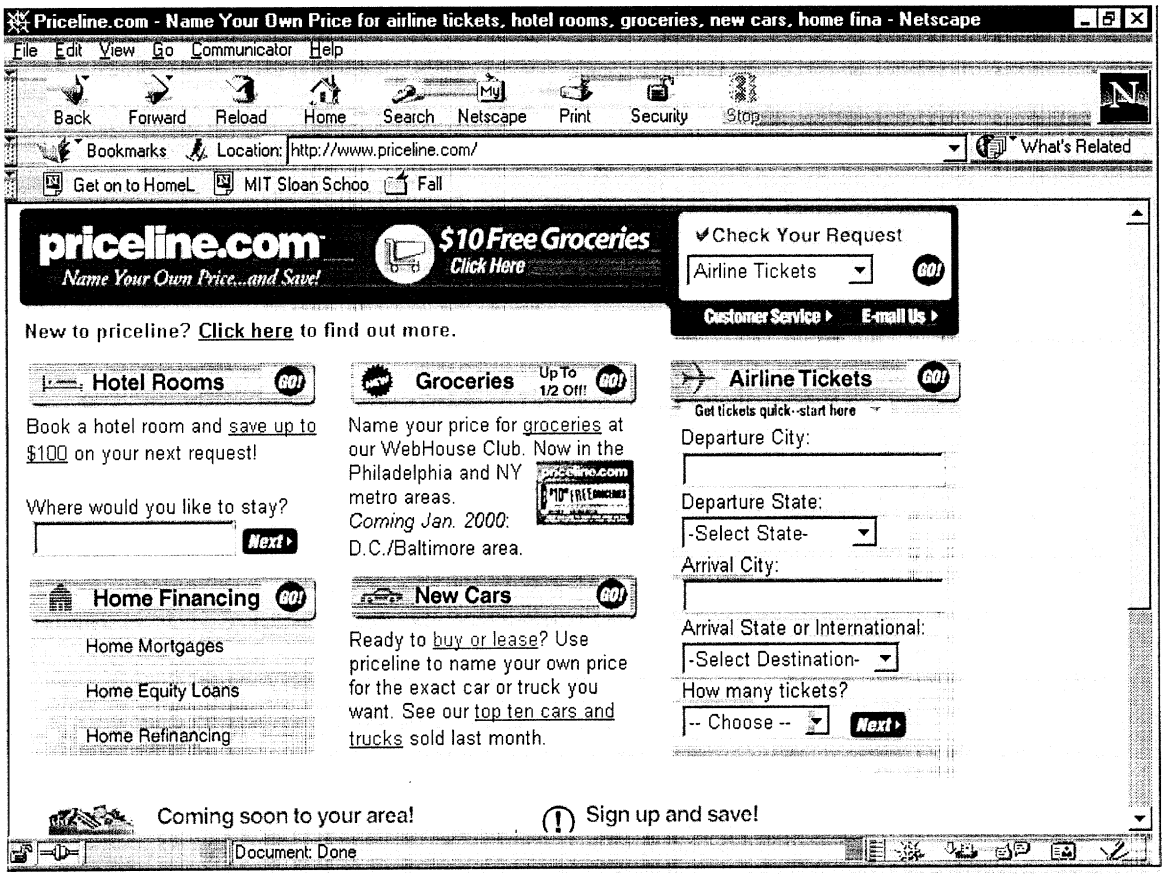

Figure 7 - Priceline.com web page

In conclusion, there are several forces pushing businesses to change, and also several solutions put in place by companies to react to the new environment. This section

discussed some of those forces and presented some ways companies have chosen in order to adapt to it. Profound changes happened to the market, particularly in the last ten years. Some of them were fads that lasted only a short time. Others, the ones discussed in this section, have reshaped permanently the way of doing business. There is only one small certainty in the actual fluid situation: this is the role of information and communication technology as an enabler of the new business models. In fact, to be effective, the models adopted by the companies as a reaction to the challenges posed by the new environment, require a much tighter coordination among the company's structure components. These models can only be implemented through a heavy adoption of the new information and communication technologies.

The next section will present a concept developed by Professor Michael Scott Morton at MIT: the Electronically Enabled Organization as a framework to redesign strategy, business model, and processes of companies that want to be one of the players in the future business environment. It will also define e-business; the purpose of the section is not to try to define differences between these two models, since I think those differences are not relevant. The introduction of e-business has the sole purpose of setting a frame to a word that has been used (and abused) in very different cases.

2. How web-based technologies are changing the way companies do business

The evolution of information and communication technology has enabled the birth of new business models that are at the same time the effect and the cause for an intensified competition on a global scale. Companies that are unable to adapt to the new models will be soon at a competitive disadvantage. Those models have assumed several forms and names during their rapid evolution and shared only one characteristic: the presence of an "e" in front of them.

These rapidly evolving "e" concepts resist clear definitions. However, at the risk of missing some of the new developments that occur almost daily, we will discuss in this section two new business models that have emerged from the electronically charged environment: **Electronic Business (E-business)** and **Electronically Enabled Organization (EEO)**. Soon we will merge the two in order to avoid confusion and we will analyze the impact of the resulting model on a company's strategy, organization, and processes. Next section will present the application of the model to a living company.

In the last few years there has been a flow of words spent on the electronic world concepts, as well as a lot of money poured into promising, and some not-so-promising Internet start-ups. It is only in the last few months that the big players, the companies that have driven and led the business world for a century, have started reacting to the threat that those new business concepts present. Those companies are now re-thinking their

business. Corporate America suddenly woke up when Jack Welch launched his new, challenging program at GE: DYB.com. Destroy Your Business dot com perfectly expresses the urgent message to large companies: redefine your business, putting in place the new business models, or the competitors will. Once more Mr. Welch looks ahead and demonstrates that it is possible for large companies to react to the changes in their business environment.

In order to remain competitive, companies that have successfully conducted business in the market so far will need to feel this sense of urgency to change and embrace the electronic way of relating to the environment. This point was stressed by Richard Owen, Vice President of Dell Online, the e-commerce division of Dell Computer Corporation, which has on-line computer sales of $30 million per day. During a speech at MIT in early November 1999, Mr. Owen said that in five years there will be no more "e-commerce". What we consider e-commerce today, will just be the normal way of doing business.

We can trace the birth of today's challenging environment back to several years ago when large companies started to exchange data through a transaction oriented system: **Electronic Data Interchange (EDI)**. From an organizational point of view, it was not a big change, except that small suppliers that could not afford such investments were cut out of the supplier chain for big companies and relegated to the role of sub-contractors. This rather complex and rigid system has evolved as an enabler of closer relationships between a company and its suppliers. The cost of implementing this standard and the rigidity intrinsic in the protocol however was so high that EDI could not

be used in the business-to-consumer market. It remained confined to transactions between companies' computers (Gossain et al., 1998).

Later appeared **Electronic Commerce (E-commerce)**, the way of trading goods and services online. Clearly, the Internet played a big role in allowing both customers and suppliers to connect to a company's system, enabling the take-off of e-commerce. Selling products to consumers through web-enabled technologies was immediately seen as very promising. Yet, despite the great interest in the business-to-consumer sector, business-to-business transactions dominate the e-commerce arena: according to Forrester Research, in 2003 e-commerce will reach $1.3 trillion of which $1.1 trillion will be in the business-to-business(Forrester Research, 1999 and White, 1999).

While e-commerce is the business community's latest buzz word, there are several areas within this new field that are worthy of further research. For example, potential research ranges from the role of brand to the trust involved in transactions with an unknown counterpart, from the pricing model to the immediate and almost automatic globalization of the offer when a product or service is put out over the Internet. If we look at the latest evolution of several industries, we understand why the last few years represent the right time for e-commerce to start and evolve. Along with the exponential growth in Internet users, the market is growing in services rather than products, allowing most companies to deliver online, while the logistics industry is performing better and better, decreasing delivery time and cost for the goods.

However, the e-commerce concept is too small in scope to represent the way companies can profit from the ultimate leverage of the information technology. While e-

commerce is focused on trading with customers and suppliers, the life of a company includes relationships with many other stakeholders such as employees, complementors (e.g. dealers in the car industry), stockholders, financial markets, press, trade unions, local and central political and fiscal authorities. In addition, the ongoing process of making the organization lean and empowering the employees by pushing the decision responsibility to the front-lines, requires an unprecedented flow of information within the company. In addition, globalization has spread the entire organization around the world, increasing the need for coordination. For example Fiat has a quarter of a million employees all over the world who must have access to a very large set of information in order to be effective. Successful implementation of information technology presents a great opportunity for integrating those people and making them more effective. Both of the new concepts that are presented in this article leverage the power of information technology to reach a larger portion of these stakeholders and address the challenges of today's global environment.

2.1 E-Business and Electronically Enabled Organization

Clear definitions, as already stated, are premature and do not capture the full scope of the two models. When we talk about E-business, we are talking about a model for growth and development using online or net-based capabilities. The technology is integral to the business in this model. James Short, Visiting Professor at MIT says: "*most of the applications I have seen so far are straightforward extensions of existing practices*

simply using a new channel and so, they are closer to the idea of e-commerce. E-business instead is more the idea that a company has new potential, new business opportunities because it is able to set-up completely different practices. Amazon is a good example of the e-commerce application: they have not changed books as a product, they have just changed the way people buy books. E-business means that you would change the book as a product for example by delivering the content electronically on the Net or any other creative and different use of the Net's features. While they are a good example of an e-commerce company, I have no idea whether they will be a good example of an e-business. Right now they are doing exactly what you expect an e-commerce company to do, which is they simply look at other products where they can apply their book ordering and distribution system too."

To further clarify, Professor Short differentiates between existing e-commerce practices and the potential for E-business in the automotive industry: *"I think increasingly automotive will be quite affected by the Net. What I have seen so far is general marketing and general promotional activities on the web without any creative use of the power of the two-way features offered by the web. The focus on purchase decision is in my mind less important than the focus on the vehicle servicing and how the car fits into the profile of the person who owns it over time. Because car companies are used to selling cars, most of the things I see on the web are how to solve this problem, how you position your product through segmentation, rather than the usability of the car and its cycle. For example, entertainment in the car is one dimension. The Onstar from GM is an interesting case because you can envision a time where the car will be the*

carrier of all these kinds of services. That becomes a viable model for how you can make revenue on that vehicle and its use. It becomes an important component on how you actually build the car, it may actually have an influence on the design of the vehicle as something easy to communicate with. The reason why I think Onstar is important is that they put together an information-oriented car that receives more than the normal relatively small set of information. A certain percentage of what I do is going to get something with the car. Sometimes I know exactly what I am going to get, sometimes I do not know. The car could have a more active role knowing my preferences, finding things for me, providing me information and developing an ability to find the places where those things are. I am dependent on the car to take me there, so in some sense the car is the intermediary to fulfil the service of product request. I do not currently use it as an intelligent component of that: I use it just for transport. That kind of a business potential I think is there".

The EEO leverages technology in order to expand its ability to respond to market needs. It relies on a hardware IT infrastructure, software, and communication technology as enablers to remaking the company's way of doing business. The Boeing 777 program is a good example of an EEO. This pioneering division gained several months in time-to-market because the EEO structure enabled a better matching of the physical parts of the aircraft. Not only did this innovation save time and money, but the level of quality and safety was improved. The change was not only in terms of technology, but the way employees worked together was redefined, as was the interaction of these teams with customers and suppliers.

However, the advantage of the 777 project remained confined and could not be spread in the company. Boeing's inability to transfer it into the whole organization should sound as a warning alarm for companies that are planning to use the approach of developing a new project from scratch for the introduction of the EEO model and transfer the best practices in the old organization. As Professor Michael Scott Morton's framework shows, there are several variables such as strategy, technology, structure, people, and processes that influence the success of the implementation. This success, although achieved in a new structure, is not transferable to an existing one because of the differences in the alignment of these variables. This inability to transfer best practices is nor related specifically to the EEO: the Saturn example, where GM developed a new car brand from scratch, with the objective of transferring the best practices back to the whole GM, demonstrates that those practices cannot be "transplanted" in an existing organization without losing their best characteristics[2].

In the EEO, information technology and communication connect all players at low cost and high reliability, allowing the flow of information back and forth within and without the company. That information has a value that can either generate a revenue stream or represent a competitive advantage (or both) for the organization in the marketplace. The expected result is the ability to sense the customers' needs and respond quickly and to deliver better, differentiated products and services at lower cost. MIT Professor Michael Scott Morton, an expert on the use of information technology for a company's strategy says: "*the EEO increases the ability to respond to customers much*

[2] For further discussion on this point, refer to Violino, 1999.

faster and it improves the relationship with suppliers and workers' job satisfaction. In the car industry this would mean mass customization with a much better cost structure. The ability to respond to the customer is obviously higher in services rather than in goods because of the physical constraint intrinsic in goods. However, the value proposition to the customer has a larger component of services, even though a physical product is involved and the car industry constitutes no exception. Moreover so much in the manufacturing of physical things are services such as designing and testing".

Given their newness and the lack of precise definitions, these two models are often confused or considered as just one model. To make things more complicated, the current providers of technology and consulting services have differing ideas on what E-business means and advertise their product with the label "E-business", regardless of its characteristics. According to Professor Scott Morton , "*The difference is very subtle. E-business implies that business happens electronically. The focus is more on electronics than on business whereas by putting the word enabled in, it says "business enabled by technology". It switches around: not electronic business but business done electronically. EEO is not e-business, it is business-e. I think about the work to be done first and then how to enable it. The technology is an enabler".*

For example, Dell Computer might be considered a precursor of an EEO since its inception (Cone, 2000). They designed the "be direct" business model for phone and mail orders and ran it for years without more information technology than that involved in any other business. The basics of the business model itself is sustainable even with the traditional means of communication such as phone and fax, even if most of the current

features of Dell's business model are unimaginable without the current technology. The initial idea behind the model was quite simple: customers called a toll free number and discussed with a sales representative their needs. The representative served as an "advisor" that configured the PC according to customer's needs. The configuration process took into account not only compatibility problems among components but also their current stock availability. Once agreed on the final configuration, the order went directly to the production that assembled the PC "made to order" in a matter of hours. The product was then shipped to the customer by an express delivery company. No PCs were made for stock, therefore Dell avoided inventory and obsolescence costs, particularly relevant in a market where the obsolescence cost is 2% per week. The value chain was shortened by skipping the distribution channel and the corresponding value remained with Dell and its customers. More important, Dell had a direct contact with its customers and could store and analyze their needs in order to design better products and improve its processes.

Only in the last few years did they enable the whole process electronically, speeding up the ability to respond to customers and the cycle itself. The implementation of web-based orders has enabled costs savings in the order entry process: customers do it for Dell. Moreover, the ability to share information with its suppliers has enabled Dell to ship components from the suppliers directly to the customers, further reducing both the delay between order and delivery, and the cost of transportation. Orders from customers are made available to the delivery company that provides to "assemble" devices coming from different suppliers into a one-delivery for the customer. The whole process is

completely scalable with very little increase in cost so, with the increase in sales volume, the unit cost decreases. At the same time the delay between the order and its fulfilment has sharply decreased, therefore increasing the value for the customer. Dell's model has much more than this and the implementation of the EEO concept, with its flow of data from the customers directly to suppliers and complementors (e.g. software) has enabled the company to be responsive to both consumers and businesses. The take-away here is that the technology itself is only one of the components of an EEO - yet very important – and the accurate balance with the other components is what makes an EEO a winning concept.

From this point forward, E-business and EEO will be considered synonymous since their subtle differences are not relevant to the remaining discussion. What is relevant, however, is that both the models imply that companies do not simply apply technologies to existing processes but redefine the processes by leveraging the features of those technologies to speed up their business cycle and, at the same time, be able to respond to customer needs with unique products.

2.2 Design and Implementation

In designing either new approach, one of the challenges that companies will face is the ability to think "out of the box". The tendency of large companies is to make organizational changes as if they were a "natural evolution" of the current model. To the

contrary, the implementation of these models has a significant impact on the company's structure and processes. Companies that have successfully implemented the new models show the need for a "quantum leap" in rethinking the business that moves the company to a completely different operational level. Existing large companies might prefer not to "attack" the entire organization and so start from one product or department. During the implementation phase this is a reasonable approach. However, the analysis of a successful case like Schneider National Inc. shows that it is very important to design the entire model while planning its gradual application[3]. Professor Scott Morton describes how companies can miss this important point: *"Companies understand that asset utilization, quality, and speed to respond to the customer is vital. They might not recognize that they are moving toward the EEO, they might not have a master plan, but they are stepping into it step by step".*

The creative component in designing the new model is critical to the company. An emphasis on the creative approach will help to avoid the trap of simply adapting the organization to the new model rather than leveraging its strengths. Professor Scott Morton says: *"the major issues in designing and deploying an EEO are the classic issues that any new model of doing business has. In designing, you need people with vision, the architects that can imagine the new world we can have; so the critical issue is to have enough creativity."*

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[3] Schneider is the largest truck load transportation company in the US, with revenues of $2.7 billion. Because of its technology-intensive strategy, the cost-per-mile has dropped from $1.00/mile to $ 0.60/mile, internal cost have dropped by 24%. At the same time quality of service has increased significantly: late deliveries have dropped by a factor of 10, even as delivery cycle time has decreased.

When moving from the design stage to implementation, the number of examples becomes small. Of the available examples, most tend to be start-ups rather than existing companies. Nevertheless, one way for a large company to benchmark may be to look at some E-business start-ups to see if there is any common strategy that can be transferred to existing organizations. The result can be confusing because new ventures are as creative in the structure of the company as they are with the business model. Since large companies will find it difficult to transform their organization overnight, efforts to apply the emerging model may be derailed if the business model is not differentiated from the start-up's structure.

My interest is mainly focused on large companies. Those companies tend to produce business models that reflect their core competencies and their current strategy. However, successful applications of the "e-model" in large organizations reflect only the new business opportunities, rather than the existing ones. Thus, these large companies face the dilemma of whether to migrate the old business to the new model or to create a new entity with the new business model that competes with the existing organization. The implications are not obvious nor are they trivial. Starting a new business or a new division as GM has done with E-GM facilitates the start-up of the new business model because it encounters no internal resistance. However it implies that sooner or later the existing organization will experience difficulties such as losing market share. In addition, the transfer of know-how and resources between the two entities is almost impossible. This in turn will accelerate the decline of the existing organization with still little guarantee that the new model has captured enough market. On the other hand, the choice

of putting in place the new business model in the existing structure will face strong resistance and the risk of resulting in the application of new technologies to the old business model, rather than a completely new model. As Professor Scott Morton says, *"the critical issue in deploying is how you break people's mindsets. It is an issue of change: you change the mental model of how you do the work and that is very tough, according to what Peter Senge studies about change management. There are a lot of ways of doing change and that depends on the organization and where you are. Some companies find very effective to start small and identify a product, a department, or a region to start with. For example Schneider (logistics and transportation) and Dell are EEOs as a whole, while other companies are EEOs only in one division or in one product. Part of Citibank, namely Citibank Japan, part of Boeing, namely 777 aircraft can be defined as EEOs. The important message is that it is not a "quick fix". It is a process that in a large organization can take a long time because it affects the way people work.*

Changing existing way of working is not an easy task. I would avoid pushing hard on change enablers, such as speeches or hypes and remove inhibitors such as wrong incentives instead. You choose an objective, for example you want to change work practices or change how to do business: there are a bunch of forces encouraging that change – competition, CEO's speeches, technology - and a bunch of forces that inhibit it – old practices, current incentive structures, skill levels. You make more progress by removing inhibiting factors than you do by putting pressure on the enablers. So, for example, more technology is not as good as taking away the incentive that says "you get

paid for your own tiny job" and replacing it with one that says "you are paid based on the company's performance".

This choice will also require making the decision about which existing function or division should be connected with or encompass the new model. Again the choice is not trivial because it will influence the development of the model, based on the function chosen. Professor Short has said: "*There does not seem to be an easy way in introducing e-commerce or e-business into large companies. For example you can create a separate business unit which is the web organization. Associated with that decision there is a set of relatively identifiable business problems. Mainly, you will have a conflict with the existing business. This model seems to be the more popular one in the US companies where they set up an e-business to compete against the established businesses under the assumption that if I do not set up this e-business before my competitor, he is going to do it. This is what Mr Welch is doing at GE. My experience with many large companies in Europe is that they have taken a slightly different approach than the aggressive spin off that tries to destroy your business. They have taken equity positions in start-up companies so they have adopted the learning base model. They basically buy control on an experiment and understand to what extent they need to learn about how those companies operate".*

At the same time, as the Dell example shows, the implementation of the EEO model in one area of a company is one step in a larger plan for the insuing company-wide integration. Otherwise the company will be exposed to two risks. The first one is that a successful partial implementation remains confined in itself, without spreading

throughout the rest of the company. This is the case of Boeing 777, which has been a very successful innovation project where information technology has played an enabling role (what has been defined as an EEO). The project out-performed planning forecasts in terms of quality, time to market, and cost. Unfortunately it remained confined to this division and the company has not successfully spread the practice to other areas of the organization. The second risk concerns the people involved in the project. The difference in practices and the personal growth experienced by the resources involved in these innovative projects can create gaps between people in the organization that cannot be overcome. This decreases the ability to spread the new practices. In fact, the more successful the implementation process is, the larger the gap.

Large companies are currently aware of the need for implementing a new business model and they have the resources needed to do it. Interestingly enough, however, most have not reacted to this challenge. These new models would help in managing the complexity in terms of products and services, processes, and geography that these larger companies face. According to Professor Short, *"Focus is the challenge for large companies. It is not comfortable for large companies to "destroy your company". Yet, the web is that kind of destructive technology that destroys the logic of how you put together channels. It provides for visibility and lack of information asymmetries that formerly you were able to depend on. This was the way we designed the business but the web does not have that. It has very different characteristics such that the information you put on it goes everywhere and can be accessed from everybody. You lose for example the ability to create targeted literature for certain segment of customers."*

2.3 International Evolution of the Models

There is an interesting debate going on about how the cultural issues will impact on the design and implementation of e-business and EEO models. One side argues that globalization tends to homogenize the outcomes. In this scenario, there will be mainly one version for each of the two models all over the world. US companies will have a first mover advantage. Indeed, the globalization creates a large competitive, unique market where companies with a longer history will be advantaged. On the other side there is the possibility that different markets (Europe, Asia) will develop new models that could be quite different than the American version and could influence the competitive advantage of the US companies. Professor Short confirms this in speaking about e-business: *These practices will influence but they will hardly define e-business outside the US borders. Other countries and companies will innovate and will develop practices that depend upon cultures, languages and business conditions in their own countries. US media argue that Europe is two years behind in adoption. I think that is the wrong view: this is not an adoption question, it is an innovation question.*

This is, for example, what happened to the cellular phone market. The US started earlier with pagers, while Europe waited some time and innovated with cellular phones. In that market, the US is still behind Europe in terms of common standards, coverage and penetration. Indeed Professor Short says: *By assuming that Europe will adopt, rather than innovate, US companies will face strong international competition, particularly in*

services because they are deliverable through the Internet. Another issue is that Europeans will sort it out in a different way, what a multilingual business context really looks like as opposed to just offering translation services on a web site. The model of integration Europe is choosing is one that will preserve local language and cultural content but in a broader business context. Once that comes into place, you will have as large a market as the US, with European companies advantaged by their ability to operate in a multi-lingual, multi-cultural environment and US companies struggling with that. Another difference between the US and Europe is that Europe has very advanced applications for cellular phones and e-commerce will benefit from this. The US is a PC culture and companies tend to be trapped in the idea that e-commerce can only be PC-based. European cars, for most of the history of automotive industry, have been well advanced over the correspondent US market, for example in style. There is no reason to suspect that in this innovation process Europeans cannot come up with very innovative ideas on the product as well as on the information and services connected with that product.

The EEO model has very little history and very few applications, either in the U.S. or abroad. It is difficult to say what innovations, if any, will be created by the different approach to business that existing companies around the world may take. The advantage of the US in the infrastructure could be reduced by the adoption of different technologies (i.e., wireless), giving companies outside the U.S. the same starting point in applying the model. Professor Scott Morton emphasizes: *"EEO is not different among*

countries but different among companies. It is true that it is very new: any country is just at the beginning."

One example is Li & Fung, an Asian company in the textile industry that has adopted what here is defined as an EEO model. That company has been able to reduce the cycle of producing and delivering clothes to the European and American markets from twelve to five weeks. Moreover they are able to deliver door-to-door with the required assortment because of their ability to manage the logistics. The entire process is governed by information technology and allows the company to manage more than 6,500 suppliers in Asia while at the same time minimizing delivery time and costs and complying with national quotas (the industry is under GATT regulations).

2.4 Management Competencies

The experience of companies that have successfully implemented an e-business or an EEO show that the characteristics that managers and executives should have, reflect the novelty of the two models. The nature of the change, that implies working in a completely different environment, requires creativity in the design, and entrepreneurship in the implementation of the model. The option for large companies to spin off the unit as a new venture requires both of those characteristics. Professor Short points out: *"In terms of competencies, e-business is about new markets. So the principal set of issues that managers need to be made aware of is growing the e-business. It is intrinsically the question of management - which is typically taking under control certain resources -*

versus entrepreneurship, which is the growing of new resources and new opportunities. It means that you should provide them with the ability of envisioning opportunities, releasing control and focusing on creativity, looking opportunistically for growth areas.

E-business is more entrepreneurial, more of a business development type of job and generally you have very few of these people in large companies. Large companies have difficulties in attracting these kinds of people".

On the other hand, changing the existing organization requires change management competencies such as team building. Professor Scott Morton says: *"I would say that the usual set of skills such as leadership, team building, and ability to maintain focus are required. The EEO changes are similar to any large scale reorganization. One thing that I think is very important is listening. To be good in listening means having the ability to really see behind the words and be prepared to ask questions."*

In terms of how to create learning opportunities for executives involved in the new models, Scott Morton says: *"I think that one very productive thing to do is build prototypes and use them, take a very small piece at a time and show how the EEO works. The second thing that is very useful is to look at the International firms that have already done this and learn from examples. So, Schneider or Dell or Boeing 777 might be very instructive exercises to think through what they did and what might apply to another company".*

2.5 Conclusion

The availability of information and communication technologies is changing the environment in which established companies operate. The two models presented in this paper have proven to be very valuable tools for companies such as Dell and Schneider when redefining their business model to remain competitive in the new technological era. One aspect of the right approach in designing and applying them is to consider both what the customer wants and how an e-competitor would structure to fulfil those desires.

This is the perfect time to design and apply new models to existing companies. Not only is it technologically feasible, it is strategically needed. As Professor Michael Porter said in a speech at MIT in November, *"strategy is about being unique"*. The business models analysed in this paper are particularly interesting from this point of view because they allow companies to leverage the information technology to reach mass-customization. They also allow the company to collect customer information and be flexible enough to customize services based on that information, and to do this fast.

The sense of urgency that is driving companies to rethink their business models is not to be confused with improvisation. Nor does it imply that companies should build applications that might be acceptable but are not integrated with a more comprehensive plan. There are many examples of companies that have felt the pressure of establishing an "Internet presence" and have created E-commerce sites without taking into consideration its impact on the structure and on the processes of the company. The result is usually very disappointing and this can create a "propaganda" against the adoption of the new electronically enabled business models. The experience of many large

companies adopting new technologies is that those technologies create dots, or islands of efficiency, in a process. E-business is not about adopting a new technology (the dots), but a new way of using technology to enable the company's business (connecting the dots).

Many large companies have successfully worked in the last few years to improve their production process by leveraging technology. This is one step toward the new models. However, technology alone is not sufficient, particularly if applied to existing processes. There are two more steps to go: integrate these "islands" of high competencies in a seamless system that leverages the information and communication technologies to be responsive to the customer. This step implies the reinvention of the way the company functions and the people work. The last step is, eventually, to take advantage of the entire system to respond to customer needs and provide them with customized value added services.

3. Practical issues with the application of the EEO concept

This section is devoted to the analysis of a case study, Schneider National Inc., the largest truck load transportation company in the US[4].

The analysis stems from the concept presented in the previous sections, with the objective of discussing the practical issues that an "EEO observer" sees in this organization.

3.1 Schneider National A: Doing Business in a Changing World

Schneider National Inc. today is the largest trucking company in the US, with revenues of $2.7 billion and 20,000 employees.

Schneider's Beginnings

From its inception, Schneider National Inc. has been an interesting company. The company was created in 1935 when A. J. "Al" Schneider sold the family car to buy his first truck. He drove that truck for 3 years, making enough money to buy a second truck. In the first of many interesting approaches to business, Al leased both of these trucks to Bins Transfer & Storage, signed on as the company's general manager and then bought that company, all in 1938. That was the beginning of Schneider Transport & Storage.

[4] The case has been originally written by Andrea Meyer for Professor Scott Morton of MIT Sloan. The original text of the case is in italic, while my comments are in normal font.

During the 1940s and 1950s, Schneider Transport & Storage grew as an intrastate carrier in Wisconsin. The company ceased storing household goods in 1944, focusing instead on transporting food and household goods. At the end of this period, in 1958, Schneider got its first interstate license from the Interstate Commerce Commission.

Schneider has always been a private, family-owned company, and Al Schneider started grooming his son Don from age 16 to one day run the company. While in high school and college, Don worked part-time as a "go-fer," in the machine shop, and as a driver. In 1961, after military service and graduating with an MBA from Wharton, Don Schneider officially joined the company as general manager. Don's rise to CEO in 1973 coincided with a new period of growth for Schneider. The company dropped the "Storage" part of its name in 1962 (to be named Schneider Transport) and diversified operations. Schneider added a fleet of tank trailers for liquids to create what later became the Schneider Bulk Services division. Schneider also began acquiring other trucking companies, increasing both the depth and range of its operations. With his ascension to CEO, Don Schneider restructured Schneider Transport into a holding company with diverse trucking-related units.

Deregulation Brings Changes

In 1980, everything changed in trucking. The passage of the Motor Carrier Act ended the age of regulation, opening new potential opportunities and threats for everyone in the industry. Trucking companies were given much greater leeway in what services they could offer, where they could operate, and how they could price trucking.

In particular, it become much easier for any trucking company to operate in any state. Anyone with the money to buy a truck could become a competitor. The number of trucking companies tripled between 1980 and 1995. The resulting competition was brutal -- the decade of the 1980s saw 12,000 trucking companies go bankrupt.

Global Competition in Manufacturing Brings Changes

The changes did not end there. In the 1980s and 1990s, American industry was also changing. Global pressure from low-cost producer nations drove manufacturers to improve operations. Concepts like quality and lean production became prevalent, which had unexpected effects on carriers like Schneider. For example, carriers came to be rated on their quality of services (on-time delivery and the like). The use of Just-In-Time manufacturing techniques challenged existing logistical systems. Companies like FedEx arose and conditioned people to expect everything overnight, while companies like Wal-Mart showed everyone the benefits of a well-run distribution system.

I have already discussed in section 1 the speed as a driving force of changes in the business environment. Very often the "Internet era" is seen as the only reason for the increased speed in business. However, in my opinion, Internet has only amplified a phenomenon that was already occurring. Just-in-time techniques in fact, have largely driven the need for faster response by suppliers, well before the Internet.

Schneider is facing a common issue: customers do not only about cost. Schneider is requested to deliver a better service, in terms of quality and reliability, at faster pace

and at lower cost. These characteristics of the service cannot be seen as a trade-off anymore (Hammonds, 2000).

Worse, lean manufacturing meant that companies needed fast, reliable deliveries of smaller loads. With little inventory in raw materials, a botched pickup or a late-running truck had a greater detrimental effect on the receiving company. Smaller loads also had an impact on carriers: because the costs to operate an empty truck are almost as much as operating a full truck, the smaller loads added greater expense to carriers, (because there were fewer pieces delivered for the same fixed shipping cost). Finally, empty trucks returning from delivery jobs are a constant problem in trucking. These so-called "deadhead" trips (driving an empty truck to a location) can as much as double the cost of a delivery. Manufacturers grudgingly pay the costs of deadhead return trips and LTL (less-than-truckload) service, but constantly look for ways to trim such costs.

The issue of a quasi-fixed-cost of the product can be found in many different industries. For example, the software industry faces the same challenge: once developed, software has a marginal cost of production pretty close to zero, or at least not relevant. Profits can be very high if the customers are numerous. This is, in a slightly different flavor, the same issue that transportation companies face: the cost of the trip is almost fixed and the marginal cost of adding another load is almost zero, up to the full capacity of the truck. Real-time information about the available capacity is then fundamental to operate at a higher level of efficiency and therefore increase profits.

In this changed environment, the dimensions of competitive advantage are three-fold. Trucking companies with a low cost-per-mile have an advantage. Trucking

companies with a good on-time delivery rate have an advantage. And trucking companies with a solution to the deadhead and small-load problem have an advantage. Any trucking company that could do all three would be a clear winner.

The EEO model applies perfectly to this case and enables Schneider to cope with the three dimensions of the competitive advantage cited above. It is evident that the ability to collect digital data about the loads directly from customers, to process the data in order to optimize pick-ups and loads, to automatically assign loads to other carriers where economical, and to support the drivers with any useful information that simplifies their job would reduce the deadhead and small-load problem. This in turn would reduce the cost-per-mile and, at the same time, would enable better on-time delivery rate.

3.2 Schneider National B: Leveraging Technology to Improve Trucking

The 1980s and early 1990s were challenging times for trucking companies due to the combination of deregulation and of changes in American manufacturing methods. These two sources of change created new demands on trucking companies to both reduce their costs and improve their service. Schneider National chose to pursue a technological route to creating competitive advantage.

In today's business environment, low price no longer ensures a competitive advantage. Low price is, in most industries, a necessary condition for remaining in the market. Instead, what can create a competitive advantage is the ability to deliver a better service than the competitors and respond faster to changes in customers' needs.

Reducing costs and, at the same time, improving service is quite a new concept. Historically, this issue has been seen as a trade-off: you can improve the level of your service but this would increase your costs. Some companies were not even able to fulfil this rule. They often increased costs without delivering better service, mainly because of coordination problems due to the increased complexity of the processes. A discussion about the reasons for that is out of the scope of this work. What is relevant here is the fact that technology has allowed, only in the last few years, to break this paradigm and achieve both better service and cost reduction. Of course this result is not automatic: applying technology by itself is not a guarantee of cost savings and better quality. The next paragraph introduces two important conditions for a successful achievement of this result.

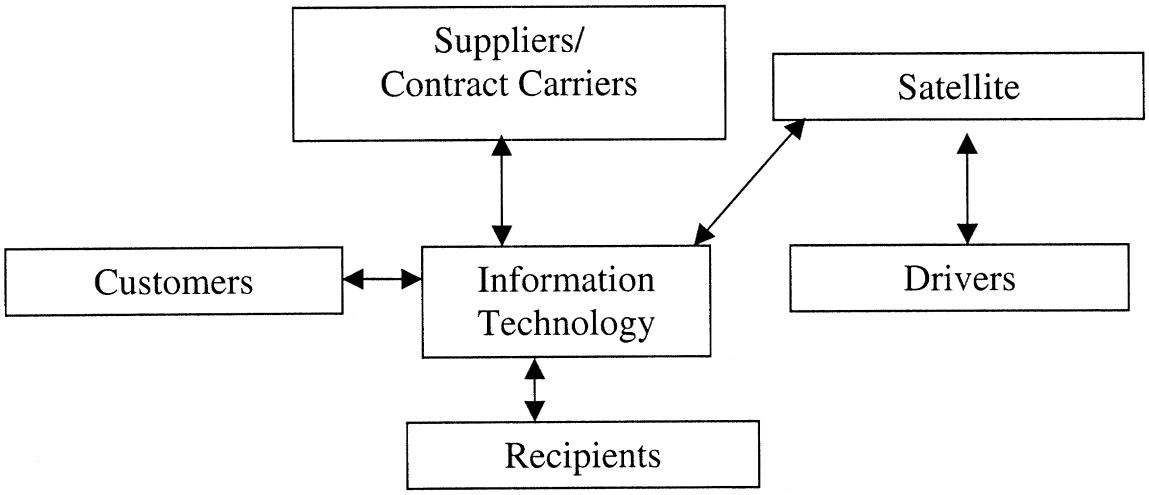

Figure 8 - Schneider's use of information technology

Introduction to Schneider's Technologies

This case describes the technology solutions created and deployed by Schneider in their efforts to be competitive. These technologies contributed to necessary performance improvements either in terms of Schneider's cost of service or Schneider's quality of service. Schneider's process for investing in technology is to spend money strategically, looking at long-term technology spending and aligning it with the business. As Chief Information and Logistics Officer Christopher Lofgren explained, "We won't go after an IT project unless there is a business leader who will take it, fund it, and be accountable for the business outcome." Schneider employs 180 applications development personnel and has formed a steering committee of senior leaders from business as well as IT to prioritize the IT projects it works on. "We look at IT expenditure as an investment that we can turn into revenue and profit advantage," Lofgren said.

As simple as these concepts seem, they are key conditions for a successful implementation. In my opinion, there are three major elements:

- The necessary alignment between technology, strategy, people, organizational structure, and processes. Technology must be an enabler of the business strategy and must allow leaner and faster processes
- The new role of IT in the companies. Far too often the implementation of technology in a company has been seen as a "job for technicians". Historically the IT budget has been allocated to the IT function and the development of business applications has been lead by IT people. As a result, very often, the new application was received by the business as a sort of tax both in terms of expense and impact on

the day-by-day operations. The shift of responsibility and budget to the business is very important to assure the commitment of the business people. At the same time, the IT function needs to evolve into a consulting function that is able to understand both the business and the technology that can enable that business to be more competitive. This evolution implies a completely different mindset of the IT people and, of course, different skills (Dalton, 1999).

- As a result of the previous two points, technology changes in nature from a "necessary expense" to a source of competitive advantage, by aligning technology with strategy and process, and committing the business to take advantage from, and see the opportunities offered by the technology.

Major elements of Schneider's portfolio of technology include:

* *SUMIT: the core multi-function shipment planning and management system*
* *EDI: Electronic Data Interchange for instant paperless communication between companies*
* *Two-way satellite communications between drivers and headquarters*
* *STAT: web-based shipment tracking and tracing system*

Although Schneider chose to invest in technology, the investments represented a means to an end: achieving the operational performance demanded by its customers. The reality that technology was just a means to an end was put best by Don Schneider when he said:

"When we first put a satellite in, I was telling one of our major customers, an automotive company, how good this communication would be. They said 'Look

Schneider, I don't care if you use carrier pigeons to talk to your drivers. All I care about is that your price does not go up and that you deliver on time, any way that you know how.'"

Schneider Utility for Managing Integrated Transportation (SUMIT®)

The core of Schneider's shipment planning and management system is called SUMIT (Schneider Utility for Managing Integrated Transportation). SUMIT is a multi-faceted system, providing subsystems for order management, load management, and carrier management.

For its order management functions, SUMIT ties directly into the customer's order entry system. It creates a paperless environment for accurate, real-time information to customers, carriers, and management. This order entry system lets the user interact with SUMIT using a variety of referencing schemes, such as the shipper's part numbers, the carrier's tracking codes, or billing codes.

One of the issues that characterize an EEO is the needed for connectivity between the front-end and the back-end. Unless this connection exists, the model is incomplete and it cannot deliver the advantages I have presented earlier in this work. Many companies are technologically advanced either in the front-end (e.g. advanced e-commerce web sites) or in the back-end (e.g. digitally-controlled production machinery). Those companies will probably enjoy a good automation of the existing processes, with some efficiency in terms of costs or time. However they will not enjoy the full advantages of an EEO because of the lack of connection within the company and between

the company and its customers and suppliers (Prince, 2000). Schneider understood quite early how the attention to this issue would have made the difference with competitors: SUMIT, that is a software for back-end management, is interfaced with the customer's order entry and the two-way satellite communications on the trucks, which are both front-end activities.

Proper load management is essential for low-cost, high-quality logistics operations. SUMIT helps consolidate less-than-truckload (LTL) shipments into full truckloads for maximum efficiency. SUMIT also selects the optimal carrier (surface, rail, water or air), based on the nature of the load and its urgency. Part of this subsystem includes a database of profiles on all shipping and receiving sites, vendors and distribution centers. Having chosen the best carrier, SUMIT even sends appropriate messages to the carrier to alert them of the load. SUMIT supports numerous communications channels, including EDI, internet, dial-in via CompuServe, automatic faxing, or manual (phone).

Load management also includes the tracking of shipments. Therefore, SUMIT maintains a database of all inbound and outbound product shipments for all facilities. This element of SUMIT ties into STAT (Schneider Track and Trace), a web-based application for checking shipment status. SUMIT monitors all movements to ensure on-time pickups and deliveries. Late shipments and problems with shipments trigger exception handling alerts to appropriate personnel. These functions ensure that loads are delivered as promised, triggering payment processes in turn.

Proper management of logistics and loads also requires a system of managing a portfolio of carriers. Most companies use multiple carriers for reasons of location, mode of shipment, capacity, and to serve special needs (larger companies may use in excess of 200 different carriers). Even Schneider uses other carriers for extra capacity, flexibility, and special needs. SUMIT therefore includes a carrier management subsystem that identifies all contracted carriers, payment specifications, contract rates, and service level measurements. SUMIT uses this information to determine the optimal carrier for each load (in the load management subsystem) and to handle invoices and payments associated with carriers. The system can even reflect volume discounts, ensuring that each carrier receives their contractual share of the shipping. This subsystem also ensures that carriers are automatically paid (electronically) for completed loads and in accordance with pre-defined rate schedules.

EDI (Electronic Data Interchange)

Logistics has traditionally been a paper-intensive process. The costs of all this paper are substantial because three different companies must process it (the shipment's sender, the carrier, and the shipment's receiver). In an effort to eliminate these costs, Schneider National has been a pioneer in EDI (Electronic Data Interchange). With EDI, companies communicate routine business transactions via computer-to-computer connections and a standardized language for business (such as the X.12 standard). EDI avoids the costs and delays associated with the process of printing, physically sending, and then re-entering transaction data.

EDI has numerous advantages beyond the simple reduction of paper-handling tasks. EDI transactions are far more accurate, and they substantially reduce reconciliation tasks (when discrepancies are found in the records). EDI data flows directly into enterprise computing systems, permitting immediate and automatic actions (such as funds transfer for bill paying).

Schneider National was an early adopter of EDI and helped shaped industry EDI standards. Schneider even uses EDI to automatically receive and send notices on shipments. More than 35% of Schneider's customers use EDI to send notification of the loads they need carried. As of September 1998, 65% of all invoices at Schneider are now processed via EDI.

Computer-to-computer communications show a very important characteristic: they are almost error-free. This is a great advantage of an EEO and shifts, together with the power to control the process, the responsibility of correctness of data entry to the first point of the chain, usually the customer. If there were not any other advantages, the strong integration between a company, its customers and its suppliers allows performing just one data-entry. The result is, of course, faster spread of data along the chain and elimination of costly reconciliation.

As I discussed in section two, EDI has been a leading but quite rigid and costly technology for e-business's ancestor. Only large companies and few forward-looking small and medium enterprises could afford this paperless digital technology. Those companies, despite having suffered the technical difficulties typical of the early adopters, have enjoyed some early advantages. They had the chance to experiment the integration

with customers and suppliers in terms of procedures, going through the learning curve in a time when this integration was not vital. Companies that are doing that now are under pressure because their short-term survival, not long-term existence, is at stake.

The improvement in data communications and the development of web-based technologies have allowed the adoption of integrated, computer-to-computer communications at a very small dimension. Small and medium enterprises can now afford those technologies and enjoy, or more and more suffer this integration. By the same token, even individuals can use the technology to be part of the game.

By being an EDI early adopter, Schneider had the chance to participate in the definition of the standard. Its commitment to an emerging technology such as EDI in the 80's shows Schneider propensity to leverage technology and it developed the culture to deal with it among the employees. This culture is, in my opinion, a great advantage today. The Internet will also allow Schneider to target the consumer market with no substantial increase in costs. With Schneider's ability, as we will discuss later, to use data in order to achieve full loads, the consumer market could be a good complement, with lower revenue per customer, but higher margins.

Satellite Communications Technology

Traditional IT (computers and software) are only part of Schneider's technology strategy. Schneider National also invests in and spends money on communications between its control centers and its trucks. Schneider National invested some $3,500 per truck to install satellite communications and tracking systems in every truck. Beyond this

initial investment, Schneider National spends an additional $7-$10 million per year (about 0.5 cents/mile) in satellite transmission costs.

Before installing this communications system, the connection between the control center and the driver of the truck was tenuous at best. The control center had no way of reaching drivers while they were out on the road. To communicate, drivers had to pull off the highway, find a phone and call Schneider's center. Often, drivers would be put on hold, either waiting for a person to talk to or waiting for a reply. If the control center did not have an answer (such as for where the next pick-up would be), then the driver would be told to try calling back later. This system was frustrating for both drivers (who are paid to drive, not to sit by the side of the road on the phone), for headquarters (who could not query drivers or alert them to upcoming events), and for customers (who could not get timely answers about shipment status). With the communications system, both the center can contact the driver and the driver can contact the center while on the road.

Also, before having this communications system, Schneider National barely knew where its trucks were. Although drivers would report where they were when they called in, such reports were sporadic. Worse, these reports depended on the driver's ability to determine and report location and Schneider's ability to understand the report and translate it into a map location. With the new system, every communication between truck and center is automatically tagged with the trucks true location (accurate to within about 100 meters). Moreover, even in the absence of messages between the center and the truck, the system automatically polls every truck every two hours to check their locations.

An example of a pragmatic solution to reach the drivers is to provide them with a cellular phone. Although this would improve the process, it will not integrate with the system. Data exchanged over the phone must then be entered in the system by some human beings, increasing the delay, the risk of errors and the cost. Schneider chose the right approach to the EEO concept by implementing digital technology and messaging in order to have online, real-time data availability. At the time they chose the satellite technology, this was the only reliable technology they could use, particularly in the US. Cellular phone coverage, in fact, was not – and still it is not – fully deployed in the US. In areas where the digital cellular network is available almost everywhere, such as Europe, companies could use this cheaper technology but would not be integrated with the system. Wireless data communication is becoming quite fast and reliable and many wireless operators are developing services to enable customers to use their network for fast data transfer. The cellular system could also be used to locate the truck through the identification of the cell in which the phone is operating. Although it is not as precise as the Global Positioning System (GPS) adopted by Schneider, it could represent a cheaper solution for other applications where the cost of equipment is the key issue. This solution still suffers from technical issues, since it would imply the real-time, online availability of the cell identification from the phone operator.

In addition to localizing the truck for operating purposes, the GPS is also an effective anti-theft system that in turn provides security and reliability to the service, increasing the value for the customer.

The contents and scenarios associated with the satellite communications run the range from the ordinary to the extraordinary. The truck's on-board system includes pre-formatted templates for some one hundred different types of messages. The system includes both headquarters-initiated and driver-initiated messages. All messages are all-digital, so they can be logged within Schneider's IT system.

Many messages communicate the routine events associated with trucking. Drivers send routine status messages associated with the progress of the trip, such as arrivals and departures, pickups and deliveries. These status messages help Schneider track every shipment for improved customer service. Headquarters sends messages with instructions on what to pick-up and where. Thus, drivers find out about their next load or changes in instructions as soon as they are known. The two-way nature of the channel lets drivers ask for more detailed instructions or to tell Schneider about preferences that they might have. Associated with all these messages (or at least every two hours) is the latest information on the truck's current location.

By collecting these messages and mining them appropriately Schneider would be able to analyze the most recurring problems to further enhance its service. In addition, those messages could be made available online to customers with the shipping record to add transparency to the service and let customers analyze the messages in order to avoid problems that depend on them. Once more the system would increase the value of the service.

Because trucking faces a range of uncertainties and exceptional conditions, many messages deal with extraordinary events. Schneider National is tapped into National

Weather Service systems so it can send updates to drivers regarding inclement weather. Drivers can send alerts concerning a range of problematic conditions, from loads that are not where they are supposed to be, to closed or full loading docks, to traffic jams, breakdowns, or accidents.

This is another good example of integration with suppliers. In this case the National Weather Service (NWS) is a content provider. From the case it is not clear whether Schneider is digitally integrated with the service or they simply originate and send out a digital message based on the information gathered from NWS. To correctly apply the concept of EEO they should pursue this digital integration in a two-way manner. Digital information from NWS would be sent to each truck, based on its actual position, while each truck would send back updated local weather information to NWS. Considering the large number of trucks that Schneider operates all around the United States, this feedback information to NWS could be very valuable. By the same token trucks could exchange information with traffic services.

Despite the up-front and recurring costs, the system creates critical improvements in cost, on-time-delivery, and customer service. Because all messages are digital character data, formatted into a set of message templates, detailed logs help Schneider National stay on top of every shipment and analyze the true travel time of shipments.

With routine two-way communications, Schneider National can confidently schedule drivers for pick-ups and deliveries. Tracking information helps Schneider National reliably predict when a driver will be available for the next load and therefore to schedule another pick-up in the immediate area (rather than waiting for the driver to

call at some uncertain time in the future). The result is both better asset utilization (less time spent parked) and fewer empty miles driven.

The reliability embedded in the system is a great value for the customers. Schneider operates mainly in the business-to-business arena, where reliability of transportation has become a key issue for JIT techniques. By being reliable in pick-up and drop-off time, Schneider has a competitive advantage in business-to-business service. Once more, the ability to generate digital data enables the integration with customers' systems, therefore Schneider can offer such critical services as JIT transportation.

In April 1999, Schneider announced plans to extend satellite technology to its 43,000 trailers, in addition to the 14,000 tractors that currently have the system. The new communications and sensor technology embedded in each Schneider trailer will detect when a trailer is connected or disconnected from a tractor, if it is loaded or empty, and what its GPS position is. Schneider worked with ORBCOMM for two years, actively participating in the design and development of the system. "We expect our trailer productivity to improve significantly," said President Don Schneider, "which means better service to our customers."

Schneider invested in QualComm's OmniTRACS system in 1988, being the first in the industry to use such a system. Now, 280,000 trucks use the system. Schneider is again the industry pioneer in extending the technology to trailers. The system, called Vantage, will let Schneider better manage the productivity and efficiency of its trailer assets by linking critical trailer location and status directly into Schneider's fleet management and logistics systems.

This again is a very important point of an EEO: better asset utilization. The digital control of assets leads to higher productivity. Data from trailers should be made available to customers in order to improve their decision process: they would have perfect information of location and space availability of each trailer and could plan consequently. It would also "materialize" the service, since the customer could figuratively see the trailer.

This advantage of "materializing" the service may not be so important for Schneider since they have already established a reputation of a reliable company but, in more general terms, it would be a great advantage for companies whose reputation is not yet established, or for services where "materialization" plays a big role in customer perception (Bitran, 1993).

Schneider Track and Trace (STAT)

STAT provides secure online access to shipment status information over the World Wide Web. It works in conjunction with SUMIT (Schneider Utility for Managing Integrated Transportation). STAT taps into the location and status data from Schneider's satellite communications system to tell customers the most up-to-date status information possible. STAT provides 24hr/day access to the information directly over the Internet, through a secure site, letting Schneider's customers bypass the traditional customer service phone center.

The in-route positioning of the truck, interfaced with the tracking system, is a very powerful feature, far better than the UPS's or FedEx's "last tracking" information

tool. In fact, customers are able to locate exactly their shipments and plan accordingly. As already stated, this feature has little direct application for consumers, while it is the one that allows companies to work JIT.

Bypassing the traditional customer service phone center has great advantages. A successful implementation of this approach is Cisco. The company has shown how the proper use of internet-based customer service is far cheaper and more effective than traditional customer service (Kalin, 1999). Online customer service has very low per-contact cost due to the fact that the initial cost of the service is spread among a very large number of customers without appreciable cost increase with the increase of the number of customers. The phone-based service, in contrast, has a quite relevant variable cost due to the need for a congruent number of service representatives. The lack of scalability of the traditional service is particularly relevant in fast-growing companies with a high component of customer service embedded in their business. In addition to lower costs, online customer service increases customers' satisfaction because of two reasons. On the one hand it allows concurrent queries from different customers, reducing waiting time, on the other hand it gives the customer the ability to look through the service, therefore feeling the importance of it.

One key feature of STAT is its flexible approach to identifying shipments. Where other systems require a special tracking ID number, STAT lets users take a number of different approaches to identifying the appropriate shipment. These include a number of typical ID numbers (either the customer's or Schneider's), as well as location codes, pick-up/deliver end points, and date ranges. The intent is to make it easy for users to find

their shipment of interest. This aspect of STAT makes use of the ability of fast computers to search through large databases.

Here again we observe the front-end and back-end connection, one of the pillars of the EEO concept. Data from operations are made available to customers without any manned intervention.

One more characteristic of a successful implementation of technology is its ability to be transparent to users. The overused example of the first VCRs, which had hundreds of functions, almost useless, at the cost of a very complicated user procedure demonstrates the point. Technology must be user friendly, regardless of the complexity of its function. In other words, its implementation must make the life of customers easier. If it fails this objective, it will require a specialized interface (almost always a human interface) that by definition introduces costs, delays and errors in the process. The flexible approach to identify shipments adopted by Schneider is in line with this requirement. The advantage of this flexibility is twofold: it simplifies the process of searching for a shipment, adding value to the service therefore differentiating Schneider from its competitors. In addition, the ability to search for the shipment in different ways increases the probability that the customer is able to find it, therefore decreasing the need for manned customer service. Once again the technology enables both lower costs and better service.

Proactive Y2K strategy

Schneider has also been proactive about addressing Y2K bug concerns in its now-extensive IT infrastructure. The date-sensitive nature of logistics makes bugs in date computations especially problematic. Schneider started its Y2K compliance program back in 1995, long before most other companies were even aware of the problem. Schneider's Y2K efforts focus on areas like internal software, EDI, software embedded in trucks, supplier compliance, and critical telecommunications infrastructure. Its leading role in this area lead to the invitation of Schneider's chief technology officer to testify to the U.S. Senate about the Y2K problem.

Result: Technology Reduces Costs and Improves Service

A technology-intensive strategy has worked for Schneider National. Between 1980 and 1998, their cost-per-mile has dropped from $1.00/mile to $0.60/mile. Internal costs have dropped by 24% through more efficient administration. Satellite-based tracking of truck's locations has lead to a 25% decrease in "deadhead" miles (driving an empty truck to the next location). Decision support helps Schneider know how much to charge and whether it can profitably accept any given shipment.

Schneider's quality of service has also improved. The fraction of late deliveries has dropped by more than a factor of 10, even as delivery deadlines have tightened. Automated information systems have reduced errors and improved responsiveness to customers. EDI (used for more than 35% of all loads and 65% of all invoices) has made Schneider easier to deal with and has accelerated its cycle time. Despite all the hefty

investments in IT, the overall drop in costs have more than paid for these investments. The result is that Schneider National has been called "an information system masquerading as a trucking line."

As we have seen, the EEO concept calls for the death of the trade-off between cost savings and better service.

The growing importance of information, sometimes bigger than the service itself, shows where the market is heading. It is a huge opportunity for traditional business to create new business opportunities by attaching information to an existing service or product. This process adds value to the customer and extends the value chain for the company. Although the telecom industry is somewhat different than traditional industries, there are a couple of examples worth mentioning to show how the value chain can be extended by adding information. In Europe, many telecom companies have started to offer content in addition to the connectivity service. Telecom Italia operates tin.it, one of the largest internet portals in Italy. By doing that, Telecom Italia has extended its value chain, adding value to shareholders and providing value to customers. By the same token, the recent acquisition of Mannesmann by Vodafone AirTouch aims to provide customers (subscribers) and suppliers (content providers) with a global internet platform for cellular phones (Evans, 1999).

Adding information also improves customer retention and loyalty. It should be used to reach a customer "lock-in position" (Hax et al, 1999)[5] because it increases the switching cost.

So far there is no evidence of process redesign by Schneider. Established companies that start the transition now should consider the need to review and redesign their processes while implementing the EEO concept. Implementing it, is not a matter of "automating a process". Instead, it is about leveraging the technology to streamline, simplify and speed up processes in order to be more effective and responsive to customer needs. During the design and implementation it is important to continuously monitor alignment between strategy, technology, people and processes. The case of Schneider could lead astray because of their long-lasting tradition to use technology as a strategic leverage. Companies that realize now this opportunity may encounter more difficulties not only during the implementation phase, but also in the previous design. This issue of alignment will be explored in the next part of the case.

3.3 Schneider National C: Changing People & Processes in a Changing World

During the 1980s and 1990s, Schneider National faced challenges associated with both deregulation and changes in the logistics demands of American manufacturers (due to global competition). Schneider National chose a strategy of creating and deploying new technology to improve both costs and quality of service. Although such

[5] For more information on this point, please refer to Hax, A., Wilde, D., The Delta Model: Adaptive Management for a Changing World, MIT Sloan Management Review, Winter 1999, Vol 40, No. 2

technology created an infrastructure for efficient, high-quality operations, it did not, by itself, create these organizational attributes. Along with technological changes have come changes in peoples' jobs and associated business processes. These changes are especially strongly felt in an organization from an industry with a traditionally non-technological past, as the trucking industry was.

This part of the case leaves strategic and technological aspects and presents the two other major components of the implementation of an EEO: people and processes. A successful design must align those four elements in order to achieve the superior performance we expect from an EEO. The top management should be highly involved in the definition of the alignment.

Many companies are struggling with how to define a viable and successful EEO strategy and which technologies to use. The reason is that it is often difficult to think of a strategy in a completely different way from the past (Booker, 1999). In the case of an EEO, the relationship with suppliers must be seen as a collaborative partnership instead of the traditional competitive negotiation relationship (Gillmer et al, 1999). In the last few years some industrial companies have moved toward closer relationships with their suppliers. For example, many car makers have started programs of co-design and co-makership so they have already started the learning curve of the new relationship. On the other hand, customers become very important players because they define the characteristics of product and services that the company must deliver and they drive, through their preferences, the design of new products. Companies may take advantage of the opportunity offered by the EEO concept to become more intimate with customers, but

they have to pursue a real customer-oriented strategy that shifts the emphasis from sales to responses to needs. From this point of view, the relationship with customers must become collaborative too. The key issue is the need to share "internal" information with both suppliers and customers. Although companies are able to define a new deal of relationships with suppliers and customers, the real implementation of these relationships often slows down due to lack of information sharing (Teresko, 1999).

Designing the alignment of people and processes is somewhat more difficult because it involves dealing with human beings. People have a natural resistance to change themselves and to change the way they operate. The motivation to change is a function of several factors that are out of the scope of this work, however age and company's culture affect employees' propension towards change. On the processes side, the "we have always done it this way" syndrome can be very tough, particularly in established companies where habits and procedures have been consolidating for years.

So far, the case has analyzed the "easy part": defining the strategy and leveraging the technology is a matter of management choices. Now the case starts the analysis of the "tough part": the implementation of the alignment of people and processes to the EEO concept.

Schneider's Culture

Schneider's culture has helped Schneider's investment in technology take hold. First, the company goes through a thorough selection process for each new hire. "We take a lot of time and effort in our selection process," said Tim Fliss, Vice President of

Human Resources. "We have a detailed selection process, with 12-13 behavioral dimensions. We use a lot of different instruments, with each [non-driver] employee going through 6-7 hours of structured interviews in one day. We look for a rounded skill set and alignment with our values, which include learning throughout your career. We look for people who are comfortable with technology, by asking things like whether they have a PC in their home."

The selection process tends to weed out candidates who don't connect well with technology. "They tend to self-select out," Fliss said. "We do hiring in the operating centers, so when you come for an interview, you see people with PCs on their desk and headsets -- its obvious the role technology will play in your job," Fliss said.

Alignment with company's values and a good set of skills are common requirements. Another important point is a willingness to learn, people's willingness to change and improve. The other point is the required familiarity with technology: it is not important whether they know how to use a PC, but their mindset. The ability to cope with today's technology, is an attitude that enables people to migrate to another technology tomorrow. One issue that large, established companies are facing is that most senior managers are not familiar with technology and so they tend not to understand its purpose. Changing this mindset is sometimes more difficult than changing people (Hammonds, 2000). Schneider tries to avoid the problem by hiring people that are more prone to change and technology savvy, but established companies should be aware of the limit to implement an EEO imposed by employees uncomfortable with technology, since technology plays a big role in it.

Once hired, all non-driver employees spend at least 2 days in training (managers spend 4 days). Employees learn about the industry and about the company, with Don Schneider himself leading the sessions that describe the company's core values. Even employees working at Schneider's Operating Centers nationwide (about 3/4 of the employees) feel the powerful family feeling and care of the Schneider culture. "I started as a maintenance shop manager, and everywhere you had a powerful feeling that you could believe in the leadership, in Don, and that they were trying to do the right thing," Fliss said.

The human side of the EEO implementation has many aspects in common with any organizational change in a company. If employees are given the opportunity to understand the vision and the strategy, and they can share the values, they will more likely be able to offer solutions to customers and to suggest better ways of doing things, i.e. review the processes. With this training program, Schneider gives this opportunity to all employees, therefore increasing performance and the buy-in for changes. Companies in the process of implementing the EEO concept should plan an adequate information campaign to share the strategy and the phases of implementation with all the employees. Knowing the strategy will help employees to understand where the company is heading and, very often, will provide them with an answer to apparently incongruent changes, giving them the ability to suggest process redefinition.

Schneider also holds annual banquets for its drivers and their spouses. About 40 banquets are held each year in regions throughout the US. "It's an opportunity to recognize people for their achievements and tell them how business is going," Fliss said.

High attendance rates demonstrate the value of the banquets, which motivates the company to continue hosting them. "Since they do cost time and money, we've wondered about holding them, but the turnout is great. I went to one in Toronto in February which had 650 people attending."

Schneider's culture is characterized by its identity statement: "The Orange On-Time Machine: Safe, Courteous, Hustling Associates Creating Solutions That Excite Our Customers."

"Orange isn't just a color, it's a way of life," said transportation planning leader David Dietrich. President Don Schneider models hard work and humility and continually praises the efforts of Schneider employees. "He talks to every new drivers class, explains the company's values, and makes everyone aware of their importance to the company's goals. Everyone in that operation knows that their job is serving the customer," remarked one satisfied Schneider customer.

Alignment at all levels with the new concept is very important. Schneider's drivers are the operating arm of the company and, because of the lower human interaction due to the online technology, they are often the real front-end, the interface with the customer. The high level of integration creates a negative side-effect: the overall effectiveness of the service is defined by the weakest part of the system. If at any level the quality degrades, the entire service will degrade. That is why it is important that everybody share the strategy.

Schneider's drivers must also be technology savvy: traditionally this job has been for more mechanical-oriented people. However, in the last few years, trucks have come with a lot of technology on board so drivers are more technology-oriented now.

The entire concept of EEO lays on the flow of digital information back and forth between the front-end to the back-end, therefore data entry acquires an important role. Companies that implement the concept should be sure that front-end employees understand how data feed the system so they will commit to supply them. In the case of Schneider for example, drivers should be made aware of how data and messages they enter flow within the company to help operations and outside the company to provide value to customers.

Schneider is the largest trucking company in the US, but it is agile enough to form strong partnerships with customers. Employees see themselves as innovative, responsible and enthusiastic. Schneider has a fairly flat organizational structure, and Don Schneider makes it clear that everyone in the company is responsible for meeting customer expectations. As a result, one of management's top priorities is pushing information throughout the company so that decisions can be made at the appropriate level, particularly at the driver and customer service representative levels where key interfaces with customers take place.

This is exactly the point: in order for all employees to be able to meet customer expectations, they must have the appropriate information (Lieber, 1999). The EEO concept goes beyond that, by allowing all company's interfaces to exchange digital data,

therefore enabling real-time data transfer. Digital data also enable data processing by software that can add value by streamlining processes.

The company's culture has helped it win new contracts. Ed Root, former Director of Transportation for Libbey-Owens-Ford, interviewed Schneider drivers on the road when he was considering a long-term dedicated carriage partnership with the company. The drivers' genuine regard for their employer was a key factor in his company choosing Schneider for the job.

The technological advances Schneider made affected all of Schneider's employees. Some of the key traditional trucking people (by job function) that were affected by the advancing line of technology include:

* *drivers (who move the loads)*
* *customer service representatives (who work with customers)*
* *service team leaders (who support/manage drivers)*
* *transportation planners (who assign loads to drivers)*
* *mechanics (who repair and maintain trucks and trailers)*
* *brokers (who find external carriers to handle particular loads)*

Changes for the Drivers

Drivers are very important to Schneider on multiple levels. Not only do they execute pick-ups and deliveries, but they are the face of Schneider at its customers' loading docks. On the financial side, drivers account for some 40% of the cost of

shipping, making driver pay and productivity major factors in the price of Schneider's services. At the same time, driving is a hard job, and few drivers stay with any company (or with the profession) for very long. On the driver side, pay is largely on a per-mile basis, so drivers want to drive as many miles as possible.

This is another example of the role of integration in an EEO. Since the drivers' pay is on a per-mile basis, either the odometer of the truck or the satellite track could be used to supply data for accounting for driven miles and therefore compute drivers' salary.

The Impact of Satellite Communications

When Schneider introduced the satellite communications system, there were major concerns about how drivers would react. Would drivers be able to learn to use the equipment with its keyboard, computer screen, and commands? Would drivers resent that "big brother" was watching their every move? The actual results highlight the challenge of predicting the effects of technology.

With regard to usability, Schneider was pleasantly surprised at how quickly drivers learned to use the new system. The "big brother" question created mixed results. In general, the drivers liked the system because it offered a major boost in their productivity. The new system meant no more wasted time in pulling off of the road to find a phone, call Schneider, be on hold, etc. Because drivers are paid for miles driven, a ability to stay on the road and moving was especially valued. Moreover, drivers liked that the messaging system replaced much of the tedious paperwork and driver's logs that

they previously used to have to complete. At this level, the improvement to their own jobs outweighed a knee-jerk resentment of the increased oversight.

Where the "big brother" issue arose was on speed limits and daily limits on amount of driving. Schneider mandated that drivers not drive faster than 55 miles per hour and that drivers not drive more than the legal number of hours per day. With the satellite tracking system, Schneider could enforce the policy, much to the displeasure of the drivers. When U.S. national law lifted speed limits to 65 in some areas, Schneider was initially reluctant to raise the limit because it could not be sure that the driver was actually on a stretch of road that permitted faster travel. Eventually, Schneider did give into pressure from the drivers, raising the speed limit. Schneider also helped stem driver resentment by offering drivers a bonus for staying within the speed limit, rather than punishing drivers who violated company policy. In any case, the ability to enforce policies on speed limits and duration of driving reduced Schneider's accident rate by 35%.

Not only does this improve drivers' safety, but it preserves company's assets and increases reliability of the service to customers because of less accidents.

The implementation of the EEO concept can create many situation like the one described here: the amount of data available and the strong integration of processes adds control to any operations, therefore employees could feel this situation as invading their privacy. While a better control of assets can be of great advantage, a strict control over people is very unpopular. Companies should find a balance and, as Schneider did, implement rewarding systems instead of sanctions. As we have seen in section two, the

reward system must be aligned and consistent with the strategy. This will help employees to better understand and buy-in the strategy, since they have a feedback that is concrete and measurable.

How Technology Improves Relations with Drivers

The combined effect of Schneider's technology has helped Schneider improve working conditions for drivers and therefore improve its relationship with drivers. These effects go well beyond the simple fact that drivers no longer waste time stopping to call for instructions. At the core of the issue is that driving is stressful and takes drivers away from family. Technology helps minimize and ease this problem.

Two-way satellite communications permit families of drivers to send emergency messages to the driver at any time. Prior to this system, drivers would worry about their families because drivers were unreachable. Now that families can contact the driver, anxieties are reduced. Technology also tracks the dates of birthdays and anniversaries, helping to avoid scheduling loads on those days. Technologically-mediated coordination improves both the drivers' ability to get their driving done and to make and keep commitments to family and friends. Schneider can even coordinate a sequence of trips so that drivers can make it back home 2 days a week.

Employees represent a big chunk of the major stakeholders of a company and an EEO will integrate the interests of these stakeholders too. This example shows how the processes are integrated and how this integration, together with technology-mediated coordination, enables the company to take into account the interests of each employee.

From this example is quite easy to see how integration works: from the pick-up request entered in the system by the customer, all the way down to the planning process and operations (the actual pick-up).

This example also shows how the concept of partnership between the company and its customers and suppliers extends now to the employees (Gillmer, 1999).

Changes for the Customer Service Representatives

Schneider's new technologies had a major impact on customer service. At Schneider, customer service representatives talk with Schneider's customers and perform a range of activities. The representatives are responsible for most of Schneider's day-to-day interactions with customers. This includes everything from taking down orders for pick-ups, to handling questions on the status of shipments, to handling complaints.

Before initiatives like EDI, SUMIT, and satellite communications, customer service was a thankless job of routine requests, made frustrating by the inability to contact the driver. Customers might call up wondering where the driver was or with changes in when or where the load was to be picked up or delivered. Although the customer service people could make note of such requests, they could only say that they would try to call back when the driver called in. Because Schneider had no way to contact the drivers, customer service reps could not guarantee that a driver would get the request or that they would have the answer to a query by any certain time.

Satellite communications have made this job much easier. Customer service reps can now pinpoint the location and status of shipments. If the customer is requesting a

change in pickup or delivery, the rep can be confident that the driver will get the message and respond promptly. This confidence in the timely execution of customer requests makes the customers happier and the reps happier.

But more importantly, technologies like EDI, SUMIT, and STAT have reduced the fraction of boring routine calls. Some 35% of Schneider's customers now use EDI to place shipping orders. The fact that the satellite communications system is digital means that status information is automatically logged and available. Routine status checks can thus be done via the web. Even if the customer chooses to call Schneider to check status, the rep can pull the answer right out of the database, instead of saying that they will check with the driver (if and when the driver next calls). Customer service representatives now have more interesting jobs tackling high-value customer needs and the technological tools to meet these needs.

The EEO concept, as we have seen, allows better customer service and lower costs. We could expect that in a company like Schneider, customer service representatives spend most of their time by taking orders for pick-ups and answer questions about shipments. The implementation of the EEO concept instead, enables customers to enter their pick-up orders directly in the system and check online the status of their shipments. This way the reps are freed from routine operations and can really concentrate on customer service. This in turn means a better quality of job and, at the same time, it improves the quality of service and the productivity. Customer service representatives can now develop new business increasing revenues and decreasing the cost-per-customer. Freed representatives could also perform a very important task: they

could analyze and redefine the processes. Their experience in dealing with the customers and with customers' complaints can be leveraged to further improve the quality of the service and fine-tune the offer. From their privileged observatory, they are the right people to perform product development.

If we generalize to any company, we can see that the same concept could apply to dealerships and brokers, since they are the ones that are in contact with the customer. Very often, companies do not know the customer because the information is mediated by the distribution system. One of the first effects of the implementation of the EEO concept is that the company gets closer to its customers and disintermediates the distribution. This issue has been a big break in the adoption of any model that touched the dealership or brokerage system. Companies that experience a great reduction of workload of their customer service representatives or dealerships/brokers because of the implementation of the EEO concept, could take advantage of this by transforming them into product developers.

Changes for the Service Team Leaders

Schneider's service team leaders provide management and support functions to drivers. Whereas customer service is designed to look out for the best interests of the customers, the service team leaders look out for the interests of the drivers (representing the drivers while they are on the road). They help make sure that drivers get the loads they need and can get home an appropriate amount of time. They also oversee the

drivers, keeping track of their performance and working with the drivers personally to help them do a better job.

The biggest change in the jobs of service team leaders is that each one now manages more drivers. In the past, one team leader handled about 25 drivers. Currently, each team leader is responsible for 40 drivers. Although one might think that this has reduced the amount of time that they get to spend with each driver, the opposite is true. With the essential and routine communications handled by technology, team leaders have time to talk to each driver daily, getting a sense for the driver's health and satisfaction. This daily communication is vital to Schneider, because the major constraint on growth is the ability to hire enough drivers. Ensuring that drivers are getting the miles they need to earn a living, while getting home on days they want to be home, helps ensure driver loyalty and retention.

Before implementing the various IT and communications systems, the job of a Schneider service team leader was paper intensive. Working with a driver meant working with the paperwork associated with that driver. Team leaders had to collate driver logs, internal documentation of who carried which load, exception reports (in which there was a problem with some driver's trip), and a range of internal performance reports. Thus, they spent much of their time with the driver's paperwork, not with the drivers themselves.

In creating a paperless system, Schneider has largely automated the reporting functions that used to be so time-consuming. Service team leaders spend less time on routine paperwork, and more time maintaining personal contact with the drivers. Before,

team leaders had been hard pressed to keep up with routine duties. Now they can manage the particular needs of each driver (such as making sure they get home for their children's birthdays). Despite having more drivers to handle, each service team leader now has more actual time per driver.

In general, the EEO enhances the human side by freeing employees from routine. As we have seen earlier regarding drivers and customer service representatives, among the many advantages of an EEO is the ability to improve job satisfaction. Schneider, once more, is a good example: the system allows drivers to be scheduled according to their needs, representatives to work on more interesting task, and team leaders to dedicate more time for human relations with drivers.

Changes for the Transportation Planner (Dispatchers)

Transportation Planners are responsible for the assignment of loads to drivers and trucks. While the customer service representatives (and electronic systems) accept information about pickups and deliveries, it is the Transportation Planners who actually coordinate the movement of equipment to handle the work. Transportation Planners have seen their jobs change dramatically because of the satellite communications system and the use of sophisticated management software.

The job of a Transportation Planner is more complicated than it sounds because of all the factors involved in matching loads to drivers. Dispatch decisions include optimizing a number of short-term and long-term objectives that include:

* *minimizing the amount of time a driver waits for their next load*

* *minimizing the distance a driver must drive to get to the next load*

* *delivering all loads within stated delivery windows*

* *meeting driver needs (driving their miles to get paid, getting back home, etc.)*

* *keeping appropriate amounts of available equipment in all regions of the country*

* *predicting realistic driving times (based on road and weather conditions)*

These factors all have impacts on the financial performance of Schneider, the quality of service that Schneider delivers, and the attitudes of drivers (which affects pay requirements and driver turnover rates). At the same time, Transportation Planners have little control over when customers need loads picked up and delivered and they have no control over weather and road conditions.

Satellite communications has been a major boon to Transportation Planners. In the past, Transportation Planners played a frustrating waiting game. Before satellite communications, Transportation Planners would create a driver's assignment, but then have to wait for the driver to call and get the assignment. Worse, the infrequency of communication meant that Transportation Planners were not even sure when each driver would be making a delivery and becoming available for the next load. Transportation Planners would have long lists of tentative assignments, gambling that drivers would get done and call for their next assignments within an appropriate window of time. The old way was quite frustrating for Transportation Planners, who could not confidently make tight coordinated schedules, and for drivers, who would be forced to wait for their next load or not know what they were supposed to do next.

With satellite communications, Transportation Planners can send information about the next trip and have the driver confirm acceptance of the trip in minutes. Any changes to pick up or delivery instructions can be similarly sent and received in a timely fashion. The tracking function of the satellite system ensures a steady update on the location and status of each driver. In-cab communications mean that drivers can easily send off a message if they get stuck in traffic or face some delay in pick-up or delivery. The implication is that Transportation Planners can know where every truck is and when it will be available for the next load to much greater certainty than before. The combined effect of confidence and timely communication lets Schneider more tightly coordinate all activities, reducing waiting time for drivers, shortening deadhead trips, and preventing quality of service problems arising from miscoordination.

The second major piece of technology that has changed the nature of dispatch is software. In the past, Schneider had to rely on the experience and judgment of Transportation Planners to make sound dispatch decisions. Since then, Schneider has embedded much of the analysis and decision making process into software. Such software is quite adept at balancing a complex panoply of probabilities and contingencies through models that help assign drivers to loads. But this software does not replace Transportation Planners. Schneider's dispatch software lets experienced Transportation Planners override the software's matchup of drivers and loads to cover complex exceptions related to the special needs of customers, drivers, and the situation. All in all, Transportation Planners accept about 80% of the software's decisions, overriding the system in only 20% of the cases.

So far the communication features of the EEO concept were at stake. Here is an example where the ability of the system to process data through software allows optimization otherwise impossible. By defining rules and using a software, the allocation of pick-ups and shipments results more objective and contributes to better human relations.

Changes for the Maintenance

Even the workers in the maintenance bays were not immune to Schneider's deployment of technology. Aside from the obvious need to maintain the satellite communications systems, these workers have also had to deal with the increasing technological sophistication of the trucks themselves. On-board computer systems monitor and control the engine and drive-train (improving fuel efficiency for one thing). Diagnostic systems connect to these on-board systems to download performance data and troubleshoot the truck.

On the one hand, this has made the mechanic's job harder because he or she must now learn to use the new systems (even to troubleshoot the on-board computer systems). More training was required to bring these important workers up to speed. On the other hand, truck availability has risen and breakdowns have dropped. The on-board systems are quite adept at detecting any abnormal behavior which presages a potential failure in a critical part of the truck. Such systems help pinpoint trouble so that the mechanic can fix the right thing the first time.

Another advantage of the EEO approach is that, once the infrastructure and data collection has been set up, any other enhancement in the system performance is made possible quite easily. For example Schneider could match the maintenance program with the scheduling of both drivers and trucks. Maintenance could be outsourced to a specialized company in order to decrease costs and increase flexibility. With data captured in the system, Schneider would allow the maintenance company to access those data and minimize the time to maintain and repair the trucks by ordering needed spare parts before stopping the truck. This would further increase trucks availability therefore it would improve Schneider's assets utilization.

Changes for the Brokers

Technology has played a major role in improving operational processes at Schneider Brokerage. Schneider Brokerage is a matchmaking service that connects loads (those which Schneider cannot or does not want to carry itself) with the available trucks from a network of qualified trucking companies. This matchmaking process occurs on a daily, real-time basis and is very information intensive.

In the past, this process was a very paper intensive. Each night, Schneider would fax out thousands of sheets advising qualified carriers of the list of available loads. Carriers, in turn, would each return information on the availabilities of hundreds of trucks. Schneider would then have to manually collate the lists of available trucks against the loads to figure out which truck might be assigned to each load. This task was harder than it might seem for several reasons. First, Schneider had to determine which

trucks were near to the loads because loads and trucks might not be exactly co-located. Matching loads and trucks was hard because there might be multiple trucks that were near multiple loads. Worse, delays on both the Schneider side and the carrier's side made some of the information out of date. By the time Schneider made a decision to assign a truck to a load, that truck might have already been assigned by the carrier, so then Schneider would have to find a second choice of truck for that load. Carriers would also send in lists of trucks for loads that had already been assigned, burdening Schneider's personnel with information on unneeded trucks. Under this older system, the entire process was labor intensive and wasteful.

The new system uses a web-based approach that eliminates the paperwork and largely automates the entire process. Schneider posts available loads to a website, while qualified carriers access the website to find loads and post available trucks. Because everyone uses the same database of loads and trucks, the problem of out-of-date information is greatly reduced. Moreover, Schneider no longer has to collate incoming lists of trucks nor manually try to match them against the list of loads. An underlying geographic information system automatically maps the locations of both loads and trucks to automatically determine which loads are near which trucks. The website even includes search functions that are keyed to location and distance (e.g., users can search to see if there is a load within 50 miles of a truck). The nightly barrage of brokerage operations has been replaced by a smoother flow of load and truck matchups.

According to the latest trends in e-procurement, Schneider could post available loads to its web site and ask carriers to bid for that load. This would decrease costs by

introducing more efficiency in the system. In fact, the nearest or emptier operator could be interested to carry the load at a lower price.

However, this practice would introduce the risk of decreasing the quality of Schneider's service because of the fault of another operator. Moreover, the advantage would exist only if the other operator is able to provide the same digital data Schneider needs to guarantee the level of information for the customer as well as for its own operations.

Again, the big issue in a strong integrated system such as an EEO, is that the level of the overall performance is based on the level of the worst performing subsystem. While auctions can be of great advantage for purchasing goods with well-specified characteristics, they might not be appropriate for purchasing high level, sophisticated services.

Blurring the traditional boundaries between the company and its suppliers and customers is a fundamental characteristic of the EEO concept. The absence of those boundaries represents a key feature because it enables the company to know better its customers and to be better known by its suppliers. In an EEO, processes within those players are so interconnected that it is very difficult to define whether they are carried out by the company or by a partner.

Figure 8 shows a graphic representation of Schneider's information flows. The graph does not represent the role of human beings. Although it highly simplifies the model, it shows the two-way relationship with customers, suppliers and employees. For

simplicity Schneider operations have been collapsed under a "black box", Schneider software: this should not weaken the importance of the role of software for this company.

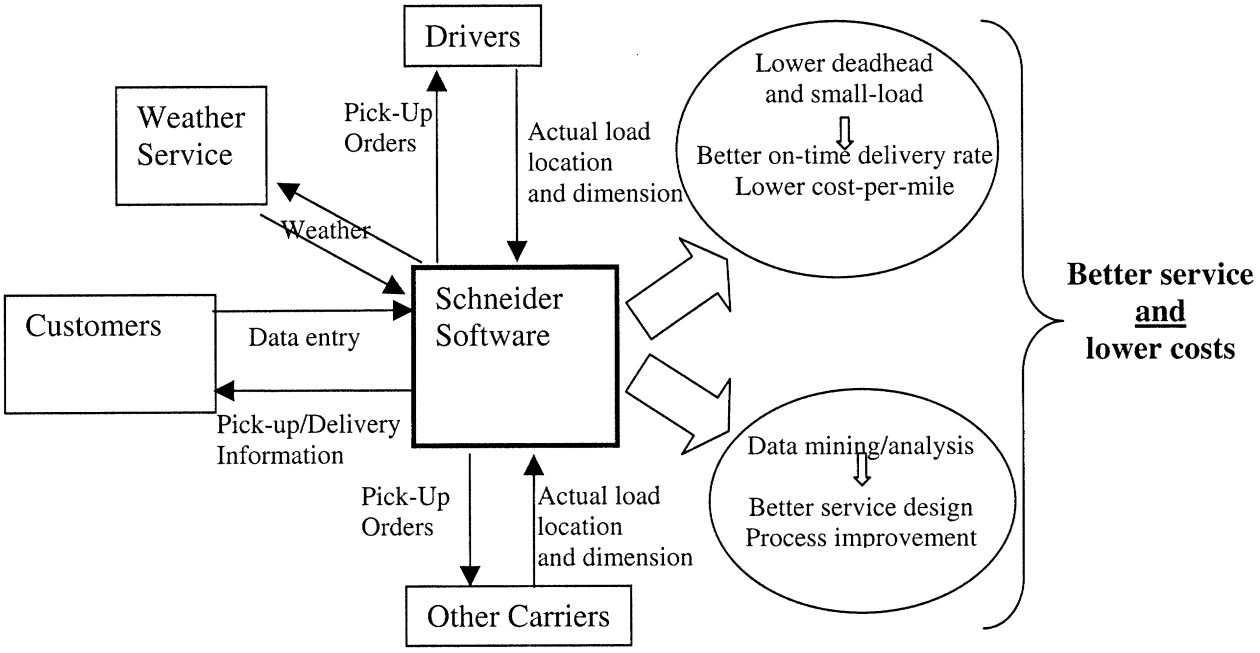

Figure 9 - Schneider's EEO model

The remainder of the case shows how the implementation of the EEO concept enables a company to set up quickly and effectively different business models to respond to customers' needs. What the case stresses is one characteristic that pertains to the EEO, namely the blur of boundaries between a company and its suppliers and customers. It shows how many different ways of blurring boundaries, once the infrastructure is set up and the alignment among the five elements – strategy, technology, structure, people and processes – has been achieved. This part will not be commented within, because it

represents the logical outcome of what I have discussed so far[6]. An EEO model allows a company to set up different activities that leverage the ability to partner with customers and suppliers: this is what Schneider has done and what the last part of the case presents. Of course other options, out of the 8 run by Schneider, could be pursued but the important point here is to see the whole spectrum of different businesses enabled by the model. In fact Schneider's different ways of doing business are possible only because of the model the company has implemented.

Figure 10 gives a graphical representation of Schneider's major businesses and how they relate with customers and suppliers.

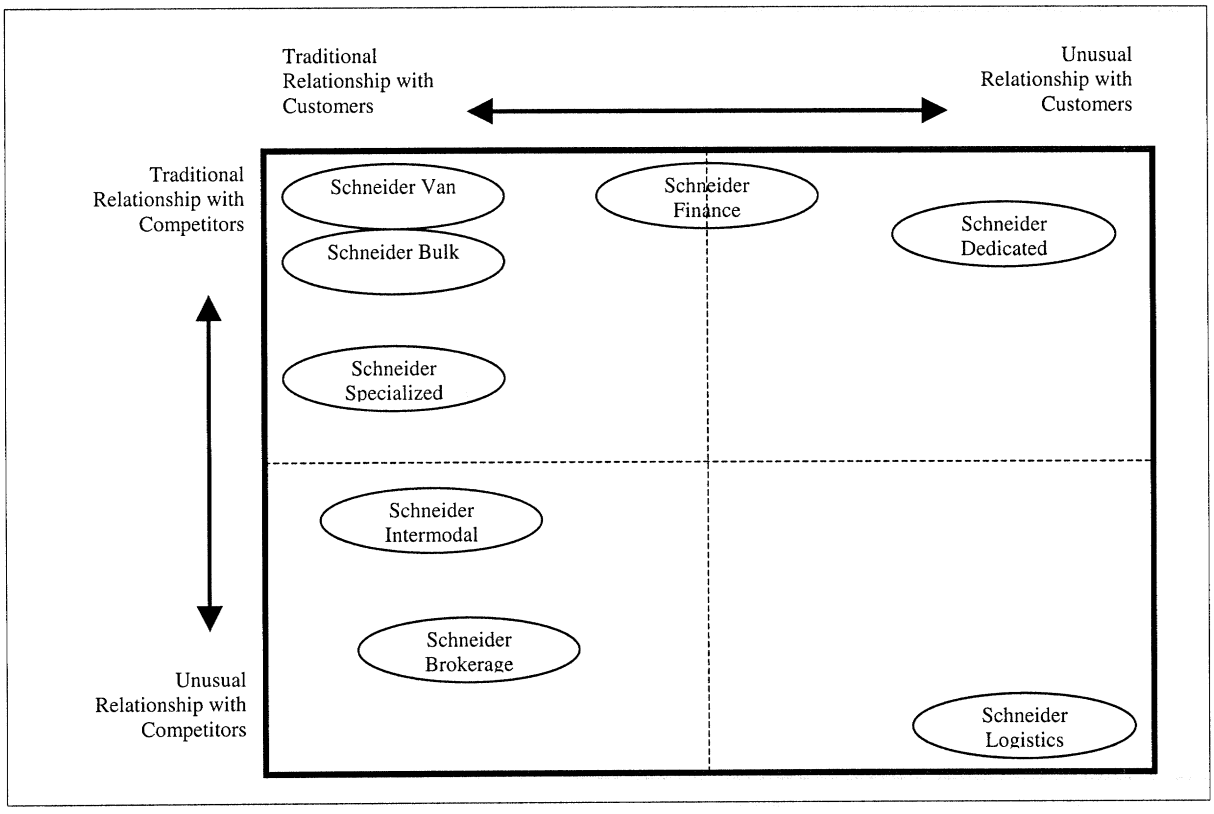

Figure 10 - Schneider National's Subsidiaries and their Relationships to Customers and Competitors (Source Meyer, 1998)

[6] Part D of the case is therefore attached as an annex, at the end of the thesis.

The traditional trucking business is competitive because of the lower cost per mile and, at the same time, it adds value to customers because of the information attached to the service. The intermodal activity is the direct result of Schneider's ability to coordinate operations. This activity in fact is nothing but coordinating sequential pick-ups and deliveries for the same load.

The collection of data about customers needs and the knowledge management of its own operations though has enabled Schneider to launch some very different services such as fleet management and truck dealership that in turn make Schneider reduce costs of its own fleet.

The other activities are important not only because they represent other businesses for the company but also because they show how much an EEO is more competitive than a traditional structure. Schneider can afford to act as a broker for its competitors and still maintain an advantage over them as well as it can act as a designer of logistics systems for other companies even though these systems will increase competitors' business.

After analyzing the company, my opinion is that this is a very good example of a living EEO. The history of the company and the way it became an EEO demonstrate that the process is long and that we could define this process as an evolution, rather than a transformation.

However, what most large established companies face today is the need for transforming themselves quite quickly in order not to be wiped-out the market from more agile, EEO-type of companies. This adds some further difficulties when implementing

the concept, particularly in the field of human resources, where change affects practices and power. The alignment of the five elements of the model, as we have seen earlier regarding Boeing's 777 and GM's Saturn cases, is particularly difficult in companies where practices have been established since a long time.

Schneider case illustrates the main characteristics of an existing EEO. The next section will put these characteristics into the framework that has guided my analysis so far.

4. Lessons learned and conclusions

In the previous section I analyzed a company that has been successful in implementing the EEO concept. However, its success has benefited from its historical orientation toward technology that has created a culture, a receptive environment, for this organizational model.

In this section I would like to extract more general indications for companies that are starting the process to transform into an EEO and draw some conclusions. I will do this by using Professor Michael Scott Morton's framework (Scott Morton, 1995).

Professor Scott Morton's model describes the tension between external force and internal dimensions of the organization, stating that, in order to be successful in responding to customers, an organization should make a balance among several forces: strategy, organizational structure, technology, processes and people. The two-way interaction among these forces is summarized in Scott Morton's article as follows:

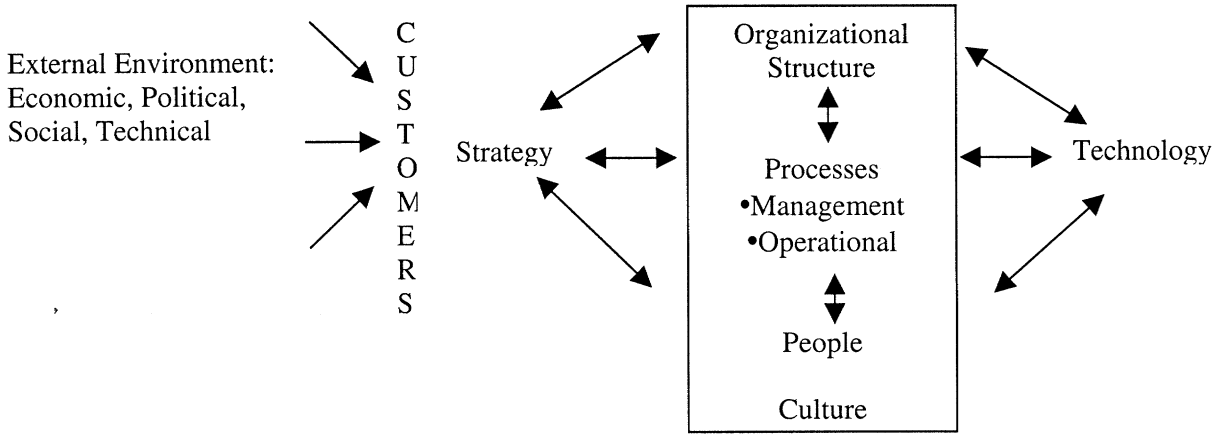

Figure 11 - Dynamic Tension between Externa l Forces and Internal Dimensions of the Organization (Source: Scott Morton, 1995)

4.1 Dos and Don'ts of the EEO concept implementation

The first issue that appears when a company wants to implement the EEO concept is that it is difficult to conceptualize it at an operational level. Although at a bird-eye level the concept is quite simple, its implications in the operations are quite dramatic and only limited by both the imagination and the difficulty to implement it on a large scale. Despite this difficulty, large and successful, yet traditional, organizations are the ones that need to move soon otherwise their market position will be threatened by fast-growing, nimble companies that apply the new model and, more often, rewrite the rules of the game. Established companies should understand that, in the new business environment forged by the forces I have described in section one of this work, actual size and market share do not represent a guarantee for their future in the marketplace and that they have to re-invent themselves in order to survive.

Competitiveness will also be determined by the ability and willingness to share accurate and timely information throughout the supply chain. This means moving the focus from internal processes to external and inter-company processes and information ((Kay, 1999 and Teresko, 1999). Although this seems to be easy to achieve, large companies' traditional habit is often to leverage their power against suppliers and, very often, customers as well, by imposing their will instead of sharing information. The ability to share information certainly is a cultural issue, of which established companies should be aware when they plan the transition toward the new model. However, in the last few years, the ability to share information with the suppliers has been growing because of the need to contain the cost of material stock: techniques such as Just-In-Time

(JIT) or co-design and co-makership need a large exchange of information between a company and its suppliers.

The increased speed requires faster communications at any level. For a company to move fast and reframe its strategy quicker than ever, this kind of information must be spread all over the company almost instantly. Otherwise there will be a gap between the top management and the rest of the organization. Often this information gap is considered the result of a subtle fight between the top and the remainder of the organization. My opinion instead, is that fast-moving organizations risk to face this problem even if the employees are willing and motivated to embrace any change, because those employees cannot follow the pace of the continuous adjustment of the strategy.

In addition to the previous issue, comes the problem of getting people to support the new strategies. Change management is the key point here (Scott Morton, 1995). In fact this issue is particularly relevant in existing and established companies where practices, even if nimble, have been established before the advent of the EEO. A discussion on how to handle this problem is out of the scope of this work. Nevertheless, the implementation of the EEO concept has strong implications on the way people operate in their company and even in other companies and institutions that are in relationship with that company, therefore the resistance to change has to be expected very high (Breen et al., 1999). As we have discussed in section two, start-up companies do not face this problem: that is why so many established and large companies have chosen the way of creating completely new structures to implement an EEO (Wilder, 1999).

Once implemented, the EEO must guarantee the ability to collect, analyze and leverage customer data. Partnership and integration with suppliers must also be a means to collect more complete data (Gossain, 1998). A quite common mistake is to collect a lot of customer data and then do not use them appropriately for strategic decisions. In my opinion, the concept of EEO, as derived from Scott Morton's original framework, implies that data are not simply collected and analysed, but the information that is distilled from them must be used to enable the way the company operates. This is an important prerequisite for the ability to react quickly to customers' expectations. As Professor Scott Morton has put it, "the strategy must ultimately be focused on a set of customers, if the firm is to have any meaning at all (Scott Morton, 1995).

The availability of data cannot be confused with the need for simplicity on the customer side. Most customers, particularly in a business-to-consumer relationship, are becoming impatient with overwhelming data and care more about having a reliable source of useful information rather than lots of unselected information to select within. An important outcome of an EEO must be to provide customers and other stakeholders with the right quantity of information for them to take the right decision.

The implementation of the EEO concept is not a task of the traditional IT department (Dalton, 1999). The company needs business-savvy IT people that interact with the other departments in order to align the technology with the strategy and vice-versa. Since the implementation goes across the whole company, the project must be carried out by cross-functional teams in order to accommodate the often conflicting ideas and interests of the different departments of the company. At the same time, it is

important to set up an appropriate rewarding system that emphasises the need for collaboration and exchange of information, as well as the results obtained in terms of competitive advantage because of the implementation of the EEO model.

One big issue that established companies have to solve in order to survive and prosper is the distribution channel (Quinn, 1999 and Teresko, 1999). Start-ups do not have this problem because they can start from scratch, without the burden of an often very costly and inefficient distribution system. On the contrary, almost all the established companies have this structure, on which they still depend for customer acquisition, retention and, often, customer care. Traditionally dealers and brokers "own" the customer, in the sense that they know customers' needs and are the means for a more personalized encounter. However, the cost of distribution through indirect channels is so high that it is not anymore acceptable in order to compete with the direct models. Established companies could have the opportunity to decrease sharply distribution costs and, at the same time, re-conquer a direct relationship with the customer, by overcoming this channel. I am not suggesting that getting rid of middle-men and distributors is the recipe. What I am highlighting is the need to consider the problem as one of the most important issues to deal with while transitioning to the EEO model. Whether the solution is to get rid of the previous distribution channel or to partner with it, depends on many factors like the kind of product or the market. For example, in the automotive industry the role of the dealer cannot be completely obliterate because of the need of test-driving the car prior to buy it, or the need to servicing it during its life. On the other side, travel agents can quite easily become useless if they are simply a distribution means of airline

tickets and a payment collector. At the moment, the direct model seems to represent the best way to distribute non-physical goods such as software and services, while the bricks-and-mortar point of sales seem to be reconsidered even in the emerging models (Creswell et al., 1999 and Cooperstein, 2000). In fact, bricks-and-mortar outlets have undergone a difficult period in the last two years because of the initial belief that the direct shipment of goods would have completely substituted the need for local physical assets. However, after two years of experimentation, bricks-and-mortar has been reconsidered as a practical means of delivery and a quite interesting complementor of online sales. The new buzz word is now "clicks-and-mortar" that embeds this concept of integration between online and physical channels. In my opinion the clicks-and-mortar model, although more expensive, represents a better solution. First it maintains a physical contact with the customer, generating more loyalty and trust, particularly during the transition period from the traditional model to the new one. Second it allows the customer to see and touch the product, avoiding excessive return of undesired goods. It also allow those customers interested in enjoying the purchase experience as an entertainment (the "shopping", so delightful to some people). Finally it enables a more efficient delivery, at a cost of holding some inventory, avoiding an overflow of packets delivered through express carriers. This is a better solution for those areas, like some European states, where the delivery infrastructure is not as reliable as in the US.

4.2 Conclusions

Sharing information within and without the company, partnering with customers and suppliers and integrating the processes with their back-ends, and connecting the front-end of the company with its back-end is not only a matter of technology. Successful companies such as Schneider, Cisco and Dell have demonstrated that the technology is mature enough to support the shift toward the EEO. Companies interested in the move toward this way of doing business should consider first the organizational and cultural aspects while planning for the change. Being an EEO must not be confused with just doing some e-transactions, as doing e-commerce must not be confused with just setting up a web site to sell the product. An EEO is one that has realigned its strategy with its people and processes using the appropriate technologies.

A company should leverage the technology to differentiate itself from the competitors by providing the customer with a new experience. This means that the EEO concept cannot be an exercise: in a few years most of the companies will be EEOs and the differentiation factor will not be just integration with the customers but rather reacting promptly to customer's evolving needs. In short, companies should develop an implementation plan that enables a short-term adaptation in order to acquire competitiveness over the slow-moving competitors and a long-term perspective that allows the company to compete in the future against the surviving competitors and the newcomers. Companies that have continuously leveraged technology to implement their strategy, such as Schneider need not to use this two-step implementation plan because the competitive advantage they have acquired allows them to plan with a longer term

perspective. On the contrary, companies that start now will need to use the two-step approach to gain some immediate advantage.

The ultimate success of an EEO however, is not measured by the success in applying new technologies to their processes but rather by how they are able to align technologies with strategy, processes, people, and structure in order to meet customers' expectations and ever changing needs.

The pressure over existing companies to migrate toward the EEO concept is high, as demonstrated by the recent explosion of offer product and service offering to help with the transition. In fact, as we speak, there are more and more .com companies that offer all sorts of applications and solutions from which to choose. However, the burden (and the opportunity) of the strategic alignment remains with the existing companies.

As far as the way of implementation of the EEO concept in large established companies is concerned, there seems to be two antithetic paths. The first is to apply the model by changing the existing organization. This is the case, for example, of Schneider, Cisco or Dell. Those companies have been evolving into an EEO by gradually, yet constantly, changing and aligning their strategy with their technology, people and processes. Although Cisco and Dell are very large companies, they are quite young and they started the changes since their early days. Because of that, they have been able to create and maintain the necessary culture for change among the employees. Schneider on the other hand has been in the market for a long time, yet it has cultivated a culture that leverages technology for strategic purposes since its inception. Long-established companies, particularly European companies that have a tradition for long-lasting

practices, might encounter more difficulties in implementing the model because of the culture of their employees.

Where the transition cannot be implemented, companies can choose to create a new structure that acts independently and, very often, in competition with the existing business. This way, established business are able to act very quickly and avoid creating problems within the current organization. However, since the new EEO should be by definition much more efficient than the traditional one, in the medium-term it would put the latter out of business, creating the same organizational and social problems that the first path would create.

Again, there is no recipe for the choice: each established organization should choose on the basis of its ability and possibility to either make an aggressive and radical change in the existing structure or to manage the competition of the new EEO. In this second case, it is very important that the shift is planned rather than suffered. In fact the passage of customers and market share, as well as the brand name - that in some cases has been built by investing large amount of money and several years of effort - to the new EEO is not "automatic". During the transition, it could happen that the traditional business loses market share to the advantage of other competitors, rather than the "planned" competitor. In addition to that, the EEO must be able to produce the product to be delivered. In my opinion, the implementation of a separate and competing business could be considered as the primer for the traditional business to change. Once the new model has been implemented and has shown its ability to compete on the market, it could be reverse-integrated into the traditional business, in order to boost the change. As we

have seen, the EEO model asks for, and allows a large integration of the company with its suppliers. In this case, the traditional business would become a supplier of the new organization, provided it has been able to leverage the experience of, and has understood the need for change from the new organization.

Whichever path a company chooses, it must be done soon. The fast pace of change in the business environment and the competitive advantage of already implemented EEOs do not leave space for further waiting. Five to ten years from now, being an EEO will not be a competitive advantage any more: it will simply be a mode of operating and the competition will move to other fields. But companies that will have not been able to evolve into an EEO will not be there.

5. Annex

Schneider National D: A Business Transformation Story

The transformation of Schneider National from its inception to the present day mirrors the changes that have taken place in the larger economy as a whole. What is interesting is that Schneider has continuously transformed itself while other older companies have risen, fallen, and been replaced by newer companies. In the early years, Schneider was a prime example of a basic trucking company -- a unionized blue-collar firm, offering simple, well-delineated, undifferentiated services to its customers. In its present form, Schneider is a much more complex, non-union, diversified services company. Beyond trucking, Schneider is now about the white-collar activity of designing and managing complex logistics systems that blur traditional provider-customer and provider-competitor boundaries.

The Current Structure of Schneider

Schneider National is a holding company with a set of 8 subsidiaries. These subsidiaries are delineated by the services that they provide. Three of the 8 look like traditional trucking companies and the other 5 represent new services that Schneider has created during the 1980s and 1990s. The 8 subsidiaries are:

* *the more traditional shipping companies:*
  - *Schneider Van - traditional low-cost trucking with 13,000 drivers, 12,000 tractors, and 35,000 trailers*
  - *Schneider Bulk - shipment of liquids & chemicals with 700 tanker trailers*

- *Schneider Specialized - shipment of overweight, oversize, and fragile items*

* *the nontraditional service companies:*

- *Schneider Dedicated - takes over the ownership and operations of private fleets*
- *Schneider Finance - full-service truck and trailer dealer (sales and leasing)*
- *Schneider Intermodal - manages shipments that combine trucking with rail and water-borne shipping*
- *Schneider Brokerage - matches loads to trucks drawn from a network of over 1,000 pre-qualified carriers (competitors to Schneider)*
- *Schneider Logistics - analyzes, designs, implements, and manages logistics systems for customers*

Schneider's New Relationships with Customers and Competitors

Schneider's transformation has blurred the traditional boundary separating a service provider from its customers and from its competitors. In the past, most transactions were arms length -- a simple service in which one company handed a load to a carrier company who brought the load to a third receiving company. But now, Schneider is much more than just a trucking company. Complex relationships and combinations of services defy the traditional arms-length arrangement of simple contract shipping. Many of these services would seem to divert revenues from Schneider, giving them either to competitors or forgoing them with customers.

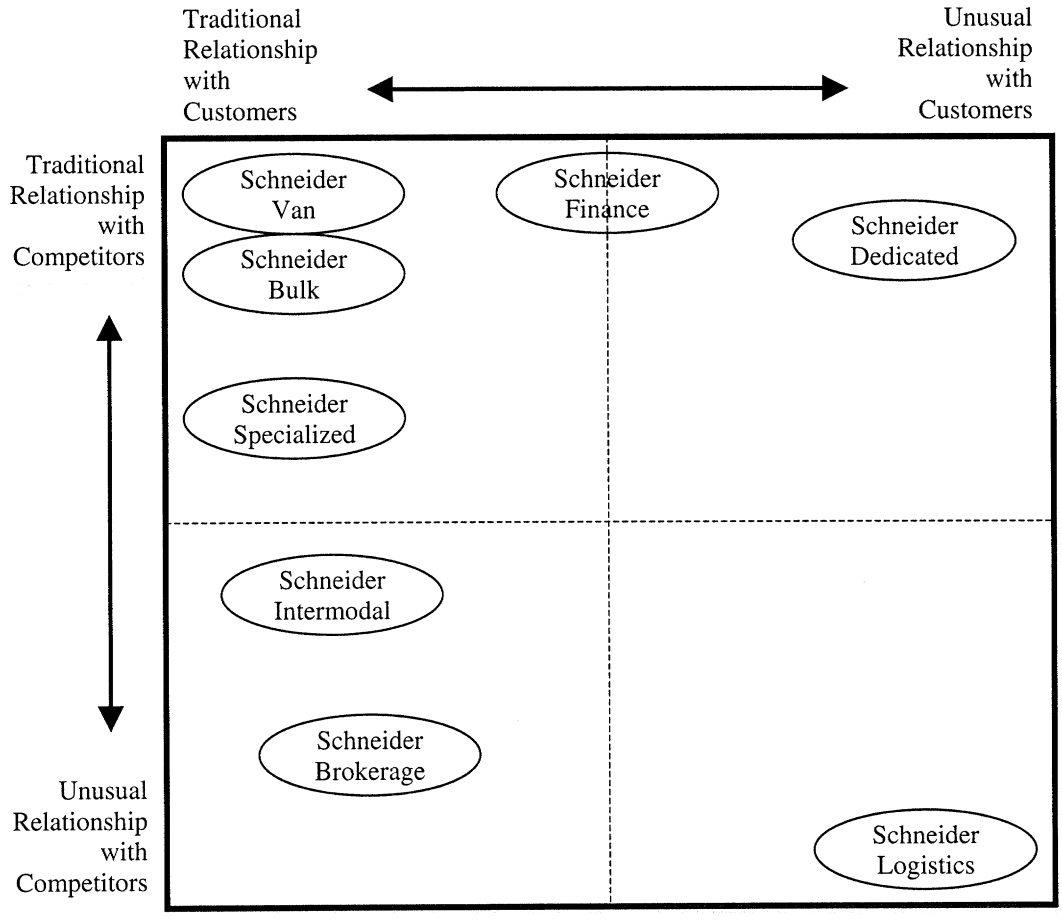

Exhibit 1: Schneider National's Subsidiaries and their Relationships to Customers and Competitors

Exhibit 1 arranges the 8 subsidiaries of Schneider along two axes. The horizontal axis denotes the nature of the relationship of Schneider to its customers. The left side contains subsidiaries with a more traditional relationship with customers, while the right side contains those with more unusual relationships with customers. The vertical axis denotes the nature of the relationship of Schneider to its competitors. The top end contains subsidiaries with a more traditional relationship with competitors, while the bottom end contains those with more unusual relationships with competitors. At the extremes are the very traditional Schneider Van (in the top left with more traditional relationships with both customers and competitors) and the most unusual Schneider Logistics (in the bottom right with unusual relationships with both customers and competitors).

Although at odds with the ideal strategy of a pure trucking company, Schneider's behavior is totally consistent with the strategy implicit in founder A.J. Schneider's 60-year-old mission statement: "We have only one thing to sell, and that is service." To further this strategy of services, Schneider has taken the improvements it made to its traditional trucking operations and repackaged them to create new services and new subsidiaries.

Schneider Dedicated: Blurring the Traditional Provider-Customer Line

Schneider Dedicated is an outsourcing service that takes over a customer company's private fleet (typically with contracts that last 3 years). The services offered by Schneider Dedicated cover a wide range that includes:

* *logistics engineering and analysis*
* *carrier management and coordination*
* *truck/trailer purchasing, maintenance*
* *driver hiring & training*
* *mode selection & load scheduling*
* *cross-dock management*
* *return container program*
* *back-haul filling*
* *warehousing services*

Rather than just extending Schneider's shipping services to carry the customer's loads, these arrangements tend to blur the line between Schneider and the customer. For example:

* *the trucks are on Schneider's books but are painted in the customer's colors and only used for the customer's loads*
* *the drivers are Schneider employees but wear the customer's livery and only drive the customer's loads*

* *the drivers use Schneider's satellite communications system but drive routes designed by the customer*

As John Lanigan, General Manager of the Dedicated division describes it, "We really create a new trucking company for each new customer." In many ways this "new trucking company" is both inside the customer company and inside Schneider. Schneider Dedicated spends time to learn the customer's systems and to adapt Schneider's approach to fit with those systems. The outcome is less of a cookie-cutter outsourcing service contract and more like a complex intertwining of Schneider and the customer company.

A good example of the complexity of the such relationships is Schneider's relationship with PPG (the largest North American glass maker). Technically, Schneider Dedicated took over PPG's private fleet. In reality, the trailers remain the property of PPG, while the drivers and tractors are now Schneider's. To sweeten the deal, Schneider offered its freight management software to PPG. PPG took the software written by Schneider, had PPG's IT personnel modify it, and now PPG runs its entire enterprise-wide logistics system with it. In a further twist, only 30% of PPG's loads go to the Schneider-run private fleet. Schneider's software is good at managing a portfolio of third-party carriers, picking appropriate carriers for each load and electronically letting them accept or reject the load. This software lets PPG give loads to some forty other carriers (competitors to Schneider). In short, Schneider gave PPG software acts in the best interests of PPG, not those of Schneider.

Schneider Dedicated's Value Proposition: all of the advantages, none of the disadvantages of a private fleet
* *Customers enjoy all the advantages of a private fleet:* - *control of drivers, tractors, trailers, & management services* - *personal touches: choice of equipment, size, color, look and routes*
* *Customers avoid the usual disadvantages of a private fleet:* - *ownership ties up capital, leasing requires long-term commitment* - *small fleets have poor economies of scale* - *it's hard to quickly add or remove capacity*
* *Advantages to Schneider:* - *leverages Schneider's vast economies of scale (fleet purchase & maintenance)* - *reduces empty miles by 10% (Schneider assists with backhaul)*

Schneider leverages its people, processes, and technology to provide its Schneider Dedicated services. Employees with Ph.D.s in operations research and experienced IT personnel work with the customer to determine the customer's logistics needs and meld customer and Schneider IT systems together. A well-honed, well-managed project team implements the transition to dedicated service. Tried and true processes for fleet management help Schneider create and maintain each new dedicated fleet. Sophisticated software is easily copied for use with each new customer. On top of all of this are the logistical models and experience to competitively, yet profitably, price the offered service.

Schneider Dedicated has supplanted all other Schneider divisions in revenue for the company. This division has grown rapidly from 7% of the Schneider's revenue in 1990 to 34% in 1997 (this growth in the relative revenues is especially large since

Schneider's absolute revenues nearly doubled during the same period). Schneider Dedicated currently serves 160 companies, 60 of which use Dedicated only. As a further indicator of success, Schneider Dedicated's contract renewal rate has averaged 99% between 1984 and 1994 (based on the latest figures available).

Schneider Finance: Blurring the Traditional Provider-Customer Line

Some of the services Schneider provides, like Schneider Finance, seem counterintuitive because they are designed to help customers "do it themselves" when it comes to trucking. For example, Schneider Finance helps companies get their own new trucks and trailers, using Schneider's economies of scale to get good prices. Schneider Finance is essentially a full service truck sales and leasing company -- actively marketing a complete range of trucks, engines, and trailers.

Although one might think that this strategy leads to a loss of long-term recurring revenue (from shipping contracts), the opposite is true. Schneider has a myriad of opportunities to serve customer who bought or leased trucks through Schneider Finance. These include:

* *taking over or managing the customer's private fleet (Schneider Dedicated)*
* *creating or managing the customer's logistics systems (Schneider Logistics)*
* *providing supplementary shipping capacity (Schneider Van and Schneider Brokerage)*
* *handling unusual shipments (Schneider Specialized)*

As an important side benefit, Schneider also obtains better discounts on the trucks that it buys for its own use because of the volume of trucks sales that it creates. Thus, Schneider Finance is another example of Schneider using a non-traditional, counterintuitive strategy to improve its competitive position.

Schneider Intermodal: Blurring the Traditional Company-Competitor Line

In an effort to offer the lowest cost service possible, Schneider will help customers ship goods via transportation modes other than trucks. Schneider Intermodal handles shipments via rail and water, when such modes make the most sense. Rather than spurn these competing modes of transport, Schneider sees them as just one more way to provide good service to its customers.

Schneider Intermodal uses Schneider's well-developed IT systems and processes to arrange and manage intermodal shipments so that they are transparent to the customer. Schneider can pick up the load (either with one of its own trailers or with a customer's trailer), truck the shipment to the rail-yard or port, have it shipped on this alternative mode, pick up the trailer at the other end, and deliver it to the destination. The customer pays Schneider (and Schneider pays the other mode's carrier). The customer gets a lower total cost of shipping, no additional hassle, and sacrifices only a little speed of delivery (because these other modes are slower than trucking).

Schneider Brokerage: Blurring the Traditional Company-Competitor Line

The Schneider Brokerage division actually arranges for shipments to be carried by competing trucking companies. Schneider Brokerage is matchmaking service that

connects loads (which Schneider cannot or does not want to carry itself) with the available trucks from a network of qualified trucking companies. Schneider Brokerage offers a range of services like:

* *fully-expedited scheduling*
* *multiple pick-up options*
* *less than truckload consolidation*
* *loading and unloading*
* *door-to-door delivery*
* *logistics management*

Technology lets Schneider provide this service in a way that adds value for all of the players. Aside from making the brokerage process much more efficient (see Case C), technology reduces transaction costs and complexity for all parties while improving Schneider's ability to provide profitable service.

Schneider's customers gain the benefit that the brokerage service is entirely transparent because of Schneider's IT systems. The customer tells Schneider about the load and Schneider makes sure it gets shipped. The customer does not have to worry about the details of finding and qualifying a carrier. This means that if customers have unexpected surges in shipping needs, Schneider can handle the demand without owning the assets full time.

Qualified shippers (technically competitors to Schneider) get the benefit of having their surplus capacity filled, thereby having fewer empty miles. At the same time, the transaction is simpler for them than if they had contracted it directly with the customer.

Schneider Brokerage handles the payment, avoiding the problem of setting up new accounts with new customers. Schneider also provides an EDI interface for even lower transaction costs.

For Schneider, the benefits are three-fold. First, Schneider gets a portion of the transaction fee for the brokerage service. Second, Schneider gets to accept many more shipping contracts than it might otherwise (saying "yes" to more customers in more situations). This includes some of the specialized shipments arranged through Schneider Specialized. Third, Schneider can off-load less profitable shipments (i.e., ones where it might have no truck immediately nearby). The result is that Schneider profitably leverages the services of thousands of qualified carriers to augment to its own fleet.

Schneider Logistics: Blurring the All Traditional Lines

Schneider Logistics blurs both the lines between Schneider-to-customers and between Schneider-to-competitors. It combines the blurring of roles associated with Schneider Dedicated with those of Schneider Brokerage. A customer company can completely outsource the entire logistics function to Schneider Logistics. In such situations, Schneider Logistics personnel reside at customer sites and often manage carriers that are competitors to Schneider's traditional shipping lines.

Schneider Logistics provides analysis, design, and management services. This includes a wide range of warehousing, distribution, and inventory management solutions. Schneider Logistics builds onto Schneider's core technological base with in-house IT that creates decision support and optimization tools for logistics. They help clients select

from among thousands of third-party carriers in all modes of transportation. Schneider Logistics offers these services as a broad menu of option and a caters to a wide range of service levels (from providing single in-house logistics engineering to completely taking over enterprise-wide logistics operations).

For example, automaker Mercedes Benz uses Schneider as a third-party logistics provider to coordinate critical freight movement between its Alabama Mercedes plant and its suppliers. Schneider manages daily truckload collection routes from 35 suppliers, delivering 160 loads per day. The task is especially challenging because Mercedes uses a process called In-Time And Sequence (ITAS) to get entire assembly systems completed and delivered in production-run order to its factory floor. (With ITAS, suppliers perform subassembly work, so that instead of Mercedes' receiving head rests and seat cushions and assembling them, it receives fully assembled seats.) No safety stock is held with ITAS, making on-time delivery of the materials essential.

Schneider manages and executes the delivery of in-order and sequence supplier packages for Mercedes. Schneider must set pickup and delivery windows and monitor transit times to ensure they are moving freight into the plant in a manner that supports Mercedes' stringent inventory levels. Schneider also handles the flow of returnable containers from the Mercedes plant back to suppliers.

Other examples of the types of work done by Schneider Logistics include:

* *for a major automotive company:*
  - *redesigned the inbound supply network*
  - *optimized location of all inbound processing facilities*

- *designed hundreds of pickup routes*
- *provided high-level facility design*
- *completed operational planning*

* *for a leading furniture manufacturer:*

- *developed a network of regional distribution centers*
- *reduced order cycle time*
- *increased shipment consolidation*

* *for a food manufacturer:*

- *developed and validated a complete large-scale distribution model*
- *(model covered 3 separate business units, 1000s of locations and over 100 products)*

* *for a major consumer goods manufacturer:*

- *placed a full-time Schneider Logistics engineer on site*
- *performed complete modeling and analysis of the client's distribution system*
- *on-site engineer continues to maintain all optimization models*

Schneider Logistics' relationship with competitors is so unusual that there is actually a "Chinese wall" between it and the rest of Schneider. This is because Schneider Logistics provides services like carrier selection in which it 1) has access to confidential data on Schneider's competitors and 2) is tasked with making impartial selection decisions regarding those competitors. If Schneider Logistics is to succeed, both its

customers and Schneider's competitors must view the subsidiary as an impartial provider of logistics services.

As a testament to the importance of this service and its success, Schneider Logistics is second in size to Schneider Dedicated. Like Schneider Dedicated, Schneider Logistics has grown rapidly. It was formed in 1993 (although the services date back to a contract with 3M in 1983). The result is that non-traditional divisions (like Schneider Logistics, Schneider Dedicated, Schneider Brokerage, Schneider Intermodal, and Schneider Finance) are, in aggregate, more than twice the size of the more traditional shipping divisions (like Schneider Van, Schneider Bulk, and Schneider Specialized).

Saying Yes to Customers

At the core of Schneider's ability to transform themselves is their willingness to accept and then leverage the challenges that customers lay before them. When 3M wanted to totally outsource logistics in 1983 (a decade before anyone else did), Schneider did it. The result was then offered to other customers and become the foundation for Schneider Logistics Services. When Case Corporation wanted logistics help in Europe in early 1998, Schneider said "yes" and formed its first international division, Schneider Logistics Europe BV. Accepting new challenges not only ensures that its customers stay with Schneider, but that Schneider stays with its customers as the world changes.

Schneider's acquiescence to customer requests is not as simple as it looks. Schneider's strategy is not a "satisfy the customer at all costs" approach. Information

systems, extensive models, and reams of data on past shipments help Schneider objectively determine what it can and cannot do profitably. If a customer wants an overly aggressive shipping schedule on some route (one that might force drivers to drive too fast), Schneider will negotiate a more feasible schedule or decline it. Indeed, Schneider Logistics actually turns away more RFPs (requests for proposal) than it accepts. The key is that Schneider has cultivated the ability to offer a wide range of services and to understand what it can do profitably for its customers without creating stultifying rules that limit flexibility.

Schneider's strategy of doing more for its customers is not just a matter of selfless devotion nor is it a simple reactive strategy. Schneider could not effectively respond to novel customer requests without its investments in people, processes, and technology. Indeed, Schneider's most important (and most hidden asset) is its ability to learn the customer's situation and create a customized solution in record time. This is especially valuable with Schneider Dedicated and Schneider Logistics where solutions must meld Schneider's technology and processes with those of the client. It is Schneider's seemingly expensive asset base that lets it take on new challenges that create new businesses within Schneider, sustaining growth in an otherwise uncertain environment.

Schneider's Core Values

Schneider's strength is rooted in a set of core values that include

* *a respect for all human beings*
* *an expectation of high levels of achievement and contribution from employees*

** relationships among associates, customers and suppliers built on trust and honesty*

** an environment that creates energy and enthusiasm*

** a belief that the purpose of work is to enhance self-esteem as well as compensation and productivity*

** a spirit of entrepreneurship that encourages innovation and creativity.*

To maintain these values and ensure that Schneider grows as a company and that its leaders act in the best interests of employees, Don Schneider has taken a remarkable step. Although Schneider National is a private company, Don Schneider has created an outside board of directors and given them the power to fire him. He has taken all of his voting shares and put them in a trust over which the Board has complete control. When peers heard of this move, they were astonished. "How could you give them such power," they asked, "the board could fire you!" Don's reply was, "That's the whole point. If I'm not acting in the best interests of the company, I shouldn't be president."

Don's belief is that rational people will behave rationally. The board has no reason to fire Don if he's doing a good job, and Don intends to keep it that way. Creating the board, however, creates an added tension that gives Don the edge to stay effective. " Humans need a tension to be effective," Don said. "With my goals and the way I think about my values, I want to keep the company private (public companies have too short-term an outlook). But in order to stay private, I needed the same tension, so I formed an outside board and took all the voting stock and put in it a trust fund that's run by the board. That made it pure -- they have total responsibility. They could fire me. I have to go through a yearly evaluation, and they could determine that it's best for the

20,000 employees if they fire me. I think I'm doing a good job, and that they won't have reason to. I trust that rational people will make the best decision."

Don created the board by calling senior executives of companies he admired, explaining his vision, and inviting them to join the board. The board has a governance committee which must approve all new board members, to avoid any "stacking of the board" in Don's favor. The board meets four times a year, assessing Schneider National's position relative to the competition, evaluating Don's strategic plans, and reviewing the yearly plan and capital expenditures. The board also assesses Don's performance by 360 degree feedback of Don's direct reports and their direct reports.

The Future

Don Schneider's plans for the future are to double the revenues of Schneider National in the next five years. To do this, Schneider will continue to make prudent investments in technology and look for ways to sell its technology products to customers to gain new revenue streams. The end goal is to support people and serve customers. As Don said, "I want my people to have really outstanding pay, to be able to grow, and to have self esteem that comes from doing a good job." The way Schneider will grow will be to provide outstanding service to customers. As Al Schneider said 60 years ago, "We have only one thing to sell, and that is service."

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