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**A FRAMEWORK TO MANAGE THE RE-ORGANISATION
NECESSARY IN BECOMING AN E-BUSINESS
BUSINESS-TO-BUSINESS E-COMMERCE**

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Half-dissertation submitted to the University of Cape Town in partial fulfilment of the requirements for the degree of Masters of Science in Engineering Management
(MSc EngMan)

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DECLARATION

I, Elizna Redelinghuys, the undersigned, hereby declare that the work contained in this dissertation is my own and original work submitted to the University of Cape Town for the Degree Masters of Science in Engineering Management, and has not previously, in its entirety or in part, been submitted at any University for the purpose of a degree.

Signed by candidate

ELIZNA REDELINGHUYS

30/08/2003

Signed

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ABSTRACT

Over the past couple of years enormous growth has been continuously forecasted for one particular core element of the Internet revolution, the B2B e-commerce market. The Internet removes geographic boundaries, opens new global markets and became the primary vehicle for performing e-business activities. Across industries, organisations are actively engaged in the adoption and integration of e-business tools and practices to better manage their internal processes, as well as their interfaces with the external environment. Doing business globally in the B2B e-business landscape brings entirely new challenges and obstacles which have to be overcome an organisation can become a successful e-business. While the importance of e-business initiatives has been widely accepted, a lack of proper management guidelines and a thorough understanding amongst business managers add to the dilemma. Without any guidelines, this could be a minefield of uncertainties for any business manager. This perceived dilemma, in a market with huge growth potential, spurred this research study.

This thesis focuses on the development of a management framework that allows organisations to gradually evolve into a full-fledged B2B e-business. Every manager considering the implementation of a B2B e-business system as part of his business plan, need a rigorous approach for the successful implementation thereof. The successful planning and managing of e-business investments are of the utmost importance to sustain and create more shareholder value for the future. The main hypothesis stated by the author is that a framework is required to guide managers with the re-organisation necessary throughout the life cycle (including planning, implementation and sustaining) of a B2B e-business model. The author believes that this framework will contribute to organisations enhancing competitive position and thus, unlocking more shareholder value.

The thesis integrates various literature sources and expert opinions to provide a parsimonious theoretical framework for understanding the B2B e-business landscape

and its implications. The most important aspects posited from the literature, which can be used as guidelines in the quest to unlock the optimal value from B2B e-business, are broken down into the following broad key categories:

1. Global control and co-ordination
2. B2B e-business strategy
3. Business and Value-Chain Processes
4. Technology
5. Management and Culture

A survey was conducted on a small sample of industry experts to determine the validity of the proposed management framework. The research results suggest that the respondents overwhelmingly approved and agreed on the aspects and issues covered in the management framework. It is, however, important to note that even though B2B e-business is purported to be a “silver bullet” for all businesses, irrespective if they are large, small or SMEs, the reality is that different business models would have to be adopted in different organisations and therefore, these models will inevitably vary considerably. The author believes that the framework developed in this thesis provides valuable guidelines that can significantly assist managers with the re-organisation required in becoming a B2B e-business. The proposed management framework should be considered as a basic starting point and could be used in combination with other, existing frameworks. The reader should realise that no one framework will be the alpha and the omega of frameworks.

The author acknowledges the limitations of the research and recommends that a more emphatic survey be conducted. The proposed survey should include a proper statistical base that will satisfy the basic requirements of representativeness, i.e. including a bigger sample of manufacturing companies with a higher degree of e-business adoption. Such an investigation might contribute significantly in developing a generalised theory for the whole B2B e-business market.

1. Problem Situation

The aim of this chapter is to describe the context within which the research was undertaken. The context informs a perceived problem situation. In developing the problem situation, a systems view (see Appendix A) is adopted in order to present a holistic, integrated view of the complex problem situation, which has components perceived to be both of a 'hard' as well as a 'soft' nature. The 'hard' issues, on the one hand, are concerned with the logical facts that are clearly definable and quantifiable. The 'soft' issues, on the other hand, consider influences of human dynamics such as cultural, social and political aspects. The chapter is organised by starting with a brief introduction of the current situation as the market experiences it, followed by a description of how the problem emerged throughout the Internet revolution. In the final section, the problem hypothesis is formulated.

1.1 Introduction

Forrester Research, Inc. (1999) predicts that the Business-to-Business (B2B) e-commerce market will grow from \$109 billion in 1999 to \$1,3 trillion by 2003 in the US alone, while global levels are forecasted to reach \$21,6 trillion by 2004. The era of e-business brings new opportunities to expand business horizons in a digital, global economy. The Internet, forming the backbone of this Internet revolution, is radically changing traditional business models around the globe. However, becoming a successful B2B e-business entails clearly more than just selling products on the World Wide Web or simply automating traditional paper-based processes. Instead, it is about re-aligning business models around global, dynamic value chains by leveraging Internet technologies to survive, compete and succeed. E-business has become the foundation required to experience seamless integration with trading partners and has therefore forced companies to realise that they do not operate in isolation, but rather as part of a larger supply-chain community.

To enable companies to successfully transform to a full-fledged e-business, managers will first need to understand the messy-ness of the situation. However, to fully understand the dynamics and variables of such a complex situation and its environment needs a coherent framework to aid in the process of enquiry. The foundation of this enquiring process relies

on systems-thinking principles. Senge (1989) argues that for managers to understand these systems, ongoing education will be necessary; education which must shift the style of thinking to realise the creative potential and to foster systems-thinking as chief function of leadership. He further argues that the systems thinking process itself is integrative, synthesising diverse viewpoints to understand the organisation as a whole. This is possible by focusing on the structure of relationships among parts and the dynamics of the system. Therefore, once leaders adopt the systems-thinking principles, they will have developed a mental model of the situation, which will help them to manage the knowledge in the organisation and to interpret this into new business strategies.

In an attempt to express the problem situation in the following sections, the author will perceive the B2B e-business phenomenon as a system. To start this process of enquiry, the author will build a model, based on multiple perspectives and it is noteworthy to mention that this model is probably in many senses not complete, however this is a true reflection as perceived by the author. This 'problem situation' model will be the cornerstone of the framework to be developed as part of this thesis; a framework for understanding B2B e-commerce, the environment of which it operates as well as its subsystems.

1.2 Context of the System

B2B e-business is only part of what is called the Internet revolution, which in business terms entails mostly e-commerce in its totality. The Internet is considered the most important enabler to do business in the virtual world today, however this has not always been the purpose of the Internet. It is important for anyone who wants to do business on the Internet, to have a clear understanding of how the Internet evolved to become the commercial business tool that it is today.

1.2.1 The Internet evolution

The past decade has seen tremendous changes brought about by the Internet to connect people and have revolutionised the computer and communications world like nothing before. However, it is only within the past 5 years that businesses realised how the

collaboration and interacting tools of the Internet, regardless of geographic location, could be applied to enhance commerce.

The Internet's origin started back in 1969, when the US Department of Defence was looking for a communication network that would resist nuclear attacks. It was not until 1973 that they initiated a project, which would develop communication protocols, allowing networked computers to communicate transparently across multiple networks. This humble network, starting out with only four nodes, would later lead to the Internet as it is known today (Sterling, 1993).

In 1986 the National Science Foundation (NSF) created the NSFNET to allow research communities to have access to new supercomputer centres. The principle was based on a number of host computers that run application programs and store data on an Internet node. The NSFNET grew so fast that the number of host computers exceeded 10,000 by 1987. In March 1989 the first experimental version of the World Wide Web, developed by Tim Berners-Lee, was released (Sterling, 1993).

At this point the web was limited to the use of research and education, however pressures from the private sector, which recognised the commercial potential of the Internet, forced the NSF to expand the network. This resulted in the development of regional networks (or Internet hosts as we know it today) to start providing services to the private sector. In 1993 the first Internet browser, Mosaic was released, while development of the new and larger infrastructure for the NSFNET in 1995 would pave the way for the Internet to explode (Sterling, 1993).

At this point the government decided to allow the commercial sector to take over the ownership of the Internet and its evolution. The first applications after the introduction of the World Wide Web in 1995 was based on file sharing and emailing, however the platform's application for business opportunities was quickly recognised. From this, several commercial uses, such as business-to-consumer (B2C) and business-to-business (B2B) e-commerce emerged.

The development of these commercial applications led to the explosive growth of the Internet. Everybody wanted to get an ISP (Internet Service Provider) and once they reaped the benefits of their positive experiences, it led to a new set of developments. This explosion phenomenon is a classic example of the law of positive feedback, based on the cybernetic principles of management. (Clemson, 1984) argues that if the nature of the feedback loop has a vicious or deviation amplifying effect on the system, then it is considered a positive feedback loop. These are exactly the properties the Internet and its evolution portrayed, and up to this day are still portraying. To illustrate the explosive growth of the Internet, the following figure shows the population of Internet users worldwide.

Figure 1. Internet worldwide population 2000: 242 million



Source: CommerceNet Research Center (2000) World Wide Statistics Internet source

The Internet, which is based on open communications protocols and common data standards, delivers a low-cost method for electronically accessing, distributing and presenting data. Such affordable and widespread access to digitised data enables new, improved, and automated business processes that can deliver significant benefits to buyer and supplier organisations, regardless the size or technological sophistication. The recognition of these attributes is exactly what made the commercial sector anxious to

explore and embrace this new technological tool. The commercial interest, on the other hand, is the main source for fuelling the rapid growth of the Internet.

1.2.2 E-Commerce

E-commerce is not a new concept; in fact, it has enabled secure, electronic communications and transactions between businesses for more than two decades (Aberdeen, 2000). Definitions of e-commerce exist in abundance. Kalakota and Robinson (1999, p.4) define e-commerce simply and rather simplistically, as “buying and selling over digital media”. A more strategic definition is provided by Wigand (1997, p.5) denoting e-commerce as “the seamless application of information and communication technology from its point of origin to its end point along the entire value chain of business processes conducted electronically and designed to enable the accomplishment of a business goal”. Although there are a many more definitions available, the author will refer to e-commerce activities as the linking of communities electronically via the Internet, to conduct business – i.e. buy, sell, share information, collaborate and provide services – more effectively and efficiently.

The traditional e-commerce environment contained several technology, cost and functionality barriers that have made it impractical for all, but the largest organisations. Traditionally, e-commerce has relied on EDI (Electronic Data Interchange), which has limitations such as rigid communications protocols and standards. Another major criteria that prevented companies from investing in EDI, is the fact that it requires major investments in software, system maintenance and also recurring transaction costs. Finally, EDI models proved to be very limited in the type and extent of data that can be shared amongst business partners. Aberdeen (2000) believes that a combination of all these factors prevented trading partners to effectively share dynamic data models in a turbulent, global economy.

The Internet provides a significant opportunity to extend the reach of e-commerce and to better utilise its full potential. Aberdeen (2000) argues that the Internet has overcome a

number of these technical and cost barriers that have inhibited e-commerce for more than 20 years. During the Internet revolution, e-commerce has developed into two very distinct areas, namely business-to-consumer (B2C) and business-to-business (B2B) e-commerce. To better understand e-commerce, the next few paragraphs will explain the differences between these two.

1.2.3 Business-to-Consumer (B2C) E-Commerce

Oracle (2000, p.1) defines business-to-consumer (B2C) e-commerce as “a term that describes the communication between businesses and consumers in the selling of goods and services”. While IBM (2001B) presents a similar perspective, they define business-to-consumer (B2C) e-commerce as “the use of Web-based technologies to sell goods or services to an end-customer”. The most important aspect regarding B2C e-commerce is the fact that the customers are individuals and not companies. Although B2C e-commerce was initially mostly seen as retailing online stores, more recently B2C has grown to include services such as online banking, travel services, online auctions, health information and real estate sites. Still, B2C e-commerce has changed traditional business models in radical ways and companies now see this online channel as a distribution and marketing channel. The most recent report by Forrester Research, Inc. (2003) predicts that online retail will grow at a steady 19 percent year-over-year growth rate, from \$95.7 billion in 2003 to \$229.9 billion in 2008. The most significant of it all is that these online retail sales will account for 10 percent of the total US retail sales by 2008. Clearly B2C e-commerce is an area that has emerged into a must-be for any business, rather than a nice-to-have functionality.

1.2.4 Business-to- Business (B2B) E-Commerce

Zwass (1996, p.6) defines Business-to-Business (B2B) e-commerce as “the exchange of products, services or information between businesses over the Internet”. The B2B transactions use web-based technologies and can take place directly between companies or through a third party (an intermediary) who helps match buyers and sellers (IBM, 2001A). Industry analysis predicts that the volume of business-to-business transactions

will be more than 90% of the total e-commerce transactions within the next five years (Craven, 1999). One of the more important aspects of B2B as a whole is the integration with consumers to enable systems communication without human intervention. Internet-based B2B e-commerce promises a new era of low-entry cost, larger and more inclusive trading communities, increased functionality and more comprehensive automation of the business cycle. It is important to note that mostly when speaking about B2B e-commerce, reference is actually made to B2B e-business. In the remainder of this document, all references to B2B e-commerce can be interpreted as referring to B2B e-business. Further explanations on e-business will follow in the next section.

The Internet has caused explosive growth in the area of e-commerce, due to the many restrictions it has overcome in the past couple of years. The above sections set the scene about the Internet evolution and defined its resulted economy in an attempt to explain this growth phenomenon. However, the Internet and e-commerce are still only parts of a wider system that has to be re-aligned to interact in such a way that a fully integrated e-business can emerge. This wider system, the system-in-focus, will now be explained in more details in the next section.

1.3 The System in Focus: B2B E-Business

Business-to-business (B2B) e-business refers to a much wider spectrum of activities than previously referred to in B2B e-commerce. Kalakota & Robinson (1999) argue that e-business, in addition to e-commerce, includes both front- and back-office applications that form the engine for modern businesses. They stress that e-business is the overall strategy, with e-commerce being an extremely important facet of it. In short, they define e-business as 'the complex fusion of business processes, enterprise applications, and organisational structure necessary to create a high-performance business model'. E-business in its widest sense involves the use of information technology to enhance communications and transactions with all of the organisation's stakeholders such as customers, suppliers, government regulators, financial institutions, employees and the public at large. The aim of B2B e-business is that it should supply immediate information to the business partners of a

particular company. This should then lead to a very efficient value chain by which products are manufactured and distributed. This efficiency should be born from the fact that companies can then respond very quickly to their business partner's needs.

The term e-business encompasses online transactions, but it also refers to online exchanges of goods, services, transactions and information and therefore linking all business partners, internal as well as external. Unfortunately e-business does not stop here, the term also implies the transformation of existing business processes to make them more efficient. Kalakota & Robinson (1999) argue that e-business is all about redefining old business models, with the aid of technology, to maximise customer value. To engage in e-business, companies need to be able to unlock data in their back-end computer systems, so they can share information and conduct electronic transactions with customers, partners, and suppliers via the Internet. Conducting these e-commerce transactions can take many forms, EDI, as discussed in the previous section, being one of them. It is therefore not only 'new' developments that will be used in becoming an e-business, but the careful harmonisation and mixture of old and new technologies will determine the new, e-business structure of the organisation.

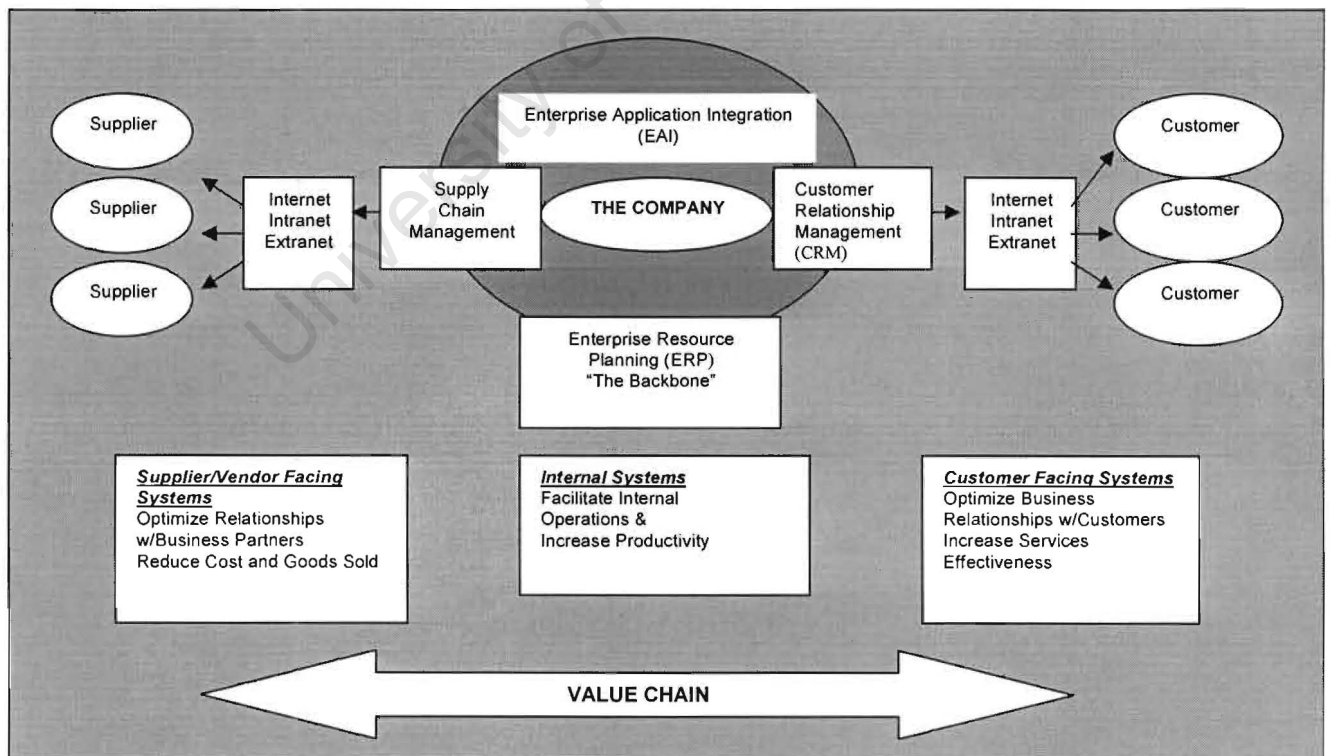
For some companies engaging in e-business means adopting new Web-enabled business models—auctioning off surplus goods, selling products directly to consumers, or joining in online purchasing cooperatives with their competitors. Without a doubt, embarking on an e-business effort requires as much thinking about business strategy as it does about technology. Yet again, the very important criteria - the ability to change - come into play when referring to 'new' business strategies. Therefore the author concludes that it is perhaps the ability to change in this ever-changing Internet environment, which is the secret to the survival game.

To enable a further understanding of this B2B e-business system in focus, the next few paragraphs will focus on the systems model, consisting of its interacting parts and working dynamics, as well as the environment it is embedded in, as perceived by the author. The concepts and ideas presented in the paragraphs above will be enhanced and modeled to develop a richer picture of the situation.

1.3.1 The system in focus: The extended enterprise model

The extended enterprise model (Figure 2) presents the relevant system, B2B e-business, and describes how the various architectural components of the B2B e-business landscape interact. To describe the system in terms of these interconnected applications is deemed useful, because it provides a holistic view of the organisation and its business partners. The extended enterprise, as explained by Cherry Tree & Co. Research (2000), is a business whose information systems operate within a distributed, application architecture and who reaches out to integrate business partners. The extended enterprise, when connected to business partners, can then be equated to e-business, in its widest sense. Kalakota & Robinson (1999) argue that if managers want to develop effective strategies for competing in the new economy, they must understand the fundamental structure of the next generation e-corporation built on an interconnected web of enterprise applications. The extended enterprise is schematically presented in the picture below:

Figure 2: The Extended Enterprise



Source: Cherry Tree & Co. Research – 2000

Principally, the relevant system can be defined as an extended enterprise, including the back-end, as well as front-end systems. Back-end systems can be described as those systems that enable an organisation to transact, communicate and collaborate with its supply chain business partners (i.e. suppliers, contractors, etc.). Front-end systems, on the other hand, are those systems that enable an organisation to transact, communicate and collaborate with its selling chain business partners (i.e. customers, dealers, etc.). The most important criteria for the system in focus, B2B e-business, is that irrespective of the business partner's position in the value chain, business is conducted with other businesses and not with end consumers. Therefore, the majority of the B2B e-business functions embrace Supply Chain Management (SCM) applications and theories. Conducting business, however, involves supply, as well as selling chain partners, and therefore, front-end applications and theories are not eliminated from the B2B system. Customer Relationship Management (CRM) applications and theories are, however, perceived to be part of the wider system, since it concentrates on end-consumers, and will therefore be described in section 1.3.3.

As e-commerce developed and opportunities became more evident, businesses realised how they could benefit from the integration with their suppliers and other business partners. This led to the development of business-to-business (B2B) products, resulting in extensive developments in the area of Supply Chain Management (SCM). SCM solutions are back-end applications designed to facilitate processes among suppliers, manufacturers, distributors and resellers in a cohesive production and distribution network. By enabling greater data sharing between supply chain partners, SCM applications improve production efficiency and flexibility. SCM software, according to Cherry Tree & Co. (2000) has three primary goals:

- 1) Decrease inventory costs by matching production to demand
- 2) Reduce overall production costs by streamlining flow of goods through the production process and by improving information flow between an enterprise, its suppliers, and its distributors.
- 3) Improve customer satisfaction by offering increased speed and adaptability.

Accomplishing these objectives can be done in many different ways, depending on the organisation, and will be discussed in more details in the chapter on the management framework.

Another very important part of the B2B e-business system-in-focus that needs to be explained, are the concepts of Intra- and Extranets and their use. In short, virtual integration of intra- and extranets are enabling the connection of operating systems amongst companies, thus enabling communication and information sharing in real-time. An intranet is the use of Internet technologies within an organisation to achieve better results to access and transfer data. It is a network within the organisation, but with access to the Internet. An extranet on the other hand, is a private network that uses Internet protocols and the public communications system to securely share information with customers, suppliers and other business partners. It can be viewed as an internal network that is extended to users outside the company. An extranet requires security and privacy. These, in turn, require firewall server management, user authentication such as digital certificates, message encryption and virtual private networks (VPN's) to send and receive information via the public network. It is not surprising then that extranets form a key part of the extended enterprise environment. Companies must determine how they can leverage these two 'nets' to improve the benefits to the organisation and its partners, while simultaneously gain competitive advantage (Cherry Tree & Co., 2000).

While the above section focused on describing the system-in-focus, the next two sections will focus on creating an understanding of how this system-in-focus fits in with its sub- and supra-systems. When applying a systems view, a holistic approach is adopted. When viewing the system-in-focus holistically, it is important to develop a clear picture of the parts the system consist of, as well as the environment in which it is embedded.

1.3.2 The Sub-system: The system parts

While the system-in-focus is directly concerned with the B2B e-business related activities, the sub-system constitutes the system parts, which are responsible for

achieving the system's overall goal. The system parts are also schematically presented in Figure 2 and therefore discussions in this section can be referenced to the same picture.

It is perceived that the core of the extended enterprise consists of the internally focused systems. Traditionally, these systems consisted of multiple, fragmented systems. However, for large companies such a system typically involves an Enterprise Resource Planning (ERP) solution. ERP solutions, seen as a comprehensive business solution, focus on the core accounting, manufacturing, logistics and human resources applications and are therefore more concerned with the internal information flows. ERP systems are extremely complex and the products were originally simply not designed for public consumption. This is mainly due to the fact that these ERP vendors were not prepared for the onslaught of e-commerce. In the new economy, where customers and suppliers are demanding to view the same information employees currently have access to, this becomes a major obstacle organisations must overcome; the obstacle of integrating the ERP backbone with its new rivals.

E-commerce demands that new channels of access needs to be developed to connect these transactional data's to the outwards facing systems, both front- and back-end systems. The two audiences typically involved in these SCM and CRM activities, customers and suppliers and/or partners, want two different types of information from an ERP system (Koch, 2002). This perceived dilemma, integrating ERP software with the newer SCM and CRM software, is one of the key areas managers will need to focus on when designing an end-to-end solution. One of the most difficult aspects regarding the integration process is that neither the Internet nor internal maintenance of the ERP system, supporting internal processes, ever stops developing (Cherry Tree & Co., 2000). The difficulty in getting ERP and e-commerce applications to work together flawlessly – not to mention the other applications that demand ERP information such as supply chain and CRM software – has led companies to consider software known alternatively as middleware and Enterprise Application Integration (EAI) software. These applications act as software translators that take information from ERP and convert it into a format that e-commerce and other applications can understand (Cherry Tree & Co., 2000). EAI

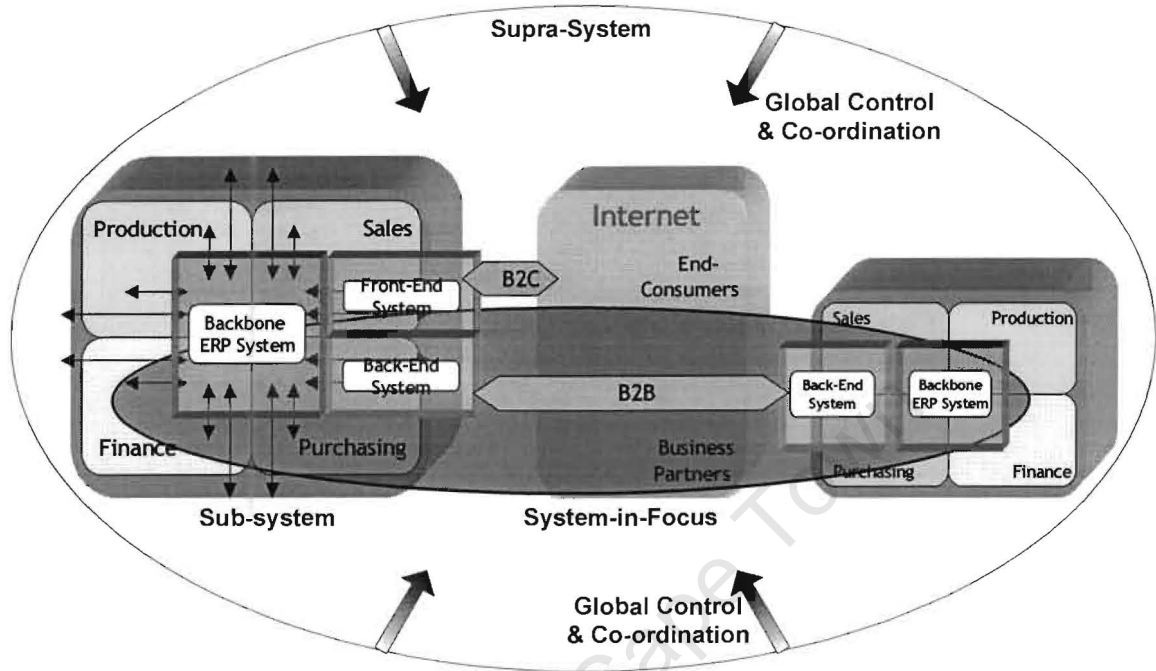
software is, however, only one of many solutions, which can assist in the quest to fully integrate these applications.

According to Cherry Tree & Co. (2000), a company completes its evolution and becomes a truly extended enterprise when this connectivity between its business partners becomes fully integrated into its ERP backbone. It is this final step in the evolution, integrating the ERP, SCM and CRM applications via EAI that is hard to pin down even for the most highly respected integrators. However, as mentioned before, although the majority of large companies do have ERP systems, not all companies in the value chain have an ERP system. Therefore, while establishing complete connectivity, the application integration process is considerably complicated with an increase in parties, and thus systems. Once complete connectivity amongst these components has been established, the business will manifest itself in a fully integrated Value Chain.

1.3.3 The Supra System: The containing environment

With the system-in-focus and the sub-system described above, it is clear that organisations operate in a wider, now more connected than ever before, environment with customers, suppliers and other business partners typically trapped within the same, global environment. To understand this, one can almost imagine a multiplication of these extended enterprises (as in Figure 2), which are all connected through B2B and B2C e-business linkages. The e-businesses all operate within a global context and are thus governed by global control and co-ordination activities. The author illustrates the complexity of the B2B e-business containing environment schematically in Figure 3.

Figure 3: B2B e-business and its environment



The supra-system picture illustrates that the ERP system, being the backbone of the B2B e-business model, contains the core, inwards-facing business functions (i.e. production, finance, purchasing, sales, etc.) of the organisation, while the front- (B2C) and back-end (B2B) systems focus on different types of customers and business partners. It should be noted that the front-end systems referred to in Figure 3 is concerned with B2C activities related to end-customers. Therefore, based on Figure 2, these activities are typically referred to in terms of Customer Relationship Management (CRM) applications.

B2C e-business originated during the beginning phase of the e-commerce phenomenon when end-customers started demanding increased information access over the web in a simple (i.e. without ERP software jargon), convenient, anytime, anywhere fashion. This demand in the market spurred the development of a new type of application, which caters for the B2C market, the area of Customers Relationship Management (CRM). CRM solutions are front-end applications designed to facilitate the capture, consolidation, analysis and enterprise-wide dissemination of data from existing and potential customers. The objective is to better understand one's customers and anticipate their interest in a

company's products and/or services. CRM software, according to Cherry Tree & Co. (2000) has two primary goals, namely:

- 1) Enable the company to more effectively identify, contact and acquire new customers
- 2) Leverage existing customer relationships.

Accomplishing these objectives can be done in many different ways. Although there are similarities overlapping between B2B and B2C, the author does not consider B2C as part of the system-in-focus. This is mainly due to the difference in the nature of the business activities and partners. The author perceives that analysis of B2B and B2C e-commerce activities might result in vastly different outcomes.

Looking at the supra-system from an even wider perspective, it becomes clear that B2B e-business is a truly global activity. Therefore this new, global marketplace has created some unique new global challenges, which requires intervention on the same, global level. The intervention on this level, characterised by activities of control and co-ordination, are discussed in section 1.5 in more details.

From the above descriptions of the three levels of recursion of the system, the author concludes that traditional business processes will probably not be suitable for the e-environment. Simply replacing certain manual business functions with digital communication would not deploy the full functional advantages of this technology. Effective exploitation of the possibilities that e-commerce can offer, requires lateral thinking when revisiting the value chain. True integration and end-to-end solutions must be designed and/or re-aligned to enable a company to emerge into a full-fledged e-business. This is creating a new set of business rules and some of the consequences this new modus operandi will have, are yet to be understood by both individuals and organisations.

The perceived problem in this area that needs to be resolved should not only answer how the gap must be bridged between business processes and technology implementations, but also how to efficiently integrate extended enterprise engineering and supply chain design with the opportunities that e-business initiatives bring. However, these opportunities have to be

perceived as relevant by the people implementing it and the culture of which they form part. The next section will now explain the role of corporate strategy, leadership and culture in this new, digital economy.

1.4 Strategy, Leadership and Organisational Culture

Embracing e-commerce depends on the maturity of the suppliers to the enterprise, the enterprise, as well as the market. Poor understanding of these elements will lead to failure during an e-business implementation and currently very few companies can afford time lost during such an exercise. To gain proper understanding of the internal and external factors, it is important for top management to analyse all three these elements carefully in developing an e-commerce strategy and vision. Revans (1982) argues that the major problems in organisations are those concerned with strategy, i.e. to determine where the enterprise must go and how to get there.

The maturity of the enterprise relies partly on the managers and leaders of the organisation and the culture they prosper. Therefore, for any company to get involved in such activities needs visionaries and leadership. As stated by Ackoff (1995), there will not be place in such an environment for autocratically managed organisations, since they simply cannot effectively cope with these unexpected and complex changes imposed on them. It is thus equally important for leaders to create a culture where the organisation can adapt rapidly in such a turbulent environment, than it is for managers to adopt the technology. To meet such requirements, organisational structure changes leading to people empowerment will be necessary to ultimately incorporate leadership at every level. These leaders must be concerned with establishing direction and aligning people, as well as motivating and inspiring.

It is essential for leaders to develop a business strategy that can be translated into the organisation's goals so that e-commerce activities in the organisation are based on and support by this mission and strategy. The role of an e-commerce strategy in an organisation

should be defined based on an analysis of the organisation's business environment and an understanding of potential e-commerce applications.

Information systems form a key component of competitive strategies and are commonly used to shape strategic thrusts to gain a competitive edge. Gaining such a competitive advantage does not necessarily require a radically new approach to business. It requires building on the proven principles of an effective strategy. Many of the companies that succeed will be the ones that use the Internet as a complement to traditional ways of competing, not those that set their Internet initiatives apart from their established operations (Porter, 2001).

Responsibility and control of e-commerce solutions must come from the top and are business systems comprising of strategy, processes, organisation and people, in addition to computer applications and technology (Frank, 1997). However, most implementations are so much focused on the 'hard issues' surrounding e-business implementations, that people tend to misjudge and underestimate the importance of the role that organisational culture, its people and the influence of their values and beliefs have on such a project.

The true challenge in the global implementation of e-commerce systems will centre on culture, because there is a need to translate and localise systems. Culture, relationships and values shape business practices in widely varying ways. Cultural differences often make it hard to obtain consensus and collaboration, no matter what technology is deployed. The more sensitive corporate leadership is towards language and cultural differences, the more an organisation is able to improve and add value to their global e-commerce initiatives (Baker, 1999). To overcome cultural challenges, regional and personal preferences have to be set aside to maximise results for the entire organisation. The organisation as a whole must be willing to adopt continuous learning as a corporate strategy (Baker, 1999). The most important thing is never to underestimate the impact of changes or cultural preferences when e-commerce technologies are implemented.

One of the most efficient ways of addressing and incorporating the issue of cultural values and beliefs in such an implementation is the creation of cross-functional teams (Frank, 1997).

Moore (1996) argues that the only way to meet the diverse, complicated demands of today's markets is to achieve manufacturing agility and to attain a long-term customer focus is to assemble a cross-functional team. These teams are charged with assembling the creative ideas necessary to develop complex, new products. It requires leadership skills to carefully choose such teams and further develop them. Cross functional teams are still only a collection of individuals and thus, although this team will ultimately be an amplifier of the e-business strategy, it is of utmost importance that the necessary mind-shift is accomplished within the team itself.

There will always be large constituencies in a firm that believe their personal fortunes and successes are tied to those old ways. They may have five, ten or twenty years invested in building the old ways, and, as a result, will be very resistant to change. Therefore, change management activities need to start with the cross-functional team themselves. In implementing an e-business solution, the team generally do not have to get trained on using a web-browser, but they need to get used to the new way of working. As part of the transition from old to new business processes, people are trained to use the system and it must be ensured that they understand the advantages of doing so. By making projects proceed in stages, employees can see the step-by-step benefits of integration and collaboration. Once the team experience dramatic financial benefits and advantages of the solution, they will become its strongest supporter. However, even with a balanced team it is still essential for the highest management levels of the company to buy into the project. It is not a matter of dropping off a few boxes and expecting the staff to get on with it, but a strong emphasis on changing the mindset at all levels within the organisation in order to best make use of the technology (Financial Mail, 2001). Attitudes of resistance to change exist from the mail room to the board room, and often stand in the way of success in e-business. Therefore it is important not to underestimate the importance and interconnectivity of the elements of change management, organisational culture, managerial values, leadership skills and ultimately strategy in an e-business implementation.

1.5 Global Control and Co-ordination

(Clemson, 1984) argues that as part of the cybernetic laws, complex systems organise themselves through continuous interactions among the system parts. The result of these interactions then gives rise to the characteristic, structural and behaviour patterns of that system. This characteristic of a system is referred to as its self-organising abilities and applies to the B2B e-business system in focus, as well as its supra-systems and environments. In an attempt to tame the complex environment surrounding the 'Internet', and more specifically e-business, the white house produced a report on the Internet, urging self-regulation. President Clinton (White House, 1997) requested governments to respect the defining features of the new digital marketplace; the features referring to the widespread competition and increased consumer choice. President Clinton further noted that governments should understand that their actions can facilitate or inhibit electronic trade and that they should adopt a market orientated approach to electronic commerce that facilitates the emergence of a global, transparent, and predictable legal environment to support business and commerce. He requested that governments should refrain from imposing new and unnecessary regulations, bureaucratic procedures or new taxes and tariffs on commercial activities that take place via the Internet. President Clinton emphasised that the goals of any regulation and government intervention activities should be to ensure competition, protect intellectual property and privacy, prevent fraud, foster transparency, and facilitate dispute resolution – not to regulate.

The new, global marketplace and its added complexity for government regulation, is a classic application of what Kaufman (1980) termed the 'commons theory'. He described the situation whereby each subsystem's goal can be in conflict and harmful to the bigger system, unless managed at the right level. In the case of the Internet and B2B e-business systems, where the global marketplace is the playground, it therefore makes sense that only the highest levels of all countries should be actively involved in the control and co-ordination of activities that will cut across country boundaries. Trying to control such global issues on any lower level might increase the speed and flexibility of the decision-making process, however it might increase the possibility for serious conflict.

Part of the reason why the Internet has been such an explosive success can be attributed to its decentralised nature. Although the idea of not regulating the e-business system has its benefits, leaving all aspects of this beast up for decision to individual countries and their governments is simply not a viable solution, since the Internet is a global marketplace. Therefore, the need to address this 'commons' problem has been identified in the early stages of the Internet revolution already when President Clinton requested that matters related to e-business must be facilitated on a global level. The matters considered by Clinton and his government included Tariffs and Taxation, Electronic Payment Systems, Uniform commercial code for electronic commerce, Intellectual Property Protection, Privacy, Security, Telecommunications Infrastructure and Information Technology, Content and lastly Technical Standards.

Although each of the points above carries significant weight in the control and co-ordination of the B2B e-business market, the details will not be discussed in this section. It is important though to note that even on the highest levels of society the need for co-ordination and the benefits of 'self-regulation' have been recognised at an early enough stage to prevent that this system is over-controlled. It is the opinion of the author that without such an appreciation of the co-ordination and control mechanisms of this, arguably most complex system any business environment has ever dealt with, the Internet would probably have never exploded into the powerful business tool that it is today. It is also valuable to recognise that it is not only within the value chains that re-alignment, rethinking and re-assessment of old methods are necessary. It is equally important that the institutions outside the direct business boundaries of the organisation, which controls and co-ordinates many of those business aspects, are being reviewed and revisited to reflect the needs that arise from the new e-business revolution. Without the proper changes in all the different parts of the system, the e-business revolution will not continue to meet business requirements as it has so successfully done in the past couple of years.

1.6 Hypothesis

Having presented the system in focus as well as the context in which the problem situation emerged, the aim of this section is to focus specifically on the eminent concern underlying the situation. The concern is what makes the research undertaken for this thesis relevant, and is derived from the contextual situation. The hypothesis derived in this section, reflects on the concern.

Based on the predicted market growth for B2B e-commerce, it becomes clear that this particular aspect is already having, and will continue to have, a profound effect on how companies are being operated/managed. Kalakota and Robinson (1999) argue that few concepts have revolutionised business more profoundly than e-commerce. This justifies that the development of a proposed management framework and the investigation of the critical components that will lead to the successful transformation into an e-business probably have more than just merit. Proper management guidelines are of the greatest concern when deciding how to move from traditional applications to the new breed of integrated e-business architecture. The successful planning and managing of e-business investments is of the utmost importance to sustain and create more shareholder value into the future.

The main hypothesis stated by the author is that a framework is required to guide managers with the re-organisation necessary throughout the life cycle (including planning, implementation and sustaining) of a B2B e-business model. The author believes that this framework will contribute to organisations enhancing competitive position and thus unlocking more shareholder value. The author acknowledges that other frameworks related to this subject has been discussed, however the framework resulting from this research study will attempt to deal with the problem from a more holistic perspective. Therefore, the focus will not only be on the application areas that are key in (re)building a B2B e-business model, but also on the aspects of leadership, strategy, organisational culture and all other aspects related to human dynamics. In developing the framework, the author intends to provide sources of competitive advantage for companies engaging in B2B e-business.

During this chapter, the author attempted at developing a perceived problem situation, identifying the system-in-focus, the sub-system, the supra system as well as elaborating on the emerging concerns. The underlying reasoning for development of this problem statement is that the problematic situation can only be effectively addressed once it has been understood in its entirety. The section aimed at addressing both the traditional 'hard issues' as well as elaborated on the area of human dynamics. The content discussed in this chapter will form the basis in the development of a conceptual framework for understanding and resolving the 'problem situation'. The chapters following as part of the thesis will focus on the further development of this conceptual framework.

University of Cape Town

2. Research Framework

This section aims at developing a theoretical framework for inquiry to aid in understanding and resolving the problem situation presented. It embodies the theoretical content of the thesis, which will present an appropriate research methodology and will further be used to guide the research inquiry process throughout this study. The resulting framework is believed to be useful in addressing complex, social problems.

The chapter starts out with an explanation of the terms methods, methodologies and models, followed by a brief overview of the research objectives. The next section includes a detailed description of the inquiry process that reflects on the actual problem solving process as perceived by the author. To improve the inquiry process and provide the research with the relevant theoretical content, the framework is enriched with the systems thinking principles (Appendix A). These are incorporated into the framework to enhance the inquiry when dealing with complex social, dynamic problems. The appropriate systems principles discussed, will include the Soft Systems Methodology (SSM) and the Viable Systems Model (VSM). The main intention is to simply highlight the particular areas in which they are most useful and how they fit into the framework. The final section of this chapter provides a detailed description on the research design.

However, before any of the above are discussed some of the terms used in this chapter needs to be explained and defined.

2.1 Methods, methodologies and models

In order to orientate the reader, the author deems it necessary to explain some of the terms used in this chapter. The terms method, methodology and models will be regularly encountered and in order to achieve a better understanding this section will aim to explain these different concepts and their relation to each other.

The Greek language seems to be an excellent source to clear the rather vague picture. In Greek, the term methodology means 'the study of methods'. The Oxford dictionary defines methodology as "the study of systematic methods of scientific

research”. Yet another definition which is more specifically related to research, is given by Crotty (1998, p.3) as “the strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes”. The definition provided by Crotty seems to be comprehensive and will be accepted as the working definition for the purpose of this thesis. An appropriate example of a methodology related to this chapter, is the Soft Systems Methodology (SSM).

Method, on the other hand, also descended from the Greek language, means “way of investigation”. More specifically related to research, Crotty (1998, p.3) defines methods as “the techniques or procedures used to gather and analyse data related to some research question or hypothesis”. For the purpose of this thesis, the definition provided by Crotty will be adopted. Based on these definitions, methods can thus be considered a lower level, more specific application of methodologies. If these two concepts would be constructed in terms of a hierarchy, methodology would be positioned at the higher level of the two.

Models, on the other hand are like metaphors in that they help making sense of the world by offering a means of comprehending an otherwise incomprehensible problem. They do this by providing a logically consistent description and representation of the interrelationships between the essential elements of a high level or composite concept. A model is by definition conceptual and generic, making it useful in providing a common understanding. Due to their generic nature, models are widely used in a variety of different areas, some explicit and some implicit.

One example of such an implicit model is that of a mental model, which Mintzberg (1994) describes as the way in which a person interprets the world around them. An example of an explicit model related to system thinking principles is that of the Viable Systems Model (VSM). The VSM is a model employed to try to diagnose problems and to suggest how organisations might be designed (Flood & Jackson, 1991). Methodologies establish the principles behind the use of such models. From

the above, the author concludes that the models used frame the reality its user imposes on the world. Further, the experience that is forged out of the use of these models, increase the users' level of understanding about the problem within the framework of the specific models adopted. In summary, models assist would-be designers to visualise a problem and break it down into manageable units.

With the terms method, methodology and model put in context in the paragraphs above, the reader should now have a clear understanding of these terms. Since they will be used frequently, it is important for the reader to be able to not only distinguish between them, but to also fully comprehend their meanings. Now that the reader has a clear understanding of these concepts, it is important to understand the research objectives first, before the discussion on the research design is continued.

2.2 Research Objectives

The overall objective of this research study is to develop a management framework that can be used by business managers as a guide in reorganising their organisation to become a successful B2B e-business. In addition to the development of the management framework, the objective is also to test the validity of the framework in practise, to further enhance the understanding. Based on the predicted growth in the B2B e-business sector, the author believes that establishing such a framework is critical for organisations to not only survive, but to thrive in the future. The management framework to be developed will be concerned with aspects related to increasing efficiency and enhancing competitive position of an organisation within the B2B e-business landscape. Additional to identifying these opportunities, and of equal importance, the framework will further aim to identify and elaborate on the barriers that might hinder the efficient evolution of such a business model. Therefore, the framework will concentrate on both traditional, 'hard' as well as 'soft' business aspects to include all the prevalent B2B e-business management practices. The author believes that for an organisation to sustain its competitiveness over a prolonged period of time managers need to navigate the B2B e-business landscape

successfully and to do this, they will need a rigorous framework to guide them. Effectively, the nature of this research study includes the analysis of frameworks and models of the secondary sources during the emergence, through synthesis of the management framework that the author is aiming to develop. While the bulk of the study reflects on the inferences drawn from these secondary resources, additionally the framework is tested in practise. It is important to note that the objective of testing the framework in practise is not to generalise the theory to the whole B2B e-business market, but merely to validate the framework and enhance understanding.

On a different level, the objectives of this research study is for the author to learn about the B2B e-business subject matter, as well as to reflect on the process the researcher engages in during the developing and testing of the framework. These main objectives determine the structure and design of the research study.

2.3 The Nature of the inquiry framework

Before any problem solver commences with the research process, it is important to understand the nature of the research to be undertaken. Of equal importance is a rigorous inquiry pattern or framework to guide the research. The inquiry process itself is the underlying tool used in any problem intervention.

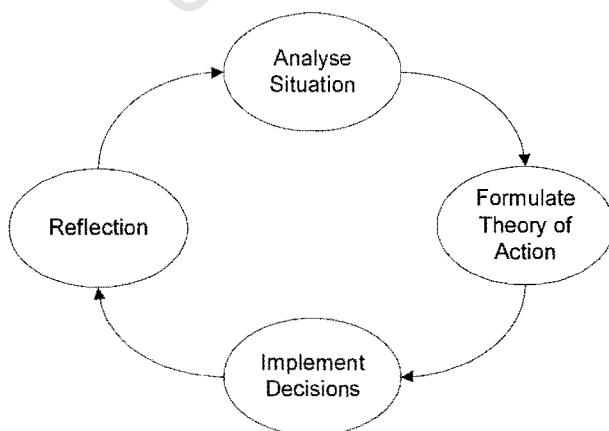
This section will attempt to expand the reader's perception related to the process of inquiry. Since the author's reality is confined to the limits of her own perception of these concepts, the section offers only a glimpse of the tools that have been developed over the many years to assist in understanding the environment and the interacting processes that govern our lives. The first part of this section focuses on the relationship between learning and inquiry followed by a detailed description of the various inquiry stages the author believes she will engage in during this research study.

2.3.1 Learning and Inquiry

The aim of inquiry is to improve the human condition by adding to the body of knowledge. The inquiry process itself is a very important aspect of the learning experience the researcher strives for during a research project. Therefore, through the inquiry process, the researcher not only obtains knowledge, but also learns from the experience. Learning, however, has been misunderstood for many years and is not simply the process of memorising facts to then later transfer them back on a piece of examination paper. It has far deeper implications on people's lives and people themselves hold the key to stimulating or hindering their own learning experiences.

The pace at which a person learns, indicates their learning curve and based on the above, one can assume that simply memorising facts does not enhance the learning curve. The inquiry process on the other hand, which relies on a full cycle of activities, should result in an exponential climb of the learning curve. The degree to which this exponential curve will climb, however, depends on certain key criteria for the learning and inquiry process. These key criteria will now be discussed in more details with the aid of Figure 4 below. Figure 4 describes the different activities that an individual engages in during the process of inquiry.

Figure 4: Learning and Inquiry framework



Handy (1993) think of learning as a wheel of activities, that goes round and round. The activities described in Figure 4 contains some of Handy's identified activities, however it is synthesized with other ideas in order to present a more comprehensive rich picture of the learning / inquiry process. He emphasizes that for proper learning to take place, this wheel must go round and round; continuously raising new questions and searching new answers. Misak (1991) implies the same by arguing that the inquiry process is a process of settling one's beliefs and thus accepting this new belief as the truth and replacing the old belief. He says if this is not the case, the individual will continue the inquiry process until doubt has been satisfactorily settled.

Argyris (1992) takes the learning experience one step further, by identifying that effective double-loop learning is a function of how people feel *and* think – the cognitive rules or reasoning they use to design and implement their actions. These cognitive rules are based on the fact that every thinking individual carries with them a set of beliefs and views of the way the world functions. Although these human thoughts are only perceptions of the world and realities, it is constantly used during interactions in this world. Through inquiry, we are constantly broadening the field of our knowledge, changing our perception of reality and adjusting our values.

The inquiry process, as perceived by the author, consists of the four activities indicated in Figure 4. The following paragraphs will now discuss each of these activities in more details.

2.3.2 Analyse Situation

Pierce (1877) argues that learning and inquiring occurs when one's beliefs, values and perceptions of reality are threatened and comfort zones are disrupted. This feeling of surprise triggers an uneasy mental state of discomfort prior to further questioning which results in doubt. Doubt, he says, is a process generated when

our experiences in relation to our belief systems do not correlate. When this happens, according to Handy (1993), the wheel of learning starts with a question, a problem to be solved, a dilemma to be resolved, a challenge to be met. The process of effective and systematic learning must afford the individual the ability to ask the right question at the right time in order to understand the situation.

These questions come in many forms and are the sort that creates a need to explore, in search for a discovery to be made. But to create the need to explore, an individual must be curious and wanting to learn about a certain situation.

Handy (1993) states that if we want to learn, the individual has to take responsibility by turning his/her own wheel of learning. He/she must portray the properties of responsible and proper selfishness, which is based on taking responsibility for your own future, having a clear vision of that future, ensuring that you get it and believing that you can get it. Therefore he says, the question must be the analysts' own question, to ensure that the wheel of learning will go round for real learning to place.

The questions arising from observations in the field is the basis for building sound knowledge about the situation. Pierce (1869) described the process of observing as a perception assisted by thought and by the aid of analysis. Since 'reality' lies in the eyes of the observer, various views of the situation will provide different 'understandings', resulting in different mental models of the situation. Checkland (1981) states that the analyst is not concerned with problems, but with perceptions of problems. Perceptions, which are subject to frequent change.

It is therefore essential to utilise these views when building a model of the 'reality' we are dealing with to provide a more comprehensive understanding.

Linestone (1989) is of the opinion that this multiple perspective approach helps the analyst in bridging the gap between analysis and action.

Revans (1982) suggests that during this observation and questioning stage, the analyst should determine what needs exist and therefore what needs to be done.

Since decisions for future course of action will be based on the outcomes of this analysis activity, it is important to determine what the difficulties are that need to be surmounted. Once these difficulties have been identified and are understood, the analyst must determine how these obstacles can be overcome. Revans (1982) reasons that the analyst must have adequate knowledge of these three key aspects to be able to develop a feasible course of action.

The understanding and knowledge obtained through the questioning and observation process leads to a hypothesis that is aimed at explaining the mental model of the problem situation that emerged. Only once the information about the situation has been secured, Revans (1982) argues, can decisions be designed.

2.3.3 Formulate Theory of Action

Revans (1982) defines a decision as a statement of the analyst's belief in the feasibility of some future course of action. These decisions take the form of theories of action that are based upon the observations made. The activities involved in formulating theory of action are concerned with providing answers to the questions raised before. Handy (1993) argues this can be achieved by investigating possible ideas. This aspect encompasses a special type of thinking that includes speculation, free-thinking, re-framing and looking for clues.

To assist the analyst with this stage, he/she should have the ability to see things, problems, situations or people in other ways, to look at them sideways, or upside-down, put them in another perspective or another context, think of them as opportunities not problems, hiccups not disasters. This type of thinking is the key to unlocking problems. This, however, is quite difficult, since we are all prisoners of the past and therefore it is hard to think of things except in the way we have always thought of them (Handy, 1993).

Since the decision is based on the analyst's belief of the feasibility of the action, it is almost unnecessary to point out the importance of the value and belief system of the analyst him- or herself. Revans (1982) argues that one of the greatest operational handicaps are the inability of these individuals to pose questions about their own value systems. This is very important when aiming for open-minded enquiry in the search to generate as many feasible ideas as possible. The analyst should therefore reflect upon his/her own value system and evaluate and compare it against that of others to ensure that the mental model developed is a more mutually informed one.

Application of the above concepts to this research study implies that the output of this phase will provide an adequate research structure / framework for understanding the specific theories used during the problem solving process. Here, special consideration is given to the methodologies, so they can be incorporated into the inquiry framework.

Decision-making and designing processes are based on the critical elements of desirability, feasibility and preference – the contingent factors or constraints (Wild, 1995). He argues that desirability is associated with the objectives, feasibility with the nature of the system and preference with the analyst as the individual. Once these three factors are understood and taken into account in the design of the theory of action, the decision is ready to be executed and tested. The theory of action results in a model that contains the predicted results. Specifically, in the case of this research study the model will take on the form of a blueprint for the application of the research undertaken.

2.3.4 Implement Decisions

The theories of action designed in the previous stage must be implemented in reality to envisage their practical value. This is the phase where these relevant theories are applied to generate an understanding that will assist in achieving the

project / research goals. To aid in generating the necessary understanding, various methods can be used in providing the information from which issues can be identified and conclusions drawn. The information sources used varies widely depending on the nature and available time of the project / research undertaken. As mentioned above, the type of information used in this research project will be mostly of a 'soft' nature, collected from various secondary resources and their opinions. By using this multiple sources of evidence approach, the author believes that different perspectives are taken into consideration, which result in the topic being addressed in the most holistically possible way, thereby ensuring research validity.

The application of the theory provides the researcher with the means of identifying and/or verifying the true causes of the problem situation. This results in the necessary understanding required to either verify or controvert the hypothesis developed during the emergence of the research concern and to suggest potential solutions to problems.

2.3.5 Reflection

Revans (1982) suggests that it is during this phase that the results of the implementation should be compared with the theories' predicted results. These processes involve activities related to auditing and inspection and test how well the design has been developed by evaluating how the decision stands up to influencing the situation itself (Revans, 1982).

Handy (1993) is of the opinion that it is especially during this stage that the analyst must portray properties of 'negative capability'. This concept encompasses the behaviour and thoughts of the capacity to live with mistakes and failures without being downhearted or dismayed. He says that getting it wrong should be seen as part of getting it right and that failures should be credited to experience. The analyst should not allow mistakes and doubt to disturb him/her

and should realize that learning takes place especially when making mistakes, and not from successes.

In reality, some theories work and some doesn't and during this stage interpretation is necessary to bring about understanding and real learning (Handy, 1993). Revans (1982) argues that a proper understanding will lead to the rejection, modification, confirmation or repeating the cycle of negotiation in light of experience gained. This, he argues, is where the control process starts; when appropriate action is taken based on the conclusions drawn from the auditing and inspection.

Applying these concepts to the research undertaken in this study, this stage reflects on the entire process. The main aim is to verify the validity of the research and therefore its findings and is done by reflecting on the outcome. During the evaluation stage the purpose for undertaking the research is reflected upon as well as the personal learning and achievement of the researcher. From these evaluations, recommendations or options for further action or research may transpire.

It has become evident that the framework for learning and inquiring provides a useful perspective during problem solving, however it does not offer a solution to the problem of 'which questions to ask' nor does it offer a methodology whereby analysis can be aided. This has led to the conclusion that it is imperative to use these concepts in conjunction with other models and methodologies to result in a more comprehensive inquiry process. The models and methodologies applied during this thesis include the Soft Systems Methodology (SSM) and the Viable Systems Model (VSM), both based on the systems thinking approach. The next section will elaborate on the systems thinking approach.

2.4 The Systems Thinking Approach

The aim of this section is to provide a brief overview of the systems thinking approach to give the reader insight into its applicability. The entire research cycle, the inquiry process described in section 2.3, is enhanced with systems thinking principles. Appendix A contains the detailed literature review on the concepts of systems thinking in general, followed by explanations of the ¹Soft Systems Methodology (SSM) and the Viable Systems Model (VSM) in particular and how each of these can be applied to the generic inquiry stages identified above.

In today's modern world we are faced with 'messes', sets of interacting problems which range from technical and organizational to the social and political and embrace concerns about the environment, the framework of society, the role of corporations and the motivation of individuals. Even though many problem-solving methodologies have been developed over the years, there does not exist a super-method that can deal efficiently with the innumerable and multifaceted issues (Flood & Jackson, 1991). According to Flood & Jackson (1991) most of the current systems methodologies applies to an 'ideal type' problem situation. In reality, like in the case of this research study, the problem will most probably cross boundaries with many 'ideal type' situations, which requires the application of a range of problem solving methodologies. Either way, all of these must still support rigorous and formalised thinking.

As we create our own reality, any perceived problem situation is subjective to the observer and therefore the 'ideal type' situation, as referred to above, depends on the observer-reality relationship. The systems approach makes us aware of the fact that this view will only be a partial representation of the perceived problem situation and that the researcher/analyst should recognise that other possible perceptions of the problem situation are also possible. Therefore, by using various problem-solving methodologies the researcher constantly tries to review these perceptions. Flood & Jackson (1991) argues that these different views are exactly what make the system

¹ After this the document will refer to SSM and VSM.

ideas such a rich concept in the development of novel and insightful appreciations of problematic situations. The systems approach is used throughout the research cycle and provides the underlying foundation that enables the author to raise certain types of questions. It will therefore not always be explicitly mentioned, however it governs the mental model that the author subconsciously uses during the research / inquiry process.

2.5 Research Design

The goal of this section is to provide the reader with useful information on the research design by not only explaining the structure of the research, but also by illustrating how all the major parts of the research project work together. It can be seen as the approach taken to address and provide an answer to the research problems. The research undertaken demanded that a systematic approach be adopted, one that set forth the plans for this intended research project.

The section is organized as follows. The first sub-section provides a description of the philosophical and theoretical perspectives; those aspects which can inform the research. Secondly, an explanation of the research strategy is given, followed by a description of the methods and techniques the author intends to use during this research project.

2.5.1 Philosophical Perspective

This section will describe the philosophical stance that lies behind the chosen methods and methodologies and will explain how it provides a context for the research process and grounds its logic and criteria. The aim is to emphasize any assumptions operating in the researcher's conscious thought processes, which influence his/her perceptions, decisions and actions.

The process that a researcher engages in during a research project can vary considerably for different individuals. The process, referring to the methods and

methodologies used in trying to solve the problem, is selected by the researcher based on his/her assumptions about reality. All research is based on some underlying assumptions about what constitutes 'valid' research and which research methods are appropriate. To be able to understand the philosophical choices underlying management research, it is important to know what these assumptions are. To know these assumptions and to gain more insight into the validity of the research creates a need to question the basis of the researcher's knowledge and understanding.

The most pertinent philosophical assumptions are those related to the underlying epistemology, which guides the research. Epistemology refers to the assumptions about knowledge and how it can be obtained, i.e. a way of understanding and explaining how we know what we know (Crotty, 1998). Easterby-Smith et al. (1991) identifies two extreme philosophies from which methodologies and methods can be derived, namely positivism and phenomenology. Positivism assumes that the world and 'reality' is external and objective and that knowledge is only significant if it is based on observations of this external world. Phenomenology, on the other hand, assumes that the world and 'reality' are socially constructed and given meaning by people, rather than objectively determined. This implies that the researcher should appreciate different constructs and meanings that people place upon their experience.

These two extreme views of the world and 'reality' serve as the basis for understanding philosophical assumptions, which determine how people make sense of different situations and ultimately what their actions are based on. The fact that people hold these different views affect what they believe, how they think and how they enquire into and construct knowledge of the world and 'reality'. These implications in combination, ultimately impact the researcher's choices.

The researcher's choice in this particular study was to investigate a situation concerned with the re-organisation necessary to become an e-business. Since the aim of the study is not to prove any specific theory, the phrases "truth" and "correct results" are not really meaningful, implying that the phenomenological paradigm is overshadowing the scientific, positivist epistemology. Easterby-Smith et al. (1991) argue that the phenomenological paradigm is associated with qualitative research methods, which are strong in looking at change processes over time, understanding people's meanings, adjusting to new issues and ideas as they emerge, and contributing to the evolution of new theories. They further note that these types of research provide a way of gathering data, which is seen as natural, rather than artificial. The weaknesses, they describe, are that data collection take a great deal of time and analysis and the interpretation of data maybe very difficult. Based on these underlying assumptions and criteria, the author concludes that the nature of this research study will take the form of qualitative research. The specific research strategies related to qualitative research, however, will be discussed in the following section.

2.5.2 Research Strategies

While the previous section focused on the various philosophical perspectives that inform the type of research to be undertaken, this section focuses on the specific qualitative research strategies. Not only will a description of the various strategies be provided, but more importantly the rationale that shapes the choice of method to be employed, will be explained.

There are numerous research strategies that can be employed within qualitative research, depending entirely upon the circumstances under which the inquiry is undertaken. A research strategy informs inquiry from the underlying philosophical assumptions to research design and data collection. Examples of research methods include sampling, questionnaires, interviews, etc. Specific research methods imply different skills, assumptions and research practices as

well as influences the way in which data is collected. Myers (1997) identifies four qualitative research methodologies, which are summarized below:

- Action research: According to Rapoport (1970, p.499) Action Research “aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework”.
- Case study research: Yin (1994, p.13) defines Case Study Research as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident”.
- Ethnography: According to Lewis (1985, p.380), ethnographic research “comes from the discipline of social and cultural anthropology where an ethnographer is required to spend a significant amount of time in the field. Ethnographers immerse themselves in the lives of the people they study and seek to place the phenomena studied in their social and cultural context”.
- Grounded theory: According to Martin & Turner (1986) grounded theory is an inductive, theory discovery methodology that allows the researcher to develop a theoretical account of the general features of a topic while simultaneously grounding the account in empirical observations or data. Grounded theory seeks to develop theory that is grounded in data systematically gathered and analyzed.

The author evaluated the strategies discussed above in terms of three criteria, which she perceives as the deciding factors. Firstly the author believes that due to the complicated nature of the subject under discussion, the research is best designed by first building a thorough understanding of its various facets and the distinctions between them. This thorough understanding can be accomplished by an in-depth theoretical study and the management framework could emerge through a process of synthesis, by carefully applying certain aspects of the SSM and VSM.

Secondly, the researcher's limitations regarding physical involvement in bringing about change in the chosen organisation (s), which are geographically spread across the globe, is considered an important factor in choosing the appropriate strategy. Thirdly, the author considered limitations regarding the number of respondents that might be included during a means to test the validity of the framework. It might be useful to re-iterate that the objective of testing the framework is rather concentrated on validating the developed framework, rather than generalising a theory for the whole B2B e-business market. These three criteria, in combination, influenced the author to decide on adopting the action research strategy, supported by the grounded theory strategy. While the overarching strategy for this research study is based on the principles underpinning action research, the grounded theory strategy plays an important role in the design of this research study. On a philosophical level, the choice of the particular combination of research strategies is based on the underlying phenomenology paradigm in this non-experimental approach. Further specifics on the action and grounded theory research methods are discussed in the next subsection.

As discussed in the previous section, the underlying epistemology is based on a phenomenological paradigm, implying qualitative research. Baskerville & Wood-Harper (1996) re-iterate this by arguing that action research does not occur in the traditional positivist philosophy of science. Therefore, the author considers the philosophical position adopted consistent with the action research strategy, justifying it as an appropriate choice for this research study. The author views action research as the overall strategy, while the grounded theory method fits in perfectly as part of the action research process. Before commencing with a description of the data collection and analysis methods and the inquiry framework itself, however, the appropriateness of the chosen research strategies needs to be reflected upon.

The Appropriateness of Action Research

Action research has been used as a research method in social science since the 1940's and Rapoport (1970) states that its use as a method of inquiry is undisputed. The research project under discussion focuses on re-organization as a result of e-business, specifically B2B. Since B2B e-business is a technology and Information Systems phenomenon, it can be associated with the general Information Systems (IS) research strategies.

Lau (1998) states that the use of action research in IS provides a unique opportunity to bridge theory with practice, allowing the researcher to solve real-world problems while contributing to the generation of new knowledge. He further notes that with the increasingly complex role of information technology as a key enabler of social change which can lead to new forms of practices, organizations and communities, the use of an action-oriented methodology should improve a researcher's understanding of such social phenomenon through 'doing' and learning through 'experience'. The key of action research is the fact that knowledge is gained as an active process and that the outcomes redefine one's beliefs. Baskerville & Wood-Harper (1996) describe action research as a pragmatic approach which aims at dealing with the real world, instead of a representation of the real world and thus a desire to 'come to terms' with the world. Action research is generally applied to complex, social situations, where a complex set of relationships between indiscrete variables exist and where it is not possible to choose which variables are crucial. Adopting an action research strategy will therefore lead to an enhanced understanding of a complex, human process, rather than a universal prescriptive truth.

Baskerville & Wood-Harper (1996) identify the following three characteristics, which they consider key to an ideal action research domain:

- Researcher needs to be actively involved, with expected benefit for both researcher and organization

- Since the researcher is perceived as an active participant, the knowledge obtained can be immediately applied.
- The research is cyclical, linking theory and practice.

Since action research focuses on actually trying out these new theories in the real world and studying their effects, Baskerville & Wood-Harper (1996) consider it both a relevant and rigorous research strategy. They suggest that action research is the most scientifically legitimate approach available in the study of human methods and that it is regarded by many as the ideal post-positivist, social, scientific research method for information systems research.

Grounded Theory as part of Action Research

Action research can be seen as the overall research approach, with grounded theory embedded in it. The basic idea of the grounded theory approach is to read (and re-read) a textual database (such as a corpus of fieldnotes) and "discover" or label variables (called categories, concepts and properties) and their interrelationships. Myers (1997) argues that what makes the grounded theory method so unique is its specific approach to theory development. The grounded theory method suggests that there should be a continuous interplay between data collection and analysis. Myers (1997) further highlights the fact that the grounded theory approach is becoming increasingly common in Information Systems research, because the method is extremely useful in developing context-based, process-oriented descriptions and explanations of the phenomenon. The author therefore perceives the interaction between these two research strategies useful to apply during this research study. Particularly, the grounded theory method, and thus the literature, is perceived to be useful in assisting the author in understanding the complexity of the problem situation. The process of triangulation, as applied in this research study, is believed to assist in achieving the necessary rigour. The specifics of the interplay between the research methods used in this research study, is discussed in the next section.

While the section on research philosophy described the underlying epistemology, the section on research strategy elaborated more specifically on the research method suitable for the circumstances of this specific research study. Although it has been explained why specifically the action and grounded theory research strategy was chosen, the design details related to the execution of the study have not been described. The following section will explain the specific methods and techniques the author intended to use during this research study.

2.5.3 Research Methods

This section will present the methods the author intended to use related to the collection of the data used in this qualitative research study. Methodologically the research study is designed as follows: Firstly by developing a management framework and secondly by testing its validity by means of a pilot survey. The intention of the survey is that the questionnaire responses could be used as a means to reflect on the management framework developed.

Conceptually, the data collection processes related to the research could be divided into two steps, namely the development of the management framework which is descriptive of the concepts of B2B e-business practices, and the testing and verification of this framework by means of a pilot survey. These methods, combined with the author's own observations in the field, provided the data that informed this research study. The two data collection methods will now be described in more details in the sub-sections immediately following.

Data Collection for Developing the Management Framework

This section explains how the author intended to obtain the data for the development of the management framework, which makes up the majority of the study.

Due to the newness of the subject of B2B e-business and the scattered management information available, the study will be of a descriptive nature based mainly on secondary data obtained from a variety of opinions and trends in the market. The secondary sources will cover a wide variety of options, including published and unpublished documents, company reports, newspaper articles, books, articles and so forth (see List of References and Bibliography).

External, secondary sources will be used to expand the understanding of the management dilemma and to look for authors who have addressed similar problems that have originated from this management dilemma. The data collection for the management framework will therefore contain no formal quantitative testing based on extensive sample surveys. The process of developing the framework can thus rather be viewed as the synthesis of secondary information, guided by the inquiry framework and the systems thinking principles enriching this framework. These will be discussed in detail in the next sections.

Data Collection for Validating the Management Framework

After the management framework is developed, the validity of the framework will be tested in practice on a small sample to provide the feedback necessary for the reflection process.

Target Population

The data collection method used to reach the goal is in the form of structured interviews. Due to the broad geographical reach of the chosen companies that comprised the sample, the interviews will be executed by means of constructing a questionnaire and emailing it to the respondents. The questionnaires will be distributed to a small sample of users, of which the population is determined based on company size in terms of annual revenue combined with level of international operations, as well as the relative position of a company within the value chain.

The criteria for company revenue and level of international operations is considered to give an indication of the high volume of supplies and partners necessary to keep the business processes flowing as well as those companies following international trends. This suggests that B2B e-business is very important to the survival of these rather large companies.

The criteria of the company's relative position in the value chain is an important factor, because the effects of B2B e-business is considered to have the greatest impact on companies positioned lower down the value chain. Therefore, large, international manufacturing (goods and/or information) companies were targeted with the questionnaires.

While the study sample is too small to be considered representative, the primary goal is not to generalize a theory for the whole B2B e-business market. The major purpose of this study is to determine the validity of the management framework developed.

Respondents

The criteria established for choosing the key informants within the chosen companies are based on the fact that they are seen as experts in the field of B2B e-business and that they are senior executives responsible for e-business strategy and/or information technology in the SBU. All the respondents will be chosen on these criteria and will therefore be targeted to answer the questionnaire.

The Questionnaire

Since the goal of the questionnaire is to validate the management framework, the questions are rather broadly structured. Therefore, most of the questions are of a descriptive nature, with a combination of multiple choice, scaling, and unstructured, open-ended questions. This ensures that the questions do not limit responses but provides a frame of reference for the respondent's answers. The

structure of the questionnaire will be based on the management framework developed from the literature. The questionnaire is presented in Appendix B.

The objective of this chapter was to develop a research framework effectively aimed at dealing with the underlying 'soft' as well as the 'hard' issues as were identified during the discussions in the problem situation. The development of this research framework effectively entails explanations on the inquiry process, the research philosophies, strategies and methods used in synthesizing the information on the different models. It is believed that in the next chapter will lead to an adequate level of understanding of the perceived problems in order to address them successfully.

University of Cape Town

3. Management Framework

The aim of this chapter is to apply the theory developed in chapter two within the contextual situation in an attempt to address the concerns, which emerged from the problem situation. The application follows two streams of enquiry, the traditional 'hard' approach, dealing primarily with the e-business processes and the surrounding architecture, as well as the 'soft' approach, dealing with human and organisational issues.

The information presented in this chapter is mostly derived from secondary sources through a process of synthesis, resulting in the coherent management framework. The aim of the management framework is to help managers with the re-organisation necessary in becoming an e-business in a business-to-business (B2B) setting.

The chapter is organised in various sections, starting with a conceptual model of the management framework, as the author perceives it. Based on the principles underlined by the SSM, rich pictures are extremely useful when addressing complex, social problems. This rich picture, the conceptual model of the management framework, will be used as the basis for the discussion and therefore, all other sections of this chapter fit into this rich picture. The logic of the chapter basically follows the two streams of enquiry as ascribed by the SSM, namely firstly to focus on the logical, 'harder' issues and secondly to focus on the 'softer' issues which are concerned with aspects related to human dynamics. Especially within the sections related to the logical stream of enquiry, the VSM and cybernetics principles provide further guidance as to which aspects should be considered in the framework.

After the model is presented, the section immediately following turns the discussion to the policy-making functions, those aspects concerned with e-business strategy. As a starting point, the first sub-section gives a brief overview related to the classification of e-businesses. After this, the discussion continues with the value chain and value network concepts, followed by a description of supply chain management in e-business environment. Next the focus turns to e-markets, followed by discussions around

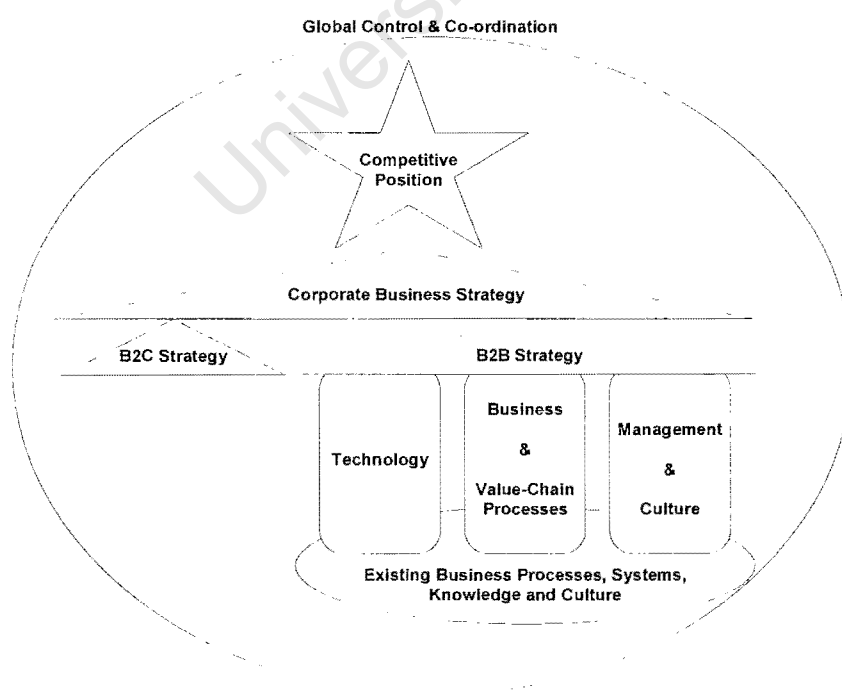
integration and security, privacy and trust principles. At this point the second stream of enquiry becomes more evident, focusing on organisational culture.

The section immediately following will set the scene by presenting the rich picture, the management framework, which encompasses those aspects perceived to be critical for the re-organisation in becoming a successful B2B e-business.

3.1 Developing the rich picture

The management framework developed emphasises the fundamental elements the author believes organisations engage in when conducting business in a B2B e-business landscape. Therefore, the framework focuses on only those variables, processes and activities that could be leveraged by means of the Internet in such a way that it enhances the organisation's competitive position. Figure 5 schematically presents the framework that will be used throughout the remainder of this chapter to elaborate on the fundamental elements presented.

Figure 5: The Management Framework



The structure of the proposed management framework basically follows a logical sequence of the fundamental elements dealt with in the research study. These elements are presented in terms of the following broad key categories:

1. Global Control and Co-ordination
2. B2B E-Business Strategy
3. Business and Value-Chain Processes
4. Technology
5. Management and Culture

This rich picture, the conceptual model of the management framework, will be used as the basis for discussion identifying the main components of an e-business followed by a detailed discussion of these components and their relationships. The remaining sections of this chapter will now continue with these discussions.

3.2 Global Control and Co-ordination

Since B2B e-business is a truly global activity, the phenomenon has created some unique global challenges. Considering the underlying principles of the VSM, control and co-ordination activities are critical for any system to be stable and thus to survive. While the cybernetic laws ascribe that complex systems organise themselves through continuous interactions, these interactions need to be controlled and co-ordinated, otherwise positive feedback might develop which will cause damage to the system. In a sense, the Internet explosion is a result of positive feedback partly due to its decentralised nature. In the B2B e-business landscape these interactions needs to be controlled and co-ordinated on a global level, since business is conducted across countries and continents. Therefore, any other level of intervention (other than global) will not be successful in controlling the system. Should such a global phenomenon be controlled on a lower level, the control and co-ordination mechanisms might be beneficial to some parts of the system, while other parts can be negatively affected.

Global control and co-ordination can be accomplished by two types of organisations namely, governments and international standards organisations. While it is critical that governments should respect the defining features of the new digital marketplace, it is equally important that these institutions understand how their laws, regulations and investments in the infrastructure affect the development of e-businesses.

Governments are responsible for how well countries are developing to create a good environment for e-business and they must therefore find the balance between allowing the system to 'self-regulate' and controlling and coordinating the e-business activities. However, to enable companies to act and react according to these mechanisms, managers need to have a good knowledge about what is new and what has changed in the government's policies to be able to perform in a suitable way for achieving the best e-business possible. The VSM explicitly mention this function as critical to the viability of a system when reflecting on the Intelligence Development activities (System 4). The governments, on the other hand, must understand what the need is for e-business and what investments have to be made. Therefore, for e-business to flourish in a country, there needs to exist a good understanding between government institutions and organisations.

While government institutions are involved in a major part of the e-business control and co-ordination activities, international standards organisations play an equally important role. These organisations are concerned with interoperability standards to develop consistent business semantics that can be used by all participants in the B2B e-business landscape. Without such standards and industry vocabularies, even if the infrastructure did exist, companies would not be able to communicate with each other. This interoperability problem is discussed in more details in section 3.7.2 during the discussion on Data Integration.

On the highest level, these two groups of organisations are critical in controlling and co-ordinating global e-business activities. However, the degree to which organisations will be affected in the B2B e-business landscape depends on the type of

e-business under discussion. The next section, which focuses on e-business strategy, will start out with a discussion on how e-businesses can be classified. The e-business category is key in determining which e-business strategies are suitable for specific organisations.

3.3 E-Business Strategy

This section will focus on the general theoretical tenets of companies' E-Business strategy, discussing the importance of its supporting role in creating more shareholder value and the success factors involved. This, however, will not be a comprehensive discussion, since much has already been said about this particular point in contemporary articles in business magazines and elsewhere.

Today, information technology is an important ingredient in the competitive strategies of many firms and is commonly used to shape strategic thrusts to gain a competitive edge (Porter, 2001). Information technology, and specifically B2B e-business should no longer be seen as a means to enhance efficiency, but it should be considered a fundamental means of creating and maintaining competitive advantage. However, the competitive advantage lies in the strategic use of such B2B e-business tools, i.e. the application and control of the information to ultimately result in more knowledgeable decisions. More recently, Kalakota & Robinson (1999, p.4) emphasised that "technology is no longer an afterthought in forming business strategy, but the actual cause and driver".

In a recent report, Vukšić et al. (2001) reports that IT, and especially e-business infrastructure, is taking significant roles in business processes, creating new needs, causing new product development and commanding new business models.

Furthermore, business strategy is building across information and value creation flows, which means that IT and e-business become the key driver and initiator of business strategy. This means that e-business technology becomes an actual cause and initiator in forming business strategy (Vukšić et al., 2001).

From the statements above, as well as a myriad of other industry examples, it can be accepted with a rather high level of confidence that information systems can significantly influence a firm's strategic direction and its long-term position in the industry. Having an e-business strategy in place is critical for any company who is interested in surviving the e-business era. The strategy should be compiled and driven by the appropriate policy making entity (system 5) in an organisation and should be communicated effectively to the rest of the organisation so that the goals and purposes of the strategy becomes clear. According to the VSM, this is critical for the survival of a viable system and although such a strategy is concerned with development for the future, it needs to take the organisation's current situation into consideration.

Traditionally, the strategic planning exercise within an organisation is typically done once or twice a year by top management, for a long-term period. The plan is then communicated to the rest of the organisation, with little or no connection between the strategy and the execution (action). In the old economy where the business environment was characterised by stability, this approach seemed to work. However today's e-business landscape is characterised by constant change. To compensate for such an unstable and unpredictable environment, companies can therefore no longer rely on the traditional static strategic planning sessions. As cybernetics laws so clearly point out that for any system to achieve homeostasis, it needs to constantly get feedback and adjust. Therefore, the strategic planning process needs to be adjusted to the same degree to include mechanisms that allow constant feedback and updating the plan. Kalakota & Robinson (1999) argue that in this new economy, the correct approach for strategic planning should be to do continuous planning with feedback, thereby allowing strategy to evolve through discovery. Therefore, the strategic plan should become a workable, update-able plan that is more compatible with the chaotic environment, which characterises the e-business landscape.

In this chaotic environment, no-one can deny that e-business in its broadest sense is emerging as a competitive imperative in a world in which value networks stretch across continents and resources are only as effective as their cross-cultural collaboration skills. These skills depend on technology links to execute the exchanges of information, goods and services. But all these skills and exchanges must ultimately add up to provide competitive advantage if the company is to sustain its competitiveness in the marketplace and -space. Though strategic planning is an integral part towards a competitive business, there are much more to explore around this topic. The following sub-sections will explore the details around competitive advantage and aims to shed more light on how these concepts fit together.

The author believes that before commencing the discussion on competitive advantage, it is necessary to discuss how e-businesses can be classified. The e-business category is key in determining which e-business strategies are suitable for specific organisations.

3.3.1 Classification of e-businesses

The Internet enables companies of all shapes and sizes to develop new business models. Effectively this means improving and altering the ways in which companies operate and interact with business partners, customers and suppliers. However, not all opportunities are equally strategic for all types of businesses. In fact, specific opportunities that emerge are more suitable and economically viable in certain types of businesses than in others. It is therefore important to develop a sound understanding of the e-business context in which an organisation exists, to ensure that the strategic initiatives matches the business opportunities that might evolve.

Although business can be categorised along numerous dimensions, a very useful categorisation has been developed by Riggins & Mitra (2001) by focusing on only three high-level dimensions. These include firstly the type of customers targeted,

secondly the position within the value chain (i.e. producer or reseller) and lastly the type of product produced or sold.

Based on first dimension, organisations can be classified as either B2B or B2C. For the purposes of this document, B2B companies are considered to be those companies whose primary customers are other businesses. These companies have little, if any, contact with end-consumers, often dealing in industrial manufacturing and more traditional settings, and providing the infrastructure that allows other companies to serve their end consumers. Typically, these companies focus on nurturing tight relationships with a limited number of customers, but choose to allow other companies (i.e. wholesalers, retailers, etc.) to sell and distribute their products (example: Proctor and Gamble). These B2B companies are normally more concerned with back-end e-business issues such as new product development and integration, manufacturing and production capabilities, and back-end supply chain management. B2C companies, on the other hand, are more focused on front-end, e-commerce issues such as developing user-friendly online storefronts, providing pre-purchase and post-purchase customer service, providing up-to date information, maximizing web site traffic and entertaining their users (Riggins & Mitra, 2001).

Based on the second dimension, organisations can further be classified as primary producers or resellers of goods and services. Primary producers are typically higher up in the value chain and are more dependent on generating output from knowledge workers, e.g. for new product development, generation of new ideas, etc. Resellers are usually in a more competitive selling environment, requiring customer service differentiation and sophisticated Customer Relationship Management (CRM) efforts (Riggings & Mitra, 2001).

Based on the third dimension, in an online setting, the most important product characteristic is whether the good is physical or informational in nature. Information producers must be concerned with enabling their knowledge workers

with sophisticated intranet and collaboration applications, while producers of physical goods need to make use of computer-aided-design (CAD) and computer-aided-manufacturing (CAM) tools and other product design applications.

Information resellers need to find a way to maximize site traffic using non-proprietary information that often generates little direct revenue. The B2B and B2C portal sites must find a way to integrate content, commerce and community to attract initial site traffic, lock-in repeat traffic and generate productive traffic that provides revenues. The classification system discussed above result in eight different e-business categories and is presented in Appendix C (Riggins & Mitra, 2001).

Having presented the extremes in terms of the type e-businesses, the author concludes that strategic, tactical and operational strategies will be vastly different for each of these eight e-business categories. The next section will build on these ideas by explaining e-business strategies in more detail. It is important to note that, since this research study focuses on the B2B aspects of e-business, only those affected types of e-businesses (as classified in Appendix C) will be considered (i.e. Traditional Manufacturer, Knowledge Vendor, Value-added Service Provider, E-Hub) in the discussions that follow as part of the thesis. Although emphasis will be put on the Traditional Manufacturer, the other B2B e-business categories are not excluded from the discussions. In relationship to the applications discussion in chapter 1 ('system in focus'), this implies that the focus of the B2B discussions will evolve around the back-end related applications and processes and therefore, those activities concerned with Customer Relationship Management (CRM), will not be further discussed in this document.

3.3.2 Value Creation in the Digital Economy

Laudon et al. (1998, p. 52) describes competitive advantage as follows:

“Organisations have a competitive advantage when they provide more value to their customers or when they provide the same value to customers at a lower

price.” Therefore, put simplistically, the basis of competitive advantage is related to providing value to customers. The following paragraphs will first focus on defining and describing value to customers, after which more emphasis will be put on competitive advantage itself. However, to understand the context in which the value creation will be used, the author finds it useful to give a short description of competitive advantage.

Businesses are successful when they carry out their major activities better than their competitors. They must do so through creativity and innovation, through strategic planning, informed decision-making and long-term vision, through organisational responsiveness to the customer and the environment and through excellent communication, both internally and externally. Therefore, to be profitable, a company must develop a sustainable competitive advantage (Hynes et al., 1999). With this short explanation in mind, the following paragraphs will not continue to expand on the concept of value creation.

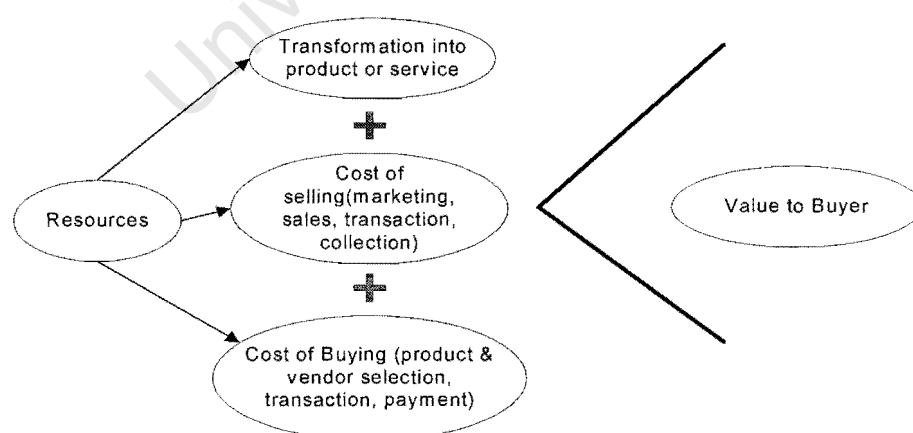
In digital economy, a firm must be able to create value in both marketplace and market space. During the industrial economy age (described in chapter 2), management’s focus was to improve the physical transformation process by implementing management techniques such as Total Quality Management (TQM), lean manufacturing and Just-In-Time (JIT) production. Today, in the digital economy age, data or information (in digital form) has become the input into business transformation process. In the new economy, value migrates from the product itself to the information and experience around the product.

Therefore, information and the manipulation thereof can now be used directly to create value. Rayport & Sviokla (1995) identify five steps to create customer value in the digital economy: gather, organise, select, synthesise and distribute. Since physical and digital economies co-exist within a business ecosystem, management should go beyond concentrating on improving transformation processes itself to focus on leveraging information assets and taking advantage of the disruptive nature of e-business to create more value for the customers (Lee,

2001). How a company package this information, either in combination with its products and/or services or on its own, is crucial in determining the strategic value created for the customer.

Although market opinions focuses on considerably different areas related to value creation, all experts do believe that to some extent or another, B2B e-business is a major, untapped source for value creation. The author believes that, even though using the Internet as a B2B e-business enabler is still in its infancy, new opportunities will continue to emerge as these phenomena reach a more mature level. Although e-business has some revolutionary elements, the laws of economics are not repealed and companies must still obey the fundamental economic laws of value. When applying these economic principles to the new technologies and business models, providing value to the customer means that the Value Inequality test must be survived (Conerly, 2001). This is schematically represented in Figure 5. From the diagram, resources used to create and sell the product must be worth less than the value placed on the product by the buyer. If this inequality is not adhered to, the buyer has no motivation to participate in the transaction.

Figure 6: The Value Inequality



Source: Conerly, W.B. (2001), *E-com Econ: The Economics of Electronic Commerce*.

The enterprise succeeds when it provides value to its customers in excess of the resources required to produce that value. To change the nature of commerce, either the left-hand side, i.e. resource usage, must be lowered or the right-hand side, value to the buyer, must be increased. Conerly (2001) argues that unless this is done, the proposed commerce mechanism is a novelty or gimmick. Therefore, all commerce must be judged against this question of how value is added to the transaction. Traditionally, information technology systems typically resulted in value creation by reducing the cost on the left-hand side by enhancing efficiencies. In the B2B e-business environment, however, value creation does not only focus on squeezing out inefficiencies, instead, it draws the attention to the right-hand side of the equation by focusing on customer's wants and needs.

What is key here, and something that is not clearly identified in Conerly's picture, is that the value equation is subjective to what the customer perceives as value. Hynes et al. (1999) argues that it is important to understand customers' businesses and to know how they perceive value. They further argue that when you are dealing with B2B, you are not enticing someone to buy your product so much as you are presenting information about your product line, prices, distribution capabilities, etc. Value then, will be achieved by assisting customers in reaching their goals. Therefore, engaging in B2B e-business will change the way the entire organisation thinks about its customers, i.e. the organisation's mindset needs to change. Through focusing on customers' wants and needs, organisations are positioning themselves to be more sensitive and responsive to their customers. This might in turn result in competitive advantage, since not all companies will be in a position to adapt their systems rapidly enough and/or align their people to take advantage of such an opportunity. Competitive advantage will now be discussed in more details in the section below.

3.3.3 Competitive Advantage

A firm gains a competitive advantage over its rivals when it creates superior value for its customer, since the customer is always looking for the best value for their money. Essentially you either give the customer more for their money (differentiate) or you reduce the cost to the customer (reduce costs) (Hynes et al., 1999).

Almost two decades ago, Porter & Millar (1985) argued that the Information Technology (IT) revolution was affecting competition in three vital ways:

1. Advances in technology are changing industry structure and in doing so, it alters the rules of competition.
2. Companies are using IT to create a competitive advantage by giving companies new ways to outperform their rivals.
3. IT is spawning whole new businesses, often from within a company's existing operations.

IT is reshaping the product itself: the entire package of physical goods, services and information companies provide to create value for their buyers. As discussed in the previous section, the value a company creates is measured by the price that buyers are willing to pay for a product or service and thus, a business is profitable if the value it creates exceeds the cost of performing value activities (Porter & Millar, 1985). Competitive advantage in either cost or differentiation is a function of a company's value chain. The value chain concept will be discussed in more details in the next section.

Even though Porter's concepts about changing competition were born in a pre-e-business era, the author still finds it extremely applicable to today's business landscape. From the points mentioned, the two fundamental factors that determine profitability will now be discussed in more details: Industry structure, which determines the profitability of the average competitor; and sustainable

competitive advantage, which allows the company to constantly outperform the average competitor.

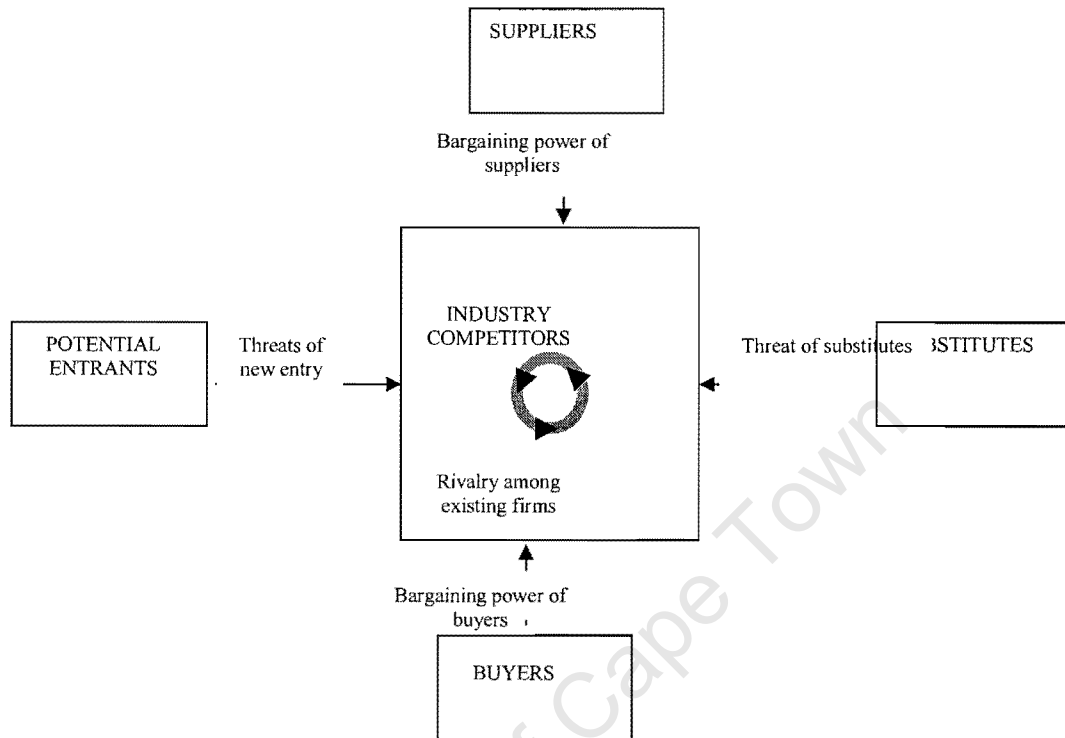
Changing Industry Structure

Whether a company is new (e.g. Dot.com companies that sprang up in 1999) or old (e.g. the motor industry that dates back to the 1920s), its structural attractiveness is determined by five underlying forces of competition, namely:

1. rivalry among existing competitors
2. barriers to entry for new competitors
3. threat of substitute products or services
4. bargaining power of suppliers
5. Bargaining power of buyers (Porter, 1985).

This is schematically presented in Figure 7. Essentially Porter's model is another way of looking at competitive advantage, where he proposes that firms face threats to their business through the five forces mentioned above. In combination, these forces determine how the economic value created by any product, service, technology or way of competing, is divided between companies in an industry on the one hand and customers, suppliers, distributors, product substitutes, and potential new entrants on the other.

Figure 7: Porter's five forces of competition framework.



Source: Porter, M.E. (1985), *How Information Gives you Competitive Advantage*

The Internet and more specifically e-business, influence these five forces in the following ways:

1. Rivalry among existing competitors: The Internet tends to expand the geographic market, bringing more companies into competition with one another. Internet technologies reduce variable costs and tilt cost structures towards fixed cost. This enables companies to become efficient, reducing the prices of the end product and creating significantly greater pressure for companies to engage in aggressive price competition.
2. Barriers to entry for new competitors: The Internet mitigates the need for such things as an established sales force or access to existing intermediaries, reducing barriers to entry. On the other hand it creates barriers to prevent another company from entering the market, such as

raising the costs of entry into the market through differentiation and the use of technology

3. Threat of substitute products or services: By enabling new approaches to meet needs and perform functions, it creates new substitutes. However, it also boosts an industry's efficiency in various ways, expanding the overall size of the market by improving its position relative to traditional substitutes.
4. Bargaining power of suppliers: The Internet tends to dampen the bargaining power of intermediaries by providing companies with new, more direct avenues to customers.
5. Bargaining power of buyers The Internet gives customers access to more information, therefore increasing their bargaining power.

By engaging in B2B e-business, organisations can improve their ability to deal with each of these five forces. While each industry will evolve in unique ways, an examination of the forces influencing industry structure indicates that the deployment of e-business technology is likely to continue to put pressure on the profitability of many businesses. Considering the predictions quoted earlier regarding the B2B e-business market, it is safe to conclude that especially this holds true for the B2B segment.

Creating Competitive Advantage through B2B e-business

In any company, e-business has a powerful effect on competitive advantage in either cost or differentiation. The technology and applications affect value activities themselves or allow companies to gain competitive advantage by exploiting changes in competitive scope. E-Business can alter a company's cost in any part of the value chain and some examples are often quoted in relation to procurement transaction costs as part of e-procurement initiatives. The impact of e-business on differentiation strategies are equally dramatic and this is probably best illustrated using an example of Dell Computers, with their new Build-to-Order system allows customers to customise products online, 24x7. There are

many industry examples that can illustrate a wide variety of differentiation enhancing or cost reduction strategies, however it is not the intention of this document to even attempt to list such strategies.

Companies need to tailor their deployment of Internet technology to their particular strategies to achieve a sustainable competitive advantage. Cost and price advantages can be achieved through operational effectiveness and strategic positioning. The Internet is arguably the most powerful tool available today for enhancing operational effectiveness. The process of creating value from information, throughout and across the economy, is the ultimate basis for the digital economy. Strategies that integrate e-business and the factors that determine traditional competitive advantages and ways of competing, should win in many industries. Only by integrating e-business into the overall corporate strategy, the powerful technology of the Internet will become an equally powerful force for competitive advantage (Porter, 2001). By creating separate e-business strategies instead of integrating it into the overall corporate strategy, companies fail to capitalise on their traditional assets, reinforce me-too competition, and accelerate competitive convergence.

To expand on the ideas discussed above, one can consider the 'new' Dot.com companies that sprang up in their thousands in 1999. Although these companies dominated the market early in the e-business era, the 'old', brick-and-mortar companies slowly started to catch up. It is obviously much more difficult for brick-and-mortar companies to incorporate e-business initiatives into their core business, because they do not have clean slate approach, they have old systems to integrate, etc. The greatest threat to an established company lies in either failing to deploy the Internet or failing to deploy it strategically. Established firms have to deal with the inertia of experience, changing corporate culture, integrating existing systems, implementing new processes and alienating existing distribution channels (Frank, 1997).

One of the major shortcomings in traditional companies is their lack of e-business knowledge. One way to capitalise quickly is for managers to be open-minded and to increase their competitive position by strategically partnering with Dot.com's and other Internet-savvy companies. This is exactly what happened in the market in 2000 when a large number of partnerships were established between Dot.com and brick-and-mortar companies to allow both types of companies to learn and benefit from each other's core competencies. One example of this was when Ford partnered with Yahoo to sell their cars (Levy, 2000). These, non-traditional partnering strategies illustrates the strong need for technical and managerial talent, knowing how to deploy, manage and evolve e-commerce.

Every organisation needs an aggressive program to deploy the Internet throughout its value chain, using technology to reinforce traditional competitive advantages and complement existing ways of competing. The key is not to imitate rivals, but to tailor Internet applications to a company's overall strategy to enhance the distinctiveness of their strategies (Frank, 1997). Companies need to create strategies that involve new, hybrid value chains, bringing together virtual and physical activities in unique configuration. To equip managers with a proper understanding of what these value chains comprise of, the following section focuses on the value chain, the value system and value networks in general.

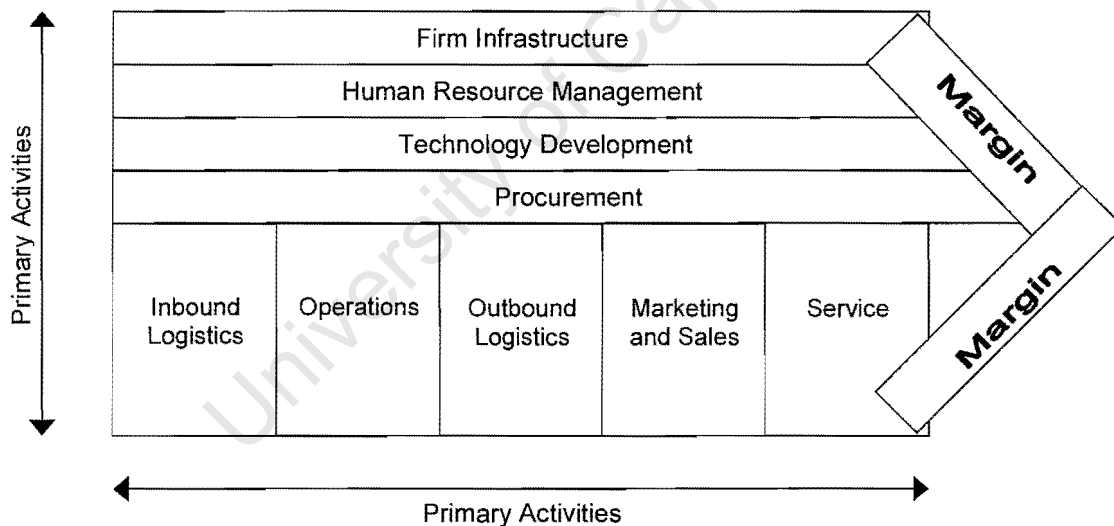
3.4 From Value Chain to Global, Digital Value Network

The aim of this section is to give more insight into the value chain, value system and value networks concepts. The author finds it useful to describe these concepts in an e-business context, as it is often used when describing e-business value creation opportunities. The section starts with a discussion on the value chain concept and evolves into the wider, e-business related value network concept.

3.4.1 Value Chain

The author finds Porter's (1991) description of a value chain most useful in creating a comprehensive understanding. He argues that a company does a series of functions or value activities, which makes up the value chain. These activities fall into nine generic categories. The value chain could be explained as a tool that assists in dissecting the important components of value as a way to understand competitive advantage. Based on his classification system, Porter considers that an organisation's sources of competitive advantage centres around their activities and that the strategy of a firm is the one that defines how these activities are interrelated and configured. The activities performed by organisations are schematically presented in the value chain framework in Figure 8.

Figure 8: The Value Chain



Source: Porter, M.E. (1991) *Towards a Dynamic Theory of Strategy*.

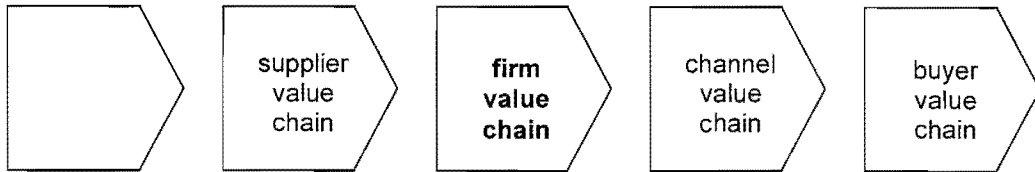
Porter (1991) classifies an organisation's activities into two groups, namely: primary and support activities. Primary activities are those activities directly involved in the production; marketing and delivery of the product (see the five blocks at the bottom of the picture). Support activities are those activities that

provide support to the first group of activities (see the four blocks at the top of the picture). Each of the discrete components is charged with adding value and overall value is aggregated throughout the lifecycle of the product or service. Referring to the VSM, these are the activities that help to keep the system alive, i.e. the system 1's in the model. Every value activity has both a physical and information component and B2B e-business affects all 9 categories of value activities, from collaborative product development to shipment tracking. Botkin & Matthews (1992) suggest that the value chain is composed of several linked stages, namely:

- Phase 1 = Research, development and design
- Phase 2 = Production (manufacturing and distribution)
- Phase 3 = Marketing, Sales and Distribution

Ideally, companies should specialise in one phase of the value chain and partner with another company, which is able to complete the other phases of the process. Porter (1991) further develops the value chain concept by emphasising that discrete activities are part of a system and as such the outcomes, cost or effectiveness of one activity affect and are affected by the performance of other activities. In addition, linkages not only connect value activities inside the company, but extend to outside of the firm by creating interdependencies between its value chain and those of suppliers and channels. A company can therefore create competitive advantage by optimising or coordinating these links to the outside. In summary, Porter (1991) does not view the value chain of a company in a particular industry as an independent system, but rather as a part of the bigger system; embedded in a larger stream of activities that he calls the 'value system'. The value system is schematically presented in Figure 9. The Internet and B2B e-business allow companies to coordinate these value activities within the value system in far-flung geographic locations.

Figure 9: The Value System



Source: Porter, M.E. (1991) Towards a Dynamic Theory of Strategy.

The concepts provided by Porter's (1991) Value Chain Framework will be used in the construction of this chapter and blended together with the 'Extended Enterprise' application framework (see Chapter 1). The basis of all e-business activities relates somehow to the value chain activities described above. These activities, which grow into business processes, are all embedded in the applications discussed in the 'Extended Enterprise' framework, with specific focus on the back-end related applications such as Supply Chain Management (SCM). Although it is not the intention of this paper to discuss the functionalities of the different applications, the business processes embedded within these applications will necessarily be referenced in terms of the re-organisation required to become an e-business. Although the value chain activities form the basis of all business processes within a company, e-business has resulted in an even more integrated view than the value system. The value chain and system, through globalisation and B2B e-business, has recently evolved in the Value Networks concept. The concepts and principles underpinning these value networks are further discussed in the following section.

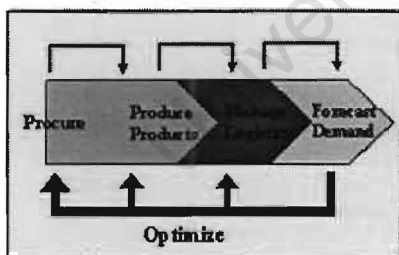
3.4.2 Value Networks

In today's knowledge economy one of the key questions businesses need to answer is on how to create value. While traditionally, this would be answered by simply referring to the value chain activities, in today's e-business era this would rather be answered by referring to value networks. Allee (2000) argues that this value chain mindset is typical of the industrial age thinking and that the challenge

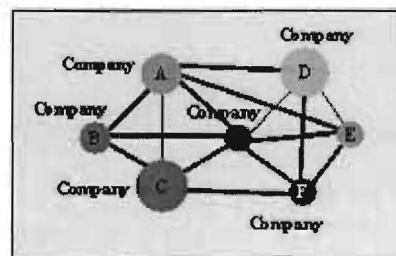
of today's organisations lies in reconfiguring these value chains to a more fluid, value networks structure.

Sturgeon (2000) argues that the 'chain' maps the vertical sequence of events leading to the delivery, consumption and maintenance of a particular good and service, while a 'network' maps both the vertical and horizontal linkages between economic actors, i.e. recognising that various value chains often share common economic actors and are dynamic in that they are reused and reconfigured on an ongoing basis. He summarises that a value network is two or more value-chains that share at least one actor (network linkage). The value chain and value network differentiation is presented in Figure 10. Whereas companies in the 1990's focused on enterprise optimisation, the focus is now shifting towards a more holistic approach, incorporating all business partners and thus moving towards network optimisation. Value networks enable businesses to become partners, optimising operations for the mutual benefit of their customers and other partners.

Figure 10: Value Chain versus Value Network



1990's: Enterprise Optimisation



Future: Network Optimisation

Source: PriceWaterhouseCoopers (2000) *E-Markets: The driver of the B2B E-Business Revolution*

Applying this concept to the e-business landscape, one can conclude that the value network consists of a community of business partners that are all working in close co-operation to transform the supply chain into a seamless, digital value network. These networks facilitate the efficient flow of goods, services, information and payments among business partners for the benefit of the end customer. However, such networked activities can only be possible through tight integration and collaboration. Value networks, as described by the UCI Graduate School of Management (2002), are integrated, collaborative aggregations of specialist companies, each providing complementary intermediate goods and services, linked by sophisticated B2B information systems that create and market end products or services to customers. Partnering in a value network allows a company to focus on its core competencies, while optimising processes in the extended enterprise. The big difference between value chains and value networks are the business partners' interdependence.

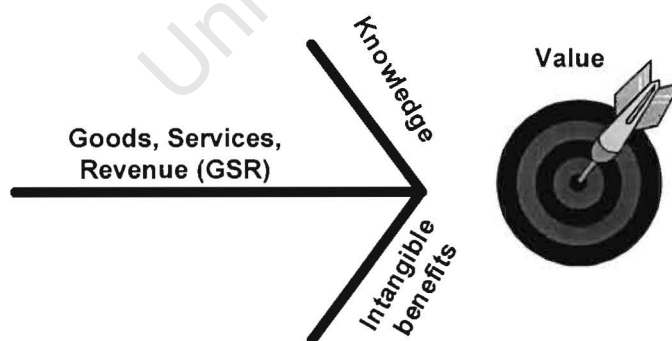
Companies that will thrive will be the ones to reach out of corporate walls to collaborate with complementary businesses, their trading partners and their competitors. The tight integration calls for superior partner relationships on the human side, while on the process/technology side prerequisites are that agreement must be reached on standards between partners. This will be extremely important in the sharing of ideas and processes across value chains and in rethinking the businesses of today. Therefore, managers with special skills will be needed to navigate the terrain; skills which include knowing how to build partnerships between companies that have conflicting agenda's and foster innovation, while at the same time trying to protect intellectual property and developing technology strategies and architecture that enables integration of processes between the various companies. UCI Graduate School of Management (2002) concludes that today's networked environment demands a new business model, one that incorporates a high level of interconnectedness between the company and its customers, partners and suppliers. These networks dramatically escalate the importance of relationships, intellectual property and information technology.

Based on the above discussion, value networks generate value through complex, dynamic exchanges between one or more enterprises, customers, suppliers, strategic partners and the community. However, in B2B e-business, these networks engage in more than just transacting around goods, services and revenues (GRS); more importantly it includes the sharing of information and knowledge. Allee (2000) argues that the key to reconfiguring the business models for the knowledge economy lies in understanding these new currencies of value. The next section will now focus more specifically on the currencies of value.

Currencies of value in the value network

Allee (2000) argues that, aside from the traditional goods, services and revenues value streams, two other very important currencies that create value in these networks are knowledge value and intangible value or benefits. She stresses that all three are equally important in the value network and call these currencies, because they all serve as medium of exchange, which is the basic definition of currency. The ideas related to the currencies of exchange are presented graphically in Figure 11.

Figure 11: Value = GSR Value + Knowledge Value + Intangible Value



While the author assumes that the reader is familiar with what goods, services and revenues (GRS) value exchanges are she believes the reader needs an explanation

of the meaning of knowledge and intangible exchanges. Knowledge exchanges typically include strategic information, planning knowledge, process knowledge, technical know-how, collaborative design, policy development, etc. which flow around and support the core product and service value chain. Intangible benefits exchanges, on the other hand, typically include value and benefits that go beyond actual service and that are not accounted for in traditional financial measures, such as a sense of community, customer loyalty, image enhancement or co-branding opportunities (Allee, 2000).

The author believes that the importance of knowledge and intangible value exchanges are considerably underestimated and that organisations engaging in B2B e-business, that really want to create lock-in effect and customer loyalty, should focus on these exchanges. However, if business partners do not trust each other, knowledge and intangible values will not be exchanged.

The above discussion focused on the different types of value exchanges, specifically focusing on exchanges other than the traditional goods, services and revenues. While knowledge and intangible exchanges should be considered as equally important exchanges, it is noteworthy to mention that, as we continue into the e-business era, the importance of these additional value exchanges will only grow. In fact, these types of exchanges are probably the most current area of exploration for e-business value creation opportunities. Collaboration between partners can be considered as one of the two 'other value exchange methods' (knowledge & intangibles) in the global, digital economy and seems to be a top priority on any executive's list. Collaboration, however, is challenged due to the global nature of today's business environment. In an attempt to enhance the framework, the following section will give a short description of the meaning of globalisation, followed by an explanation on collaborative value networks.

Globalisation in the digital economy

Value networks most often than not, result in global trade. In recent years one of the benefits mentioned quite frequently relates to the ability of the Internet and e-commerce to open up new and global markets. To ensure a common understanding of what is meant by the term globalisation, the author finds the definition provided by Sturgeon (2000) very useful: “On the broadest level, the term globalisation refers to the growing global-scale inter-connection and integration of human activity”. These inter-connections are expressed in many areas of society and the economy.

Sturgeon (2000) warns that ‘internationalisation’ should not be confused with globalisation. He argues that the main difference lie therein that when firms globalise, they attempt to integrate their key day-to-day functions on a global scale, such as component sourcing and product development. Dicken (1998) makes the following very useful distinction between internationalisation and globalisation. He states that the internationalisation processes involve the simple extension of economic activities across national boundaries. It is, essentially, a quantitative process, which leads to more extensive geographic pattern of economic activity. The globalisation processes on the other hand, are qualitatively different from the internationalisation processes in that it involves not merely the geographical extension of economic activity across national boundaries, but also – and more importantly – the functional integration of such internationally dispersed activities.

From the above the author concludes that globalisation in the e-business environment will have considerable consequences on the B2B sector. One of the means to overcome and improve efficiencies in the light of globalisation is to design a collaboration of value networks. This is described in more details in the following section.

Collaboration of value networks

A company cannot succeed with a self-sufficient, 'closed box' approach, in which it performs all end-to-end processes through the value chain. That approach provides neither the speed nor the flexibility to respond to the ever-changing demands of today's marketplace. Instead, a company must focus on core competencies, and outsource all non-core aspects of its business to others – suppliers, distributors, even customers (for order placement). To do so effectively, it must coordinate, collaborate and integrate with those outside entities, creating an extended, virtual enterprise. B2B e-business makes this extended enterprise viable by enabling a company to link together all its core and outsourced processes, to create self-adjusting, uninterrupted process flows from start to finish through the value chain.

The promise of B2B e-commerce is fast, efficient and repeatable experiences for all users of a business ecosystem. Instant and ad-hoc relationships can be formed and propelled forward unimpeded by traditional commerce 'friction'. However, e-business has high complexity build into transactions. Not only are people collaborating with people, but also machines are collaborating with machines. The result is a dramatic Net increase in the volume of communications between organisations that are more ad hoc and instantaneous than the traditional model.

How to organise and make sense of the myriad of transactions, communications and new relationships is a major challenge. In a distributed business environment, information must always be made explicit. One cannot rely on the shared sense of understanding that face-to-face contact tends to foster. Without a common frame of reference, collaboration and communication between the dispersed team members may be disordered and inefficient. The value of today's work force is based on the worker's ability to make critical, rational decisions using the information at hand (not to mention that the organisational structure should allow this). These knowledge workers, unlike in the industrial age where repetitive work was done, turn innovation into execution through tight collaboration with

customers, suppliers and business partners. This also stresses the need for cultivating a culture that is more flexible, responsive and cooperative, more focused on processes and less on tasks; concentrating on building functional teams and less on departments. Having these collaboration efforts inline with B2B business processes is an indispensable corporate asset and a competitive advantage to any e-business company (SiteScape Inc., 2001).

However, to be tightly integrated and in a position to use the information provided, the underlying assumption is that the applications to provide this kind of information should be in place and the software and standard electronic platforms should exist to enable workers to seamlessly integrate. Integration on three levels; applications, business processes and people (collaboration) are crucial for B2B e-business. The most common applications of inter-enterprise collaboration are currently seen in the areas of collaborative planning and forecasting as well as the area of new product development.

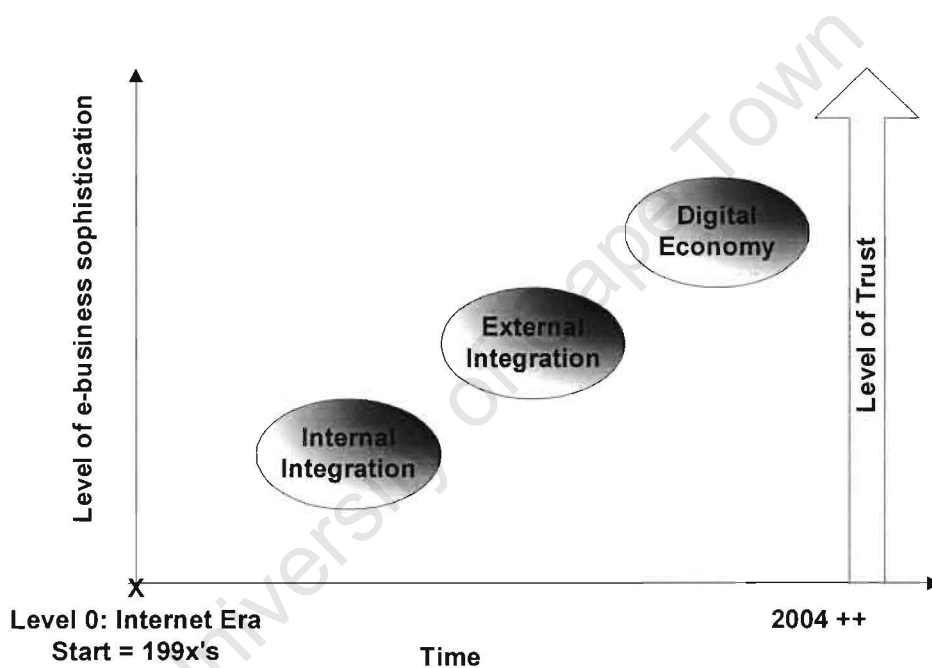
Based on the above explanations on value chains, systems and networks, the author concludes that the ultimate goal of any enterprise should be to become a global, collaborative, digital value network. Clearly, business has gone through – and will continue to go through – quite some phases in order to reach such a state of B2B e-business. To understand the phases that businesses typically go through in their quest to become a successful e-business, the author provides a comprehensive explanation on these phases in the next section.

3.4.3 E-business evolution

Based on the information presented above related to the industrial age, value chain and later the value network, it cannot be denied that the world is evolving. With the Internet evolving as business tool, companies are not only evolving in their thinking about businesses, but they are also evolving in terms of adoption of these new technologies. Rome was not built in one day, and so a company can

also not go out and buy a B2B e-business system. The system must be carefully designed and step-by-step implemented to ensure gradual and smooth transition from 'old' to 'new'. Wu & Balasubramanian (2001) define the intensity of E-Business adoption as "the degree of implementation and utilisation of such internet-related technologies across a firm's functional domains." The typical phases of adoption organisations go through during their e-business journey, as perceived by the author, is schematically presented in Figure 12.

Figure 12: The e-business states of adoption



When organisations decide to go down the B2B e-business path they typically start out by focusing on the optimisation of internal business processes within the four walls of the organisation. During the Internal Integration phase companies have a very loose link with their customers, suppliers and partners. This is the initial amalgamation among functions, replacing inefficient legacy systems and homogenising and integrating disparate corporate databases.

During the second phase, External Integration, organisations typically start to focus on integration and collaboration with business partners. Since integration and collaboration requires a different type of mindset on how the organisation views its partners, participants establish a stronger sense of trust that surpasses the traditional relationships. During this phase, the external players (i.e. suppliers and other partners) get involved as the supply chain extends through inter-organisational process integration to support new business models (i.e. build-to-order, available-to-promise). Collaboration can be reinforced by infrastructure that links supply and demand chains, facilitating continuous interaction and exception handling by adding context to B2B e-business transactions. Core processes are very tightly coupled with these value networks and are supported by applications, which run across enterprise boundaries.

During the digital economy phase, organisations master mission-critical operations and transform the supply chain into a source of competitive advantage, crossing the last threshold of the trust domain (i.e. knowledge and competence sharing). Carmerinelli (2002) reasons that during this phase, corporations un-bundles the elements of the value chain to change the asset mix and to create flexible, adaptive structures that leverage numerous outsourced supply chain activities from trusted parties. From the value network discussions earlier, this is clearly the ultimate step towards optimising the network in its entirety; a phase that very few companies have reached as yet. In this phase, business processes are supported by applications, which are created dynamically from components developed either in-house or sourced externally. Clearly this move towards de-capitalisation and outsourcing will be significant, as we have seen this phenomenon referred to multiple times within the literature quoted.

To enable any of the phases discussed above, an organisation will need to invest serious capital in technology and e-business applications. Within each of the phases discussed above, there exists some typical application components that support the business processes and strategies needed to reach those states. The

typical components that companies invest in during these phases, as identified by Carmerinelli (2002), are listed in Appendix D as the SCM Portfolio Domains.

The e-business evolution discussion gives the reader an overview of how companies evolve into complex B2B e-business value networks. This, combined with the concepts discussed on e-business classification, value creation and competitive advantage and finally the value chains and networks, lays the foundation to understand the heart of the B2B e-business phenomenon especially in the traditional manufacturing (see Appendix C) environment: Supply Chain Management. In the problem statement the application architecture was presented in an attempt to create a picture of the e-business landscape in its simplest form. As time goes by, the picture will become more complicated with new applications; however the crux of B2B for these companies operating lower down the value chain will continue to build on the basic principles of ¹Supply Chain Management (SCM). Although SCM is not a new concept, it is getting new meanings on a daily basis in the context of B2B e-business. This is due to the fact that for the first time in history businesses have at their fingertips a multi-company communications networks. The following section will now focus on the details surrounding SCM and its applications in the B2B e-business environment, i.e. the re-organisation necessary in supply chain management.

3.5 Re-organising the Supply Chain

The supply chain consists of all the contributors to a final product and its delivery to the customer or end-user. The goals and rewards of SCM are numerous, provided the managerial strategy, new processes and procedures, and technology are applied successfully. Cross (2000) argues that SCM was in many ways hampered by the lack of enabling technologies. He further notes that SCM came about as a response to the failure of JIT to fully benefit the end user and that essentially, SCM is JIT on a global basis.

¹ From now on Supply Chain Management will be referred to as SCM.

As illustrated in the section on value creation and competitive advantage, in today's e-business landscape organisations are not longer concerned with reducing manufacturing cost while increasing product quality, instead the value proposition has changed to what the customer wants, when he wants it, where he wants it, at the lowest possible cost. With e-business, process focus is shifting inexorably outside the organisation's four walls; from the plant or warehouse to an entire supply chain. While BPR, TQM and other trends have focused on optimising internal operations within an organisation, the next opportunity lies in the fusing of each company's internal systems to those of its suppliers, partners and customers (Kalakota & Robinson, 1999). For this fusing to take place, supply chain partners require a cost-effective information system that links multiple companies. The Internet and B2B e-business applications can meet this need undoubtedly. In a sense, e-business is on the natural growth path of enterprise information systems development that started with MRP (materials requirements planning), expanded to MRPII (manufacturing resource planning) and then to intra-enterprise integration ERP (enterprise resource planning).

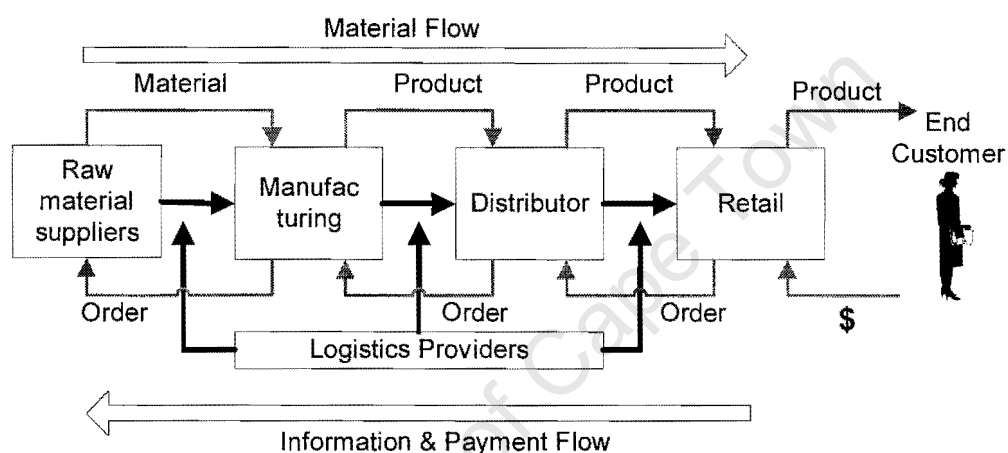
Lee & Whang (2001, p.2) define e-business as 'the marriage between the Internet and supply chain integration'. They further use the term E-Collaboration and argue that this facilitates coordination of various decisions and activities among the supply chain partners over the Internet. Since supply chain typically spans over multiple companies, SCM particularly highlights the importance of cross-enterprise coordination in the name of supply chain integration. To understand the e-business implications, it is necessary to first define SCM.

3.5.1 SCM Defined

Kalakota & Robinson (1999, p.197) state that SCM in its simplest sense is actually no more than a "process umbrella" under which products are created and delivered to customers. They further define that "from a structural standpoint, a supply chain refers to the complex network of relationships that organisations maintain with trading partners to source, manufacture and deliver products. In a

nutshell, ‘SCM is the coordination of material, information, and financial flows between and among all the participating enterprises’ (Kalakota & Robinson, 1999, p.197). Clearly, SCM is a complex subject involving the flow of goods from upstream suppliers to manufacturers, distributors, and end customers. Figure 13 presents a graphical representation of what a typical supply chain consist of.

Figure 13: Typical supply chain view



Source: Cross, G.J. (2000) How E-Business is Transforming Supply Chain Management.

A typical supply chain has several suppliers, which provide the manufacturer with raw materials. The company manufactures the product and sell it at least to a distributor and retailer. Towards defining SCM, Simchi-Levi et al. (2000, p.1) defines a supply chain as: “A set of approaches utilised to efficiently integrate suppliers, manufacturers, warehouses and stores so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimise system wide costs while satisfying service level requests”. As this definition seems to be the most comprehensive, this will be adopted as the working definition for this thesis. Based on all these activities involved, it becomes clear that SCM must involve quite an extensive set of disciplines, from procurement and supplier management to multi-site manufacturing, customer

management, order processing, distribution planning, forecasting, demand management, warehousing, transportation and managing final points of sale (Kalakota, 2000).

3.5.2 SCM Reconfigured

The disciplines embedded in SCM are, however, adjusting to the market as it changes and therefore supply chains themselves are undergoing dramatic changes on today's e-business landscape. The rapid development of new technologies does not only allow customers to be more informed about products, but also allow them to be more demanding. These factors, combined with probably a myriad others related to the e-business landscape, are changing the structure of supply chains and forcing them to evolve. Kalakota (2000) suggests that the following new supply chain configurations are emerging:

- *Integrated make-to-stock*: This type of supply chain is changed, because the finished products are more and more being configured according to the distribution channel. This is called postponement. Hewlett-Packard is a good example where each order is configured with specific power supply, power cord, appropriate language instruction manual, etc. in the box before shipping.
- *Continuous replenishment*: This type of supply chain changes when a customer-demand pull system is created, performing inter-organisational boundary spanning aimed at coordinating activities in an integrated manner. A good example of this is the CVS – McKesson Demand Chain.
- *Build-to-Order*: This type of supply chain changes because customers are wanting customised products and therefore the supply chain is changing from a mass production to mass customisation environment, resulting in build-to-order (BTO). A good example of this is the Intel, Solectron and Ingram Micro supply chain.

To reconfigure supply chains in such ways as suggested above is a task well beyond the traditional organisational scope, both in terms of the systems and in terms of the relationships. The following paragraphs will explain more on how these crucial ingredients are affected.

3.5.3 SCM Goals are still the same

As can be expected in a SCM scenario with globally dispersed partners, information management is key to the effectiveness of SCM. This paragraph will focus on the information component related to achieving SCM's goals. While the SCM theory was being developed, the Internet and e-business were also in the development phase, both aiming in the same direction. These two, e-business and SCM, came together to change the way the supply chain operates and achieve the goals: customers want the right product at the right time and place, for the lowest possible price. Although, since the beginning of commerce, the basic requirements have not changed much (the right product, at the right time and place, at the lowest possible cost), the goals of SCM is to achieve these goals by tracking them throughout the supply chain, rather than having each member act as an island.

To achieve the SCM goals, the first goal to consider is 'the right product' and to meet this, the supply chain must understand the end user's needs. Distributors typically offer flexibility to end-users by aggregating many products across many manufacturers into one-stop shopping. The second goal to consider 'the right time and place' is a capacity management issue (Cross, 2000). Capacity can be broken down into two categories, namely production and storage capacity. Both of these are forecast dependent and forecasting, as well as capacity planning, is information based. The third goal 'lowest possible price' implies better forecasting, which results in better capacity planning, translating into better availability and less idle capacity; production or stored. Therefore, SCM seeks to decrease cost and increase customer service simultaneously and the only way to

do so is to greatly improve information-related activities in the supply chain (Cross, 2000).

3.5.4 SCM Integration

Thriving in challenging economic times requires flexibility. Building a robust supply chain that integrates flexibility into a company's systems and processes enables companies to adjust to market conditions. Today, networked value chains demand new ways of thinking, involving integrated decision making between trading partners and even the collaboration of competitors to make joint decisions. Essentially, organisations need to re-organise and tighten their relationships with supply chain partners. These principles of alliance, cooperation and interdependence in the supply chain, holds the key to the e-business path and can only be achieved if the information flow is of mutual benefit to all partners. Cross (2000) re-iterates this idea by commenting that teamwork and partnerships between all parties in the supply chain will be essential to e-business success. He predicts that partnerships will appear on all levels, examples include partnerships with customers, resulting in Vendor Management Inventory (VMI) and partnerships with suppliers, resulting in the use of third-party logistics carriers (3PL's).

Changing relationships, however, is easier said than done and unfortunately does not happen overnight, since this involves humans with a deep, underlying culture. Therefore, the most practical way going down the e-business integration path is to integrate functions slowly over phases. It might be helpful to apply the 80/20 rule in this case to ensure that the bulk of non-value adding, repetitive type processes which can assist partners with self-service are implemented first. Organisations should start with simple transactions and as the relationships strengthen and grows start working on more complex, integrated solutions. By implementing B2B functions in this way, partners are not overwhelmed with an abundance of new ways of doing things, but can slowly settle in and get used to adapting to

change. Exception on the rule processes, which are typically more complex, should be added at a later point in time. Organisations should, however, strive to provide all logistics and service related functions online and coordinate them through the trading community.

Process Integration

The supply chain perspective transforms a group of ad hoc and fragmented processes into a cohesive system capable of delivering value to the customer. This requires process optimisation across the value network; end-to-end by minimising the total cost of the order-to-delivery process and by trading off costs of inventory, transportation and handling. Kalakota & Robinson (1999) argue that since traditional systems only focus on the costs controlled under an organisation's direct control, these systems cannot handle the complex interdependencies created by such a network. It is for this reason why, not until recent developments, no one player has the information visibility needed to synchronise the entire channel.

New applications, such as i2 and APO (SAP's product) provide an integrated approach and can optimise not only cost, but also service, quality and time factors which can strongly influence customer satisfaction. These new applications can now help companies enhance the ability to integrate processes through collaborative information sharing and planning. Kalakota & Robinson (1999) reason that this is where information is replacing inventory, i.e. supply chain applications can then manage inventory that companies cannot see and do not own. This is after all the goal of sharing information, to align all the up- and downstream processes of the partners, even though all the separate parts are owned by different companies. Therefore, SCM requires inter-enterprise integration and the Internet have emerged as the most cost effective means of driving supply chain integration.

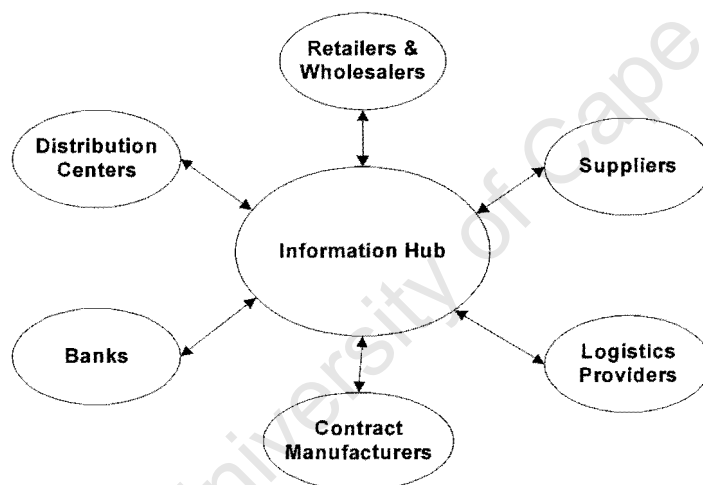
Since manufacturers are positioned lower down the value chain and have only a limited number of customer's, they are not particularly interested in analysing these customers' behaviours. In the B2B e-business landscape, distributors and retailers, on the other hand, who are the closest to the point of product consumption, will be required to increase their ability to gather, handle and analyse this consumption information. Collaboration amongst B2b e-business partners can significantly enhance the value chain's competitive position by sharing this information with supply chain partners. Effectively, this information will drive production planning and replenishment across the supply chain. However, to manage and facilitate integration among various participants in the supply chain, organisations have to deploy large-scale enterprise applications to address collaborative planning and execution requirements. The collaborative planning applications use information to facilitate the delivery of the right products on time to the correct location at the lowest cost (Kalakota & Robinson, 1999). However, while collecting information can be done in the same way for multiple supply chains, superior information analysis skills can result in a serious differentiator for the partners in the supply chain. This means that employees can add more value by spending their time on analysis instead of data collection. However, for employees to adapt effectively, organisations should ensure that these employees have the right skills and that the cultural environment supports this new way of doing business.

3.5.5 The SCM e-business processes

With Figure 12 in mind, consider the information flows among the supply chain: a customer places an order with a retailer, who places an order from the distributor, who on its turn places the order from the manufacturer. Finally the manufacturer places a bunch of orders to multiple raw material suppliers. It should be clear from the process described, that time can become a serious factor in passing information along the supply chain.

The Internet, used as a central information hub, is a very effective way to take the time dimension, along with the associated costs, out of logistics. Lee & Whang (2001) developed the information hub concept, describing it as ‘a node in the data network where multiple organisations interact in pursuit of supply chain integration’. The information hub would be a web site or central server on the Internet running an ERP system for the supply chain. Typically equipped with front-end web interface and back-end supply chain integration, it operates through the information hub, representing a model of e-business. The information hub concept is schematically presented in Figure 14 below.

Figure 14: The information hub



Source: Lee, H.L. and Whang, S. (2001) Supply Chain Integration over Internet

The process discussed above, when executed in this e-hub environment, will become: the retailer places an order to the manufacturer via a website and the information is distributed to the relevant partners immediately. Real-time parallel processing of information, instead of sequential processing in batch mode, is the key to this model. Lee & Whang (2001) argue that the hub architecture offers a new paradigm of coordinating the activities of the supply chain from the end customer to the different supply chain partners. The important concept here is

that the customer is not interested in knowing the different systems and/or partners behind the scenes. The customer thus wants to log in with a single sign-on and track the order, irrespective of which partner is currently holding the order. Lee & Whang (2001) classify the SCM applications as follows: e-commerce, e-procurement and e-collaboration. The author finds it useful to use these three classes during the discussions that follow, where each of the three application areas will be discussed in more details.

E-Commerce

E-Commerce activities are related to the flow of customer orders through the supply chain, including the placement thereof, the tracking of the specific order throughout the supply chain and after sales service. The Internet provides a natural platform to link supply chain partners to deliver product or service in tight coordination. To execute a sequence of transactions in a speedy and accurate way is perhaps the most fundamental form of interaction among supply chain partners. This classification of e-commerce goes beyond the B2C functionality, as it includes back-end processing of transactions in the supply chain as well.

E-Procurement

The typical manufacturing company needs to procure thousands of products from hundreds of suppliers and the Internet can help to manage the complexity of this process. As the first paragraphs in this section explained the reconfiguration of the supply chain, the need for efficient procurement practices is a key ingredient to flexible manufacturing. The ERP systems typically determine which materials should be procured, when they should arrive and how much of them should be procured. It therefore addresses the planning part; however, the execution of procurement is outside the scope of a typical ERP system. Companies like Ariba and CommerceOne offer web-based enterprise procurement solutions that dynamically link buyers into real-time trading communities over the Internet. E-procurement solutions to-date mostly focuses on reducing operational costs and increasing efficiencies by automating the entire procurement process.

According to research conducted by the Garner Group, B2B e-procurement solutions can save companies up to 74% of their per-order costs. To achieve these kinds of business savings and efficiencies, companies should however first deploy the e-procurement system across the company and secondly, they should leverage the system by channelling all purchasing through the system. Summit Strategies (2002) warns that real payoff from e-procurement investments come when companies drive volume transactions through the system. Analysis shows that a company is unlikely to achieve target cost reductions until 80% of the business' transactions are channelled through an integrated B2B e-procurement environment. For organisations to quickly achieve these volumes of transactions, they must prioritise the product categories and suppliers that represent 80% of the company's e-procurement transactions. They should use this information to evaluate supplier capabilities in e-procurement technology to determine the general readiness of the supplier. Without suppliers participating, the B2B e-procurement initiative will not be a success and therefore, selecting 'strategic' suppliers based on their e-procurement capabilities, becomes critical if companies want to speed up their integration and project implementation time and thus maximise on ROI.

B2B E-procurement in the Standards Driven Industry

Doxis (2000) argues that the largest opportunities for cost-saving efficiencies in B2B e-commerce lie within direct procurement – purchasing of goods that are incorporated into the manufactured products. They estimate that about two-thirds of all direct procurement is conducted by standards-driven industries. These include industries such as Aerospace, Defence, Automotive and Pharmaceuticals; industries with extremely specialised requirements regarding the Supply Chain Compliance process dataset. Doxis (2000) predicts that this major sector of direct procurement will amount to 40% of global B2B e-commerce. For the standards-driven manufacturers and their multi-tiered supply chains, complying to industry standards are a necessity and without this, the collaborative Internet solution – the true benefit potential - cannot be fully realised in these industries.

Supply Chain Compliance datasets has forced standards-compliant manufacturers to push the regulatory compliance practices down the supply chain – requiring their multi-tiered suppliers to conform to the procedures, forcing them to submit and manage a labour-intensive paper trail. Therefore, automating this supply chain, the compliance paper trail and audit process will add tremendous value throughout the supply chain, cutting costs and facilitating quick, accurate transactions. New, packaged solutions have emerged that can bridge the gap to share this Compliance information across company boundaries throughout the supply chain.

Compliance data generally focuses on process and quality data (e.g. certificates of compliance/analysis; corrective action reports, conformance reports and material safety data sheets) that needs to be incorporated with the information flow, accompanying the goods/service. Most of these documents in today's world exist only in paper form and thus they are disconnected from enterprise systems. Implementing such a web-delivered replacement for these paper-based processes, like an e-paper system, resolves the problem (Doxis, 2000). The B2B supply chain can, as in any chain-situation, be only as effective as the weakest link. In the case of the standards-driven industries, this weak link is considered to be the compliance dataset, traditionally paper based processes that are labour intensive, difficult to coordinate and slow. Managing this information on an electronic platform and incorporating it into the scope of B2B e-business business processes, will strengthen this weakest link and therefore enable this compliance dataset to keep pace with the rest of the B2B transactions.

In the early adoption years of B2B e-business, these first two application areas – e-commerce and e-procurement - have been implemented widely. Linking this back to the e-business adoption graph presented earlier, these applications typically fall within the External Integration phase where external optimisation becomes the focus of the business. By proceeding into the e-collaboration

applications, which is presented next, companies start to move into the Digital Economy phase.

E-Collaboration

It has been mentioned several times in the value networks discussion, as well as the supply chain generic discussions, that e-business in the supply chain will transform relationships and partnerships to a degree never seen before. The integration of supply chains implies that the nature of relationships between companies will no longer be characterised by an arm's length, transaction orientated approach. In contrast, supply chain partners will find new ways of collaborating to ensure that their organisations are tightly integrated so they can operate as one, even though they may consist of several disparate entities. This is the goal of collaborating, global supply networks in the digital economies.

The concepts discussed in the previous sections about value networks and how they interact, can be considered as the preferred state that every supply chain partner would want to find itself in, in this e-business world. More often than not, these tightly coupled supply chain partners will start to share information and knowledge that traditionally may have been considered as proprietary or even strategic. Examples of the type of information being shared among these partners include sales data, inventory status, production schedule, promotion plans, demand forecasts, shipment schedule, and new product introduction plans (Lee & Whang, 2001). Another concept mentioned before is the fact that supply chain partners will even go one step further, by making joint decisions based on combined information and knowledge.

The process to coordinate collaboration can be readily facilitated by the Internet, and Lee & Whang (2001) call this form of applications e-Collaboration. These applications provide the base case for e-business and a new generation of information systems. A common thread across these diverse applications of

supply chain integration is that it supports cross-enterprise coordination in a supply chain, beyond the traditional ERP system.

Lee and Whang (2001) argue that, unlike e-Commerce or e-Procurement whose functions are well defined, e-Collaboration exists in a variety of functions, such as information sharing, collaborative decision-making, and product change management. These three will now be discussed in more details to elaborate on the ideas.

Information sharing

The Internet can serve as a powerful platform to facilitate information sharing amongst supply chain partners. Baker Street Technologies is a good example of such an e-collaboration effort. They provide a real-time link among supply chain partners, offering cross-enterprise visibility of supply chain activities. Partners share and view purchase orders, sales orders, invoices, checks and other business documents over the Internet. Therefore, an integrated view of the supply chain status is collected from disparate information sources and projected onto a single web site. Another example is that of TSMC (Taiwan Semiconductor Manufacturing Company) who communicates with their assembly partners real-time about complex design drawings, prototype plans, test results and production shipment schedules. This greatly facilitates their ability to be aware of demand and supply levels and respond quickly to potential mismatch problems. It also helps to shorten new product development times. With this system in place, Adaptec's cycle time was cut by more than half (Lee & Whang, 2001).

In a completely different application, Ford Motor Corporation is using 900 virtual work spaces to design cars and hold meetings. In one project, Ford used digital conference rooms from eRoom to manage the formation of the auto industry e-marketplace Covisint. Lawyers from law firms and three automotive manufacturers shared virtual rooms to haggle over contracts (Ante, 2001).

These are just some examples that occurred in the marketplace, however the concept of sharing business-critical information has become a reality. Leaders must prepare their organisations to support such an information sharing culture. The cultural aspect of information sharing will be discussed in more details under the e-Culture section of this document.

Collaborative planning

The Internet provides the architecture to implement collaborative decision making in a cost-effective way. Companies like American Software and Synkra developed information hubs that facilitate knowledge sharing and collaborative decision making in the spirit of CPFR, or Collaborative Planning, forecasting and Replenishment. Essentially what this boils down to is a B2B real-time MRP. Internet technology enables us to construct a real-time planning environment to create a multi-company business model. In this software, supply chain partners first exchange product forecasts and replenishment plans. The technology then synchronises and develops new agreed-upon plans that closely match supply with market demand. As a result they can jointly reduce inventory costs and raise customer service levels. An example of this is the companies Nabisco and Wegmans who implemented a pilot of CPFR. The result of the implementation was that Nabisco's warehouse fill rate increased from 93 – 97% while inventory dropped by 18% (Lee & Whang, 2001). Clearly this is a top class achievement.

New Product Development

As product life cycles are shorter and shorter, managing product rollovers is becoming a routine challenge faced by many companies, especially in the high technology sector. Product rollover, defined as the transition from one version of product to its successor, is often a vulnerable time for a company. Engineering changes involved in rollovers may require both new suppliers, new bills of material, and new requirements for existing parts. In the past couple of years, it has become increasingly difficult to make such a wide variety of products with speed, efficiency and quality, forcing companies to start thinking about

technology solutions for collaboration. Collaborative product development software is a tool to improve quality significantly, reduce write-offs and ultimately improve the process' overall profitability. By applying Internet technology and by creating collaborating teams, companies can manage the various aspects related to global product development.

During a study of more than 350 executives by Deloitte Consulting, it was concluded that 57% of the organisations believed that collaborative e-commerce is critical to their business over the next year. This is driving companies to spend \$10.6 billion on collaborative software in 2001, growing to \$33.2 billion by 2004, according to the Aberdeen Group and AMR Research (Ante, 2001). On top of this, the Yankee Group Research Inc. estimates that over the next five years, collaborative commerce can save companies \$223 billion by cutting inventories and slicing production costs (Ante, 2001). Clearly this is an area that will substantially enhance the profitability of firms in the near future.

3.5.6 SCM and the SME's

Although there has been much talk about the possibilities of SCM integration in B2B e-business, most of these tremendous opportunities in the supply chain have not been obtained. Smeltzer (2001) argues that this is due to the fact that the SME's (Small and medium sized enterprises) – who frequently make up 80% of the supply chain members - have not been electronically connected. By 2001, terms such as integration, connectivity, synchronisation and collaboration were frequently heard in relationship to SCM. Smeltzer (2001) argues that despite the power of the Internet, businesses failed to totally embrace the potential, resulting in a much lower adoption rate than anticipated.

Initially the future of B2B e-business appeared to be with large firms, but as the phenomenon were incorporated in the real world, it became evident that major impacts and savings may well be found with SME's within the supply chain. The

study conducted by Smeltzer (2001) concluded that this lack of adoption in SME's is due to 3 distinct differences between large companies and SME's. The differences all boil down to a lack of resources in SME's – be that financial, technical capabilities or people. To embrace B2B e-business, businesses had to make large upfront investment in software, hardware, application upgrades and at the same time get people trained to develop the expertise. Evidently, this is an unrealistic request from SME's since they simply do not have the budgets, staff or expertise to implement these costly technologies and thus need an economical approach.

Therefore it is not an impossible task to connect SME's, but a model needs to be created that allows SME's to enter the e-business world without having to overcome those limitations. Over a time period the market realised this and new models started to emerge that focuses on having technology delivered via subscriptions, with low, predictable monthly fees. This of course gave way to a complete new business sector in its own right – the emergence of info-mediaries. In this model the second parties are responsible for the upkeep of the infrastructure, which relieves the SME's from these investments.

Based on the study results presented by Smeltzer (2001), it appears that although SME's initially created a weak link related to the connectivity and integration of the supply chain, a new model will take care of this problem. This illustrates again that there is no one-size-fits-all solutions related to e-business and that different businesses will have vastly different B2B requirements and restrictions. The author concludes that SME models will be completely different than the models used for large companies, however they will serve the same purposes and help these SME's to create competitive advantage. Therefore, to maximise the Internet and the power of supply chain management within B2B e-business, it is non-negotiable that SME's must be included.

To achieve true supply chain collaboration, supply and service chains must integrate people (who make the decisions), with the data (on which the decision depends), with the process (which actually makes it happen) across company boundaries. To achieve this collaborative environment, "shared" applications need to be developed to meet the people, process and data needs of all trading partners and be built on many-to-many, peer-to-peer architecture. In the late 1999's the information hub concept started to develop as a tool to serve these different SCM functions and to create this 'shared' platform environment, as well as to solve the SME problem that was discussed. This information hub concept has driven many companies to develop B2B e-marketplaces in search of becoming more e-business orientated. E-marketplaces have since played an extremely important role in the B2B e-business landscape and it is therefore important that every manager understand the structure and functions of B2B e-markets. The next section will now turn the attention to B2B E-Marketplaces and follows with a comprehensive discussion on this subject.

3.6 The role of e-marketplaces in B2B e-business

This section aims at defining and describing e-marketplaces (also called B2B Exchanges) and how their functions fit into the holistic B2B e-business ecosystem. Further to the generic explanation and classification of e-marketplaces, the challenges and future growth opportunities are discussed in detail. This section aims to demonstrate how e-marketplaces provide dramatic opportunities to automate and collaborate business processes with customers and suppliers, generate internal efficiencies and reach new markets at minimal costs.

During the year 2001, some of the most dramatic business developments were the explosion of large-scale B2B e-marketplaces and the shift of power from manufacturers and suppliers to customers. The B2B marketplaces have rapidly transformed the way industries operated, removed geographic barriers and created new channels of customer acquisition and integration. In addition, products were no longer pushed through the supply chain, but rather pulled by customers who are less

patient and who demand increasingly complex bundles of products and services; the bigger and more powerful the customers, the more options and variants they demand. The traditional, fragmented systems can no longer handle the new customer requirements.

B2B and SCM solutions are no longer about reducing costs, but have become the primary drivers for improving competitive advantage of an enterprise in the connected economy. At the same time, reengineering has broken out of the back-office box and is now widely applied to more knowledge-intensive, front-office processes, such as demand creation (marketing), order acquisition (sales) and product development (Hammer, 2000).

As B2B commerce shifts to the Internet, e-marketplaces will exert enormous influence over the way transactions are carried out, relationships are formed, and profits flow (Kaplan & Sawhney, 2000). To illustrate this point, in January 2000, Gartner Group predicted that the value of goods and services sold via B2B e-markets will reach \$2.7 trillion by the year 2004, representing some 27% of the overall B2B market and almost 3% of global sales transactions. This growth is slated to occur in the context of a global market for B2B transactions worth \$953 billion, growing to about \$7.29 trillion by 2004 (Gartner Group, 2000). Therefore, it is crucial that leaders understand how these e-marketplaces work in order to create an e-business strategy. Based on Gartner Group's predictions, it is not surprising that with such a growth factor, each of these new entrants will complicate the e-marketplace landscape substantially by continuously bringing new business into the B2B space. By classifying these e-marketplaces the author hopes to give order to this seeming chaos of the B2B e-marketplaces. By explaining how the different types of e-marketplaces work and how they create value, the author would like to provide useful guidance to managers looking to develop strategies for capitalising on B2B e-business. However, before one can begin to understand e-marketplaces, the author believes that a firm understanding of marketplaces in general, must be present. The first section

will thus focus on a general description of marketplaces, after which the discussion of e-marketplace classifications will follow.

3.6.1 Markets and Marketplaces

From an economic perspective, a marketplace, in its most basic form, is a place where buyers and sellers meet to exchange value. However, to understand marketplaces, a good understanding of what a market is, is necessary. From an economic perspective, no planning is needed for a market to function. Markets fill the role of matching overall supply and demand through a price mechanism. Furthermore, a market is a more abstract concept than marketplace; the latter indicating a specific location. A market usually consists of many specific marketplaces. As long as specialisation (as opposed to self-sufficiency) exists, there would be a need to exchange products. This can be accomplished by simply bartering between two parties of one product for another or through a centralised exchange function, where a new person, called a 'merchant', appears and locates in a central area called a marketplace.

Naturally, a marketplace does not have to be hosted by a certain merchant, but might as well be hosted by a community, as typically illustrated by the local medieval European marketplaces. When buyers & sellers find each other through an intermediary rather than through direct search, the total number of contacts required in a market in order for all buyers to know the products and terms of all sellers, is reduced. This is discussed in more details in Relationships Integration section.

With this foundation of markets and marketplaces in general, the author will continue to provide structure to and build an understanding of e-marketplaces by providing a quick overview and short history of e-marketplaces.

3.6.2 The promise of e-markets

In 1997 the first seeds of the new business entity, the e-market were sown. The e-market was seen as the next evolutionary step from using the Internet in individual company value chains, to create electronic marketplaces that linked value chains together. After silently growing in popularity, the first quarter of 2000 has been characterised by a frenzy of e-market activity. Digital markets, vertical markets, exchanges, and auctions have dominated the business news. At that point, the e-market stampede was led by procurement officers who wanted to take advantage of the e-market liquidity and transparency to drive costs down. Their goal was simply to cut non-value adding steps through streamlined, electronic workflows.

In 2000, Farina & Turrinelli compiled a research report and concluded that the B2B e-markets have not achieved their full potential, which the Internet and related digital media promised to offer. Initially, the 'digital market' concept essentially focused on B2C shopping, auctions and web browsing of consumer items. They argued that, on the contrary, B2B e-markets are about reducing costs, shortening supply chains and increasing overall efficiency. B2B e-markets are embedded in every sector of the economy, from chemicals to steel and airlines to agriculture. Farina & Turrinelli (2000) argued that for businesses to realise the benefits discussed in all the documents published about B2B e-business, e-marketplaces needed to offer much more than just simply facilitating auctions and exchanges. Even though this is the preferred state every B2B e-marketplace would envisage itself to be in, the reality is that most of the early adopters of B2B e-marketplaces do not offer much more than these basic auctions and exchanges functions.

Farina & Turrinelli (2000) concluded that the B2B e-marketplaces that were in existence in 2000, provided only a portion of what is needed for supply chain integration. Conerly (2001) elaborated by saying that SCM requires a company and its vendors to have databases that accurately reflect orders, production plans,

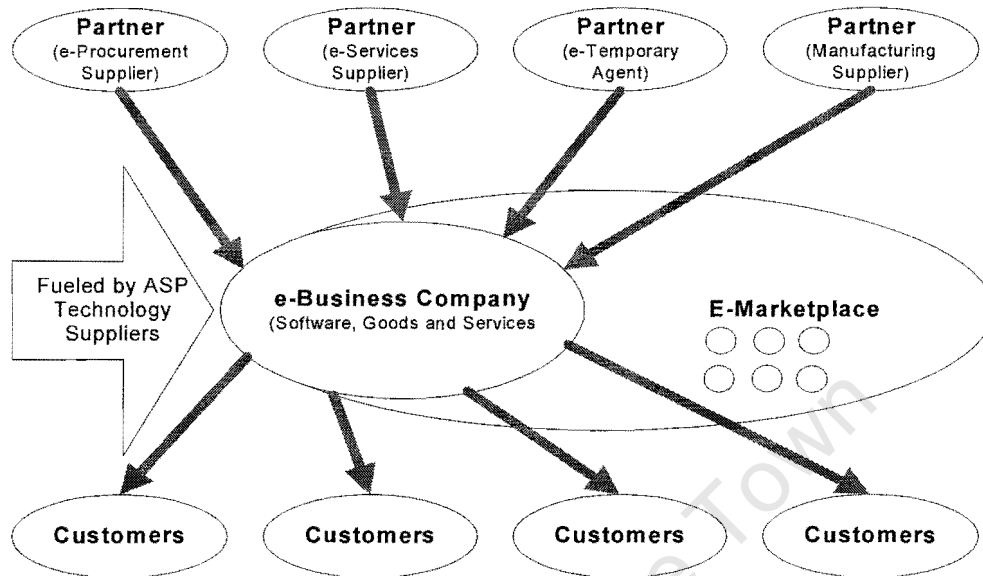
inventories, etc. and that in 2000, most of the businesses have not even achieved the 1990 state of the art ERP systems, let alone SCM integration with e-marketplaces.

While the above discussions emphasise what e-markets did and did not achieve, the author feels it necessary to provide some detailed descriptions of what e-markets are. The next couple of paragraphs will then attempt to define e-marketplaces to give the reader a better understanding of what this research is expecting from e-marketplaces.

E-Marketplaces Defined

Dai & Kauffman (2001) suggest that internet-based B2B e-marketplaces are distinctly different from the EDI inter-organisational systems model, in that they are open systems that enable firms to communicate and transact with business partners in virtual markets without investments in dedicated systems. They define these B2B e-marketplaces as “digital intermediaries that focus on industry verticals or specific business functions...and create value by bringing buyers and sellers together to create transactional immediacy and supply liquidity, and by supporting the exchange of demand and supply information” (Dai & Kauffman, 2001, p.3). PriceWaterhouseCoopers (2000) defines e-markets as “digital marketplaces, which uses Internet technology to optimise a network of businesses”. They argue that, what was considered state of the art in the 1990’s with ERP and enterprise optimisation is now replaced by value network optimisation. This value chain versus value network optimisation is schematically presented in Figure 10. Since the PriceWaterhouseCoopers (2000) definition is more focused on network optimisation, this will be the definition that needs to be adopted for the purpose of this thesis. A schematic presentation of e-marketplaces is shown in Figure 15.

Figure 15: E-Marketplace



Source: Aberdeen Group Inc. (2000) *Strategy Profile: Success Is Not Simply e-Business, But 360° e-Business*

Olsen (2000) argues that e-marketplaces coordinate interactions among a community of interdependent organisations. Their initial focus has been mostly on commodity-style procurement (e.g. MRO, spare parts, etc.), using exchange and auctioning models. An e-marketplace can be considered a broker that needs to manage and execute various relationships among community members (e.g. catalogue/pricing information management, order management, shipping coordination). Seybold (2000) defines an e-market as ‘an electronic trading community made up of buyers and sellers with common needs’. She suggests that these e-markets include auctions, exchanges, and multi-supplier online catalogues. They typically offer a wide variety of ancillary services required by the members of a trading community, such as authenticating buyers and sellers and streamlining procurement workflows, risk management, settlement services, conflict resolution services and logistics services. Seybold (2000) identifies that in 2000, these disparate e-markets were typically converging as:

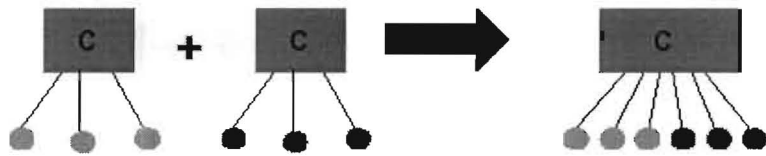
- digital exchanges to handle commodities and overstocks
- auctions to link buyers and sellers of speciality, one-off products like used equipment or overstocks
- Trading hubs to connect buyers to suppliers and superseding earlier, single-supplier e-procurement initiatives.
- Well-organised multi-vendor catalogues; becoming the crown jewels that e-market players desire, while vertical industry-focused content and directory sites are suffering.
- E-services to provide many of the behind-the-scenes business processes that are required, examples are title transfer, conflict resolution, tracking the shipment of hazardous chemicals, and bridge financing.

E-markets have since evolved to include more powerful tools, aimed at helping the members of the community. Some of these examples will be explained during the discussions that follow. However, before continuing to the e-markets classification section, it is important to understand how e-marketplaces create value. The following paragraph will explain these concepts.

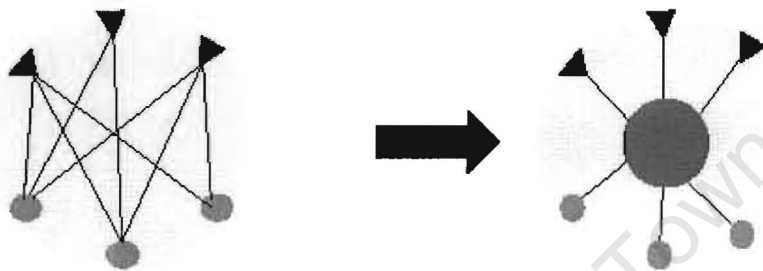
How E-Marketplaces Create Value

Value creation by B2B e-markets are pretty much based on Gesztes & Gibe's (2001) description which states when buyers & sellers find each other through an intermediary rather than through direct search, the total number of contacts required in a market in order for all buyers to know the products and terms of all sellers, is reduced. This is because B2B e-markets tend to be two-way networks that mediate between buyers and sellers, and create benefits for both buyers and sellers. This concept is schematically presented in Figure 16, which illustrates Metcalfe's Law of switched networks. Metcalfe's law states that 'the usefulness, or utility, of a network equals the square of the number of users' (Boyd, 2003).

Figure 16: Metcalfe's law illustrated in B2B and B2C commerce



One-way (Sarnoff) network in B2C commerce: Value $\propto N$



Two-way (Metcalfe) network in B2B or C2C commerce: Value $\propto N^2$

Source: Kaplan, S. & Sawhney, M. (1999) *The Emerging Landscape of Business to Business E-Commerce*

Consequently, the value created by B2C e-markets tends to increase linearly in the number of buyers, while the value created by B2B e-marketplaces increases as the square of the number of participants (Kaplan & Sawhney, 1999). It is important to understand how an e-market creates more value than individual company e-business initiatives. Today, companies are using the power of e-business to optimise their individual supply chains, procurement and sales/distribution processes. Although implementing e-procurement software or creating online storefronts may enable a company to create value, these approaches are limited to own market power and infrastructure and require significant upfront investment by a single seller or buyer. As a result such solutions are structurally inefficient and fundamentally limited.

E-markets are not merely a means of bringing buyers and sellers together to create a marketplace. Instead, it is a whole new way of business collaboration where significant first mover advantage can be experienced on account of the lock-in

effect. E-markets also create multiple streams of revenue (PriceWaterhouse Coopers, 2000). Whereas earlier in the 1999's, B2B start-ups were leading the B2B e-business revolution by creating these e-markets, once the traditional brick-and-mortar's caught up, the industry players started leading the initiatives. Leading industry players (including competitors) started partnering to create network effects and capture the e-market value potential. Examples can be found in almost every industry, but some of the most talked about examples are the B2B e-market Covisint, with GM, Ford and Daimler Chrysler as partners. Another well-known example is the partnership between Warner Lambert, Pharmacia, SKB, Pfizer and Novartis to create the e-market Pharmaceuticals PriceWaterhouse Coopers (2000).

Kenjale & Phatak (2003) reason that B2B transactions typically involve long, complex processes including searching for vendors, requesting for quotations, evaluating different proposals, negotiating, supply chain planning, shared product design, document exchanging, billing, payment and extensive data analysis. As a result B2B exchanges go far beyond simply streamlining buying and selling; they can create customer-driven value chains that substantially reduce costs for both buyer and seller and better align the entire supply chain with the customer's needs. E-markets can also enable companies to enter new markets at minimal costs and substantially reduce the time required to respond to changes in demand patterns.

E-Marketplaces can employ a variety of market-making mechanisms to mediate transactions between participants and thus add value to their members. They create value by two fundamentally different mechanisms: aggregation and matching (Kaplan & Sawhney, 2000). Aggregation mechanisms provide one-stop shopping by bringing together large numbers of virtual buyers and sellers under one virtual roof. The aggregation mechanism is static, because prices are pre-negotiated. The matching mechanism, on the other hand, brings buyers and sellers together to negotiate prices on a dynamic and real-time basis. This is more

likely to be used in spot sourcing where prices are determined at the time of purchase. The matching mechanism can also take the form of an auction (e.g. FreeMarkets). In these matching mechanisms, the roles of players are fluid – i.e. buyers are sellers and vice versa (Kaplan & Sawhney, 2000). Although it is not the intention of this paper to discuss and compare the different mechanisms used in e-markets in detail, it is noteworthy to mention that some mechanisms are more value-adding for systematic- and others for spot purchasing. A detailed analysis of these market-making mechanisms is discussed in works of Kaplan & Sawhney (1999).

It should be noted that most of the above information is based on articles and white papers released during the early years of e-marketplaces (1999, 2000 and 2001). Lee & Whang (2001) suggest that during this period, most of the e-marketplaces models were focused on online exchanges and auctions. Therefore, the functions of the e-Marketplaces were mostly representing workflow automation, thereby making existing processes more efficient by automating transactions and by reducing interaction costs among buyers and sellers. Lee & Whang (2001) argue that this auction and exchange model has three significant flaws, namely:

- Competitive bidding and seeking the lowest possible price runs counter to buyer-seller relationships. Customisation, quality and timing of delivery must be top priorities.
- Exchanges deliver few advantages to sellers, because pricing pressures are overwhelming the benefits.
- Business modes have been created quickly and without thorough consideration of customer needs and priorities.

At that time, Lee & Whang (2001) suggested that extensive market research should be done to determine the best business models, because these exchanges were no longer primary source of value. Instead, they argued, value was not considered to come from information-based transactions. In the years to follow

the models have shown that value has shifted from the product itself to information about the product. This is evident in the B2B e-marketplaces which adds significant value related to product information, instructions on how to use products, etc. Therefore, B2B e-marketplace transactions are becoming information intensive, which means that companies must develop more specialised and creative business models to accommodate these demands and expectations. Businesses have surely taken these comments to heart and more recent, innovative business models come in many forms, including online decision-making tools, etc.

Businesses started to focus on models that redesign workflow across businesses in specific industries, instead of just automating transactions. These workflow re-designers marry the efficiency gains from workflow automation to the effectiveness gains from the redesign of the processes by which businesses interact in B2B e-marketplaces (Kaplan & Sawhney, 2000).

Based on the above, there are so much evidence pointing towards the fact that the real value of e-markets does not only lie in the automation of procurement activities and their workflow (focus on efficiency). Most of the functions described above, focus on these types efficiencies, however, it is expected that the post 2000/2001 e-markets are developing into 'real value creators', thereby incorporating the next logical step of optimisation, which includes effectiveness. These e-marketplaces include not only automation of transactions, but completely re-designed workflows; portraying innovative business models. As the e-marketplace model matured through the years, the value proposition have changed and as mentioned above, has shifted from the product itself to the information (and the experience) around the trading of that product.

While the information presented above, is aimed at developing a clear understanding of e-marketplaces and the value they add, the author feels it is necessary to classify them in order to make sense of the e-marketplace landscape.

Therefore, the following section will now focus on building such an e-marketplace classification scheme.

3.6.3 E-Markets classification

E-Markets are considered very powerful vehicles in developing value networks and can be built in many ways. There are several business models aiming to structuring B2B e-markets. Models can be found in a lot of reports and white papers from consultant companies, in news articles, and on the Internet sites, as well as some books and research journals (see listing under bibliography and references). In this section, the author will describe only some of the basic classification schemes to give the reader an overall idea of the structure of e-marketplaces. Two basic models, the first based on ownership structure and the second, based on function and focus, will be discussed below.

Ownership Structure

The first very important characteristic the author considers as critical towards a complete classification scheme is the bias or ownership structure of an e-market. Business models vary depending on the economic viewpoint of their owners, thereby separating neutral from biased e-marketplaces. The author adopts the categorisation provided by Kaplan & Sawhney (2000), dividing e-marketplaces into three categories, namely:

1. Consortia: These exchanges are typically formed by a group of leading vendors in a particular industry (e.g. Global Food Exchange, Covisint, etc.)
2. Public Exchanges: These exchanges are run by a third party (known as infomediaries) and open to all companies that meet the standards defined by the exchange (e.g. CommerceOne). They are a purely neutral middleman; a digital service that facilitates the flow of information between

network partners by providing the partners with technical information such as an e-catalogue web site, etc.

3. Private marketplaces: The exchanges are run by a single company and its key suppliers (e.g. Wal-Mart and Dell)

Within the biased e-marketplaces (consortia or private), functions are typically either sell-side or buy-side orientated. Sell-side e-markets are essentially on-line distributors that provide suppliers with efficient access to buyers. Sell-side e-markets exist for the economic benefit of their supplier members: to create efficient, aggregated distribution channels and to provide extended reach into otherwise untapped buyer groups. At the opposite end of the spectrum, buy-side e-markets are on-line procurement portals. These e-markets exist for the economic benefit of their buyer members: they provide an efficient mechanism for aggregating the buying power of otherwise fragmented buyers to achieve improved procurement advantages (better price, greater access to products, etc.) While distinctly different, each one of these three ownership models has their own difficulties in becoming a business in its own right, let alone gaining competitive advantage. Riggins & Rhee (1998) identified three key factors that a consortium, which functions as a virtual organisation, can use to move towards becoming a learning network and improve its competitive position. These factors include the following:

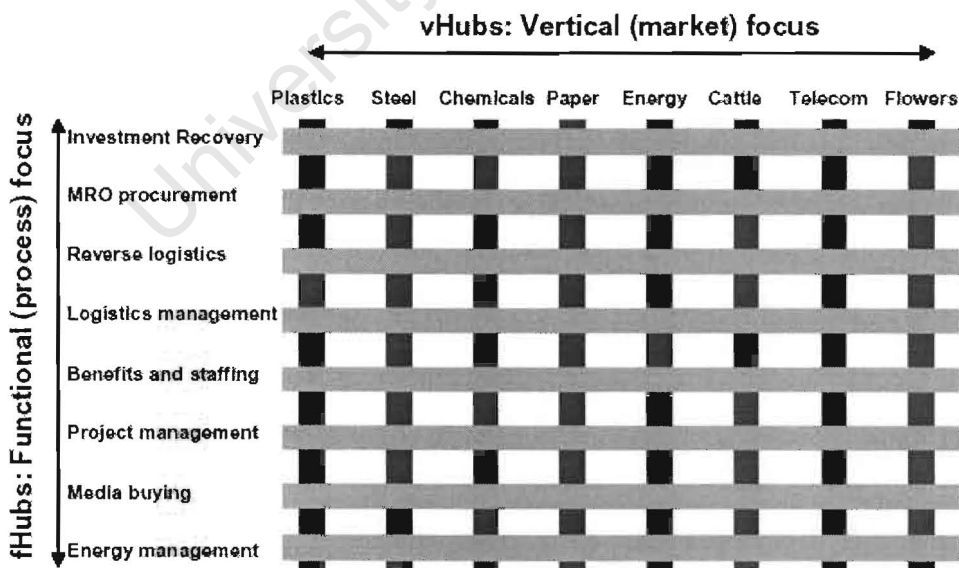
- Exclusive information: Competitive position is enhanced when the system provides exclusive information and knowledge to the consortium members.
- Process redesign: Competitive position is enhanced when users use the information provided to alter their internal business processes. An example of when systems are enhanced is when inter-organisational engineering teams work teams alter their usual processes to take advantage of the online capabilities of downloading centrally stored engineering documents to engage in inter-organisational concurrent engineering.

- Higher level management decision support: Competitive position is enhanced when the information from the e-market is directed at higher level management decision making as opposed to operation management support.

Function and Focus

The second very important characteristic the author considers as critical towards a complete classification scheme is the combination of the functional versus market focus that an e-market engages in. Kaplan & Sawhney (1999) classified e-markets as either vertical (which specialise in serving one particular industry, like Chemdex) or horizontal (servicing a broad range of industries, e.g. PurchasePro). This is probably the most general classification the author came across in the literature. Based on this classification, an e-market specialises either vertically along a specific industry or it specialises horizontally along a specific function or business process. This is schematically presented in Figure 17 below.

Figure 17: Vertical (Industry) versus Horizontal (Functional) E-Marketplaces



Source: Kaplan, S. & Sawhney, M. (1999) *The Emerging landscape of Business to Business E-Commerce*

The vertical markets have an industry focus and provide a deep domain specific context and relationship. Examples of these types of e-markets include Chemdex, SciQuest, E-Steel, PlasticsNet.com, etc. Kaplan and Sawhney (1999) argue that the likely success of vertical e-markets increases with:

- Greater fragmentation on the buyer and the seller side in the vertical market.
- Greater inefficiency in the existing supply chain.
- Ability to create critical mass of key suppliers and buyers.
- Domain knowledge and industry relationships
- Ability to create master catalogs and metadata schemes for searching across catalogs.
- Presence of attractive adjacent verticals for leveraging existing supplier or buyer base.

Functional hubs, on the other hand, focus on providing the same functions or automating the same business processes across different industries. Their expertise normally lies in a business process that can be generalised across vertical markets. Examples of these types of e-markets include iMark.com, MRO.com, etc. Kaplan & Sawhney (1999) argue that the likely success of a horizontal e-market increases with:

- Degree to which processes can be standardised and generalised
- Process knowledge and workflow automation expertise
- Ability to complement process automation with industry-specific content
- Ability to customise the business process to respond to industry-specific differences.

From the above, the author concludes that an organisation's overall strategy for value creation and its business strategy are both dependent upon market characteristics. As the e-marketplace model develops more value creation and business strategies will emerge, enriching this framework.

3.6.4 Implementation Considerations

B2B e-markets are governed by the network effect (as explained earlier with Metcalfe's Law). The network effect can also be explained in terms of cybernetics, by referring to the law of positive feedback. This resulted in the explosive growth of the network. Effectively, this means that the value created by an e-market increases non-linearly in the number of participants. The key goal of any e-market is therefore to obtain liquidity – a critical mass of buyers and sellers – as quickly as possible. The problem, of course, is that it is difficult to attract buyers without sellers and similarly it is difficult to attract sellers without buyers. This is what Lennstrand et al. (2001) and other industry experts refer to as the 'chicken and egg' problem.

Unless the network reaches a critical mass, very little value is created; at this inflection point networks reach hyper-growth; wherein fixed costs remain more or less constant, while revenues continue to grow. This implies that the fixed cost per unit keeps declining, resulting in huge economies for first movers and huge entry barriers for others.

What is happening in reality is that in each industry large companies are forming e-market alliances and strong-arming their suppliers into joining their preferred digital e-market. They are urging their customer to join, who brings along thousands of suppliers, resulting in the network effect - the more players join, the more players need to join.

The 'chicken and egg' problem is probably the most evident and the biggest obstacle in neutral e-markets, starting with a clean slate. These types of e-markets find it difficult to achieve sufficient transaction volume, because the buyers hesitate to connect to and purchase at the marketplace until there is an adequate number of sellers present with offers. The sellers are equally hesitant to publish their offerings until they are convinced that a significant number of buyers will be reached.

A neutral e-market is likely to yield the maximum efficiency to communities in the supply chain. With a single hub for supply chain, it avoids redundant investment in creating multiple hubs. It also avoids complications for the e-buyer (or e-supplier) where suppliers (or buyers) have to comply with different rules and standards associated with different hubs. Further, all transaction parties will enjoy benefit of one-stop shopping. Lee & Whang (2001) reason that a neutral e-market is much more difficult to implement because many parties may have difficulties in reaching agreements to share the same e-market. The implementation of such cross-enterprise systems is costly, time consuming and risky. One of the issues related to this is that partners may not agree on the specifications of the technical system and how to split the cost of investing in the system. This, combined with the challenge that companies faces related to integrating, extending or replacing their legacy systems to fit into the new system, is complicating a neutral e-marketplace implementation. These issues are not mutually exclusive to neutral marketplaces, but are however substantially amplified, considering the number of parties involved.

Another common concern, specifically related to neutral e-marketplaces, is related to competition among partners over ownership of customers. Distributors may worry that the e-market model will link manufacturers directly to end customers and ultimately eliminate the role of intermediaries. This concern can be directly related to the type of relationships a company fosters with its partners (Lee & Whang, 2001). A detailed discussion in the e-culture section of this document will focus specifically on the relationships among partners.

Procurement focused e-markets, which was the original focus of e-markets, on the other hand, may not have what it takes to gain market momentum. Competing businesses in the same industries are compelling competing software vendors to form alliances. Their mutual goal is to get the network effect going in a specific industry (Lee & Whang, 2001).

Some other critical considerations that should be incorporated into the design of e-marketplaces, are issues related to trust and sharing of gains among partners. Lee & Whang (2001) argue that aligning incentives for different parties is considered one of the biggest challenges. In these open trading environment, each partner is wary of the possibility that other partners may possibly abuse the trust and reap all the benefits from supply chain integration. Trust and cooperation are therefore the two most critical components of supply chain relationships. This concept will be further elaborated on during the e-culture discussion later in this document.

The above paragraphs gave a basic overview of the development and implementation considerations of B2B e-marketplaces. While B2B e-marketplaces seems to create many pitfalls as well as opportunities, the most important aspect to take into consideration is that depending on the ownership structure and the focus of the e-marketplace, these issues and opportunities will vary considerably for different businesses. While the issues mentioned above are certainly critical, the issue concerning B2B integration and interoperability certainly takes its toll on most marketplace makers, as well as partners. Although this has a great impact on B2B e-marketplaces, it is not limited to the marketplaces and will therefore be discussed in the next section on its own.

3.7 Integration

Building digital value networks means that multiple business entities are united under a single application platform ('virtual roof'). Enterprises will therefore function not as a standalone entity, but instead as a node in a network of business partners, sharing data and processing transactions in real-time. For these companies, continuing to efficiently run their businesses while exchanging information electronically in real-time, B2B integration is crucial. B2B integration is fundamentally about coordinating information among businesses and their information systems and is a rich, complex activity. The key aspect of B2B integration is that it focuses on system-to-system

integration (as opposed to person-to-system in B2C), strengthening relationships between corporations. The next three sections will focus on these critical areas of B2B e-business, namely: Application, Data and Relationships Integration.

3.7.1 Application Integration

It is important that, before an organisation gets involved directly into the details, as part of the strategic process; management should develop an overarching design to guide the construction and assembly of e-business initiatives into the growing superstructure, the e-business inter-enterprise architecture. The architecture must provide the cohesion and coherence of the component applications necessary to result in a complete, integrated e-business solution.

The application integration problem can be best described with a B2B e-marketplace scenario. The typical scenario starts where the e-marketplace accepts and orders and immediately transmits the information to all the supply chain partner's systems. The concept is that everyone immediately knows what they have to do to fulfil the order, reducing the risk of errors and minimizing the communication time. Typically an order must pass through a multitude of disconnected systems, such as an order entry, inventory, production, purchasing, invoicing, shipping and financial accounting. The challenge in B2B e-business is the communication with these legacy applications, many of which are still running on mainframes of midrange computers.

Business rules and computer rules need to be interchangeable with each other, allowing a set of business rules built for e.g. for an oracle planning system to be re-used with different mediums like XML or EDI. It allows changes and application upgrades to be isolated to a single company so changes made in one place can automatically ripple through the entire network. When large companies' back-end systems are directly integrated with thousands of supply chain partners, changes become a daily occurrence. Smeltzer (2001) re-iterates

this by arguing that the 'old world' integration methods of 'hard wiring' connections between two supply chain partners will not keep up the demands of the future. The 'new world' integration technology that can be quickly adapted to business and technology changes, both internally and externally, becomes a requirement. Therefore, businesses must build systems to change, instead of to last. Since the B2B e-business landscape will only increase the number of machine-to-machine transactions, the applications should be connected through independent, nimble connections that can rapidly assimilate packaged applications and reuse existing applications in new ways.

Malhotra (2001) suggests that the key to these new e-business applications will be to adapt and react when connections are added, removed, broken and restored on the fly. Brown (2000) calls this the 'modularisation' of applications, referring to the arrangement of the connections among their systems. Brown (2000) uses the metaphor of a molecular economy by arguing that successful enterprises need to create a molecular infrastructure, using integration technologies that define and redefine the interactions between systems, irrespective if they reside inside or outside the enterprise. This molecular approach is based on the premise that competitive differentiation is increasingly derived from relationships between different applications. This implies that the integration of multiple enterprises in an Internet context requires the integration of applications to be loosely coupled. Brown (2000) emphasises that this is exactly the opposite of what was historically true, where tightly coupled technology (like CORBA, etc.) was used.

The 'new' type of technology that is typically used to provide loosely coupled integration is messaging technology. In companies where Information Technology is used as the main source of competitive advantage, technology is typically initially applied for efficiency, followed by initiatives to ultimately leverage the technology for innovation and effectiveness. In the B2B e-business landscape, corporations that have never collaborated before will need to work together, implying that applications will have to communicate with each other

even though they have not been designed to do so. Processes will therefore be coupled electronically via the Internet on an inter-enterprise level through flexible integration infrastructure, resulting in a value network.

As discussed in the section on e-business evolution, companies evolving into a digital, virtual organisation will be further characterised by focusing on core competencies and outsourcing, while outsourcing the other activities to partners. Outsourcing activities will necessarily result in new alliances, taking the integration process one level higher; a level where enterprises will rapidly form and break links with each other. In terms of e-marketplaces, this means that they will ultimately form and break links with each other on a regular basis.

In summary, the above all points in the same direction: that successful B2B e-businesses should build flexible processes, supported by information technology infrastructure and applications that combines web-based technology with loosely coupled messaging infrastructures. Organisations should therefore ensure that technology investments are directed towards sustainable e-business infrastructure, one that is modular, process centric, and strategic.

3.7.2 Data Integration

To enable people to communicate effectively, they should understand each other's language. This is not any different in B2B e-business, where machines have to speak to each other. The problem, however, gets more complicated with the fact that different business worlds/environments use different languages.

In the open market environment created by the Internet, interoperation of e-commerce applications is critical. Interoperability is the way information and transactions are processed among entities, firms, and markets in the new digital economy. Interoperability will be key to survival as multiple standards proliferate and webs of marketplace consortia multiply (Roddy et al, 2000). If there is any

hope for interoperability at the commerce level, these languages (also called industry vocabularies) requires a common vocabulary based on standards (Fingar et al., 2000). Standardisation is the primary method for addressing heterogeneity and eliminating duplicated efforts, while enabling interoperability. However, it is probably one of the most distinctive, difficult aspects of B2B solutions.

Interoperability

Industry experts seem to be in agreement that ontologies (or structured knowledge) are key building blocks towards interoperability in the digital economy. They are essential to the construction of a truly flexible trading environment in cyberspace and are probably the single biggest issue in B2B data exchange. This is due to the absence of a single, unifying, widely accepted B2B vocabulary, resulting in the need to map between different ontologies.

When business systems communicate, i.e. send, receive and interpret messages among them, the system must understand the source and destination of the information transmitted. Ensuring which data items are the same in different systems, is one of the interoperability problems companies face today. To effectively 'map' two systems' data items, means that the data definitions of these items need to be understood. Comparing human-made definitions is a tough job, because different companies, and even departments, define things differently for things that are really the same, and sometimes the same definitions for things that are very different in reality. Sometimes these data definitions are obscure, not well defined and it often use new words from a natural language, which is not precise; implying the definition is not precise. E.g. one system calls the data item customer address, but this can also mean shipping address, billing address, etc. This example illustrates why ontology mapping is so difficult, different meanings for things. A good example of this is the abundance of industry vocabularies for B2B exchange like xCBL, FinXML, FpML, etc. as well as some older one's like EDIFACT, etc. These vocabularies can be seen as ontologies (De Graaw, 2001). Beside these vocabularies that were developed by certain industries, many

companies have developed in-house data exchanges; often simply in ASCII comma-separated format. In some cases, companies even have different ontologies within different legacy databases of different departments. All these different data sources present huge interoperability problems in the e-business landscape. To minimise duplication in mappings, standardisation seems to be the generally agreed upon solution to the interoperability problem.

This interoperability problem is commonly experienced within B2B e-marketplaces, when the contents of various customers' product catalogues and document descriptions need to be integrated. Historically, there were many different ways in which products were categorised and described and often vendors have their own private way to describe products. Product catalogues' actual use lie in the ability of the buyer to select the product, create a purchase order for it and receive order confirmation from the vendor. To enable the buyer and vendor parties to read each other's business documents, a common language is required (Fensel et al., 2001).

The ultimate purpose of interoperability standards is to develop consistent business semantics that can be used by all participants so they can 'speak a common language'. The semantics provide commonality to the names of and relationships between processes, workflows, and data across value and supply chains (e.g. XML, HTML, etc.). In the section related to application integration, one of the main points were that the new generation applications should be 'loosely coupled' and that one way of achieving this, is by document messaging technologies. XML is a technology that is used for passing information between trading partners in an e-business ecosystem. The document type definition (DTD) alone can identify a given document type in a B2B transaction, similarly to the document types defined for the EDI community, e.g. ANSI X12 EDI 850 is a Purchase Order transaction set. Unfortunately, implementing messaging technologies like XML and other standards does not solve the problem. The truly

difficult part of interoperability lies in gaining global agreement on the semantics (Fingar et al, 2000).

Since the introduction of centralised corporate databases in the 1960's, information systems designers have been confronting issues related to agreements on semantics and standards. Any systems designer will confess that departments within the same company cannot even agree on data names, not even to mention their meanings. In a typical B2B ecosystem, many trading partners come together, exploding the mapping problem exponentially.

Fingar et al. (2000) argues that, what is really needed for open e-business and thus true interoperability, are standard XML industry vocabularies for document type definitions and schemas. Only then, once companies adhere to these standards, will they be able to talk to each other digitally in the same tongue with no mapping required. A number of XML industry vocabularies have been developed by individual companies, vertical industry consortia and software industry groups, e.g. RosettaNet for the PC industry supply chain, Bank Internet Payment System (BIPS), Electronic Component Manufacturer Data Sheet Library Specification (ECMData), Signed Document Markup Language (SDML) for digital signatures, etc. The list of standards and industry vocabulary initiatives are still growing, causing obvious problems when connections are needed between them in given e-business ecosystems. This, Fingar et al. (2000) terms the 'tower of Babel' problem of industry vocabularies. Therefore, what is really needed is a common repository of XML schema that can be shared by participants globally over the Internet.

Creating these open standards between and among these towers is essential to digital e-business. Therefore, constructing a framework that incorporates all other industry efforts have been critical to the survival of e-business and in late 1998 CommerceNet established the eCo Framework workgroup. Their aim was to construct such a framework by integrating those various existing technologies.

The focus of this workgroup was on interoperation at the e-commerce semantic level.

Fingar et al. (2000) argues further that the registries of meaningful taxonomies must be more than just a way to classify information. Additionally, these taxonomies must encode and represent knowledge to unleash the meaning of the information. While XML and java processing brings the information needed for e-commerce, ontologies bring knowledge to the e-commerce table. Therefore, these ontologies should not only store the information the business document mappings need, but more importantly it should include the context to which it applies. This allows for knowledge to be captured in the form of ontologies. Adopting shared ontologies allows e-commerce software to simultaneously 'interoperate' without misunderstanding and retain a high degree of autonomy, flexibility and agility. Fingar et al. (2000) argues that, without these ontologies, the task of integrating and unifying the rapidly growing list of XML vocabularies is almost as monumental as building the tower of Babel itself.

The above paragraphs described what is involved in true B2B interoperability, specifically referring to the standards and ontologies. While application and data integration is more applicable to technology integration, relationships integration refers to conducting business in an environment where people are ultimately the key in making an organisation a successful B2B e-business. The following section will focus on relationships integration amongst humans.

3.7.3 Relationships Integration

The Internet is changing the face of the economy and is rapidly transforming both supply and demand chains into value networks of collaborative e-business. The greatest impact is being felt in the B2B sector where new supply chain models and e-marketplaces have a profound impact on the way organisations form both strategic alliances and short-term supplier relationships.

Although business has always been about exchange, the new, digital economy not only depends on the exchange of notes and coins, but increasingly, the invisible transfer of electronic information between machines is considered as exchange currencies. Additionally, value exchanges of knowledge and intangibles have been identified as critical elements in B2B exchanges. Even though businesses might appear distant and remote, there must still be an exchange and e-business does not change this. However, what e-business does profoundly change is the way in which companies will establish and manage relationships with other companies to provide materials and value-added services. In the B2B e-business landscape, organisations will therefore move the focus from the enterprise itself, to its partnerships and relationships.

The metamorphosis of the economy will demand from enterprises to be able to form and break inter-enterprise relationships in a flexible manner. This means that companies must be agile, managing fluid organisational structures and external relationships to respond rapidly to change. The nature of these flexible relationships should, however, be matched with e-commerce strategies. When companies consider B2B e-business opportunities, careful consideration should be given to the relationships embedded among the parties involved. This will help companies to better manage the B2B opportunities, while at the same time minimise the pitfalls. Jap & Mohr (2002) argue that one of the largest stumbling blocks in leveraging emerging B2B technologies (like e-markets) is the reality that they can undermine long-term business relationships which have been built and established over the course of many years. Therefore, it is essential that a company's e-business strategy is compatible with the types of relationships that have been developed in the customer or supply base.

The type of exchange relationships organisations craft with their suppliers or distributors varies widely, from being adversarial or arms-length in nature, to being more like a partnership and mutually oriented in nature. Attempting to use the Internet in similar ways amongst various companies will necessarily result in

vastly different outcomes. The interplay between the capabilities of emerging technologies and the relationship contexts, in which these technologies are being placed, highlights the need to systematically understand their interdependence. In doing so, companies have a better chance of improving the productivity created by technology investments.

The above sections have focused on the integration aspect on three different levels, namely: application, data and relationships. The author deems these three elements the key components to an integrated B2B e-business; however these elements do not operate as islands on their own. They are extremely interrelated and embedded in an environment which creates the foundation for enabling integration on these three levels. This foundation is governed by the underlying principles of a trusted e-business environment. The next section will focus on the security, privacy and trust aspects related to the e-business landscape.

3.8 The trusted e-business environment

This section aims to describe the privacy, security and trust aspects related to the e-business environment.

In today's B2B landscape, multimillion-dollar transactions flow between partners, sharing mission critical information automatically and in real-time over the Internet. Examples of these types of transactions are purchase orders, sensitive marketing promotional plans, engineering drawings, sales forecasts, etc. Businesses do not want the outside world to have unrestricted or unauthorised access to companies' information, especially information that is of strategic nature.

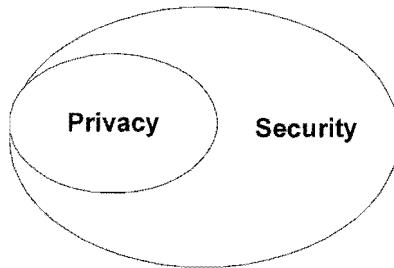
This brings old fears of security back to the e-business landscape. In fact, in 1999 CommerceNet reported that security and trust were cited as top barriers and inhibitors to electronic retailing during a study conducted on the inhibitors to e-commerce.

Although security and trust issues are considered ‘old fears’, in the Internet world, they will be addressed with new technology and open standards.

Before the advent of the Internet, there really was not an effective network to carry B2B communications – no practical, secure way for trading partners to share information or to participate in collaborative business processes. Previously, the best option was EDI over VAN’s (also described in problem statement), but due to various reasons, of which cost is considered the most influential, only about 20% of all industries could afford this proposition (IPNet Solutions, 2001). In short, the limitations of EDI and VAN’s restrict the information that can be shared and is not conducive to supply chain collaboration. The most important aspect of VAN’s is the fact that the information travelling across them is not encrypted and therefore the security system is vulnerable and inadequate for today’s needs.

Fingar et al. (2000) reports that privacy and security reasons have often been cited as one of the top barriers in e-commerce adoption. Since the Internet allows a company to open its business to the world, it needs to adapt its privacy and security measures to match the e-business landscape. It is important that an organisation align its security and privacy policies with the business objectives. These objectives can be vastly different between businesses, as they move through the e-business adoption phases (see section 3.5.3 on e-business evolution), resulting in vastly different security needs. Companies can adopt e-business in ways from launching a simple web site to being fully integrated in an inter-enterprise setting. A company must translate these security requirements, based on the e-business adoption level, into policies, procedures and management guidelines. Security can exist without privacy; however privacy cannot exist without security. This concept is schematically presented in Figure 18.

Figure 18: The trusted e-business environment



Security and privacy goes hand-in-hand to create a 'trusted' e-business environment, giving companies confidence to move through the e-business adoption phases, ultimately resulting in the digital economy. The different states identified in Figure 12 (section 3.5.3 e-business evolution), each has a different security and privacy requirement/need. Privacy and security requirements grow as a company moves further away from the publish state and closer to the digital economy state. The privacy and security needs range from simple firewall & anti-virus protection to inter-company authorisation/authentication and privacy contracts. Appendix E contains a table, giving an overview of the type of security and privacy requirements for each of the typical e-business phases (IBM, 2001).

Now that is it clear why the old fears of security and privacy must be addressed in new ways that applies to the e-business context, the sections following will focus on discussing each of these, security and privacy, and how they relate to the different phases of e-business adoption.

3.8.1 Security

Fingar et al. (2000) argues that security must be designed into an e-business system from the start, both on technical and business process levels, because it is more expensive to add it after the fact. At technical level, transmitted data is normally dealt with through a combination of encryption schema and transmission protocols such as SSL. In addition, firewalls control and limit access to private e-

commerce networks from the public Internet. At the business process level, authentication is needed so no one else can pretend that he or she is an authorised user and access control so that a particular user can gain access to only those portions of the business for which he/she is authorised. The details of the technical, as well as business process levels will now be discussed in two separate sections following immediately. For a brief explanation of the most common security terms utilised in this section, Appendix F presents the Basics of Application Communication Security.

Security on the technical level: Security Architecture

A secure architecture is a pre-requisite to achieving secure communications amongst business parties within a value network. However, secure communication can only be achieved if the network architecture is built in such way that it can protect the communication. The network needs to support the communication necessary for businesses, without allowing unauthorised access.

These network architectures vary vastly during the different states of e-business adoption, as can be seen in Appendix E. The security needs associated with the publish state, for example, relies on simple firewall and anti-virus architecture, while security needs from the transaction state onwards become more complex as companies create 'demilitarised zones' (DMZ). These are protected neutral zones that are admissible to outsiders, yet walled from a company's internal systems by other firewalls. The concept of firewalls and demilitarised zones (DMZ) are discussed in more details in Appendix G.

As companies evolve beyond the more complicated transactional state, the e-business infrastructure begins to play a larger role. If security systems and networks are not well designed, configured and managed, then security breaches may occur (IBM, 2001). Business data travelling over a public network such as the Internet can be intercepted on the way. To secure the data against such theft, it is coded before transmission and decoded when received. The

encryption/decryption is implemented with public key systems in which each party has a pair of related keys – a public key that is published to all partners and a private key that is kept secret. One approach is to establish a secure communications channel by using one of several protocols such as secure sockets layer (SSL) that operate as a layer above the standard Internet TCP protocol. Another approach in ensuring the privacy of communications, which can be used in place of or in combination with a secure protocol, involves transmitting a message in a secure form so that it cannot be opened or read by another party (IPNet Solutions, 2001). Public key infrastructures (PKI's) provide the supporting services needed when public-key-based technologies are used in a large scale (Kenjale & Phatak, 2001). Since the different technologies can vary quite a lot in cost, it is important that the security controls are matching the company objectives.

Security on the business process level: Authentication

Authentication, providing that the sender and receiver of the message are indeed the people or company that they claim to be, represents a supremely important requirement of B2B e-commerce. This especially holds true for those companies who evolve beyond the internal integration phase, where the entire organisation becomes customer focused. In this phase, the organisation views customers from holistic perspective and thus needs integrated data. Typically in this phase customers order online, check availability of products, etc. and therefore the need for centralised authentication and authorisation for all systems and applications becomes critical (IBM, 2001).

In the B2B context, workers typically execute their jobs across multiple applications running on multiple servers. Therefore, it is important that the authentication procedures must provide convenience in terms of a single, universal user logon to all these systems (Fingar et al., 2000). The author believes that one of the most important characteristics of a good security system is to provide users with access to a range of applications, many of which contain

sensitive data. Authorisation is the process by which the authenticated users are limited in their actions or operations, based on their security clearances. In order to ensure that a user is assigned the correct authorisations, it is imperative that the user in question can be identified and authenticated. Authentication is an important component of security architecture because the user who has logged on should be able to access a multitude of different applications and information based in distinct platforms. Probably the most well-known and acceptable authentication mechanisms are through user ID / password or digital certificates. Companies that require a more stringent security check, typically use certificate-based authentication with SSL (see more on technical details in Appendix F).

Certificates based authentication is most commonly accomplished using digital signatures at protocol or message levels, or both. A digital signature authenticates the identity of the sender and performs other functions, such as the delivery of the public key. In addition to authenticate the message, the digital signature can also meet the basic commercial requirement of non-repudiation (IPNet Solutions, 2001).

Non-repudiation plays an important role in e-commerce by preventing one party from disavowing a communication, such as an order, simply by stating that the business transaction was never sent or received. It is based on the digital signature of the original message and a digitally signed message disposition notification (MDN) that provides proof of receipt. By the same token, third parties cannot claim to have received a message from a company that uses its private key to digitally sign all of its transactions (IPNet Solutions, 2001).

It is essential that all parties involved in business agreements must agree on the level of security required for their individual needs. Public key infrastructure (PKI) technology uniquely fits the bill for B2B transactions, providing robust, bullet-proof security perfectly suited for the e-business environment. PKI establishes the essential element of trust – the foundation for business – between

partners. (IPNet Solutions, 2001) PKI integrates digital certificates, public key cryptography, and certificate authorities into an enterprise wide-security architecture that authenticates and verifies identities and provides non-repudiation of transactions – meeting the needs of enterprises and e-marketplaces that should assure participants that individuals are truly who they say they are, and that their transactions are secure. More information on PKI can be found in Appendix F.

3.8.2 Privacy

In both B2B and B2C e-commerce, trust and privacy are critical issues that must be dealt with electronically. Trust is a measure of confidence and is a necessary component that should exist among parties when entering business relationships. Whenever sensitive information, such as addresses must be given online, privacy becomes a major issue. Levy (1999) reports that while security concerns have decreased privacy concerns have increased. Privacy of this type of data is critical, since individuals can be damaged from misuse of credit card numbers, pin numbers, social security numbers, medical information and other personal sources. These issues are closely interrelated for merchants and consumers who wish to do business online, because consumers will not buy if they do not trust the web based merchants. In contrast to the retail sector's concern, the lack of privacy was not cited as top barrier to e-commerce for larger corporations, because they focus mostly on B2B transactions. B2B transactions are less dependent on privacy than consumer sales online. Nevertheless, Lieb (1999) emphasises that overall privacy is one of the greatest barriers that presently face businesses online.

To build trust, companies need to publish, internally and externally, privacy policies that clearly articulate who has access to data under what circumstances. This has resulted in the fact that one of the leading web privacy practices today is the use of a web site privacy policy to explain what a company does with the personal information it gathers on the site. Examples of such organisations

include TRUSTe.com, bbbonline.org, privacy.org, etc. of which TRUSTe appears to be the industry leader. Privacy principles embody fair information practices approved by the US department of commerce, federal trade commission, and prominent industry-represented organisations and associations. To become a TRUSTe licensee, a candidate creates a privacy statement with the help of a TRUSTe online wizard, reads and signs a TRUSTe license agreement and pays annual fees.

Providing a trusted and private presence on the web is essential to any e-commerce initiative (Fingar et al., 2000). As customers, suppliers and partners are becoming an increasingly integral part of a company's e-business, protecting their data and its integrity serves as the foundation of the trusted environment needed for moving through the states of e-business. As companies move towards a collaborative business environment, implementation of security features will also become more complicated, since implementation will then cross enterprise borders and therefore, organisations must harmonise differences in security policies.

3.9 Reorganising the organisation towards e-culture

This section is aimed at stressing the necessity for changes in organisational culture, management techniques, socio-economic restructuring and other changes leading towards a shift in organisational restructuring in the context of e-business (and therefore globalisation).

E-business has changed the business environment forever; in fact, it has not been since the industrial revolution that change has been such a competitive imperative. E-business has changed the nature of work; it has become more abstract than physical, more team-based and collaborative than individual, organisational structures have become flatter and more empowering, and businesses have become networks of organisations rather than stand-alone firms. Today's business environment is

radically different than in the past, characterised by discontinuous, rarely predictable, and filled with players from different industries across the globe fighting to change the rules of the game and to destroy the stranglehold of incumbents in leadership positions.

Vasudevan (2000A) argues that the change characterising today's business world is so real and frequent that the concept can no longer be considered by only the CEO and the top management team of a company once every five years in a holiday retreat. Instead, he says, change is now and companies should be aware of the fact that change is the only constant in today's economic landscape.

The changes caused by e-business developments are actually enabling, if not driving, enterprises to adopt new work practices, new organisational structures, and even new management styles in order to extend their businesses both domestically and abroad. As the pace of business activity increases and markets emerge and disappear almost overnight, different approaches are required to respond to these rapid changes. Managing radical change is only possible with a radically different approach to business modelling: building equally dynamic business models based on e-business infrastructure. Although e-business is mostly seen as being heavily dependent on new technologies, it is equally – if not more – dependent on the human factors surrounding the e-business infrastructure. In fact, Vukšić et al. (2001) reports that most of the unsuccessful projects failed because agreed upon organisational changes were not carried through. This is mainly due to the fact that e-business implementations often underestimate the people-factor and their contribution to making an e-business project successful.

Therefore, the author feels it is imperative for managers to ensure that their framework to re-organise the business towards an e-business is based on the people-related factors discussed below.

3.9.1 Reorganising the organisational structure

More than 10 years ago Peter Drucker heralded the coming of a new organisational form, what he described as a knowledge-based organisation which would be largely composed of specialists who direct and discipline their own performance through organised feedback from colleagues, customers and headquarters (Drucker, 1988). Cherian (1999) argues that although Drucker's prediction was right, nobody had any idea of the speed of change and the profound impact that e-business will have on organisational structures. I couldn't agree more with both of these statements.

The e-business landscape is characterised by value networks where organisations focus on core competencies by outsourcing other activities. The result is that companies do lots of partnering – even with competitors (alliances), and lots of fast-paced changes when necessary. Even though many changes have already taken place, e-business will continue to change the nature of work beyond comprehension. Increasingly B2B e-commerce is having even greater impact on how businesses are organised and managed. When businesses organise around processes and not functions, the result is inevitably the horizontal organisation. E-commerce demands organisational change – both internally and externally. However, the degree to which an organisational structure needs to change will be dependent on the phase of e-business adoption an organisation is at.

E-commerce and the resultant shift in business processes will undoubtedly cause changes in jobs. Clearly clerical, logistical and administrative staff will be reduced when e-commerce is embraced. However, traditional technical staff will be required to design, install and maintain the network system, and then train staff in its use. Companies can only hope that the net effect is a reduction in cost, one of the objectives of e-commerce (Cherian, 1999).

Although much has been written about the changes e-commerce will have on supply chain partner relationships, very little has been said about the long-term

relationship between companies and their employees. Cherian (1999) argues that the major structural changes in these relationships result in the fact that employees are no longer committed to corporate loyalty, but rather to be independent consultants. E-commerce technology allows people to work in small teams or as independents, both intra- and inter-organisational. Thus, e-commerce facilitates the trend away from large, centralised command and control structures to very small, flexible temporary networks, or teams, of organisations and individuals. The result is that traditional industrial models of hierarchical, formal, layered organisations are becoming out of date and are replaced by more flexible, dynamic structures.

The author believes that successful models of work organisation in the 'new economy' will include small-scale networks of interlocked specialists getting together on a temporary basis to approach a focused market or project. IBM (2001) elaborates further on this concept by arguing that this combination of entities will stay together only long enough to meet the members' specific goals and then disband, with individuals and teams moving on to other projects and other venues – the Hollywood model. Today's formal workgroups with member relationships that span long periods of time and numerous work efforts, will be replaced with these focused, temporary, virtual organisations of organically formed business 'molecules'.

3.9.2 Develop the capability to change

In today's turbulent e-business environment, companies are pulled into opposite directions by forces of stability and change. The forces of stability focus on methodical planning and controlling structures, which emerged to enable organisations to maintain a focus on marketplace realities and preserve the source of their current wealth-creating strategies. On the other hand are forces of change, such as experimentation, learning and innovation that emerge to enable organisations to increase their capability to adapt, change their current wealth-creating strategies and seek new wealth-creation opportunities. It is the challenge

of every organisation to balance these two opposing forces and in doing so companies must embrace change, instead of being tolerant of it (Vasudevan, 2000B). Cybernetic laws indicate very clearly that every system has certain configurations, which are stable. For an organisation to move from one stable configuration to the next, a certain amount of energy needs to be applied to ensure that the new configuration is stable. In this case, the energy that needs to be applied refers to the changes necessary in the culture of the organisation.

The capacity to survive in an environment of continual change is inextricably tied to one's ability to consistently change the rules of the game. To be able to change these rules, organisations must constantly explore new ways in which they can source new ideas, new rules, and new wealth-creation opportunities.

Organisations wishing to improve on these kinds of abilities need to see things differently, do things differently and establish a culture of learning and experimenting. These three aspects will be discussed in the following sections in more details.

See things differently

Handy (1993) identified the ability to 're-frame' as a lubricant of change; a necessary condition to be able to comfortably change. He argued that re-framing is the ability to see things, problems, situations or people in other ways; to put them in another perspective or another context, to think of them as opportunities and not as problems. He further argued that re-framing unlocks problems through lateral thinking, using the creative part of brain. Thinking of things in the same way as has always been done does not solve problems or changes things. This re-framing ability of an organisation is critical when revisiting and questioning the assumptions of an organisation's business model. However, to generate these new business insights, organisations must foster a climate that encourages the emergence of new perspectives and ideas. Such a climate is deeply disturbed by hierarchical traditions and can result in the greatest impediment to the free flow of ideas and perspectives within an organisation.

Do things differently

Vasudevan (2000B) emphasises that although seeing things differently is the first and most crucial step towards competing in an environment of change, it will only pay off if it is accompanied by appropriate action.

Establish a culture of learning and experimenting

Another lubricant of change identified by Handy (1993) is what he terms 'negative capability'. With this he refers to the capacity of a person to live with his/her mistakes and failures without being downhearted or dismayed. He argues that negative capability is an attitude of mind, which learners need to cultivate to help them write off their mistakes as experience and is a measure of a person's ability to live with uncertainty and mistakes. Organisations are embedded in orthodoxies that dictate what they should do as opposed to what they can do and sometimes what they would like to do. While they require effort, learning and experimenting do foster change and now more than ever, organisations should seek ways to make learning and experimenting part of their culture.

Experimenting and learning are essential to the future success of organisations. One is worthless without the other. Successful new approaches are often stumbled upon as a result of a series of experiments and initial failures. Entrepreneurs have only 1 out of 9 successes, of which the failures are credited to experience (Handy, 1993). One of the most powerful ways to learn is through tolerating mistakes and learning from them. Fostering a culture of innovation among employees, coupled with a tolerance for mistakes, will result in a leading organisation.

As more information becomes available, knowledge will grow from experience and instead of companies being overwhelmed, they should learn as they go. The importance of learning in today's e-business environment as a competitive imperative has been stated by DeGeus (1988) over a decade ago, when he emphasised that an organisation's ability to learn faster than their competitors

might be their only sustainable competitive advantage. The learning ability of an organisation is a crucial precursor to successful e-business adoption. Successful and intensive adoption of e-business calls for the ability to quickly recognise new developments in the e-business arena, understanding the potential that new e-business tools can bring to existing operations, and frequently scanning the environment for successful e-business implementation stories in other firms that can be replicated.

Wu & Balasubramanian (2001) points out that an important component of learning is the organisation-wide sharing and dissemination of information that leads to a shared understanding and interpretation of external phenomena and internal strategies.

IBM (2001) argues that success in the next generation e-business model will depend upon integration of not only data and processes across inter-enterprise supply chains and value chains, but also integration of decision-making across inter-enterprise boundaries. The challenge of information sharing will result from the potentially competitive nature of various enterprises across the value chains as access to privileged information may often determine the dominant position in the inter-enterprise value networks.

Often, individuals may not willingly share information with their departmental peers, supervisors or with other departments, because they believe that what they know provides them with an inherent advantage in bargaining and negotiation. These human concerns may often result in sharing of partial, inaccurate or ambiguous info. Therefore, integrated information flows depend upon the motivation of people to share accurate information on a timely basis across intra-enterprise and inter-enterprise info value chains. Motivation of employees, organisations, customers, and suppliers to share accurate and timely info is based on trust, despite the potential of using the information in unanticipated ways. This, in turn, depends on the overriding inter-enterprise and intra-enterprise

information sharing cultures. As community and commerce paradigms increasingly intermingle, e-business enterprises will be challenged to inspire trust and motivation of sharing needed information with their stakeholders, over which they may often have little control (IBM, 2001).

Learning, however, not only depend solely on information sharing, but also on the transferring of knowledge across and within sub-units that maybe quite removed from the original point of entry. The adoption of e-business is, by its very nature, a function-spanning task. Therefore, one can consider that the learning ability of the organisation determines the overall intensity of the e-business adoption. The learning ability of the organisation should therefore be particularly relevant in empowering the organisation to undertake relatively complex tasks, crossing organisational boundaries.

Learning involves the constant interaction and flow of communication between employees within the organisations that want to embrace change and create the future. In the e-business environment this extends to interactions across enterprises. While most of the literature is focused on the organisation's ability to learn, the 'new economy' is inevitably resulting in inter-enterprise learning. Senge (1990) identifies four basic disciplines that characterise the learning organisation: personal mastery, team learning, shared vision, and mental models. Riggins & Rhee (1998) suggest that it is possible that similar disciplines exist for the learning network, but only expanded on an inter-organisational level, i.e. corporate mastery (commitment of organisations to improve its contribution to the overall 'consortium'), network teaming (formation of entirely new inter-organisational work teams), ecosystem vision (development of 'network mind'), environmental models (models about how consortium members work together and how the overall consortium performs within its external environment). From this the author concludes that systematic thinking, would be the concept of business partner reengineering (the alteration of consortium members' systems and processes to improve overall group performance). Riggings & Rhee (1998,

p.3) define the learning network as “a group of trading partners that purposely coordinate their efforts to acquire, distribute, interpret, and retain information about its members, competitors, customers, and other external entities for the purpose of altering its range of potential actions”. Clearly this view on learning networks, rather than the learning organisation in isolation, is more applicable to the e-business environment.

Therefore, for these value networks to learn, they should rely on the collective intelligence and wisdom of people across organisations, combined with their willingness to share this information. Sharing knowledge and learning goes hand-in-hand. By constantly fostering a culture of learning and experimenting, generating new visions, new perspectives and new market shaping concepts, companies can and will be able to consistently recognise and exploit emerging opportunities, keeping their competitors off balance.

This chapter focused on building a management framework to help managers with the re-organisation necessary in becoming an e-business in a business-to-business (B2B) context. The framework was constructed based on a holistic, systemic approach to enable managers to get the ‘bigger picture’ and make the connection between the different ‘parts’ of the B2B system, instead of only focusing on certain parts in isolation. The holistic approach was combined with the two streams of enquiry, the traditional ‘hard’ approach, dealing primarily with the e-business processes and the surrounding architecture, as well as the ‘soft’ approach, dealing with human and organisational issues.

The management framework described, is composed of the relevant elements extracted from a carefully selected collection of literature sources. The framework focuses specifically on B2B e-business, although some topics are applicable to e-commerce in general. The framework is an attempt to assist managers in successfully dealing with the important issues that will arise when a B2B e-business system is considered and implemented. The chapter following integrates the inquiry and management frameworks and apply them through describing the B2B e-business implementation process.

4. The B2B E-Business Implementation Process

This section is aimed at giving an overview of the application of the framework in terms of the e-business implementation process. The overall implementation phases and their importance will be discussed in detail.

Implementing B2B e-business moves an organisation through the e-business transformation process. The author proposes that the implementation process follows similar steps to what has been described in chapter 2 in the Enquiry Framework, consisting of: Analyse Situation, Formulate Theory of Action, Implement Decisions and Reflection. Although some of these steps might be broken down and/or combined and named something different, the underlying process is following the same logic as the basic enquiry process. The implementation approach typically follows the two streams of enquiry as suggested by SSM, namely: logic and cultural. (See full discussion in chapter 2, Appendix A). Therefore, each step of the implementation will have a logic and cultural component to it. For practical reasons however, the cultural aspects will be discussed under its own heading.

4.1 Develop an e-business strategy

Creating a B2B e-business landscape involves multiple disciplines, which are applied simultaneously. These disciplines typically include aspects related to business strategy, technology, processes and management and organisational cultures. Since all of these disciplines need to work together in perfect harmony, synergy needs to be developed amongst these. Therefore, it is important that the very start of such an endeavour, developing a B2B e-business strategy, should fit into the rest of the corporate strategy.

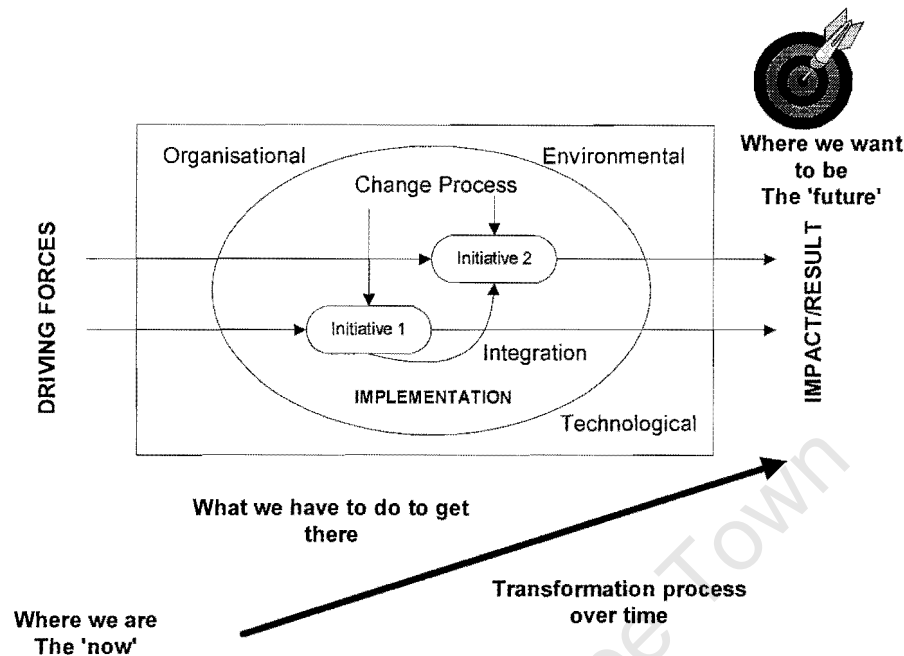
When a company considers a B2B e-business implementation, the first things they should ask themselves are 'where are we now?' and 'where do we want to be in the future?'. To answer these questions, as a first step towards the creation of an e-business strategy, companies need to understand their current position within the

bigger picture. This requires that the organisation develops a thorough understanding of their existing capabilities. This evaluation should focus, not only on an assessment of existing technologies, but of equal importance are the existing business processes, knowledge, culture and relationships as well as the global context that exist within the ecosystem.

As a second step, since B2B e-businesses focus on customer needs, it is important that the organisation develops a clear vision of what customer needs are and which capabilities are necessary to meet those needs. By defining these customer needs, the company basically creates a vision of what it perceives the future to look like. The combination of these two sets of information will result in a rather clear picture of the current and future states the organisation envisages.

Once the organisation has developed a clear picture of the current state and the future vision, an e-business design needs to be developed. The e-business design is aimed at developing a coherent decision that lays the foundation to address new customer needs. Thus, during this step, the business effectively identifies what they perceive the e-business future of the company should look like and thus evaluate various e-business related opportunities. The combination of information about 'where we are' and 'where we want to be' is the basis for determining what the gaps are between the 'current' and 'future' state of the organisation. The output of this step is then related to closing the gap between the 'now' and the 'future' by identifying a list of focused, targeted e-business initiatives. The e-business initiatives should be designed in stages, which should roughly stretch over a 3-5 months period. Each initiative should focus on the business model, as well as the related organisational and technical architectural changes. Figure 19 schematically present the implementation process that transforms an organisation into an e-business.

Figure 19: The e-business transformation process



Kenjale & Phatak (2001) reason that companies typically implement these successive initiatives, starting with a first version that is very slim in functionality in terms of the sophistication and customisation capabilities it offers. This version lets the business gain transactions and start generating revenues. The successive version will then focus on being able to handle large volumes of data and large numbers of users and will be able to interface with a larger variety of systems.

Effectively, the output of the strategy phase should result in a blueprint to integrate business functions and processes with industry specific strategies, web-driven technologies and web-driven applications by defining the current state, target state and an action plan on how to close the gap (Integic, 2000). Companies should at this stage develop a project plan to form a basis for project costs, while evaluating the opportunity derived from the initiatives to complete a cost/opportunity assessment.

The importance of creating an overall architectural design during this phase cannot be stressed enough. While each of implementation phases represents certain business

initiatives, the digital enterprise needs not be fully built before a company can implement its digital business initiatives, however, the overall structure needs to be integrated. Business goals, objectives and constraints will determine which initiatives and how much infrastructure will be implemented at each step along the way. Building a coherent and cohesive infrastructure is important to ensure that, as the e-business initiatives grow, they fit in and interact with the growing superstructure. The enterprise architecture provides the blueprints that arrange and connect business and technology components to achieve a company's purpose – now and in the future.

Creating an effective e-business strategy requires innovation. However, for an organisation to be innovative, strong e-business leadership is necessary. This type of leadership is characterised by valuing the adoption of new beliefs and mindsets and by leaving behind the old, outdated assumptions and practices. Executives need to recognise that new realities call for new mental models, new approaches and new ways to do business. Aligning innovation with strategy is the most significant way to create value, but innovation requires 'out of the box' thinking. Strategic planning is about preparing to win and is considered a long-term focus. This focus should therefore advance the company's core value – collective organisational learning, and increasing knowledge about the business.

With the strategy and design in hand, the next step is to develop and deploy (implement) the solutions to leverage the power of the internet to better communicate with customers, suppliers and business partners.

4.2 Develop and deploy (implement) the solution

Constructing the technology solution is a multi-disciplinary process that integrates technology, processes and people to deploy solutions that create value and exploit market opportunities. During this phase the blueprint must be further developed by identifying, designing and developing new and innovative business processes that allows the organisation to realise the benefits of the new business model. The systems design is fourfold, based on technology architecture (hardware, software,

network, user support, etc.), component architecture (application software package selection, build-or-buy, etc.), security architecture and process architecture. It is during the deployment phase that the rubber hits the tar when the system goes 'live'. The system is then opened to its users to be used in their daily activities. Many companies spend so much time and money up to this point, but once the system is live, little attention is given to its ongoing development. This is what the next section will focus on.

4.3 Measuring, feedback and continuous improvement

While most of the literature studied describes only the stages above, the author believes that measuring and giving feedback on the outcome of the previous implementations, is key in continuously improving the system. According to cybernetic laws, negative feedback is critical to keep a system stable. Therefore, feedback on the system's operation is critical to make the necessary adjustments. Since the e-business landscape is subject to a very high degree of change, it is important that the system needs to be continuously adapted to ensure that the digital ecosystem remains relevant. Kalakota & Robinson (1999) emphasise this point by arguing that continuous improvement depends on feedback and a good e-business strategy must evolve as innovative infrastructure emerges and new customer needs are spotted.

Feedback is based on the measures and audits on which organisations rely and is a critical element in any system of management. It is critical in the ongoing development and improvement of a system's functionality. A company cannot buy an e-business system; instead it must make it a way of business to grow the system. The measures related to the value of e-business should include the long-term value of the business infrastructure it provides as well as the individual return on investment (ROI) of specific e-business initiatives. Due to the fact that e-business changes the way the company operates, it calls for new measures of business performance. While financial (ROI) measures have dominated the industrial age corporations, the business reengineering movement in the early 1990's gave birth to information age measures

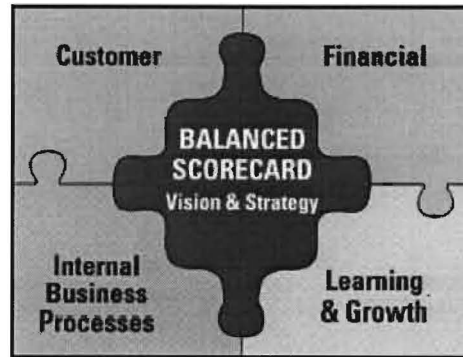
of performance. These are business-critical performance measures and in the e-business environment it requires measuring the right things, those things that create competitive advantage in the digital age competition.

The rest of this section will focus on two possible models that can be used for measuring the success of the e-business initiatives, including Kaplan & Norton's (1992) Balanced Scorecard and Riggins & Mitra's (2001) E-Commerce and E-Business Value grids.

Balanced Scorecard

Kaplan & Norton (1992) developed the Balanced Scorecard, which is specifically aimed at including the 'new economy' performance measures. They argue that the traditional, industrial age financial measures tell the story of past events and are thus inadequate for today's fast changing business landscape. The balanced scorecard is a strategic management system for achieving long-term goals. Kaplan & Norton (1992) show how to use measures in four categories – financial performance, customer knowledge, internal business processes and learning and growth – to align individual, organisations and cross-departmental initiatives and to identify entirely new processes for meeting customer and shareholder objectives. The measures are illustrated in Figure 20.

Figure 20: Kaplan & Norton's Balanced Scorecard



Source: Fingar, P., Kumar, H., Sharma, T. (2000) *Enterprise E-Commerce: The Software Component Breakthrough for Competitive Advantage*

The balanced scorecard serves as a learning system for testing, gaining feedback and updating an organisation's strategy. The four perspectives provide a balance between short-term and long-term performance, and include subjective as well as objective measures. When applied to e-business initiatives, measures may include process cycle-time, transaction per employee ratio's, cost per transaction, volume of transactions, percent of customers supported by e-commerce, time to fulfil service requests and inventory costs. Kaplan's recent research initiatives have extended activity-based analysis to technology and product development and inter-organisational measurement systems between manufacturers and retailers that capture supplier and customer profitability. Whether it is the balanced scorecard or other equally robust systems of measurement, measuring the 'right things' in addition to financial ROI is crucial to successful e-business (Fingar et al., 2000).

E-Commerce and E-Business Value Grids

As the works of Riggins & Mitra (2001) are more specifically focused on e-commerce and e-business per se, the author will describe this measuring tool in more details. Riggins & Mitra (2001) argue that as companies move toward a more disciplined approach to e-business strategic planning, managers are seeking metrics

that will help them analyse the success of their e-business investments. However, any set of e-metrics should extend well beyond e-commerce to incorporate the various aspects of e-business, including internal Intranet applications, B2B extranets, and B2C Internet applications.

In an effort to categorise different e-commerce applications, Riggins (1999) developed the E-Commerce (EC) value grid. The grid is based on the concept that businesses compete along five 'dimensions' of commerce. By using various modes of interaction, companies compete over both time and distance in order to provide some product or service through a chain of relationships eventually ending with the end-customer. Hammer & Mangurian (1987) focused on the use of communications technology to impact time, geography and relationships. Riggins (1999) expanded on this to include the impact on altering the nature of interaction, the potential to offer entirely new products & services, and the application of the framework to a web-based e-commerce environment.

Each row in the grid is based on a different dimension of the firm's competitive environment: Internet time, geographical distance, Structure of Relationships. The Columns in the grid are based on three ways in which information technology (IT) investments are traditionally justified: efficiency benefits, effectiveness benefits and strategic benefits. By combining the three types of justification or value creation with the five dimensions of e-commerce, the grid identifies fifteen different areas where managers can use web-based e-storefronts to add value to their customers to create a unique online experience. The EC value grid can be used to describe the scope of both internally focused web sites as well as externally orientated ones. The slightly modified version of the grid shown in Figure 21 incorporates more generic terminology that can represent a complete portfolio of Intranet applications, a B2C portal/community site, a web-based information news site, and an online storefront selling physical or information goods. In this way the EC value grid can be used to describe the scope of both internally focused web sites, as well as externally oriented sites (Riggins & Mitra, 2001).

Figure 21: E-Commerce Value Grid

Dimension	Value Creation		
	Efficiency	Effectiveness	Strategic
Time	Accelerate User Tasks	Eliminate Information Float	Establish 24/7 Integrated Service
Distance	Improve Scale to Look Large	Present Single Gateway Access	Achieve Global Presence
Relationships	Alter Role of Intermediaries	Engage in Personalization to Look Small	Create Dependency to Lock-in User
Interaction	Make Use of Extensive user Feedback	User Controls Detail of Information Accessed	Users Interact via Online Community
Product	Automate Taks Using Software Agents	Provide Online Decision Support Tools	Bundle Diverserse Content with Rich Multimedia

Source: Riggins, F.J. & Mitra, S. (2001) *A Framework for Developing E-Business Metrics Through Functionality Interaction*

However, while many e-business applications are web-based in their interface design, others utilise the Internet to transmit server-to-server information to support process oriented tasks such as inventory flow or logistics coordination, or are based on back-end database technologies linked to the browser front-end. Therefore, for many e-business applications, particularly many B2B applications, the EC Value Grid is insufficient to represent a comprehensive e-business strategy. This was the basis of the works of Riggins & Mitra (2001) when they introduced a complementary e-business value grid that takes into account these upstream activities.

To do this, the EB value grid incorporates activities down the value chain and therefore introduces five additional dimensions associated with activities further up the value chain. The activities normally associated with the value chain are inbound logistics, internal production systems and outbound logistics. However, two preliminary support activities include planning the overall value chain strategy and

technology development through R&D (Porter & Millar, 1985). Using the three types of justification and five upstream supply chain activities, Riggins & Mitra (2001) identified fifteen additional back-end Internet applications as shown in the E-Business (EB) Value Grid in Figure 22.

Figure 22: E-Business Value Grid

	Efficiency	Effectiveness	Strategic
Plan	Implement Rich Media for Cmpy Wide Interaction	Provide Online Executive Information Systems	Facilitate Knowledge Management Between Partners
Develop	Standardize Platform for Cross-Functional Design	Achieve Design for Manufacturability	Enable Concurrent Design Across Virtual Organization
Inbound	Support Electronic Transactions with Suppliers	Generate Supply Flexibility through E-Hub communities	Offload Replenishment Responsibility to Suppliers
Produce	Integrate Shop Floor with ERP Systems	Exchange Production Data Between Partners	Optimize Utilization of Global Production Capacity
Outbound	Support Electronic Transactions with Customers	Furnish Online Order Status Information	Institute Seamless Integration with FullFillment Partners

Source: Riggins, F.J. and Mitra, S. (2001) A Framework for Developing E-Business Metrics Through Functionality Interaction

Riggins & Mitra (2001) discuss each of the fifteen opportunities in great deal of details in terms of each of the value activities as identified by Porter & Millar (1985). They emphasise the importance of not implementing any application from either of these grids in isolation, because each application outlined in these frameworks is enabled by the functionality in other cells and that functionality interaction therefore increases the value proposition for a given application because information generated from functionality in one cell flows into the application in other cells.

Riggins & Mitra (2001) then go one step further to identify information sources (enabling functionality) and sinks (create dependency to lock-in users) to illustrate how the flow of information creates functionality interaction. They further stress that while not exclusive to one or the other, B2B companies will be more focused on activities within the e-business value grid, while B2C companies will more often develop applications found in e-commerce value grid.

Riggins & Mitra (2001) argue that developing a set of e-business metrics will depend on what type of e-business is under consideration (see Appendix C) and that within each e-business category, the strategic thrust of the enterprise, and consequently that of its electronic applications will play a major role in the definition of e-metrics. They further argue that competitive advantage will come from cost leadership (through manufacturing efficiency or supply chain efficiency), product differentiation (through product and service innovation), and customer service or brand and image superiority. Riggins & Mitra (2001) then map these e-business categories (as in Appendix C) to the primary (note not all) strategic thrusts of their typical e-business and e-commerce applications. The idea is to only show the possible primary strategic thrusts for each type of e-business. Companies might decide on different areas based on their overall corporate strategy. The end product is shown in Appendix H.

Riggins & Mitra (2001) further suggest that that the e-metrics must be developed by mapping an organisation's e-business strategy into a series of functionality interaction maps, and that from these maps three types of metrics should be considered, namely:

1. Metrics within sink applications in either grid
2. Metrics of interaction between cells within grids
3. Metrics of interaction between cells across grids.

The EC and more specifically the EB Value grids developed by Riggins & Mitra (2001) are very powerful tools, which can help organisations to decide which measures to implement in a B2B context. The framework establishes a clear and

logical sequence of steps that links an organisation's overall strategy to the choice of e-metrics.

4.4 Change Management

Managing organisational change is an integral part of developing and deploying technology solutions and any company who wish to successfully implement such a solution need an approach to help organisations understand and adapt to these.

Although change management is presented as a separate section, it is actually embedded in each of the implementation phases discussed above.

Change management should address the structural and cultural issues that challenge organisations, while concurrently addressing technology issues. As was explained in the culture section of this document, e-business will necessarily change the business processes, people's jobs and ultimately the organisational structure. In a typical technology implementation, the change management team need to ensure that the organisational structure, business practises, processes and employee skills and capabilities are aligned with the strategy. Alignment will help an organisation achieve the potential gains which web technology makes possible.

Traditional and known ways of working in organisations bring a sense of familiarity and security to the people performing those activities. Having to change these familiar ways is often met with scepticism and unwillingness to comply, since nothing is known of what the situation will be like after the changes have taken place. The situation becomes even more problematic when employees feel that they cannot influence the change process. Therefore, one way of overcoming resistance to change is through working with people - not only arising their availability, flexibility or productivity, but also improving their knowledge, managing their natural resistance to change and helping to convert that resistance into commitment (Wangler et al., 2002). In the process of creating an enterprise model, knowledge about the business is acquired from different stakeholders. Therefore, the quality of a conceptual model is heavily dependant on the willingness of different stakeholders to contribute their

knowledge, experience and ideas. If stakeholders feel in any way threatened in that process, they will not willingly contribute. Therefore, by advocating a participative way of creating models collaboratively, not only the resistance factor can be addressed, but at the same time the knowledge of the people is enhanced. By using such a participative approach the quality of the model is enhanced, consensus is enhanced and acceptance and commitment is achieved. These three combined, contribute substantially to the successful implementation of the modelling result.

B2B integration is likely to change business operations in one way or another and as a consequence the work of individual employees will be affected. How to deal with this issue of possible resistance to change and how to involve different stakeholders in the process is therefore an important management decision in B2B integration projects.

In a B2B context however, the organisation is extended to its partners and thus when companies implement e-business solutions, they should also convince their partners affected that the initiatives are truly worth their while. People have habits and preferences that can be hard to change. Very small things can become barriers to fully adapting technologies that may become new consumer channels. If the need is great enough, people will use a new channel if the boundary of unfamiliarity is made easy to cross (Henley Center, 2000). This possible barrier to acceptance is another critical requirement that a typical change management team need to consider. It is extremely important that employees should be educated to be able to use the new information technology.

This chapter focused on the application of the framework as it applies to the B2B e-business implementation process. The implementation cycle basically follows the same logic as the inquiry process discussed in chapter 2. While the chapters 3 and 4 give an overview of what the author believes constitutes the framework as well as the implementation process, the next chapter provides feedback on testing the validity of the framework, based on a limited, practical industry sample.

5. Summary of Survey Findings

The aim of this chapter is to give a brief overview of the key findings of the e-business survey. The feedback is rather unstructured, based on the respondents' personal opinions of the management framework related to B2B e-business. The majority of the data presented in this chapter is in the form of a qualitative analysis, with some inclusions of quantitative analysis. What makes this qualitative analysis purposeful, because the objective of the survey is not to generalise the results but rather to use it in an exploratory way. Therefore, the unique cases presented from industry experts in the area, are especially informative. The chapter starts out with a short overview on the method used, followed by the actual survey findings. The final section of the chapter presents a comprehensive conclusion of the survey results.

5.1 Research Method

Due to the broad geographical reach of the chosen companies that comprised the sample, the interviews were executed by means of constructing a questionnaire and emailing it to the respondents. The questionnaires were emailed to the small sample of designated people in the respective chosen organisations, of which the population was determined based on company size in terms of annual revenue combined with level of international operations, as well as the relative position of a company within the value chain. The companies, who participated in the survey, are listed below:

- Alsons Cement Corporation (ACC) (Cement Industry)
- Asia Pulp and Paper Company (APP) (Pulp and Paper Industry)
- B. Braun Medical Industries (Pharmaceutical Industry)
- Insurance Corporation of British Columbia (ICBC) (Insurance Industry)
- M-Web CommerceZone (B2B e-commerce service provider)
- SASOL (Process Industry)
- South African Breweries (SAB) (FMCG)
- Union Cement Corporation (UCC) (Cement Industry)

The main objective of using such a small sample is to get feedback from a specialist group to validate the framework and therefore the intention is not to generalize a theory for the whole B2B e-business market.

The questionnaire was developed after the development of the management framework from the information sources was completed. Since the goal of the questionnaire was to validate the management framework, the questions asked were rather broadly structured. Therefore, most of the questions were of a qualitative nature, with a combination of multiple choice, scaling, and unstructured, open-ended questions. This ensured that the questions did not limit responses but provided a frame of reference for the respondent's answers.

The structure of the questionnaire was based on the management framework developed, consisting of the following major sections:

- **Section A:** This section deals with the company background and respondent information. It was included to confirm the criteria used in selecting the respondents, confirming the actual respondent, as well as the size of the company and their relative position within the value chain.
- **Section B:** This section addresses basic aspects pertaining to a business' B2B e-business strategy.
- **Section C:** Section C deals with the B2B e-business processes and the related changes in the e-business landscape. The questions are focused on all facets of the changing landscape including business processes, management skills, partner relationships and more.
- **Section D:** This section addresses e-marketplaces, the value they add, the extent to which they are employed, the threats for their existence and the major issues related to their implementation.

- **Section E:** This section deals with the softer side of business, the management, organisational and cultural aspects of B2B e-business. Additionally, it also includes questions on privacy and security, as well as on the benefits of B2B implementations.

These five sections discussed above are the broad outlines of the constructed questionnaire (see Appendix B) and therefore the findings of the survey will also be discussed in the same order, starting with Section A: Company and Respondent Information, followed by Section B: B2B E-Business Strategy, Section C: B2B E-Business Processes related, Section D: E-Marketplaces and finally Section E: Management, Organisational and Cultural. The rest of this chapter will provide a summary of the key findings from the survey.

5.2 Section A: Company and Respondent Information

This section will be broken down into the two main areas concerned with the choice of respondents. The first sub-section focuses on the choice of companies to participate in the survey, while the second sub-section focuses on the actual key informants within those companies who participated in answering the questionnaires.

5.2.1 Companies

The criteria used to determine the companies participating in the survey was based on size, i.e. that they are large, international organisations with high revenues and secondly, that they are positioned lower down the value chain as producers.

The first criterion, which indicates the company's size in terms of its annual revenues, confirmed that 2 of the companies have annual revenues between \$US2 – 5 Billion, 3 of the companies between \$US500 Million - 2 Billion and another 3 between \$US100 –500 Million. All the companies selected operate

internationally. Therefore, all the companies selected qualified on the first criterion, i.e. their revenues are all higher than \$US100 Million per annum.

The second criterion addresses the company's relative position in the value chain. Six of the companies were categorized as producers of goods, while the remaining 2 were categorized as producers of information. This satisfies the criterion that the company should be positioned lower down the value chain, typically where a producer of goods/service and/or information is situated.

The third aspect respondents were questioned on relates to the company's level of e-business adoption. Although this question did not serve as part of the criteria in choosing the companies, the author believes information on this aspect might put the response in context. Of the participants, 1 company indicated that they are currently in the internal integration phase of e-business adoption, while the remaining 7 all indicated that they are in the external integration phase. This strongly suggests that the majority of these companies are indeed involved in B2B e-business initiatives somehow or another and should therefore be able to provide very useful and practical input on the subject.

5.2.2 Key Informants

The key informants within the chosen companies were determined based on the criteria that they are seen as experts in the field of B2B e-business and that they are senior executives responsible for e-business strategy and/or information technology in the business unit.

The first criterion, which relates to the informant's knowledge about the content of the inquiry, was determined by asking the informants to provide a self-assessment of their knowledge-ability related to the subject B2B e-business. This was based on a five-point scale (1 = not very knowledgeable; 5 = very knowledgeable). Companies A and C both rated their knowledge on level 3. Companies D, F and G rated their knowledge on level 4, while company E and H

rated their knowledge on level 5. Clearly such a response strongly suggests that the respondents were indeed knowledgeable about the domain of inquiry.

The second criterion relates to the respondent's position within the company. The following shows the respondent's positions within each of the companies:

- Company A: Vice President Finance
- Company B: Logistics Manager South-East Asia
- Company C: Director Information Technology
- Company D: Project Director
- Company E: Chief Executive Officer (CEO)
- Company F: Senior E-Business Consultant
- Company G: Systems Manager: Procurement and Inventory Management Systems
- Company H: Vice President Information Technology

From the results, it is clear that the majority of the respondents were at a very high management level.

Further to this, the respondent's were asked to provide an indication of their involvement in terms of e-business and/or IT strategy based on a five-point scale (1 = not involved at all; 5 = extensively involved). Of the respondents, companies A, C, D, F and H all indicated an involvement level of 4, while the remainder companies B, E and G indicated an involvement level of 5. These results strongly suggest that the respondents were indeed involved to a high degree in determining strategic direction.

5.3 Section B: B2B E-Business Strategy

Companies were asked how their e-business initiatives are structured and implemented. Of the respondents, 6 of the companies, companies A, B, C, D, G and H, indicated that their B2B e-business initiatives are implemented as shorter project

milestones compared to other operational systems (example ERP), which fits in an upfront, overall application architecture picture. The remaining 2, companies E and F, indicated other means of implementing. Company E indicated that since it is their business to build and operate private e-procurement exchanges, their initiatives fit the ERP-type scenario better. Company F, on the other hand, suggested that their strategies are continuously updated based on research on new trends and another respondent pointing out that their business is to develop private e-procurement exchanges for their customers.

B2B e-business within the companies questioned were perceived by 7 respondents, including companies A, B, C, D, E, F and H as both a means to enhance efficiency and to create and maintain competitive advantage. Only one respondent, company G, indicated that B2B e-business is perceived within the company only as a means to enhance efficiency. This is not surprising considering the fact that this specific respondent has indicated that they are currently still only in the e-business adoption phase of internal integration.

Feedback related to the position within the company responsible for B2B e-business development, varied to a high degree. Only one respondent, company B, indicated that e-business development is the responsibility of the IT director/senior manager, while 3 respondents, companies C, E, F, reported they have a special e-business director/senior manager who takes this responsibility. The remaining companies, companies A, D, G and H all indicated different variations of senior-level managers/directors taking responsibility for this. In company A, a Business Development manager takes this responsibility, however an IT steering committee has been established to approve the strategy. Company D's e-business strategy is determined by the CEO and CIO of the company. In company G, the Finance Department is responsible for developing the e-business strategy, while in company H, the Marketing Director is responsible for the E-sales group who determines strategy related to Sales activities and the Materials Management Director is responsible for the e-procurement group who determines strategy related to

Procurement activities. Although the results prove to be quite different for the companies questioned, there is one very important similarity that cuts across all the respondents – the fact that for all these companies, e-business development and strategy is left to the discretion of top management.

Respondents were asked about their company's focus with regards to the value equation (i.e. the resources used to create and sell a product/service (cost of buying + transformation costs + cost of selling) < value to customer); whether it is more focused on the left hand side of the equation or more on the right hand side. Of the respondents, companies E and G reported focus on the left hand side of the equation, while company H focuses on increasing value to the customer. The majority of the respondents, companies A, B, C, D and F, however, indicated that their company focuses on both sides of the equation suggesting that these companies are not only interested in enhancing efficiency. All of the respondents agreed with the value equation.

The degree to which the companies' B2B e-business strategy is viewed as a strategic priority within the companies, were determined based on a five-point scale (1 = not a priority at all; 5 = very high priority). Of the respondents, companies A, C and G rated themselves on level 2, companies F, H and D rated 3 and companies B and E rated 5. These results suggest that B2B e-business strategy is indeed viewed, to some degree or another, as a strategic priority within all the companies who participated in the survey.

A B2B e-business strategy, according to all the respondents, was seen as one element to support the company's overall corporate strategic plans and is seen as an enabler for reaching their strategic goals. In some cases, the companies did mention their main strategic goals of B2B e-business, and as expected these vary widely amongst the various respondents.

When respondents were asked if they have experienced major changes in their competitive landscape as a result of B2B e-business, 6 of the respondents, companies A, B, C, F, G and H indicated virtually no changes. Although all of these respondents did mention the anticipation of changes in their environments and that pressure are slowly starting to build, all reported that the landscape is still virtually unchanged. The companies, who reported little or no changes to their business landscapes, are all manufacturers of goods. The 2 respondents, companies D and E, who indicated drastic changes in their business landscapes, included a producer of information (insurance) and a provider of B2B e-business services. Both these companies stressed the fact that competition was forcing these changes and that customers were no longer content with the 'old' business models and that if they did not adapt, their businesses would have died. The B2B e-business service provider further commented that B2B automation, without aggregation and strategic sourcing capabilities, did not provide adequate ROI for customers and that efficiency gains were not a sufficient reward for the capital outlay required to move to B2B. This respondent is of the opinion that customers need to see their procurement costs (on the buy side) and their cost of sales (on the supply side) coming down in real bottom line terms, or they will not invest in B2B technology. Clearly, for the two respondents who did see changes in their competitive business landscape, the changes appear to be dramatic, resulting in an 'adapt or die' situation.

5.4 Section C: B2B E-Business Process related

Outsourcing and partnering activities is viewed by six respondents, companies A, B, D, E, F and G, as a strategic part of the business plan, while the remaining two respondents, companies C and H indicated that it is done out of necessity (e.g. too little capacity). Company C also indicated that outsourcing and partnering activities are done out of necessity, also indicated that they engage in these activities to bring about cost savings and to get specialized knowledge. The results suggest that companies are no longer engaging in outsourcing and partnering because they have to, but for the majority this has become a strategic activity.

Companies were asked to indicate how well the terms extended value chain, value network and collaboration were understood and defined within their organisations based on a five-point scale (1 = poor understanding; 5 = very good understanding).

The response from all the companies for each of the respective terms is shown below:

- Company A: 4, 2 and 2
- Company B: 5, 3 and 4
- Company C: 3, 3 and 3
- Company D: 4, 2 and 3
- Company E: 5, 5 and 5
- Company F: 4, 3 and 1
- Company G: 5, 2 and 3
- Company H: 4, 3 and 4

The results suggest that the majority of the companies are still thinking more in terms of linear-value chains, as in the industrial age rather than value networks. All the respondents do, however, portray reasonable understanding of the terms.

The extent to which outside partners are regarded as key assets in the various companies were measured on a five-point scale (1 = not at all; 5 = very highly). Of the respondents, companies A, G and F scaled a 2, companies C, D and E scaled 3 and companies B and H scaled 5. The results suggest that the majority of the respondents are not 100% ready for complete integration with business partners yet.

Still addressing outsourcing and partnering, the respondents was asked to indicate to what extent their organisations were engaged in these activities as a result of B2B e-business. This was based on a five-point scale (1 = not at all; 5 = very highly).

Company G indicated a scale of 1, companies D, C, A and F scaled their activities as 2, companies E and H scaled 5 and finally company B scaled 3. These results confirm conclusions derived from the previous question. Therefore, based on the organisation's understanding of the value chain, network and collaboration terms, combined with their view of partners as assets, their involvement in partnering and

outsourcing as a result of B2B e-business is rather low compared to what would be termed an e-corporation.

The value activities considered in the companies' B2B e-business initiatives varied amongst the respondents. Of all the respondents, none have implemented, or are planning to implement, B2B e-business initiatives related to research, development and design value activities. On the other hand, all the respondents identified that e-procurement is implemented in the organisation to some degree, however the percentage compared to the total value seems very low. Only two respondents, company E and G elaborated, of which company G indicated that the e-procurement software is only used for non-strategic, low value, high volume items. The second respondent, company E, commented that 100% of indirect goods and services, and about 10% of direct goods are procured through their e-procurement software. Only three of the respondents indicated that they have implemented B2B e-business to some degree in the Inbound Logistics activities, with the producer of information and service indicating the highest percentages. Still, the percentages quoted are even much lower than that of the e-procurement initiatives. Only two respondents, companies D and G, indicated that B2B e-business initiatives have been implemented in the Internal Operations value activities, while outbound logistics were identified by four of the respondents in very small percentages; typically less than 25%. Sales and marketing activities implemented in B2B e-business were identified in much larger percentages than any of the other initiatives by 5 of the 8 respondents. Finally, service activities are enabled by B2B e-business in 4 of the respondents' companies, ranging between 5 and 25%. Based on the respondents' feedback, it seems that the B2B e-business initiatives currently implemented (and planned) are more concentrated on e-procurement (for the buy side) and e-sales (for the sell side) and that integration in the supply chain itself is either non-existent or still in its infancy. In the strict sense of the term this means that none of the respondents in their present incarnation can be described as virtual e-corporation. They are in the process of transforming their businesses, i.e. they are currently in a transitional phase.

The question related to the changing of partner relationships, indicated that in six of the cases, including companies A, B, D, E, F and H, partner relationships have changed as a result of B2B e-business. Of the remaining two respondents, one did not answer the question, while the second respondent, company G, perceived B2B e-business as a communications method and indicated that relationships are not dependent on this. For the companies who did experience changes in the relationships, the impact varies widely amongst the respondents. Company A have experienced a move towards more regional/global negotiated supplier contracts through companies across the group. Company B remarked that changes in relationships includes moving from spot purchasing to more contract-based procurement and from own stock to Vendor managed Inventory (VMI). Company D, on the other hand, have experience changes in partner relationships related to the application/software vendors and noticed an increase in reliance on these external vendors. Company H experienced changes related to procurement sector, due to the fact that e-procurement bids are transparent through the web, while on the sales side they have experienced positive feedback related to customer satisfaction, since customers perceive that they are being serviced 24x7 through Internet sales.

When asked which aspects of these 'new' B2B relationships are considered critical, a variety of responses emerged, including:

- Company A: Performance measurements / scorecards
- Company B: Long-term and stable business commitment, avoid speculative and short-term profit business
- Company D: On-going continuous improvement. Setting of metrics and tracking of key performance indicators (KPI's) which reflect the new optimised solutions
- Company E: Management information – knowing at key stroke who bought what from whom at what price and the ability to package this in a way that confirms the value proposition to customers.
- Company F: Understanding and process Integration

- Company G: Quality of content on the catalogue. Technical performance of the e-application.
- Company H: Support functions that prove that B2B is effective, i.e. to ensure the company deliver as promised on the website.

When asked about the respondents' views on partnering with competitors and the circumstances under which they will consider this option, four of the eight respondents, companies C, E, F and H, proved in favour of such a notion. All these companies basically agreed that as long as the partnership impacts the company's cost structure favourably, without compromising its competitive advantage while increasing customer service, such options should be considered. Two of the respondents, companies A and B, indicated that although it is not ruled out, this is currently only done in their organisations only due to capacity restrictions and thus not actively perused. Company D, on the other hand, indicated that in their particular industry, this is simply not a viable option. Finally, company G argued that e-business should not drive partnering, but rather commodities, criticality and value should drive the level of partnering required.

The question addressing if managers need special skills to navigate the B2B e-business terrain, was agreed by the majority of the respondents, companies A, B, D, E and F. Some of the special skills identified by these respondents include:

- Company A: Managers must understand the concept of total profitability of the business transactions with customers and suppliers.
- Company B: Managers must have a mindset of B2B as competitive advantage rather than IT.
- Company D: Managers must understand the underlying concepts of B2B, planning and SCM, otherwise they will not reap the benefits that can be derived.
- Company E: Managers need change management skills. While the technology is mature and mostly intuitive and the business case behind it is

understood, the benefits will only become real with compliance to the imperatives of B2B.

- Company F: Managers need to trust those with the necessary skills

Of the remaining respondents, one did not answer the question, while two, companies G and H, did not agree that managers need special skills. Of these two respondents, company H argued that managers only need to be willing to learn, while company G argued that e-business is not a new concept and that it is purely a method of communicating and sharing information using an electronic medium. The author does, however, consider a manager's ability to learn as a special skill.

When asked if respondents agreed that B2B e-business exchanges go beyond the traditional exchange of goods, services, revenue and information, including the exchange of knowledge value and intangible benefits, two of the respondents, companies E and F agreed, company G disagreed and the remaining five respondents did not express any opinion on the matter. Company E also pointed out that it is noticeable when price, quality and service are all legislated to be equal; people still buy from the recognised brand. Company G argued that although B2B e-business can assist in creating brand loyalty, it removes supplier loyalty depending on the type of exchange. The fact that most of the respondents did not express an opinion, lead to the conclusion that respondents probably did not understand the question completely or alternatively have not sufficiently dealt with this aspect to develop an opinion.

The question dealing with the standards driven industry, proved to be not applicable to seven of the eight respondents. Company C, however, is indeed subject to industry standards and agreed that the compliance datasets could be seen as a 'weak link' and added that these industry-wide data harmonisation efforts requires a lot of time in each project and is largely under-estimated.

Four of the eight respondents indicated that SME's have an impact on the amount of transactions executed via B2B e-commerce. These four include companies A, E, D

and H. In three, companies B, F and G, of the remaining respondents' organisations SME's did not have any impact on this, while one respondent, company C, did not give an opinion on the subject. The response of the companies on whom it did have an impact included the following noteworthy points:

- Company D: The company created a dealer network, which integrates these SME's, increasing the volume of B2B transactions.
- Company E: The SME's has a positive impact on the company's B2B e-business transactions, because the company created an online order management system and allows SME's to join in on real-time interaction.
- Company H: Internet sales level the playing field for SME customers, because they can now order like a big dealer.

Company B noted that their strategy is to first integrate the large companies into their B2B e-business environment and that the integration of SME's will therefore only follow after they have completed this phase.

All eight respondents indicated that multiple procurement strategies are used in their companies. Some of the noteworthy comments made by respondents are as follows:

- Company A: Depending on strategic importance of materials and number of suppliers
- Company B: Strategies dependent on product or material types
- Company E: One respondent commented that they value the benefit of long-term relationships with suppliers above the short-term gain of digital price wars. Therefore, they do not engage in auctions, although they have used it to break supplier resistance.
- Company F: Depends on type or structure of environment and supplier abilities.
- Company G: Use multiple procurement strategies per commodity
- Company H: e-procurement bidding (manual and electronically), strategic partnerships.

Six of the eight respondents, companies A, B, D, E, F and H, felt that e-procurement strategies are highly dependent on the type of relationships that exists between the company and the suppliers. Of the remaining respondents, one, company G, did not believe that it was significant, while one respondent, company C, did not express an opinion on this matter. Of the respondents who agreed, the following comments are noteworthy:

- Company A: The technical capabilities of the suppliers who are participating determine the e-procurement strategy.
- Company B: Determining factors include kind of materials, raw materials, packaging or spare parts, office supplies, and commodity or not, specific technical parts, critical or non-critical items. Type of suppliers like agent, principles, overseas or local suppliers.
- Company D: The relationships between the company and supplier combined with the competitive landscape are highly influencing e-procurement strategies.
- Company E: One respondent noted that a supplier's ability to compete should not be measured in terms of their digital readiness.
- Company H: For strategic procurement the best factors are good prices and reliable supply. A long-term contract is most suitable for a traditional manufacturer.

The respondent who did not perceive relationships as an important factor for e-business strategies, company G, commented that commodity, risk and value determines procurement strategy. These results strongly suggest that e-procurement strategies are highly dependent on the relationships amongst companies and their suppliers, combined with some other aspects.

5.5 Section D: E-Marketplaces

Of the respondents, five (including companies A, B, D, F and H) are not involved/participating in e-marketplaces. For the remaining three respondents,

company E indicated that 100% of its business goes through a self-owned e-marketplace, company G indicated that 100% of its stationary business goes through a third-party owned e-marketplace, while company C indicated that roughly 5% of its business goes through a self-owned and another 5% through a consortium. All of the respondents who are involved/participating in e-marketplaces could classify their model within the categories presented.

The question on the proportion of business conducted through vertical and horizontal marketplaces, delivered the following results:

- Company C indicated that all of its e-marketplace business is conducted through vertical marketplaces.
- Company E indicated that 5% of its total e-marketplace business is conducted through vertical marketplaces, while the remaining 95% is done through horizontal marketplaces. This respondent commented earlier that the bulk of its e-procurement (which is really what their B2B includes) is for indirect goods, while a marginal amount of direct goods are included. The conclusion is thus that the indirect goods are handled by the horizontal, while the direct goods are handled by the vertical marketplaces.
- Company G indicated that all if its total e-marketplace business is conducted through horizontal marketplaces and further noted that it is used 100% for stationary, which explains the use of horizontal marketplaces.

The respondents could all classify their businesses within the categories of vertical and horizontal marketplaces.

The respondents were asked to indicate the risks associated with e-marketplaces based on a five-point scale (1 = low risk; 5 = extremely high risk). The risks were divided into four categories with the option to provide additional information on risks not identified by the questionnaire. The responses for each of the categories are shown below:

- Integrating B2B e-marketplace technologies: Company E scaled 1 and company G scaled 3. Company E's response is to be expected, considering

that it conducts all its e-marketplace business through a private, self-owned marketplace. This explains why integrating with other marketplaces is not a big issue to this company.

- Attracting sufficient number of participants: Company E scaled 1, company G scaled 5 and company C scaled 3. Company E perceives attracting as a very low risk since it conducts all its business through a self-owned, private e-marketplace, while the company G, who indicated extremely high risk, participates in a third party e-marketplace. Company C, indicating a medium risk (3) participates in both private, self-owned as well as consortium e-marketplaces. Thus explaining the mixed response from this respondent.
- Margin erosion on supply chain: Company E scaled 1 company and company C scaled 3. The author concludes therefore that the respondents do not really perceive this as a real risk factor for their e-marketplaces.
- Competition from other B2B e-marketplaces: Company E scaled 3, company G scaled 1 and company C scaled 2. This was another overwhelmingly consistent response from all the respondents that clearly suggest these companies consider other e-marketplaces a trivial risk.
- Other: Company G, belonging to a third party e-marketplace, did indicate that costs should be considered a risk.

When companies were asked about the major issues they experienced during the implementation of the B2B e-marketplaces, the respondents replied as follows:

- Company C, who conduct business through both self-owned as well as consortium e-marketplaces indicated that choosing the right initiative and project was a major issue.
- Company G, who belongs to a third party e-marketplace, indicated that unwilling suppliers posed serious issues.
- Company E, who operates a privately owned e-marketplace, indicated that getting the people to change deemed a much bigger issue than simply integrating the systems.

The respondents were asked to comment on the value these e-marketplaces add to their business. Unfortunately two out of the three respondents did not respond to the question, while the third respondent, company E, indicated that, since they are a B2B e-business service provider, e-marketplaces is their business.

5.6 Section E: Management, Organisational and Cultural

The respondents were asked to indicate the degree to which B2B e-business have changed their organisations based on a five-point scale (1 = hardly changed; 5 = dramatically changed). Of the respondents, companies A, C and G rated these changes a 1, companies D, B and F rated them 2 and company H rated it 3. The results implying that across all the respondents very few changes have taken place in their organisational structures as a result of B2B e-business. Only company H indicated that, since special e-business task groups have been established within their company, the organisational structure has changed quite a bit.

The respondents were asked to indicate to what extent their organisations has adapted its performance indicators according to the new B2B e-business environment based on a five-point scale (1 = not yet reflecting; 5 = highly adjusted to the B2B context). The response of the companies were quite widespread, with companies F and C scaling 1, company D scaling 2, companies G and H scaling 3, company B scaling 4 and company E scaling 5. These results suggest that in general very little adjustments in performance indicators have indeed taken place as a result of B2B e-business. However, the response is quite distributed, with the most e-business savvy companies indicating scales of up to 4 and 5. From the results, it seems that the higher the e-business adoption rate (which is dependent on the strategic importance management put on B2B e-business), the higher the impact on organisational structure changes.

Respondents were asked to indicate the level of criticality related to security and privacy in a trusted B2B e-business environment based on a five-point scale (1 = not really important; 5 = critical for the survival). Of the respondents, companies C, D, F

and G rated this issue 4 on the scale, while companies A, B, E and H rated this 5. The response shows that companies unanimously agreed that these aspects are critical for survival in a B2B e-business environment. It seems though, that companies who have a higher rate of e-business adoption, rates this issue as more important than others.

When asked about the impediments of B2B adoption, the response was rather mixed amongst participants. The results are listed below:

- Company A: A lack of clear business strategy to encompass B2B into the entire business process will result in difficulty in the realisation and measurement of benefits. This will impede the e-business adoption rate.
- Company B: If IT infrastructure is not integrated into the overall business strategy and seen as an alternative to competitive advantage, it can be a major impediment to e-business adoption.
- Company C: The time and effort spend to integrate processes are impediments to the adoption of B2B e-business.
- Company D: If management does not have a good understanding of the underlying concepts of B2B, planning and SCM it will become an obstacle in e-business adoption.
- Company E: Entrenched relationships between buyers and suppliers are the biggest impediment to the adoption of B2B e-business.
- Company F: Ignorance at all levels is a major impediment.
- Company H: The willingness of partners (irrespective of whether it is a vendor, customer, etc.) to participate can be a major impediment in the adoption of e-business.

The respondents were questioned on their opinion related to the fact that B2B e-business has changed employees into knowledge workers. Of the respondents, five, companies, A, E, F, G and H, indicated that they did not believe this was the case, while the remaining three, companies B, C and D, agreed and elaborated on what they believe the enablers for such an environment are. Some of the noteworthy comments from respondents are:

- Company B argued that B2B e-business improves information transparency, traceability, employee productivity, accuracy of information exchange and supply chain efficiency. All of these, in combination, result in improved knowledge amongst employees.
- Company C commented that e-business indeed contributes to raise the knowledge of employees as they have to deal with a broader scope of responsibilities in a multidimensional environment.

Although the majority of the respondents gave a negative response to the question, none of them gave any explanations to justify their choice. It is interesting to note that even the more Internet savvy companies do not believe that B2B e-business has changed employees into knowledge workers.

When asked whether the respondents considered cultural aspects paramount to the success of B2B e-business initiatives, two of the respondents did not express an opinion. Of the remaining six respondents, four agreed that cultural aspects were important, while two respondents, companies H and F disagreed. One of the respondents who disagreed, Company H, argued that there needs to exist a willingness to use a new medium amongst workers. Of the respondents who agreed, the following comments that were made are noteworthy:

- Company A indicated that an essential element of this B2B e-business culture is trust with a secure element to measure results
- Company D commented that an e-business culture must believe in the optimisation of supply chain and the importance of the planning concept. This environment must aim for the creation of optimised and automated processes and an organisation that can move the mindset from transactional processes to strategic sourcing and partnerships.
- Company E believes that the B2B e-business culture is one of transparency and efficiency amongst participants, where more time is spent on securing optimal outcome, than processing the deal/project. It is an environment in which control becomes automated and time can be used much more productively.

All the respondents agreed that resistance to change, as a result of B2B e-business, should be seen as a very important issue. Some of the noteworthy comments related to the most effective ways in addressing such an issue in a B2B e-business implementation, is listed below:

- Company A: Individuals need to take ownership of the initiatives and that strong leadership is needed to drive the process.
- Company C: Change management from senior management is required and e-business is unique in this regard.
- Company D: The use of change agents is critical to drive the concepts, with an initial top-down approach.
- Company E: All the stakeholders must be part of the designing process to enable them to understand the business case and to see the benefits. In addition, change management is critical for the success.
- Company F: It is not people who resist change, but ignorance and it can be addressed by effectively applying education and change management.
- Company H: Training should be extended to customers and vendors, with follow-up visits to manage the project with them.

In summary, respondents pointed to training and education, change management, stakeholder involvement and senior management involvement.

All the respondents agreed unanimously that the type of relationships between the company and its partners is an important factor when considering which B2B e-business strategy to implement. Noteworthy comments by some of the respondents are listed below:

- Company B: Changing the way business is conducted through B2B must be settled amongst business partners and they should together define the information exchange and business events. The willingness to accept the change is very critical to determine the success of B2B.
- Company D: Industry specifics can be critical. Competitive, commodity based, industry and trade secrets, etc.

- Company E: To secure sustainable benefits, costs must be removed from the total supply chain and this is not done by brow beating suppliers into submission.
- Company G: Relationships are built on trust and that e-business allows transparency that, for example, could result in price wars if not managed correctly.
- Company H: B2B is nothing without partners therefore companies need to work on these relationships.

All eight respondents agreed that management involvement is critical to the success of a B2B e-business implementation. The following responses related to the level of management that needs to be involved are noteworthy:

- Five of the respondents mentioned top management involvement as key in providing strategic direction, breaking through resistance and creating the new culture.
- Two of the respondents indicated that all levels of management, from top management through to production, needs to be involved.

Respondents were questioned about the major areas of improvements in their organisations and because each of these organisations implemented different areas of B2B e-business, the responses were expected to be rather mixed. The results are listed below:

- Company A: Benefits related to strengthening the brand, reduction in costs and improved customer loyalty.
- Company B: Benefits related to cycle time reduction, customer satisfaction, employee productivity, traceable bottleneck, internal control and reduction in administration costs.
- Company C: Benefits related to cost reduction through increased efficiency.
- Company D: Benefits related to stronger relationships to dealer networks and ultimately end customers, better service levels, reduction of transaction costs and focus on these processes, resulting in more time for strategic initiatives.

- Company E: Benefits related to stronger relationships with suppliers, price reduction in procurement, shortening of lead times, better quality control, better contract compliance and reduction in transaction costs.
- Company F: Benefits related to strategic positioning for the future when maturity levels rise.
- Company G: Improved compliance to internal policies and procedures, standardization of processes, reduction in procurement costs and reduction in stockholding.
- Company H: Benefits related to stronger relationships with customers, who also brought about that customers are expecting more. In the procurement are, benefits were realised relate to transparency through bidding.

While the level of detail in which each respondent answer the questions varied widely, some common benefits derived by multiple respondents include reduced cycle time, improved relationships, improved customer service and overall cost reduction through increased efficiency.

5.7 Survey Conclusions

In this section of the report the conclusions of the e-business survey are drawn. The intention of this section is to enable the reader to grasp the important issues in a concise manner. While the previous sections of this chapter provided a complete version of the empirical aspects of the study, this section rather focuses on putting these results in the appropriate context. The following paragraphs present the conclusions of the survey similarly to the major sections of the questionnaire.

5.7.1 B2B E-Business Strategy

Among all respondents, B2B e-business is without a doubt perceived as a strategic priority that enjoys high priority on top management's agenda. The strategic importance of B2B e-business has shifted the focus from long-term efficiency-driven projects to shorter-term projects, which focuses on the creation

of competitive advantage. Additionally, these B2B e-business strategies are completely integrated with the company's corporate strategic plans and are rather perceived as an enabler for reaching their strategic goals. It seems that even though companies are generally very aware of and portray a sense of urgency in applying B2B e-commerce strategies to their businesses, the actual changes to the business landscape has been rather insignificant for companies lower down the value chain. However, exactly the opposite seems to be true for companies that are manufacturers of information. For companies lower down the value chain, like traditional manufacturers, it appears that despite the media headlines suggesting that entire industries will reinvent their businesses based on B2B e-business technologies, it is still a relatively new paradigm in its infancy.

5.7.2 B2B E-Business Processes

B2B E-Business is expected to redefine supply chain management with the help of collaboration efforts, which is based on superior partner relationships. While most of the respondents have indicated that outsourcing and partnering has recently become a strategic activity for their businesses, the majority of these companies are not 100% ready for complete integration with business partners yet. This sheds some more light on the nature of partnering and outsourcing in the e-economy. It seems the higher the e-business adoption rate, the more aggressive a company becomes towards partnering and outsourcing in a strategic way, even if it entails partnering with competitors.

While the companies are thoroughly aware of these concepts, their involvement in partnering and outsourcing as a result of B2B e-business is rather low compared to what would be termed an e-corporation. In fact, it seems that most of the B2B e-business initiatives are more concentrated on e-procurement (for the buy side) and e-sales (for the sell side), rather than for transacting business between enterprises. This implies that integration in the supply chain itself is either non-existent or still in its infancy. In the strict sense of the term this means that none

of the respondents in their present incarnation can be described as virtual e-corporation. As a result, companies may be missing potentially important B2B e-business related opportunities for expanding market access, cutting costs, increasing productivity, and strengthening relationships with customers, suppliers and other business partners. By not making the transition to e-business processes, companies may be placing themselves at risk of becoming less competitive in the global interconnected market, impacting on both their current market positions and long-term viability. However, making the transition will not only involve significant investments, but also take a fair bit of time since companies need to transform both their internal and external configurations to take full advantage of the potential opened up by B2B e-business.

Further important insights that emerged relates to the fact that various B2B e-business strategies (e.g. online sales and e-procurement) may not be equally appropriate for every company. These can be very dependent on the type of industry as well as the type of relationships fostered with the company's business partners. Whereas selling online for one customer can for example deliver some efficiency gains, it could lead to some significant drawbacks for another customer that is often ignored. Therefore, companies should not be shortsighted in their approach of adopting B2B e-business processes, since any efforts can only be accomplished successfully through the alignment of key environmental factors (e.g., the systems infrastructure of customers, partners, and suppliers and their willingness to adapt to new ways of doing business) that are often beyond the control of the company. This implies that companies should take a holistic view of the long-term impact on customer relationships and profitability, in parallel with a consideration of the more obvious, short-term efficiency gains.

Another insightful finding points to the fact that most of the companies do have a relatively good understanding of value networks. However, the prevailing thinking is still based on that of the industrial age, i.e. value chains. The author is

of the opinion that until a level of education is achieved about these concepts, many of the benefits and capabilities of e-business will elude organizations.

5.7.3 B2B E-Marketplaces

It appears that even though companies are considering B2B e-business as a top strategic priority, these do not necessarily translate into investments into e-marketplaces, thereby generating B2B e-business transactions as expected. Only a very low percentage of the companies actually participate in e-marketplaces and even for those who do so, these are mostly focused on e-procurement.

Furthermore, it seems that depending on the ownership structure and market focus of these e-marketplaces, associated risks varies significantly. As mentioned in the previous section, adopting B2B e-business processes depends on various key environmental factors (e.g., the systems infrastructure of customers, partners, and suppliers and their willingness to adapt to new ways of doing business) that are often beyond the control of the company.

Companies have to ensure that their partners are ready to enter into electronic exchanges; else if they are unwilling to participate, this will pose serious risks to the survival of such a marketplace. Often, this human element is underestimated and companies should invest in the necessary change management activities to ensure that the change process is managed properly. Ultimately, reluctance to allow trading partners to the inside information of the company stems from the company's fear that its weaknesses will be exposed. Such behaviours suggest a lack of trust between trading partners and therefore special consideration should be given to developing shared vision among business partners to engage in virtual collaboration.

5.7.4 Management, Organisational and cultural aspects of B2B E-Business

Important insights suggests that for managers to successfully navigate the B2B e-business terrain, special skills are required on the road to building mutual trust,

shared vision and virtual collaboration. Managers must be aware that the higher the B2B e-business adoption rate, the more significant the changes to the organisational structure. However, changes in organisational structures are results of changes to processes, which imply that performance measures have to be changed accordingly. While the companies did not necessarily believe that B2B e-business changes employees into knowledge workers, with the adoption rate of B2B e-business rising, this concept will become more obvious through the development. It is the opinion of the author that companies should be aware that adoption of B2B e-business might necessarily result in more knowledgeable workers and therefore managers should be sensitive to the issues that will accompany such developments.

Managers should be aware that B2B e-business is heavily dependent on the human element and thus resistance to change should not be underestimated as one of the key barriers to adoption. Therefore, cultural aspects should be perceived as paramount to the success of B2B e-business initiatives. Possible ways of addressing the cultural aspects of B2B e-business might include training and education as well as change management activities. Furthermore, from a cultural perspective the antecedents to e-business adoption which are perceived as significant include top management's emphasis, learning ability and stakeholder involvement.

The sections presented above discussed the feedback and concluding arguments based on the survey related to the management framework. This feedback, in combination with the management framework developed from the secondary literature sources, will be used to reflect on the validity of the framework in the next chapter.

6. Reflecting on the outcome

In this last part of the thesis, the author presents her opinions and conclusions about the re-organisation necessary in becoming a B2B e-business. The aim is to put forward the major elements of the management framework, based on the problem analysis and the performed survey presented in the paper. In chapter one, a hypothesis was formulated that embodied the research concern; subsequently the relevant theory was developed, followed by the development of the management framework in chapter three and its application during implementation during chapter four. Chapter five reported a summary of the findings related to the testing on the validity of the framework by means of the questionnaires and the survey. Finally, this last chapter completes the research cycle according to the reasoning processes introduced in chapter two.

The details of this chapter will reflect on the outcome of the research undertaken, i.e. the management framework developed. Essentially, this is done to confirm the validity of the research undertaken. Since the survey only included eight respondents, of which the majority portrays rather low levels of e-business adoption, the credibility of the feedback may be questioned. The findings on the survey are, however, used in combination with the developed framework, which is derived from many expert opinions. The special combination of these two main categories of information sources informed the author and ultimately leads to the conclusions presented in this chapter.

Once the conclusions have been drawn and the major elements of the framework presented, a short paragraph is presented to reflect on the research process the author engaged in during the research study. Finally, the chapter is concluded with a section on the recommendations related to the application of the framework as well as opportunities for possible future research.

6.1 The proposed management framework

Having established that becoming a successful B2B e-business will significantly enhance an organisation's chance of improving competitive position and thus

shareholder value, it is important to emphasize the main points of an appropriate management framework. It has been established that, for an organisation to become a successful B2B e-business, managers need a coherent framework that concentrates on certain fundamental elements. This research study has provided the opportunity to devise such a management framework and this section provides concluding arguments on these fundamental elements.

The management framework consists of the relevant elements extracted from, on the one hand, the literature review that addresses management guidelines to successfully re-organise an organisation and, on the other hand, the feedback from the questionnaires. The framework, presented in Figure 5, is considered a tool that attempts to assist business managers in successfully dealing with the important issues that will arise when evolving into a B2B e-business. The structure of the proposed management framework basically follows a logical sequence of the fundamental elements, which can be presented in terms of the following broad key categories:

1. Global Control and Co-ordination
2. B2B E-Business Strategy
3. Business and Value-Chain Processes
4. Technology
5. Management and Culture

For each of these broad categories, the relevant concluding arguments pertaining to them will be discussed in the next sections during this chapter.

6.1.1 Global Control and Co-ordination

E-Commerce, in its widest sense, is controlled and coordinated through various global organisations and governments. Governments affect e-commerce by laws, regulations and different restrictions, which affect the actual development of B2B e-business within organizations. The government is responsible for how well a country is developing to create a good environment for e-business. To enable

companies to perform in a suitable way for achieving the best B2B e-commerce as possible, it is important for them to know government policies.

E-commerce related standards are being evolved by various international organisations. These organisations are typically concerned with technology (e.g. XML, etc.) and business (e.g. OFX for payments, etc.) standards. Companies should pay close attention to the standards most relevant to their industry and if possible participate directly in the works of such organisations. Participation will help companies keep abreast developments and offers an opportunity to help shape standards that will serve as the rules of engagement.

6.1.2 B2B E-Business Strategy

A company should, at the very least, have a B2B e-business strategy in place as a basic point of departure and must perceive it as a high strategic priority within the company. In fact, the strategy should become an actual cause and initiator in forming business strategy. To capitalise on the qualities of existing assets, the strategy should be integrated into the overall corporate business strategy. Therefore, it can be seen as a core element in supporting the company's overall corporate strategic plans and as an enabler for reaching the strategic goals.

Companies must realize that there is no 'one size fits all' strategy and that traditional brick-and-mortar companies will necessarily have different strategies than their new, click-and-mortar counterparts. The strategy should be viewed as both a means to enhance efficiency and a means to create and maintain competitive advantage. The value created by B2B e-business is not only in the form of direct cost savings, but is ultimately achieved by assisting customers in reaching their goals.

It is imperative that strategic direction comes from the top if the B2B e-business strategy is to be executed successfully. This requires strong leadership and a good understanding of the contribution that the new B2B e-business might bring to the

company and how it might support the company in the market. One of the best ways to educate and coach top management on the competitive implications of B2B e-business is to incorporate e-business savvy individual(s) into the top management team.

The strategic plan should encompass an overall inter-enterprise architecture vision, broken down into various initiatives. The architecture's components should be implemented in relatively short phases, which are represented by e-business initiatives. This ensures that the plan can be updated continuously, ensuring that new trends and technology are taken into consideration. In this way, the strategic plan becomes a workable, update-able plan.

B2B e-business is bound to have a profound impact on the competitive landscape of every industry. Though it seems that some industries are subject to more immediate and deadly effects, eventually all industries will be affected. Therefore, it is critical that companies understand how the forces of competition are affected by the changes brought about by B2B e-business in their specific industries. Companies need to be constantly aware of what is happening in their competitive landscape and adjust their strategies accordingly.

6.1.3 Business and Value-Chain Processes

Value chain processes, especially SCM related activities, are considered the essence of B2B e-business. Sources of competitive advantage is centred on a company's primary and support activities; the value chain activities. In the digital economy, value stems from new prospects, such as relationships with customers and suppliers and the ability to aggregate customers across the globe – issues that are central to e-business and supply chain management. The ultimate aim of a B2B e-business is to produce an integrated value network that is electronically connected across the extended enterprise and which can respond rapidly to changes in customer demand. To achieve this, tight integration, collaboration and partnership amongst business partners is required, especially in relation to supply

chain processes. Effectively, this means that companies must exploit B2B e-business opportunities related to every aspect of the value chain activities; activities that reach well beyond e-procurement and e-commerce.

One of the most effective means in which companies can optimize these value chain activities across value networks, is to forge alliances. Through focusing on its core competencies, companies can partner with another company and outsource its uncompetitive, non-core services. Furthermore, depending on the industry structure, partnering with competitors can also be considered a viable option; as long as it impacts the company's cost structure favourable, without compromising its competitive advantage while increasing customer service. Outsourcing and partnering should be considered not only to bridge capabilities and geographic gaps, but also to create new value and thus it becomes a strategic lever.

However, for companies to seamlessly operate in such an environment tight integration must exist on three levels; namely: technology, business processes and people (collaboration). Integration of technology will be discussed in section 6.1.4, while integration of people will be discussed in section 6.1.5. Through outsourcing and partnering, B2B e-business brings business partners in the value network together by sharing information, ideas and knowledge. This ultimately leads to tightened, intertwined relationships and beneficial interdependence. Companies should therefore use the manipulation of information, combined with the application and control of knowledge as their key competitive advantage.

Relationships amongst business partners are based on a variety of factors and come in a myriad of forms; under different circumstances, companies engage in different types of relationships with partners. Similarly, one company will apply multiple strategies amongst different partners. Therefore, companies must be sensitive that when creating B2B e-business strategies, these types of relationships create an important backdrop against which strategies will prove

successful or not. At the same time, companies must also be aware that B2B e-business does profoundly change the way in which companies establish and manage relationships. Ultimately the B2B strategy must be compatible with the types of relationships that exist.

Companies that are part of the standards-driven industry (e.g. Aerospace, Defence, Automotive and Pharmaceuticals) must be aware of the consequences that the specialized requirements regarding the Supply Chain compliance dataset will have on a B2B e-business initiative. Special software should be considered to assist in managing this information on an electronic platform, thereby incorporating it into the scope of B2B e-business processes. This is crucial in keeping pace with the rest of the B2B transactions and companies should not underestimate the efforts needed for such an exercise.

SME's are essential to the existence of value networks; in some networks more than in others and therefore, it is non negotiable that they should be integrated in B2B e-business scenario's. However, the business models adopted by large organisations are in many cases simply impractical and unaffordable for SME's. SME's should consider their current status of business partnerships to support the development and on-going maintenance of web based applications and e-commerce initiatives. To ensure survival, all SME's should be involved in B2B e-business one way or another.

E-Marketplaces provide value to organizations in various ways, depending on its ownership structure (i.e. self-owned, third-party owned or a consortium) and its market focus (i.e. vertical and horizontal). Similarly, the ownership structure and market focus determine the types of risks associated with e-marketplaces. Companies should employ these different types of e-markets and their market-making functions (e.g. matching, aggregation, etc.) in combination to be able to match the various business scenarios. These scenarios are typically dependent on partner relationships as well as the types of products and their strategic

importance. Therefore, it is imperative that companies take these factors into consideration when developing e-market business models.

To take full advantage of the potential of e-marketplaces, companies should look well beyond simply automating procurement value activities and their workflow; which focus on efficiency. Instead, they should aim to increase effectiveness and to become more strategic in nature by integrating all value chain activities through collaboration. Companies should realize that the value proposition is shifting from the product itself to the information and the experience around the trading of the product. It is critical that companies are aware of the significant first mover advantage on account of the lock-in effect.

6.1.4 Technology

In the B2B e-business landscape, companies strive to innovate value chain processes across enterprises, which require tight inter-enterprise application integration between both existing as well as new technologies. In the new economy, systems should be built to accommodate change and therefore, the business applications must be flexible in accommodating technology and loosely coupled, resulting in a value network. Companies without agile business architecture will be eliminated from the B2B e-business game.

In B2B, multiple enterprises are involved, resulting in data that exist in a wide variety of formats. On the political front, there is not one management team responsible for the decision-making process, but multiple management teams representing their organisations. Therefore, reaching agreements on standards between the business partners is essential for interoperability amongst the various technologies across enterprises. The best way for companies to address this is to adopt open standards like messaging technologies.

In a trusted B2B e-business landscape, security and privacy are considered critical for survival. Companies should be aware that while moving through the different

phases of e-business adoption, their security and privacy needs will change and the infrastructure will have to be upgraded accordingly. Security technologies can vary quite a lot in terms of functionality and cost; therefore it is important that the security controls are matching the company's objectives. Companies should adapt their security and privacy strategies to match the e-business landscape. The prime challenge is to assure security at all levels of e-business, starting with complex corporate configurations and ending with individual customer transactions. Privacy, on the other hand, can be addressed with online privacy policies and by displaying the trust mark (i.e. becoming a TRUSTe licensee). To build trust, companies should disclose their personal information collection and privacy practices – i.e. what they do with the personal information gathered on the web-site.

6.1.5 Management and Culture

B2B e-business undoubtedly change the way companies conduct business with their partners. The more e-business savvy a company becomes, the more changes occur in work practices, resulting in changes in organisational structures. These changes require a radical different approach and new management styles. To change management styles, the 'old' boards require to learn new things and forget the 'old ways' and the entrenched mental models. Managers should not be ignorant to the B2B e-business phenomenon and it should not be viewed as an IT system, instead they should become aware of the underlying concepts and principles that B2B e-business consists of.

B2B e-business contributes to raise the knowledge of employees since they typically deal with a much broader scope of responsibilities in a multidimensional environment. To manage this new breed of employees, the traditional, hierarchical organisation structure needs to be replaced with a more flexible, dynamic one. This environment should not only stimulate knowledge workers, but also need to be supportive of collaboration, trust and information sharing. Additionally, the environment should support employees to change and learn

from experimentation. This learning culture should adopt the principles of systems thinking as a way to increase their knowledge.

A culture that is groomed for collaboration is an absolute necessity in the B2B landscape. The underlying factors of such a culture are based on trust amongst the participants, to facilitate the sharing of information. Sharing information amongst business partners is a fundamental element of superior human relationships, which forms the cornerstone of outsourcing and partnering. Cultural aspects are paramount in the B2B e-business environment and managers must be aware that it can possibly cripple an initiative if not managed properly.

Managing and changing culture is extremely difficult, since it touches deep into the value and beliefs of the participants. In B2B, companies should realise that this aspect should be managed across enterprises, including all the participants of the value network. This is critical in preparing and motivating participants, since without partners, a B2B scenario is non-existent. Resistance to change can cripple a B2B initiative without any doubt. Managing resistance to change can be addressed in an e-business initiative right from the start, by getting all the stakeholders involved in the design process. Additionally, change management programmes should be implemented. It is critical that change management should be driven by top management. Finally, extensive training and education should be done on all the partners to ensure buy-in, to overcome ignorance and to realise the benefits.

Top management involvement is considered critical in providing strategic direction for B2B e-business initiatives. They are responsible for breaking through resistance and creating the new culture. However, managers and stakeholders from all levels must be actively involved in such a strategic project. Therefore, it is suggested that cross-functional teams are used for the implementation of such initiatives. These teams ensure that input from the different departments that will be affected by the changes, are incorporated.

Management should be able to measure the benefits of the e-business initiatives and since this changes the way the company operates, it calls for new business performance measures. These measures should not only include the traditional financial ROI (Return on Investment) measures, but should also involve measures of the actual value chain activities in a B2B context.

The author wishes to offer that the management framework that flowed out of the research findings of this report could serve as a useful starting point for any manager that proposes to implement B2B e-business systems. The author believes the framework might assist managers, even if it is just used as a form of a checklist for covering the relevant issues before taking the plunge.

6.2 The research process

This section aims to reflect on the research process applied during the course of the research study.

The research strategies chosen for this research study was based on a combination of action research, which was considered as the overall research method, with the grounded theory method embedded within it. These two research methods were used based on the principles underpinning the systems approach in general, the Soft Systems Methodology and the Viable Systems Model.

From a research perspective, the findings indicate that B2B e-business is a rich, multifaceted domain. Particularly, the grounded theory method, and thus the literature, proved to be extremely useful in building a deep understanding of the various facets. Such a detailed consideration yields insights that are not available when the phenomenon is evaluated from a bird's-eye view only. However, analysing such a complicated phenomenon requires a rigorous approach to conceptualise the interaction of the various detailed facets. The systems thinking principles (including the Soft Systems Methodology and Viable Systems Model) provided this insight and guidance in aiding the process to gain a more comprehensive picture of the overall

situation. This process of triangulation proved extremely useful in achieving the necessary rigour.

From an action research perspective, the study proved to be more difficult than originally perceived possibly due to the global nature of the pilot sample. Such a study could be enhanced by incorporating the practical concerns of people in the immediate problem situation more actively. This implies that a joint collaboration should be formed between the researcher and the people in the problem situation, providing a unique opportunity to bridge theory with practice. The author believes that through joint collaboration, the researcher will be closer to solving the real-world problems, while at the same time contributing to the generation of new knowledge.

The author also believes that a deeper, more practical understanding will be achieved if the research actually includes the physical implementation of changes, thereby providing the opportunity to complete the research cycle. This will provide the opportunity to evaluate such changes in practice as part of the implementation and thereby generating feedback, which will trigger another cycle of action. The author believes that the above two areas, which concentrates on doing and experiencing, that lacked from the research study could further enhance the researcher's understanding of such a complex, social phenomenon.

6.3 Recommendations

This section aims to provide, on the one hand, recommendations related to the application of the management framework developed and on the other hand, recommendations related to possible future research.

6.3.1 Applying the Management Framework

The literature study, in combination with the limited survey, have provided sufficient material for the researcher to venture the compilation of an overall management framework, appropriate and sufficient for use during the development of a B2B e-business landscape. For managers in the field struggling

with understanding and implementing B2B e-business practices, the aspects of B2B e-business revealed in this study provide a framework for guidance through this terrain. While the specifics may vary across industries, it is recommended that the proposed management framework should be used as a general guideline to assist managers with the re-organisation necessary in becoming a full-fledged B2B e-business.

6.3.2 Future Research

This study represents an effort to decipher the rich, multifaceted phenomenon of B2B e-business. The author is of the opinion that research into B2B e-business is best designed by first building a thorough understanding of its various facets and the distinctions amongst them. The research demonstrated that insights regarding the various aspects of the B2B framework differ widely amongst organisations, depending on the organisation's industry-specific competitive landscape as well as the organisation's level of e-business adoption. As such, the research undertaken has certain limitations that can be addressed in future research. The author believes that the survey could have been even more successful if a more representative sample had been selected. In view of the above, it is recommended that a more emphatic survey should be conducted. Such a survey will require a proper statistical base that will satisfy the basic requirements of representativeness, i.e. including a bigger sample of manufacturing companies with a higher degree of e-business adoption. This implies that the questionnaires should be appropriately adjusted to reflect the research goals more emphatically. Certainly, such a research effort will be costly and proper sponsorship should be considered.

Despite all the media hype, it seems that the B2B e-business phenomenon is, in many ways, still in a developing stage. The author is hopeful that this study will catalyse rigorous research to further expand the understanding of B2B e-business aspects.

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APPENDIX A: The Systems Thinking Approach

The aim of this appendix is to present the underlying body of knowledge on which the entire research undertaken in this thesis rests: the Systems Theory. Therefore, the first section of the appendix will provide a summary at a very high level on the nature of systems thinking. This will be followed by an introduction of the Soft Systems Methodology and the Viable Systems Model to illustrate how their application can assist in understanding complex, problematic situations. The author perceives the problem situation to reflect the properties that will be best dealt with by using these two methodologies. These reasons will be discussed in the next sections. Each of these models and methodologies offers a perspective, which complements the other to some degree. SSM provides a methodology for analysing the situation from both a cultural as well as a logical perspective, while VSM provides a model for inquiry into the functional issues of managing interactions within an organisation as well as its reaction to the influences of the environment.

A1: Systems Thinking

The main purpose of this section is to introduce the systems concepts – the underlying body of knowledge on which the entire research undertaken in this thesis rests. This is done by giving a short explanation on the development of systems thinking; followed by an explanation on the main concepts and principles surrounding systems thinking.

The evolution of systems thinking started during the Industrial Revolution, when the prevailing worldview was Newtonian – where the world is viewed as a closed, self-contained, mechanical system, without an environment (Ackoff, 1995). This resulted in enterprises being viewed as machines, where employees' personal interests and purposes were taken to be irrelevant. Mechanistic thinking adheres to analysis and reductionism, claiming that all objects and events, and their properties, can be understood in terms of ultimate elements where the parts can be optimised

independently in pursuit of some goal (Flood & Jackson, 1991). By the end of World War I the biological worldview, one where enterprises were viewed as organisms, has largely replaced the mechanistic views (Ackoff, 1995). This view was characterised by the fact that the enterprise was now considered to have a purpose of its own, although the interests and purposes of individuals were still considered irrelevant.

However, shortly after the end of World War II a new worldview emerged where individuals wanted to be treated with needs and desires of their own and expected employers to take their concerns, interests and objectives into account. At the same time organisations were forced to take into account the larger system of which it made a part of (i.e. society) – and any other systems that were part of the same containing system. This preoccupation with the purposes of parts and containing wholes resulted in the worldview to be replaced by a social systems view. Ackoff (1995) defines social systems as systems that have purposes of their own, are made up of parts that have purposes of their own, and are parts of larger systems that also have purposes of their own, and these larger containing systems include other systems that have purposes of their own. With this, organisations were now to be treated as whole entities, or systems, whose identity and integrity had to be respected. Flood & Jackson (1991) states that this shift, from mechanistic to systems thinking, is characterised by changes in the way people look at certain phenomena. In mechanistic thinking the ‘system’ is viewed as an aggregate of parts in which the whole is equal to the sum of the parts. In systems thinking, however, the ‘system’ is viewed as a complex and highly interlinked network of parts exhibiting synergistic properties where the whole is greater than the sum of its parts.

Now that the evolution of systems thinking has been explained, the concepts surrounding and the nature of systems thinking will be further explored. To achieve the goals of this thesis – to know what changes are required in the business environment and to understand why they are required – the author believes that an understanding of the nature of social systems is required. Ackoff (1995) defines a

system as a whole that contains two or more parts that satisfy the following five conditions:

1. The whole has one or more defining functions
2. Each part in the set can affect the behaviour or properties of the whole
3. There is a subset of parts that is sufficient in one or more environments for carrying out the defining function of the whole; each of these parts is separately necessary but insufficient for carrying out this defining function.
4. The way that the behaviour or properties of each part of a system affects its behaviour or properties depends on the behaviour or properties of at least one other part of the system.
5. The effect of any subset of parts on the system as a whole depends on the behaviour of at least one other subset.

Kaufman (1980) provides the definition that 'a system is a collection of parts which interact with each other to function as a whole'. This implies that, to execute the particular function, all of the parts must be present and arranged in a proper way.

Ackoff (1995) reasons that maybe the most important aspect of a part's performance is the way it interacts with other parts to affect the performance of the whole.

Checkland & Scholes (1990) states that this whole may have properties that refer to the whole and are meaningless in terms of the parts, called the 'emergent properties'.

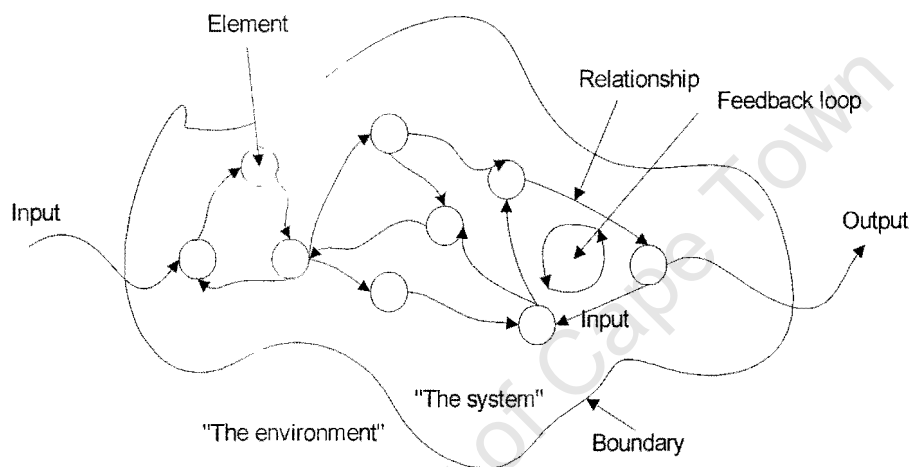
It is from these definitions that the concepts were born which states that the performance of a system is not the sum of the performance of its parts taken separately, but the product of their interactions.

Checkland & Scholes (1990) argues that the concept of emergent properties itself implies a view of reality as existing layers in a hierarchy. Systems occur in hierarchies, with sub-systems and containing systems portraying the same characteristics as the system itself. Kaufman (1980) states that if systems on the same level combine with each other, they result in the next level, the larger system. The more complex a system, the more sub-systems it has that must be maintained and

coordinated. Co-ordination, combined with integration, is the management of the interactions between the parts (Ackoff, 1995).

Flood & Jackson (1991) provides a very comprehensive and useful description of systems, which can be explained with the aid of Figure A1.

Figure A1: A general concept of a system



Source: Flood & Jackson (1991)

Figure A1 illustrates that a system consists of elements / parts with relationships between them, all contained within a certain boundary wherein a richly interactive group of elements are separated from its environment. Ackoff (1995) defines an environment as those things that can affect the properties and performance of that system, but over which it has no control. When the system requires certain environmental conditions to carry out its defining function, the system is termed an 'open system'.

The system transforms certain inputs into outputs and the processes responsible for this are characterised by feedback. Feedback, as described by Kaufman (1980), occurs when one part has an effect on the rest of the system and the system as a whole

has an effect on that one part, resulting in a circular relationship or feedback loop. A system is able to sustain an identity and survive through homeostasis; a phenomenon that occurs when the feedback loop acts to cancel out changes in the system. This is called negative feedback and is an extremely important idea in understanding the self-stabilising abilities of surviving systems in their environments. A system that can maintain an identity in changing conditions is considered to exhibit some form of control, which results from negative feedback. When change result in even more change, the feedback loop is considered positive, because it amplifies or adds to any disturbance in the system.

Kaufman (1980) argues that the importance of understanding these feedback loops lies therein that any changes that does not change the positive or negative feedback loops, will only be temporary. At the same time, he argues, any changes that effects the relationships between the feedback loops will alter the long term behaviour of the system. Either way, it is these processes of communication and control that enable a system to survive and respond to the shocks from the environment (Checkland & Scholes, 1990). The image of an adaptive whole fighting for survival in an ever-changing environment, is based on two pairs of ideas, namely that of emergence & hierarchy and that of communication & control. To make mental use of this image and thereby choosing to view the 'problem' as a system is to do systems thinking (Checkland & Scholes, 1990). Systems thinking is then basically to perceive a problem situation in terms of multiple system-layers and to apply a methodology to this perceived reality in order to gain a higher level of insight and understanding.

Although there have been many publications on the subject of systems thinking which contains much more details and examples, the author merely attempts to provide an overview of the most important concepts as she perceives it. The explanation above is therefore parsimonious and only enough is covered to make sense of the discussions about SSM and VSM, which follows. Since these two systems methodologies, which are used during the inquiry process, are based on the systems thinking concepts and ideas, the next two sections will focus on describing them.

Once the reader is brought up to speed with the underlying concepts that govern the thinking of the author, these concepts can be applied to the subject under discussion in the next chapter.

A2: Soft Systems Methodology (SSM)

The aim of this section is to introduce the Soft Systems Methodology (SSM) and illustrate how its application can assist in understanding complex, problematic situations – as in the case of this research study. According to Checkland & Scholes (1990), management science has shifted from engineering thinking to management thinking to try and increase its relevance to the world of management. Systems engineering is best described as dealing with questions on ‘how to solve the problem?’, while management thinking take one step backwards and concentrate firstly on ‘what is the problem that must be solved?’. Since the objective of this research study is to develop a management framework, it is necessary for the researcher to adopt this type of ‘what’ thinking. The author believes that the management science of SSM is the most appropriate tool to aid the researcher in obtaining such thinking patterns.

The main reason why the author deems the SSM an appropriate methodology during inquiry is the fact that the methodology takes into account the subjective appreciations of human participants while analysing the complex issues. SSM has evolved due to the inability of hard systems analysis tackling coherently complex, human-related problematic situations that are less well-defined. As stated by Flood & Jackson (1991) ‘SSM has been developed for use in ill-structured or messy problem contexts where there is no clear view on what constitutes the problem, or what action should be taken to overcome the difficulties being experienced and therefore should prevent managers from rushing into poorly thought-through solutions based on preconceived ideas about an assumed problem’.

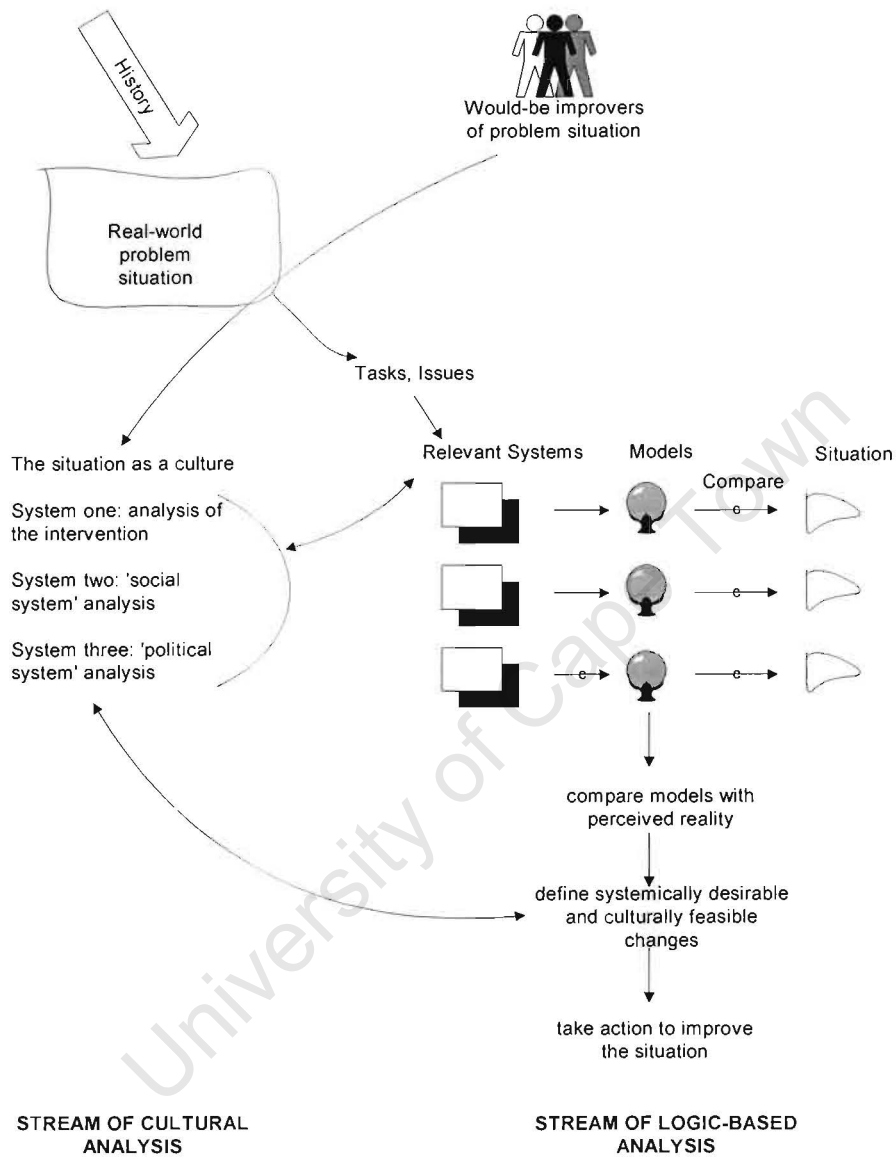
In applying the methodology, in conjunction with the VSM, the research study should be able to formulate theories of action concerned with the 'what' as well as 'how' questions, thereby covering a spectrum of perceived problems. To add to the above, Von Bulow (1989) provides the following definition:

"SSM is a methodology that aims to bring about improvement in areas of social concern by activating in the people involved in the situation a learning cycle which is ideally never-ending. The learning takes place through the iterative process of using systems concepts to reflect upon and debate perceptions of the real world, taking action in the real world, and then reflecting on the happenings using systems concepts. The reflection and debate is structured by a number of systemic models. These are conceived as holistic ideal types of certain aspects of the problem situation, rather than as accounts of it. It is taken as given that no objective and complete account of a problem situation can be provided".

SSM is considered 'soft' systems thinking, wherein the main distinction exist that the process of enquiry itself is viewed as a human activity system. The main focus in the application of the SSM, is to generate questions related to 'what should be done?' Furthermore the philosophy believes that problem situations arise when people have contrasting views on the 'same situation', which result in multiple possible viewpoints and therefore many 'relevant problems' (Flood & Jackson, 1991).

The methodology might be thought of as a seven-stage process of enquiry, however it must be noted that the process is in no way to be followed sequential, with no beginning and no end. The process follows two interacting streams of enquiry, logic and cultural, based on the perceptions formed about possible tasks that need to be done and issues that need to be resolved. Figure A2 below presents the process of SSM as adopted by the author:

Figure A2: The process of SSM



Source: Checkland & Scholes (1990)

Stages 1 and 2: Finding Out and Selecting Relevant Systems

The enquiry process normally starts when someone views a certain situation as problematic and believes that something should be done to manage and improve the situation. Any situation exists within a certain human-relationship context, which encompass many views of a particular history and the aim is to go beyond this logic,

thereby enabling action in the full idiosyncratic context of the situation (Checkland & Scholes, 1990). Although there will normally be an identified individual or team of improvers, SSM is essentially a collaborative approach, whereby the appropriate people needs to be involved in the process of problem solving.

The logic-driven stream of enquiry aim at naming the various primary task and issues-based systems, modelling them and finally comparing them with perceptions of the real world in order to structure a debate about possible change. Checkland & Scholes (1990) defines primary task systems as 'systems that map on to institutionalised arrangements', while issue-based systems are 'relevant to mental processes which are not embodied in formalised real-world arrangements'. He argues that if the problem solver works with both these kinds of systems, it will free his/her thinking.

Stage 3: Naming Relevant Systems by Formulating Root Definitions

The names of the systems, known as 'root definitions' express the core purpose, explained as a transformation process of purposeful activity systems. Checkland & Scholes (1990) proposes that when defining the root definitions, the analyst should consider the elements such as customers, actors, transformation process, worldview, owners and environmental constraints. Flood & Jackson (1991) says that this process aims at drawing out the essence of what is to be done, why it is to be done, who is to do it, who is to benefit or suffer from it and what environmental constraints limit the actions and activities. He argues that pairing the transformation process and the worldview makes this meaningful. Once the root definitions are formulated, they should be translated into conceptual models.

Stage 4: Building Conceptual Models of Relevant Systems

While root definitions present what the idealised system is, the 'conceptual model' presents the activities, which this ideal system must do in order to fulfil the requirements of the root definitions. The conceptual models are then constructed by drawing out verbs that describe these activities. These verbs are then grouped to

represent one sub-system concerned with the operations of the system, while another sub-system of verbs is concerned with the monitoring and controlling of the system (Flood & Jackson, 1991). To aid with the comparison between the model and perceptions of the real world, the model should also contain the criteria concerned with judging the successfulness of the transformation process. Checkland & Scholes (1990) suggests that should be done on three levels; firstly to measure whether the means chosen actually works in producing the output, secondly whether the transformation is being carried out with a minimum use of resources and thirdly if it is achieving the long-term aim. These three criteria are named efficacy, efficiency and effectiveness.

Stage 5: Comparing Models with Perceived Reality

The aim behind this stage is essentially to generate debate about possible changes that could be made to bring about improvements in the problem situation. The debate is structured by using the models based on a range of worldviews to question perceptions of the situation. Flood & Jackson (1991) suggests that the questions should be concerned with if the activity exist in the real world and if so, how well is it done and how is it being judged or measured. Checkland & Scholes (1990) states that irrespective of the method used in comparison, the aim is to find an agreement for improvement between different interests in the situation. However, before getting to this situation the analyst first requires some cultural knowledge.

The second, culturally driven stream of enquiry pays attention to the cultural aspects of the human situations and interacts with the logic-driven stream. Checkland & Scholes (1990) sees this process as threefold, firstly examining the intervention itself, secondly examining the situation as a 'social system' and thirdly examining the system as a 'political system'. Organisational culture can be defined as 'a shared reality, or a socially constructed reality (of values and beliefs), that deems certain social practices to be normal, acceptable and desirable' (Flood & Jackson, 1991). The culture of an organisation determines how organisations react and what they

perceive to be feasible changes, which is why it is so important when designing possible improvements.

Analysis of the intervention should focus some attention firstly on the client's reasons for causing intervention, secondly on the perceptions, knowledge and readiness to make resources available to the problem solver and thirdly on the problem owner. Checkland & Scholes (1990) argues that this role analysis, now termed systems one, is very productive.

Examining the situation as a 'social system' involves analysing the interaction between the elements' roles, norms and values. Checkland & Scholes (1990) argues that the interaction between these elements is assumed to be continually changing and that each of them defines, redefines and is itself defined by the other two. He defines a 'role' as 'a social position recognised as significant by people in the problem situation which is characterised by expected behaviours in it, or norms and whose actual performance is judged according to local standards, or values'. Since the nature of the social system is implicit, the analyst must evaluate this system unofficially and through interpretations, rather than direct questioning.

Examining the situation as a 'political system', involves analysing the power-related activities concerned with managing relations between different interests (Checkland & Scholes, 1990). Flood & Jackson (1991) defines political as looking at relationships between individuals and groups as competitive and involving the pursuit of power. When studying problem situations involving human relations, it is therefore unavoidable to encounter purposeful acts with a political dimension. This analysis three can be practically applied by questioning how power is expressed in the situation studied. Answering these power-orientated questions enriches the cultural appreciation and complements the work on selecting, naming and modelling the relevant human activity systems, which are simultaneously executed in the logic-driven stream of thinking.

Stages 6 and 7: Defining Desirable and Feasible Changes and Taking Action

The comparison of model-reality naturally involves consideration of possible changes. However, the kinds of changes considered, must be both systemically desirable and culturally feasible (Checkland & Scholes, 1990). These last stages focus on debates that finally confirm which changes are indeed culturally feasible in the organisation at the specific time. Implementation of changes will take place in a human culture, however they will only be implemented successfully if they are perceived as meaningful within that culture, within its worldview.

The paragraphs above provide the reader with a brief overview of the SSM and the reasons why the author feels it is applicable to this research study. The aim of introducing system thinking in this way to the research study is to promote rigour. SSM essentially introduces some ordered, structured systems thinking with four main principles underpinning it, concerned with learning, culture, participation and the 'two modes of thought' (Flood & Jackson, 1991). Overall, the aim of SSM is to take seriously the subjectivity, which is the crucial characteristic of human affairs and to treat this (Checkland & Scholes, 1990). Although SSM is described as a seven-stage process, the author will adapt this to the research study context in which it is employed. However, SSM will be used in conjunction with the VSM to enable the analyst to address all areas of primary concern, which includes areas of human dynamics as well as organisational and managerial dynamics. Therefore, the next sections will provide a brief description of the concepts surrounding the VSM.

A3: Viable Systems Method (VSM)

The aim of this section is to briefly introduce the Viable Systems Model (VSM) and to provide the theoretical basis that can guide the author in resolving problems related to organisations and management. The intention is only to set the scene, to give an overview, to sketch the outline. The framework provided by the VSM, focuses on natural laws, theorems and principles, which specifies the limits for organisations (Clemson, 1984). Since the principles underpinning the VSM are all cybernetic in

nature, when an organisation do not perform well it is assumed that these principles are being violated (Flood & Jackson, 1991). Therefore, to enable the author to apply these concepts in the research study, it is critical to understand the fundamental ideas on which the VSM is based first. Understanding the basics, equips the researcher with a new way of thinking about organisations. Once this has been done, a brief explanation will follow on the VSM itself by using this rich new language.

Beer (1972) defines cybernetics as 'the science of effective organisation'. Clemson (1984) expand on this definition by describing cybernetics as being 'concerned with the general patterns, laws and principles of behaviour that characterise complex, dynamic, probabilistic, integral and open systems'. Since the cybernetic definitions refer to systems, some of the concepts are contained within the general systems thinking theories, which have already been discussed in section A1. Ashby (1970) argues that when dealing with systems of great complexity and intricate dynamics, it may not be possible to improve a problem situation without cybernetics. The fundamentals of cybernetics rest on several laws of nature that are applicable to all systems, but are specifically important when dealing with social systems and institutions. The three laws to be discussed in the following paragraphs are firstly the self-organising systems law, secondly the law of feedback and thirdly the law of requisite variety.

Clemson (1984) states that 'the characteristic, structural and behavioural patterns in a complex system are primarily a result of the interactions among the system parts'. This is what is meant with the self-organising systems law, whereby complex systems organise themselves. Therefore, systems are the way they are because they continuously adjust their parts through interaction and therefore organise themselves to be that way. Clemson (1984) further reasons that 'complex systems have basins of stability separated by thresholds of instability'. This means, in effect, that some configurations of the system are stable and others are not. The point here is that systems will always try to organise themselves in such a way that they get to a basin of stability and if the system is to be taken to a new, alternative basin of stability, the

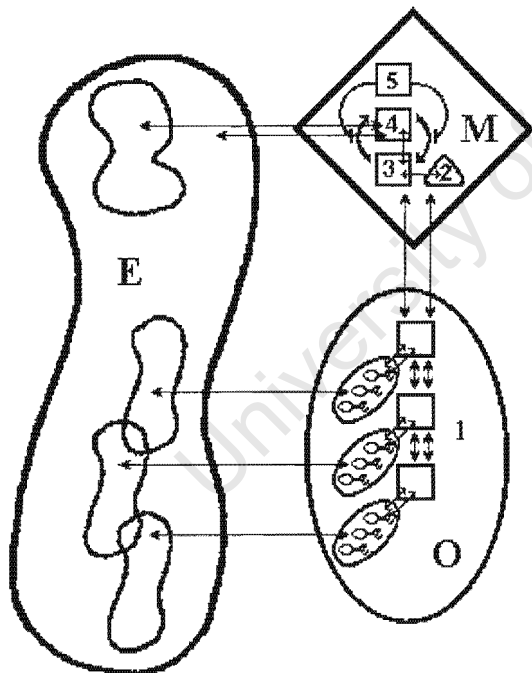
right amount of energy needs to be applied to get that system over the hills. This implies that those involved in designing systems must know where the top of the hills are as well as where the alternative basins of stability exist (Clemson, 1984). The law of feedback is described by Clemson (1984) as: 'the output of a system is dominated by the feedback and, within wide limits, the input is irrelevant'. The second thought linked to this law says that 'all outputs that are important to the system will have associated feedback loops'. The point being made by this law is that for any system to be able to survive in a changing environment, feedback loops have to exist and needs to be carefully designed else the system will fail and will not achieve its purpose. The two different types of feedback loops and their characteristics are described in section A1. The feedback loops are critical in enabling systems to comply with the self-organising laws. In fact, the peculiar behaviour of self-organising systems can be largely explained by sets of interconnected feedback loops.

The law of requisite variety is described by Clemson (1984) as: 'given a system and some regulator of that system, the amount of regulation attainable is absolutely limited by the variety of the regulator'. Since regulation implies continuous interaction / communication between a regulator and a system, it is obvious that such a process deals with a variety of situations / possible states. The more complex the system, the higher the variety of that system, and therefore the higher the number of situations / possible states the regulator will have to deal with. Therefore, this law implies that the degree to which the system can be regulated is absolutely limited by the variety of the regulator.

The three laws discussed above are all mutually supportive and can be explained as follows: Systems organise themselves mostly through the feedback loops, which in turn is also the primary way in achieving regulation. These concepts are very useful when applied to management and organisational situations and will be used extensively in this research study. However, before that can be done an explanation first needs to be given on the VSM itself.

The VSM is a tool that is used for modelling and analysing the structure and functioning of an organisation. The model, based on cybernetic principles, presents regulatory mechanisms that are essential to organisations in order to cope with the complexities, adapt to the dynamic world and at the same time learn. The VSM is illustrated in Figure A3 below. The elements consist of the environment (amoeba shape marked with an E), the operation (circle marked with an O) and the meta-system (diamond marked with an M). The arrows show some of the many and various ways the elements interact and can represent various things, e.g. information, money, goods, people, etc. (Clemson, 1984) The essence of the VSM is then is to consider the organisation as a whole, which must be in balance with its environment.

Figure A3: The Viable System Model



Source: Clemson (1984)

The VSM is an arrangement of five functional elements (Systems 1-5) that are interconnected through complex information and control loops. The meta-system consists of systems 2, 3, 4 and 5 and is responsible as a whole to ensure that the System 1's

are working together in an integrated, harmonious fashion. For any organisation to remain viable, all five these functions must be adequately performed. The model describes the requirements for any organisation to simultaneously maintain internal stability and adapting (Clemson, 1984). The model is to be applied on different levels of recursion to be able to represent organisations on different levels. The concept of recursion is illustrated in the 'explosion' of the Operational unit in Figure A3. The explanation is that for every organisation, the operational unit will be composed of sub-operational units and that each of these sub-units is a replication of the larger system. The principle of recursion applies to all levels of the VSM, where each operation consists of smaller viable systems and is embedded in a larger viable system.

System 1: Implementation

This is the operational function of the organisation and consists of the parts that do or produce whatever the organisation is supposed to do or produce. These semi-autonomous units perform the functions that keep the organisation 'alive'. All other VSM sub-systems are management, rather than action, oriented. System 1 has its own local environment and management and interacts with its environment by sending and receiving data. System 1 management sends collated data to the System 2 (coordination) and System 3 (control) functions, and also to other System 1's. Every organisational unit becomes an integrated system, devoted to achieving its own goals. It is therefore important to determine what the goals are of these units and if they are supportive of the overall purpose.

System 2: Coordination

This function ensures that the System 1's function in a coordinated fashion and provides a regulatory centre for each element of System 1. System 2 is an anti-oscillatory mechanism that operates through models of System 1, under direction of System 3. To manage variety effectively, variety amplifiers and filters need to be designed. Since the operation generates much more information than what management can cater for, explicitly designed filters need to be designed that can

regulate the information. Similarly, variety amplifiers needs to be designed that can cater for information flowing from management back to the operational units.

System 3: Internal Control

This function is responsible for the internal and immediate control of the organisation and supervises the coordination activities of System 2. System 3 ensures that the System 1 units follow the policy created by System 5, by interpreting it for the System 1's. To ensure that data being passed from System 1 management is accurate, a direct audit channel (System 3*) collects performance data directly from the System 1 units. Another essential communication channel is the ability of System 3 to send emergency signals to the System 5 function for immediate action.

System 4: Intelligence and Development

The function of this system is to collect data from System 3 and the total environment in which the organisation is embedded. This is beyond the capability of the System 1's, since they are only concerned with a sub-set of this total environment. The information gathered from System 3 helps in understanding the organisation, as it currently exists. System 4 cannot do its job of intelligent adaptation without containing a model of the whole organisation, and its environment. It is very important that Systems 3 and 4 are in proper balance. As an example, it is useless to produce excellent products, which are about to be rendered obsolete by new technology, but it is equally useless to do great research and development, but go out of business because you have nothing to offer the market now. System 4 is also responsible for exploring the future of the organisation.

System 5: Policy and Identity

The intelligence function, System 4, does not think in a vacuum, but operates within a certain ethos that comes from somewhere. System 5 makes this possible by being the overall policy-making entity in the organisation. In effect, System 5 is responsible for maintaining the balance between 'the here and now' and the 'future' (Systems 3 and 4) and do this by ensuring that the identity and purposes of the organisation is

clearly defined. Therefore, system 5 has to soak up any variety left unbalanced by the operation of the System 3-4 homeostat. Any emergency conditions detected by signals passing between Systems 1 – 3, is sent directly to System 5 via the algedonic signal.

The viable systems model outlined above provides a way of structuring organisations and a language for discussing viability. The concepts and principles are invariant across levels from the smallest units of an organisation to the entirety of the largest organisation. The cybernetic laws discussed describes the general principles of growth, learning and adaptation in a complex, dynamic environment and are important for the functioning of organisations, in that they provide the theoretical limits to what is possible and guidance to what is efficient (Clemson, 1984).

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APPENDIX B: Company Survey Questionnaire

The information collected during this questionnaire will be used for academic purposes only and will be treated as highly confidential. The study is conducted in conjunction with the School of Engineering Management, University of Cape Town (UCT), Cape Town, South-Africa. The main purpose of the questionnaire is to determine the validity of a framework developed to aid managers in reorganising companies in their quest to become a B2B e-business.

A. Company and Respondent Information

1. Please state the following information:

1.1 Your Company's name

1.2 Your name

1.3 Your position within the company

1.4 Your basic field of expertise

2. Choose which category best describe your company (Please check box)

a) Producer of goods

b) Producer of information

c) Reseller of goods

d) Reseller of information

3. Considering an organisation move through various phases of e-business adoption, at which level would you classify your organisation (Please check box)?

a) Internal Integration (functional optimisation within organisation)

b) External Integration (extending the enterprise to partners)

c) Digital Economy (concentrate on core, outsource other activities)

4. What is the size of your company in terms of annual revenue (Please check box)?

a) <\$US 100 Million

b) \$US 100 Million to 500 Million

c) \$US 500 Million to \$US2 Billion

d) \$US 2 Billion to \$US5 Billion

e) > \$US 5 Billion

5. Please indicate your involvement in terms of e-business and/or IT Strategy on a scale from 1 to 5 (where 1 = not at all and 5 = extensively involved)?

6. Please indicate your level of knowledge related to B2B e-business on a scale from 1 to 5 (where 1 = not very knowledgeable and 5 = very knowledgeable).

B. B2B E-Business Strategy

7. How are e-business initiatives structured and implemented in your company?
- a) Ad hoc as the need arises without an upfront, overall picture of an application architecture
 - b) As shorter project milestones compared to other operational systems (example ERP), fitting in an upfront, overall application architecture picture
 - c) Any other means, please explain the process in the area below
-
8. Which of the following options best describe how your organisation perceives B2B e-business (Please check box):
- a) E-Business is a means to enhance efficiency
 - b) E-Business is a means to create and maintain competitive advantage
 - c) Both
 - d) None of the above
9. Which position in your company is responsible for e-business development?
- a) IT director /senior manager
 - b) E-Business director / senior manager
 - c) Other, please specify in the area provided _____.

10. Consider the following statement: *The resources used to create and sell a product/service (Cost of buying + transformation costs + cost of selling) < value to customer.* Where is your company's main focus (Please check box)?

- a) Reduce the cost of buying and selling and transformation costs
 - a) Increase the value to the customer
 - b) Combination of both
 - c) You disagree with the value inequality presented above. Please explain your reasoning below
-

11. Please indicate to what degree B2B e-business is a strategic priority in your company on a scale from 1 to 5 (where 1 = not a priority at all and 5 = very high priority)?

12. How does this e-business strategy fit in with the overall corporate business strategy?

13. Have you experienced major changes in your competitive landscape related to B2B e-business? Please explain in which areas and how it affects your company.

(Example: a major reseller eliminated your company as a supplier based on inferior e-business technology)

C. B2B E-Business Processes related

14. Which of the following best describes the outsourcing and partnering activities your organisation has engaged in:

- a) It is a strategic part of the business plan
 - b) It is done out of necessity (e.g. too little capacity)
 - c) Other, please explain in the area below:
-

15. Which of the following terms have reasonably defined meaning in your organisation? Please indicate a scale of 1- 5 (where 1 = poor understanding and 5 = very good understanding)

- a) Extended Value Chain
- b) Value Network
- c) Collaboration

16. Please indicate to what extent outside partners are regarded as key assets in your organisation on a scale 1 to 5 (with 1 = not at all and 5 = very highly).

17. Please indicate to what extent your organisation is engaged in partnering and outsourcing as a result of B2B e-business on a scale 1 to 5 (with 1 = not at all and 5 = very highly).

18. Which of the following value activities are considered in your company's B2B e-business initiatives (current and future) (Please check box)? Where possible, please mention the *proportion of total business* conducted through e-business for each of these activities (please note, EDI is not considered e-business for the purpose of this study), their *high level functions* as well as the *software applications* used in each case (e.g. e-procurement: 50% of all purchasing done through the system, purchasing of direct materials, CommerceOne). Please note **only** B2B initiatives, no B2C !

a) Research, development and design: _____

b) Procurement: _____

c) Inbound logistics: _____

d) Operations (internal): _____

e) Outbound logistics: _____

f) Marketing and Sales: _____

g) Service: _____

h) Another category not mentioned above, Please explain: _____

19. Have your partner relationships changed as a result of B2B e-business? If so, please elaborate on your experience in this regard.

20. Which aspects do you consider critical in these 'new' B2B relationships?

21. What is your view on partnering with competitors and under which circumstances do you consider this option?

22. Do you believe that managers need special skills to navigate this B2B e-business terrain? If so, what would you regard as the most critical skills required?

23. Would you agree that B2B e-business exchanges do not *only* exchange the traditional goods, services, revenue and information, but also include knowledge value exchanges and intangible benefits (e.g. brand recognition and loyalty). Please elaborate on your opinion.

24. If your company is part of a standards-driven supply chain (e.g. Pharmaceutical, Defence, etc.), do you find compliance dataset requirements a 'weak link' in the chain; i.e. slowing down some of the inter-company processes that could potentially be automated with B2B e-business? If so, please elaborate.

25. Does the Small and Medium Enterprises (SME's) in your organisation's supply chain, have an impact on the amount of transactions executed via B2B e-commerce? If yes, which business model do you believe will solve this issue?

26. Does your company engage in only one type of e-procurement strategy for all materials (i.e. only buy through auctions, etc.) or do you use multiple strategies?

27. Would you agree to say that these e-procurement strategies (as in 31) are highly dependent on the type of relationship that exists between your company and the

supplier? If yes or no, do you believe there are other factors that determine which e-procurement strategy to use?

D. E-Marketplaces

(if you are not involved/participating in e-marketplaces, you can skip this section)

28. Are you already a member of a B2B e-marketplace? If yes, what percentage of

your business goes through each of these options:

- a) Established and self-owned: _____%
- b) Consortium: _____%
- c) Third-party owned: _____%
- d) Other: _____%

29. What is the total proportion of your business conducted through B2B e-marketplaces in the following categories?

- a) Vertical marketplace(s) (industry specific): _____%
- b) Horizontal marketplace(s) (cross industry): _____%

30. Do you consider the following points as risks associated with e-marketplaces?

Please indicate their risk factor on a scale from 1 to 5 (1=low risk, 5=extremely high risk)

- a) Integrating B2B e-marketplace technologies:

- b) Attracting sufficient number of participants:
- c) Margin erosion on supply chain:
- d) Competition from other B2B e-marketplaces:
- e) Any others, please specify: _____.

31. Which were the major issues related to the implementation of the B2B e-marketplace(s) in your organisation? (standards, agreements, trust, etc.)

32. What value does the e-marketplace(s) add to your business model in the different functional areas?

E. Management, Organisational and Cultural

33. To what degree (level 1 to 5) and how has B2B e-business changed your organisational structure? (1 = hardly changed, 5 = dramatically changed)

34. To what extent has your organisation adapted its performance indicators according to the new B2B e-business environment? (1=not yet reflecting, 5 = highly adjusted to the B2B context)

35. To what level do you consider security and privacy as critical in a trusted B2B e-business environment? (1 = not really important, 5 = critical for the survival)

36. What, in your opinion, are the major impediments to B2B e-business adoption?

37. Do you believe that B2B e-business have changed employees into knowledge workers? If so, what do you believe are the enablers for this type of environment?

38. Do you consider cultural aspects as paramount to the success of B2B e-business initiatives? If yes, how would you characterise a B2B e-business culture?

39. Do you consider resistance to change an important issue? If yes, what do you believe are the most effective ways in addressing this in a B2B e-business implementation?

40. Do you perceive the type of relationships an organisation foster with its partners as an important factor when considering which B2B e-business strategies to implement? If yes, please elaborate.

41. Do you consider management involvement critical to the success of a B2B e-business implementation? Please elaborate on the level of management you see involved.

42. Which are the major areas of improvement your organisation has realised as a result of B2B e-business (e.g. stronger relationships, reduction of transaction costs, etc.)?

Thank you for your time.

APPENDIX C: E-Business classification grid

Target	Position	Good	E-Business Type	Examples	Primary Focus	Critical Application
B2B	Producer	Physical	Traditional Manufacturer	Dow Chemical Boeing Millipore Air Products	Cost control, product innovation, customer service	CAD/CAM, ERP systems, flexible manufacturing systems, factory automation, online brochureware, online decision support tools, online after-sale service
		Information	Knowledge Vendor	McKinsey Accenture Ferrester Razorfish	Employee Retention Knowledge Creation	Intranet for collaboration and knowledge management, executive information systems, access to external databases, branding/image site, online delivery to clients
	Reseller	Physical	Value Added Service Provider	OfficeDepot Grainger American Express Ingram Micro	Customer Loyalty, Efficient Fulfillment	Systems integration, online service support, integrated logistic service, company-specific storefront
		Information	E-Hub	Orbits e-Steel Covisint Vertical Net	Maximize Site Traffic, Efficiency as market-maker	B2B exchange, auctions, industry-specific information portal, industry/topic-specific discussion forums
B2C	Producer	Physical	Manufacturer Selling Direct	Dell L.L.Bean Delta Air Lines Avon	Supply Chain Management Differentiation	Online storefront, decision support tools, integrated build-to-order inter-ERP system, online after-sale service
		Information	Online Information Service	CNN.com Business Week WSJ Interactive Fuqua School	Personalization, differentiation fast global delivery	Personalized front-end, accelerate user tasks, global presence, multimedia presentations, portal to affiliated storefronts, intranet for collaboration

	Reseller	Physical	Retailer	Amazon Webmart Walmart.com ToyRUs.com	Personalization, order fulfillment, customer service	Personalization marketing, global fulfillment capabilities, decision support tools, intelligent agents
		Information	Community Portal	AOL Yahoo e-Bay NBCi	Personalization, network effect, differentiation, customer loyalty	Personalized front-end, wide assortment of user services (e-mail, financial services), multimedia applications, chat, discussions

Source: Riggins, F.J. and Mitra, S. (2001) A Framework for Developing E-Business Metrics Through Functionality Interaction

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APPENDIX D: Supply Chain Management Portfolio Domains

Domain	Portfolio Components	Strategy	Operation Focus	Domain Threshold
Digital Economy	<ul style="list-style-type: none"> • Fourth-party logistics (e.g. Ryder Integrated Logistics, Descartes, etc.) • Collaborative design and Product Life Cycle Management (PLM) (e.g. Agile Software, EDS, etc.) • Channel Relationship Management (e.g. Siebel, Comergent, etc.) 	Virtualize	Business	
External Integration	<ul style="list-style-type: none"> • Advanced planning and scheduling (APS) (e.g. i2, Manugistics, etc.) • Vendor-management Inventory • Supplier Relationship Management (e.g. Frictionless, Yantra, etc.) • E-procurement (e.g. Ariba, CommerceOne, etc.) • Adaptive networking • Collaborative Planning, Forecast and Replenishment (CPFR) (e.g. i2, IPNet, etc.) 	Integrate and Collaborate	Process	Knowledge/competence
Internal Integration	<ul style="list-style-type: none"> • Production planning and scheduling (e.g. Synquest, Logility, etc.) • Inventory Management • Product data management • Transportation management (e.g. Descartes, etc.) • Warehouse management (e.g. EXE, Optum, etc.) • Enterprise resource planning (ERP) (e.g. SAP, PeopleSoft, etc.) • Maintenance, repair, and overhaul (e.g. Datastream, 	Optimize	Operations	Transactions

	MRO, etc.)			
Level 0	<ul style="list-style-type: none"> • MRP • Shop Floor Control • Sales orders • Purchase orders • Administrative functions 	Exist	Functions	Data

Source: Carmerinelli, E. (2002) Run, Grow, Transform the (Supply Chain) Business

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APPENDIX E: Security and privacy requirements at each state of e-business adoption

State	Description	Security and privacy Requirements
Publish	Site provides multiple web pages or non-interactive access to business information. Use the Web for e-mail.	Basic firewall, anti-virus and e-mail password protection, privacy policy, Web notification of privacy policy.
Transact	Use the Web to execute one-way or two-way transactions against core business systems.	Demilitarized zone; identification, authentication and authorization at the Web and application levels; intrusion detection; transaction encryption; basic administration, privacy notice containing procedures for data handling.
Internal Integration	Use the Web to improve and/or integrate core business processes.	Well-defined policies; centralized identification, authentication, authorization and management for all systems, data and applications; data encryption; privacy 'contract' between business units.
External Integration	Use the Web as a means of integrating business processes across enterprise boundaries	Integration of administration; identification, authentication and authentication with partner, supplier and/or customer companies' data and applications; cross-enterprise trust; privacy 'contract' between entities
Digital Economy	Use the Web as the foundation for existing in a digital community	Well-defined requirements for adoption of common privacy and security standards that span the Internet.

Source: IBM (2001) *Linking security needs to e-business evolution*

APPENDIX F: Basics of Application Communication Security

Digital Certificates

Digital certificates are electronic files that are used to uniquely identify people and resources over networks. Digital certificates also enable secure, confidential communication between parties. As an analogy, a passport as a traveling document provides a universal way to establish the traveler's identity and gain entry. Digital certificates provide similar identification in the electronic world. Certificates are issued by a trusted third party called a Certification Authority (CA). The CA can be compared to a passport office whereby its role is to validate the certificate holders' identity and to "sign" the certificate so that it cannot be forged or tampered with. Once a CA has signed a certificate, the holder can present their certificate to people, Web sites, and network resources to prove their identity and establish encrypted, confidential communications. A certificate typically includes a variety of information pertaining to its owner and to the CA that issued it, such as:

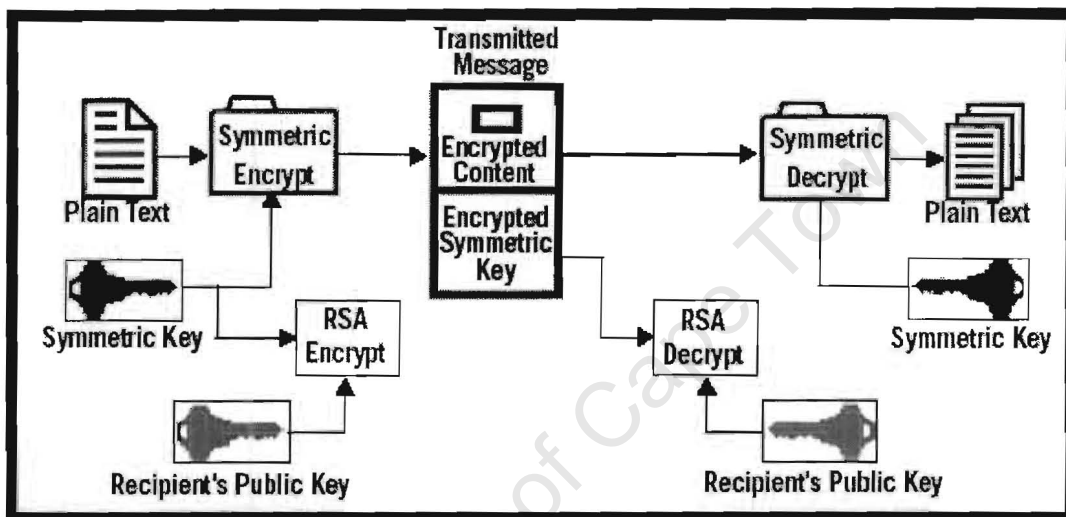
- The name of the holder and other identification information required to uniquely identify the holder, such as the URL of the Web server using the certificate, or an individual's e-mail address;
- The name of the Certification Authority that issued the certificate;
- A serial number;
- The holder's public key (more on public this below). The public key can be used to encrypt sensitive information for the certificate holder;
- The validity period (or lifetime) of the certificate (a start and an end date).

In creating the certificate, this information is digitally signed by the issuing CA. The CA's signature on the certificate is like a tamper-detection seal on a bottle of pills – any tampering with the contents is easily detected (Fingar, et.al, 2000).

Digital certificates are based on public-key cryptography, which uses a pair of keys for encryption and decryption. With public-key cryptography, keys work in pairs of matched "public" and "private" keys. In cryptographic systems, the term key refers to

a numerical value used by an algorithm to alter information, making that information secure and visible only to individuals who have the corresponding key to recover the information (IPNet Solutions, 2001). The PKI encryption process is schematically presented in the figure below.

Figure F1: Public Key Encryption (PKI)



Source: IPNet Solutions, 2001.

The public key can be freely distributed without compromising the private key, which must be kept secret by its owner. Since these keys only work as a pair, an operation (for example encryption) done with the public key can only be undone (decrypted) with the corresponding private key, and vice-versa. A digital certificate securely binds your identity, as verified by a trusted third party (a CA), with your public key (IPNet Solutions, 2001). A Web server certificate is a certificate that authenticates the identity of a Web site to visiting browsers. When a browser user wants to send confidential information to a Web server, the browser will access the server's digital certificate. The certificate, which contains the Web server's public key, will be used by the browser to:

- authenticate the identity of the Web server (the Web site), and

- Encrypt information for the server using Secure Sockets Layer (SSL) technology (more on SSL below).

Since the Web server is the only one with access to its private key, only the server can decrypt the information. This is how the information remains confidential and tamper-proof while in transit across the Internet.

A CA certificate is a certificate that identifies a Certification Authority. CA certificates are just like other digital certificates except that they are self-signed. CA certificates are used to determine whether to trust certificates issued by the CA. In the case of a passport, a passport control officer will verify the validity and authenticity of your passport and determine whether to permit you entry. Similarly, the CA certificate is used to authenticate and validate the Web server certificate. Companies such as Verisign and Entrust provide this security infrastructure to allow B2B customers and suppliers to conduct business over the Internet securely and with confidence (IPNet Solutions, 2001).

When a Web server certificate is presented to a browser, the browser uses the CA certificate to determine whether to trust the Web server's certificate. If the server certificate is valid and trusted, the browser and Web server will establish an SSL connection. If the server certificate is not valid, the server certificate is rejected and the SSL session is stopped. CA certificates come pre-installed on most popular Web browsers (Westley, E. and Gladdon, I., 2001).

Public-Key Infrastructures

In the past few years, public-key technology has become the preferred method for providing the means by which organisations can safely conduct business with each other over the World Wide Web. Public-key technology provides a variety of critical enabling capabilities for bringing trust to e-business transactions (IPNet Solutions, 2001).

Through encryption, public-key technology provides confidentiality. Through digital signatures, the technology provides:

- Strong authentication. Strong authentication means users can securely identify themselves to other users and servers on a network without sending secret information (for example, passwords) over the network.
- Data integrity. Data integrity means that the verifier of a digital signature can easily determine whether or not digitally signed data has been altered since it was signed.
- Support for non-repudiation. Support for non-repudiation means that the user who signed data cannot successfully deny signing that data.

Digital Signature is a transformation of a message such that a person having the initial message and the signer's public key can accurately determine whether the transformation was created using the private key that corresponds to the signer's public key and whether the message has been altered since the transformation was made. Each capability is required to effectively move business processes from the paper-based world to the electronic world, and to improve existing electronic processes (Westley, E. and Gladdon, I., 2001).

The comprehensive system required providing public-key encryption and a digital signature service is known as a public-key infrastructure (PKI). The purpose of a public-key infrastructure is to manage keys and certificates. By managing keys and certificates through a PKI, an organisation establishes and maintains a trustworthy networking environment. A PKI enables the use of encryption and digital signature services across a wide variety of applications (Westley, E. and Gladdon, I., 2001).

When discussing requirements for PKI, businesses often neglect the requirement for client-side software. For instance, many people only focus on the CA component when discussing PKIs. Ultimately, however, the value of a PKI is tied to the ability of users to use encryption and digital signatures. For this reason, the PKI must include client-side software that operates consistently and transparently across applications on

the desktop (for example, e-mail, Web browsing, e-forms, file/folder encryption). A consistent, easy-to-use PKI implementation within client-side software lowers PKI operating costs (Westley, E. and Gladdon, I., 2001).

There are a number of requirements that businesses have with respect to implementing effective public-key infrastructures. First and foremost, if users cannot take advantage of encryption and digital signatures in applications, a PKI is not valuable. Consequently, the most important constraint on a PKI is *transparency*. The term *transparency* means that users do not have to understand how the PKI manages keys and certificates to take advantage of encryption and digital signature services. An effective PKI is transparent (Westley, E. and Gladdon, I., 2001).

In addition to user transparency, a business must implement the following items in a PKI to provide the required key and certificate management services:

- public key certificates
- a certificate repository
- certificate revocation
- key backup and recovery
- automatic update of key pairs and certificates
- management of key histories
- Client-side software interacting with all of the above in a secure, consistent, and trustworthy manner.

Certificate repositories and certificate distribution

As mentioned earlier, the CA acts as a trusted third-party, issuing certificates to users. Businesses also must distribute those certificates so they can be used by applications. Certificate repositories store certificates so that applications can retrieve them on behalf of users. The term *repository* refers to a network service that allows for distribution of certificates. Over the past few years, the consensus in the information technology industry is that the best technology for certificate repositories is provided

by directory systems that are LDAP (Lightweight Directory Access Protocol)-compliant. LDAP defines the standard protocol to access directory systems (Westley, E. and Gladdon, I., 2001).

Several factors drive this consensus position:

- storing certificates in directories and having applications retrieve certificates on behalf of users provides the transparency required for use in most businesses
- many directory technologies supporting LDAP can be scaled to:
 - support a very large number of entries
 - respond efficiently to search requests due to their information storage and retrieval methods, and
 - be distributed throughout the network to meet the requirements of even the most highly-distributed organisations

In addition, the directories that support certificate distribution can store other organisational information (Westley, E. and Gladdon, I., 2001).

Secure Socket Layer (SSL)

Secure Sockets Layer (SSL) technology is a security protocol. It is today's standard for securing communications and transactions across the Internet. SSL has been implemented in all the major browsers and Web servers, and as such, plays a major role in today's e-commerce and e-business activities on the Web (Westley, E. and Gladdon, I., 2001). The SSL protocol uses digital certificates to create a secure, confidential communications "pipe" between two entities. Data transmitted over an SSL connection cannot be tampered with or forged without the two parties becoming immediately aware of the tampering.

Certificates are used in an SSL transaction when someone wants to connect to a secure Web site to buy something online in the following way:

- When this person visits a Web site secured with SSL, the browser sends a "Client Hello" message to the Web server indicating that a secure session (SSL) is

requested. The Web server responds by sending this person its server certificate (which includes its public key).

- The user's browser will verify that the server's certificate is valid and has been signed by a CA whose certificate is in the browser's database (and who the user trusts). It will also verify that the CA certificate has not expired.
- If the certificates are all valid, the browser will generate a one-time, unique "session" key and encrypt it with the server's public key. The user's browser will then send the encrypted session key to the server so that they will both have a copy.
- The server will decrypt the message using its private key and recover the session key.

At this point the user can be assured of two things:

- That the Web site he/she is communicating with is really the one it claims to be (its identity has been verified), and
- That only the user's browser and the Web server have a copy of the session key.

The SSL "handshake" - the process of identifying the two parties that want to establish an SSL connection - is complete and a secure communications "pipe" has been established. The user's browser and the Web server can now use the session key to send encrypted information back and forth, knowing that their communications are confidential and tamper-proof. The entire process of establishing the SSL connection typically happens transparently to the user and takes only seconds (Westley, E. and Gladdon, I., 2001).

The browsers today show a key or padlock icon in the lower corner of the window identifying the security mode of a browser. When the browser is running in "normal" mode, the key looks broken or the padlock looks open. Once an SSL connection has been established, the key becomes whole, or the padlock becomes closed, indicating that the browser is now in "secure" mode (Westley, E. and Gladdon, I., 2001).

SSL is supported in the vast majority of browsers, which means that almost anyone with a browser can take advantage of SSL encryption. SSL is also incorporated into most Web servers on the market (Westley, E. and Gladdon, I., 2001).

The Internet, Intranets, Extranets and wireless networks are re-defining how companies communicate and do business. As the value of business relationships and transactions increase, so do the associated risks and security requirements.

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APPENDIX G: Firewall and Demilitarised Zone (DMZ)

A secure architecture is a pre-requisite to achieving a secure communication amongst the components within the network. In the portal's world, this communication has to be secured between the user and the Portal and finally between the Portal and the backend applications.

Secure communication can only be achieved if the network architecture is built in such way that it can protect the communication. The network needs to support the communication necessary for the customer business without allowing unauthorised access. Highly sensitive systems and components, such as the Portal Server and Unification Server, should be located in a separate area that is sealed off from attacks from outside. Sensitive application and database servers should only be accessible via a demilitarised zone that is protected by a number of firewalls and proxy gateways serving different purposes (Westley, E. and Gladdon, I., 2001).

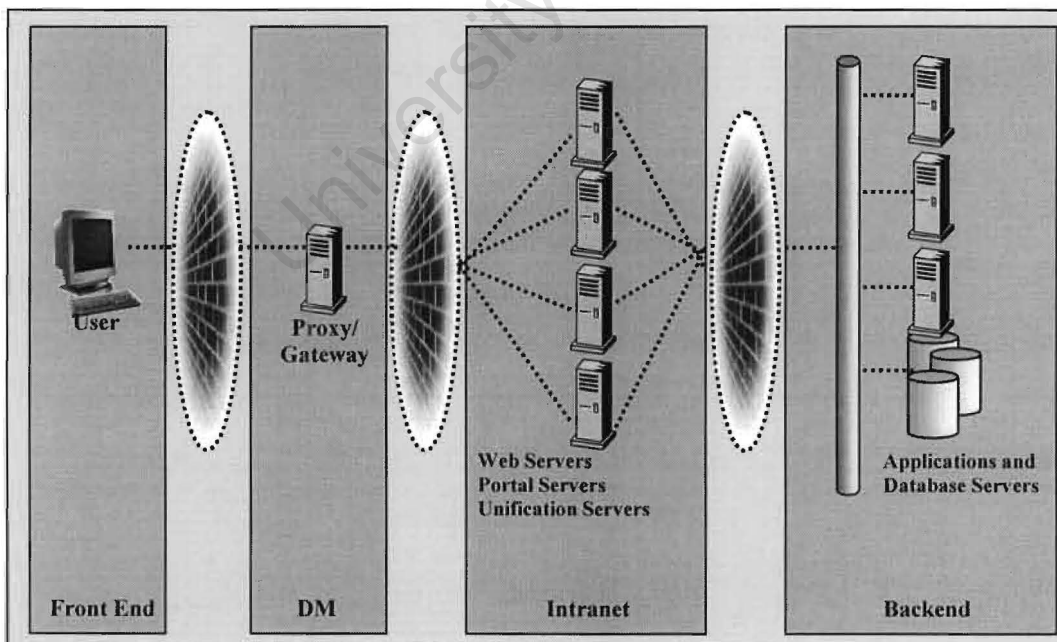
The use of firewalls can control the access to internal systems and resources from outside. It allows only desired connections to pass through and blocks certain communication channels (ports). In addition to this, firewalls may screen content (Westley, E. and Gladdon, I., 2001).

Before describing the Landscape and the possibility for distributing the components, it is necessary to explain the usage of Firewall and Demilitarised zones (DMZs). A Firewall is a system designed to prevent unauthorised access to or from a private network. Firewalls can be implemented in both hardware or software or still a combination of both. Firewalls are frequently used to prevent unauthorised Internet users from accessing private networks connected to the Internet, especially Intranets. All messages entering or leaving the intranet pass through the firewall, which examines each message and blocks those that don't meet the specified security criteria (Westley, E. and Gladdon, I., 2001).

Firewalls and Gateways are not the same but sometimes mistakenly used to describe the same thing. Firewalls are filters that block the transmission of certain classes of traffic (such as HTTP or FTP). A Gateway on the other hand, is one or more machines that supply relay services (acting as a proxy) to compensate for the effects of the filter (Westley, E. and Gladdon, I., 2001).

The DMZ (Demilitarised Zone) is a computer host, gateway or small network placed in a “neutral zone” between a company’s inner network and the outside public network. The DMZ is always isolated in between two firewalls. The first firewall isolates it from the Internet and the second firewall isolates it from the Intranet. The DMZ avoids the direct access to the private network coming from the outside world (Internet). In some cases, companies implement a three-tier firewall architecture for added security. In this case, there is an additional firewall protecting the Intranet. In this kind of architecture, two DMZ areas are encountered: Outer and Inner DMZ. This is schematically presented in the picture below (Westley, E. and Gladdon, I., 2001).

Figure G1: Three-tier firewall architecture.



Source: Westley, E. and Gladdon, I. (2001) *Business Case for the Atos Origin Enterprise New Drug Application (eNDA) Solution for the Pharmaceutical Industry*

APPENDIX H: Mapping application to e-business categories via strategic thrust construct

Figure H1: Mapping application to e-business categories via strategic thrust construct

Traditional Manufacturer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Knowledge Vendor			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Value Added Service Provider		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
E-Hub				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Manufacturer Selling Direct	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Online Info Service			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Retailer		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Community Portal				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Organization Type		Cost Leadership		Differentiation		
	Strategic Thrusts	Manu- facturing	Supply Chain	Innovation	Customer Service	Brand & Image
EB	Plan	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	Develop	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	Inbound		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	Produce	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
	Outbound		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
EC	Time				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Distance				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Relationships		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Interaction			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Product				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Legend
 Primary Strategic Thrust

Legend
 Primary Application (Sink)

Efficiency
Effectiveness
Strategic

Source: Riggins, F.J. and Mitra, S. (2001) *A Framework for Developing E-Business Metrics Through Functionality Interaction*