

# The language of digitalisation

*- An extract from the Ph.D. dissertation "Towards a new understanding of the digital strategic process"*



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<b>1</b>	<b>E-COMMERCE, E-BUSINESS OR JUST DIGITALISATION?.....</b>	<b>3</b>
1.1	DIGITALISATION IN A HISTORICAL PERSPECTIVE – FROM STEEL AND COTTON TO THE COMPUTER CHIP AND DIGITALISATION.....	3
1.1.1	<i>Phases in a Technological Revolution.....</i>	5
1.1.2	<i>The Search for Digital Values in the Digital Evolution.....</i>	7
1.2	THE CONCEPTS OF DIGITALISATION AND E-COMMERCE.....	9
1.3	DIGITALISATION – THE DEVELOPMENT FROM PHYSICAL TO DIGITAL.....	12
1.3.1	<i>Digitalisation of the Actor Dimension.....</i>	14
1.3.2	<i>Digitalisation of the Process Dimension.....</i>	15
1.3.3	<i>Digitalisation of Products.....</i>	16
1.3.4	<i>Applying the Concepts to a Case - Danfoss.....</i>	17
1.4	WHY MOVE FROM PHYSICAL TO DIGITAL STAGES?.....	18
1.4.1	<i>Why digitalise – a Perspective on Time, Place and Interface.....</i>	20
1.4.2	<i>The Importance of Interfaces – a case (Danfoss).....</i>	29
1.4.3	<i>Summing up of the Discussion on Digital and Physical Interfaces.....</i>	30
<b>2</b>	<b>STRATEGY AND STRATEGIC PROCESSES.....</b>	<b>31</b>
2.1	PERSPECTIVES ON THE CONCEPT OF STRATEGY AND STRATEGIC APPROACHES.....	31
2.1.1	<i>What is ‘Strategy’?.....</i>	32
2.1.2	<i>How does the Process towards a Strategy develop and who creates it?.....</i>	32
2.2	VARIOUS PERSPECTIVES ON THE PROCESS LEADING TOWARDS A STRATEGY.....	33
2.2.1	<i>(1) - Strategic Planning.....</i>	37
2.2.2	<i>(2) - Strategic Management.....</i>	39
2.2.3	<i>(3) - Scenario Learning – Strategic Interpretation.....</i>	41
2.2.4	<i>(4) - Strategizing – Strategic Behaviour.....</i>	43
2.2.5	<i>Summing up of the four Approaches to Strategy.....</i>	46
2.3	THE PROCESS LEADING TOWARDS A DIGITALISATION STRATEGY.....	47
2.3.1	<i>How Digitalisation is viewed in the Literature.....</i>	50

*Every young and growing people has to meet, at moments, the problems of its destiny (...). The fathers are dead, the prophets are silent, the questions are new, and have no answer but in time (...). The past gives no clue to the future. The fathers, where are they? And the prophets, do they live forever? We are ourselves the fathers! We are ourselves the prophets!*

John Hay (1838-1905)

## 1 E-commerce, E-business or just Digitalisation?

The purpose of the first part of the text is to identify and define digitalisation as phenomenon. The section is built up as a journey where we step by step dig deeper and deeper into the phenomenon of digitalisation. The journey we embark upon begins with a comparison of different technological revolutions as experienced through world history encompassing the invention of the computer and digitalisation. The rationale behind this comparison is to put the turbulent history that the internet and the digital technology have gone through since the invention of the computer chip in the 1970s into perspective – a history that has been communicated through various media. In that connection special attention should be paid to the events experienced at the end of the past century and the beginning of the new millennium. The intention is to construct a reference framework in which the challenges linked to the initiation of the digital technology can be made comprehensible.

The journey continues by uncovering and defining the different central concepts pertaining to the phenomena of digitalisation, including e-commerce, e-business and digitalisation. It will thus be unveiled that the little “e” (i.e. the electronic component), constitutes the gist of the discussion. Subsequently the journey moves towards a discussion of what it means to be digital, and later towards the question of why industrial companies should embark on digitalisation altogether.

### 1.1 Digitalisation in a Historical Perspective – from Steel and Cotton to the Computer Chip and Digitalisation.

Before engaging into a more detailed discussion of digitalisation, I intend to analyse and describe the evolution<sup>1</sup> that digitalisation and internet have undergone during the last decade, and compare this evolution with the development that similar technological revolutions have experienced. It can seem surprising that the comparison covers three decades and not only the period from the 1990s and onwards. Nevertheless, this is one of the most important discoveries that will be revealed in this section, as the digital technology has a longer history than is normally discussed. This is typical for technological revolutions as they are often spread over longer time - from the innovation until the respective technology has found its place as an integral and a natural part of the daily life of both consumers and companies. The purpose of this comparison is to present an often forgotten perspective on the development that is intensively described by the media. The development attracted much attention in the beginning of the new millennium where the dot-com bubble burst and e-commerce and e-business as concepts was declared dead.

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<sup>1</sup> The use of the concepts “evolution” and “revolution” alternates in this chapter, but both concepts should be understood in the way that the digital technology can be defined as a technological revolution spreading over the first invention of technology until it is generally accepted and incorporated into different levels of society. However, it is easier to understand the process in which technology became accepted in society if understood through the concept of “evolution”, as many small adaptations seen together constitute the process in which “revolution” becomes reality.

The gist in this discussion is to consider the computer, the microprocessor and the digitalisation as a technical revolution in line with the printing press and the steam engine. A technological revolution is described below:

*“[...] powerful and highly visible cluster of new and dynamic technologies, products and industries, capable of bringing about an upheaval in the whole fabric of the economy and of propelling a long-term development “ (Perez C.,2002)*

Disregarding the invention of the printing press, the steam engine or the motor car, all these technologies have gone through a comparable development from the time of their introduction until they find their use within the industries and areas that are very different from the place where the invention was originally identified<sup>2</sup>. The euphoria that followed the new technology did not stop to grow and consequently collapsed. The collapse gave rise to new perspectives on the use of the technology at a level that can be justified. The inherent values in the existing areas as well as in other areas, tools etc. that represent the new inventions, begin to emerge. Thus the exiting and the new merge, which creates the basis for new revolutionary technologies.

Great values are to be found in the merging phase between the “new” and the “old”, and the persons who are successful are often the ones who understand to combine the exiting elements in a new way. As examples of this it suffices to mention Henry Ford (the mass produced car) and Josiah Wedgwood (industrialised ceramic production) (Zuboff & Maxmin 2003). Actually, these (and several others including Michael Dell – [www.dell.com](http://www.dell.com)) epoch-making entrepreneurs did not build their success on new technological inventions. They did not invent new technologies for which they could take out patent and sell. On the contrary, at an early stage they discovered leeways to combine consumer patterns, technological possibilities and organisational innovations that had the potential to found their success (Zuboff & Maxmin, 2003).

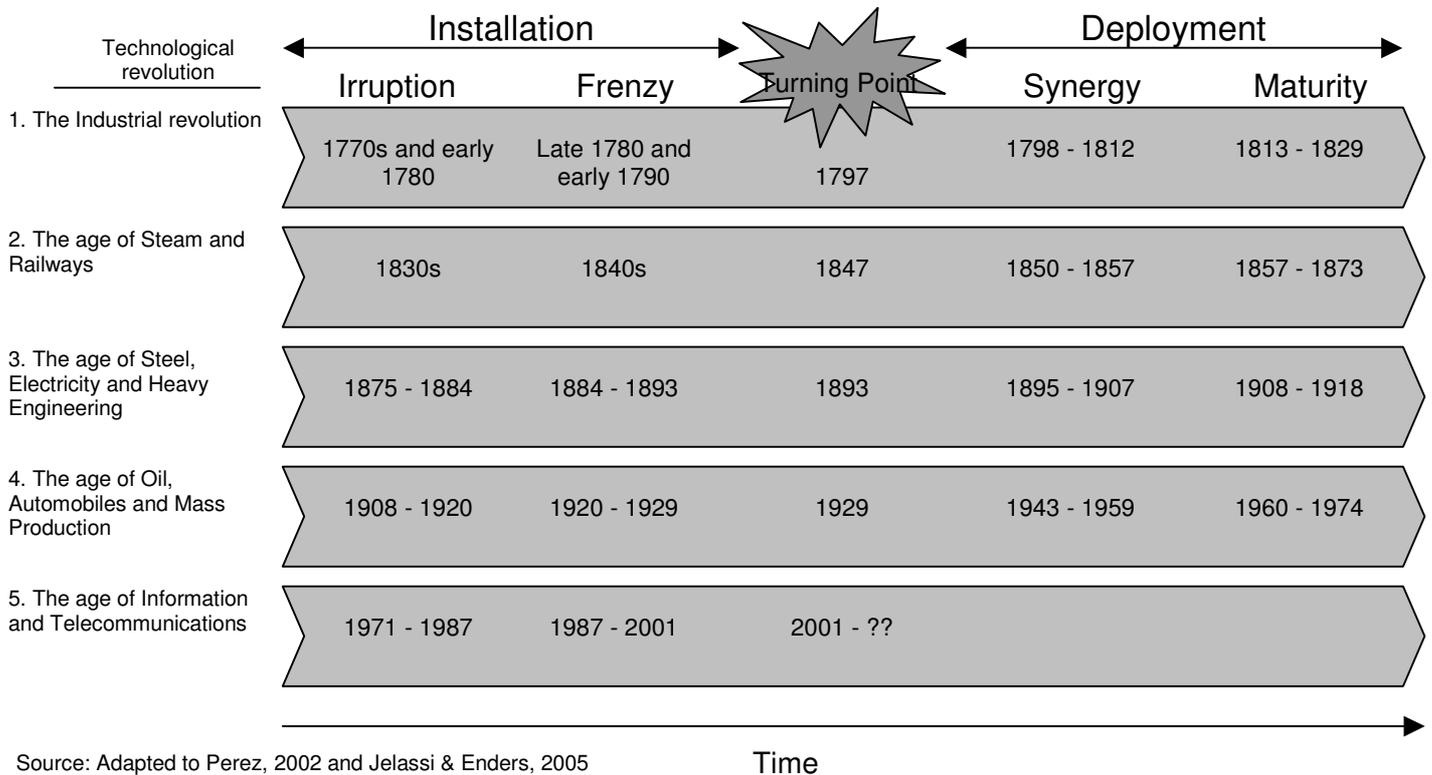
It has often been claimed that digitalisation will comprise the same importance for the economy as steam, railways and mass production. (Van Hoek, 2001, Huizingh, 2002, Perez, 2002, Jelassi & Enders, 2005). In this regard it is interesting to reflect the development the digitalisation and the internet have undergone in other technological revolutions. This will provide an indication of the present stage of development within digitalisation as well as it will identify the challenges that face organisations and industrial actors. The development can be divided in different periods and stages as illustrated in Figure 1.

As shown in Figure 1 Perez divides the development that the technological revolutions have undergone, in two main periods that each contains several stages: (1) the installation period encompassing the changing- and wildness phase and (2) the application period encompassing the golden age and the adult phase. According to Perez there is another stage, the collapse, between the two phases.

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<sup>2</sup> An example: The railway was originally invented to carry coal out of the mines, and it was not until years later it was discovered that this technology could be used to the transportation of goods and people.

**Figure 1: Technological revolutions and their development**



The specific technological revolutions thus stretch over longer periods of time, and the time from the discovery of the original invention until its recognition in the existing economy is often considerable. The era of information and telecommunication began in 1971 with the introduction of the microprocessor that made it possible to produce computers in sizes and to prices which put companies and private persons in the position of owning and using this new technology.

The model outlined in Figure 1 showing regularities that are identified as well as the whole concept that technological revolutions undergo comparable phases, is obviously a simplification of the reality. Hence the model entirely encompasses sequences of isolated events which are not all immediately causally interconnected. Furthermore, the model excludes other significant events such as wars, droughts, gold occurrence as well as many other social and political events.

The model serves entirely the purpose of creating order in chaos through a structuring of many historical incidents. The structuring renders the model useful in understanding the history that digitalisation has undergone. This understanding intends to generate indications of the situation and the challenges organisations face in relation to digitalisation.

### 1.1.1 Phases in a Technological Revolution.

The first phase is the *Irruption phase* commencing immediately after the introduction of a new technology on the market. Examples of technologies are the mechanised cotton industry in 1770, the construction of railways in 1830 and most recently the introduction of the first microprocessor in 1971. Throughout the irruption phase innovative products and services based on the new

technology are launched. Slowly they get access to the market that is still dominated by the traditional technology and its special way of acting.

The *Frenzy phase* is characterised by a feeling of exploration and wealth, as entrepreneurs, engineers and investors during this phase attempt to find the best conditions and use of the new technology. Many projects are launched by using a trial and error methodology. These projects rapidly lead to the introduction of the new technology to the existing market. As time goes by in the frenzy phase, a feeling of infallibility is noticeable, especially among investors. In this phase depending on the different technological revolutions, the investors - excited and convinced of their own geniality-, have generally speaking, financed channels through all rivers, constructed railways between all towns and villages and more recently created digital retail enterprises trading in all possible types of products from animal feed to medicine and clothes. This phase continues until the stock market prices for the new enterprises distance themselves so much from their fundamental principles that a collapse is inevitable.

The collapse is the unavoidable result of the massive inflow of capital to companies that in one way or the other use the new technology. The collapse occurs when leading players recognise that the heavy investments can never justify future revenues. The result of this newly acquired insight is that the investors loose faith in the companies that are involved in the new technology, and they withdraw their investments. The consequence is a spiral in which everybody withdraws their investments and the stock market prices decline drastically. The adventure evaporates in the thin air, and the stock market collapses.

The golden age phase, as named by Perez (2002), is the time where the easy money has disappeared. Now the investors prefer to place their money in the “proper (old)” economy, and in the companies that are successful in using and incorporating the new technology. During the period of collapse many of the new companies have been forced to close down, and focus has now shifted from technological innovation to ensure that the technology is reliable, easy to use, safe and cost effective. In order for the golden age phase to develop there is a need for macro-economic adaptations to restore the confidence in the new technology.

The *adult phase* is the last phase in the Perez model. This phase is characterised by saturated markets and thoroughly tested technology. There are fewer technological innovations, and the companies’ focus is on improvement of effectiveness and reduction of expenses.

Thus the period from the first commercial utilisation of a new technology to its actual application covers nearly 50 years. This long period and the fact that the customers often use the innovations in new contexts that no one could have foreseen, is also the reason why even well informed persons can get away with statements like the following:

“640K ought to be enough for anybody”  
Bill Gates, 1981

“This’ telephone’ has too many shortcomings to be seriously considered as a means of communication. The device is inherently of no value to us”  
Western Union internt memo, 1876

#### **An parallel example: The Railway Industry**

A good example of a technological revolution that has undergone the same development, is the development the railway industry went through in England from the early 1830s till 1847, where the big collapse took place. During the 1830s the railways were the object of growing interest from entrepreneurs whose projects were financed by investors seeking profit. Connections were constructed between many bigger towns in England. As opportunities for new projects had been depleted as a result of the considerable eagerness to invest, projects that previously had not been able to attract investors suddenly became interesting. Hence the stretches where it was easiest to build the railway, and where the potential for passengers proved to be most significant, were the first to attract investors. Later it was possible to obtain financing of stretches that were far more complicated. As these possibilities were depleted competing railway companies started constructing parallel railways between the same towns, although it was obvious, that only one single railway would be able to generate profit.

This keenness for investing inevitably made the railway-bubble burst, and the share prices on railway companies lost 85% of their value, when it was highest. After the collapse in 1847, where many companies went bankrupt, only 5 years passed before the profit in the industry were tripled, and in 1850 a great deal of England’s economic growth originated from the railways. (Jelassi & Enders, 2005)

*“I think there is maybe a world market for maybe five computers.”*

Thomas Watson, direktør i IBM, 1943

*“I can think of no conceivable reason why an individual should wish to have a computer in his own home.”*

Ken Olson, president, chairman and founder of Digital Equipment Corp., 1977

So the above statements are expressed by people who definitely knew what they were talking about. The fact that they are so unmistakably wrong, illustrates in all plainness the development that the technology is undergoing as well as the amount of innovation and new lines of thinking that are necessary for the technology to be applicable within areas that were difficult to imagine and hence predict. This is also one of the most important explanations to the long period from the *irruption* to the *golden age* and later to the *adult phase*.

Thus it does not suffice that the right and operable technology is available. It is likewise necessary that senior staff, engineers etc. show willingness to relinquish traditional ways of acting and instead begin applying the new technology in areas where it makes sense and generate value. The transformation takes time as well as it demands experiments and adaptation. Finally it results in:

*“(...) the new paradigm eventually becomes the new generalized “common sense”, which finds itself embedded in social practice, legislation and other components of the institutional framework, facilitation compatible innovations and hindering incompatible ones” (Perez 2002)*

A new “common sense” must be created, by which the new technology can be fused with the traditional economy.

### **1.1.2 The Search for Digital Values in the Digital Evolution.**

The development that digitalisation and related concepts as e-commerce and e-business have gone through can easily be compared to the above described development. The fundamental inventions the digitalisation is based upon (computers, microprocessors and internet), date back to the early 1970s. Despite the fact that these inventions emerged more than 35 years ago, it was not until the end of the 1980s and during the 1990s the computer was to be found in every home. Later, by the end of the 1990s the internet leaped from the status as an exciting technology to being a product that brought value to consumers and companies. 1995 was the year where the internet bookshop [www.amazon.com](http://www.amazon.com) was established, and hence this year inaugurated the dot.com period. At the same time the dot.com era represents the most heated *wild phase* that resulted in bankruptcy for many dot.com companies in 2000 and 2001. The following statement from Børsen, illustrates the generally accepted understanding before the collapse:

*“The difference of being inside or outside the digital economy is simply a question of neck or nothing, and there are no easy short cuts – either you are participating actively in the network society -or you end up as a simple comma in the history books”*

(Børsen, Informatik, 3<sup>rd</sup> Oct. 2000, p.18-19)

During this period there was no room for scepticism, and therefore everybody had to jump on the digital wagon. The Internet bubble burst in 2000 and 2001 where not only the dot.com companies but also the Internet retail businesses went bankrupt. Also the NASDAQ stock exchange fell with

45% during 8 months in 2000 (Jelassi & Enders, 2005). The Internet, e-commerce and the digital economy, as referred to earlier, was declared dead, and the time had come where the well established companies would take over. This period has often been portrayed as a negative incident. However, Perez describes how these collapses actually play an important role in the development of the technological revolutions, the reason being that the rapidly increasing investments prior to a collapse affect the expansion of the infrastructure, that in the future will contribute to support the development that a new technology has to go through. Perez (2002) states:

*“To accommodate each technological revolution, many changes need to occur (...). The new technologies will require the establishment of a whole new network of interconnected services such as the specific infrastructure and the specialized suppliers, distribution channels, maintenance capabilities and other that provide the territorial externalities to facilitate diffusion. Without roads, gasoline stations and mechanics, people cannot use automobiles, yet only enough automobiles on the road will make it profitable to run a station or a garage. So diffusion occurs through intricate feedback loops.”* (Perez,2002).

The extensive media coverage the technological revolutions experience prior to and just after the collapse also contribute to initiate a learning and a cultural adaptation among senior staff, engineers, sales – and service staff as well as among consumers. In this connection Perez claims:

*“(...) there is the cultural adaptation to the logic of the technologies involved. A vast learning process must take place among engineers, manager, service and sales people and obviously consumers, about the production and use of the new products. This not only supposes learning to drive a car, use a radio or washing machine, but also an understanding of the direction of innovation, so that novelties can easily be adopted and accepted.”* (Perez, 2002)

There is no doubt that the intense enthusiasm to invest, the collapse and the death of many dot.com businesses in the beginning of the new millennium have contributed to initiate a learning and cultural adaptation in relation to the digital economy. This learning does not only relate to consumers and companies, but to a great extent there has likewise been extensive activity at government and EU-level during the following period, and several important regulations have been enacted. As an example the Danish Government has played an important role in the expansion of the infrastructure by establishing Den Offentlige Indkøbs Portal (DOIP)<sup>3</sup> and the demand for electronic invoicing to all public authorities. Seen together and individually these actions contribute to promote the spread of the digital technology, especially with regards to further expansion of the infrastructure and learning as well as adaptation to the general economy.

In relation to this Perez (2002) writes:

*“The world of computers, flexible production and the internet has a different logic and different requirements from those that facilitated the spread of the automobile, synthetic materials, mass production and the highway network. Suddenly, in relation to the new technologies, the old habits and regulations become obstacles, the old services and infrastructures are found wanting, the old organizations and institutions are inadequate. A new context must be created; a new “common sense” must emerge and propagate.”* (Perez, 2002).

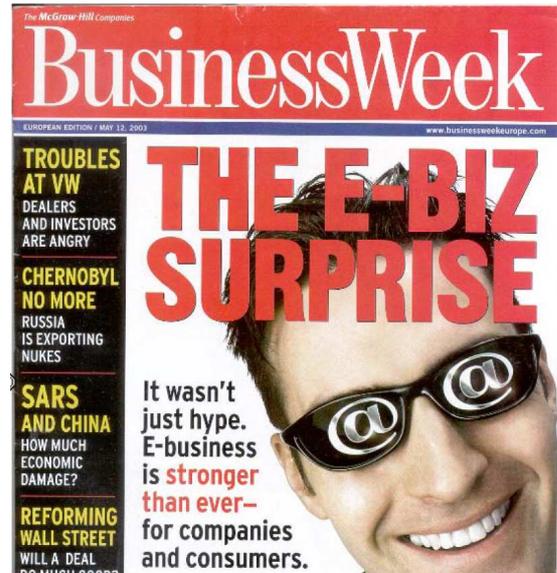
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<sup>3</sup> The Public Shopping Portal

According to the analyses carried out by Perez (2002) and Jelassi & Enders (2005) there are strong indications that the digital technology enters the early *golden age phase*, where it diffuses to all parts of the existing economy. A quick look in journals or at the front page of Business Week (2003) substantiates this.

The following is a quotation from Børsen: “*The E is about to leave the e-business as internet shopping is becoming an integral part of the companies*” (Børsen Informatik, March 6, 2001:16) “*In a year nobody will talk about e-business*” (Børsen Opinion, June 21, 2000:3). “*The new economy will have disappeared in 3-4 years*” (Børsen Informatik, April 24, 2001:10).

Also van Hoek (2001) explains how we are entering the *second wave* of digitalisation in which it is the existing companies leaning on thoroughly tested business models that profit from digitalisation. Cagliano et al. (2003) conclude in their study that many companies are in the middle of a transformation phase, and that many of the researched companies plan to use digitalisation in many transactions in the future. Huizingh (2002) agrees as he describes a development in which the companies are consolidating the company with regards to the use of digitalisation. Although the companies are in the middle of a consolidation phase, the internet technology is still in its infancy (Humphrey et al. 2006). In their excellent book Zuboff & Maxmin (2003) argue that what we are witnessing is a new form of capitalism. The internet and digitalisation is one of the most significant forces that facilitate this new capitalism, that they name “*The Support Economy*” (Zuboff & Maxmin, 2003).



Kilde: BusinessWeek, 12 Maj, 2003

More examples could be mentioned, but individually and as a whole the examples described above indicate that the digital technology pervades what Perez (2002) denote as the *golden age* – the phase in which the new technology will merge into the existing economy, or as Michael Porter notes:

“*The key question is not whether to deploy internet technology – companies have no choice if they want to stay competitive – but how to deploy it (...). The next stage of the internet’s evolution will involve a shift in thinking from e-business to business, from e-strategy to strategy. Only by integrating the internet into overall strategy will this powerful new technology become an equally powerful force for competitive advantage*” (Porter 2001).

Thus time is a factor to be taken into consideration as the technology slowly but safely merges into the DNA of the existing company, for later to become a natural part of running a business. In the same way as the telephone, mass production and other innovations have become a natural part of our daily life.

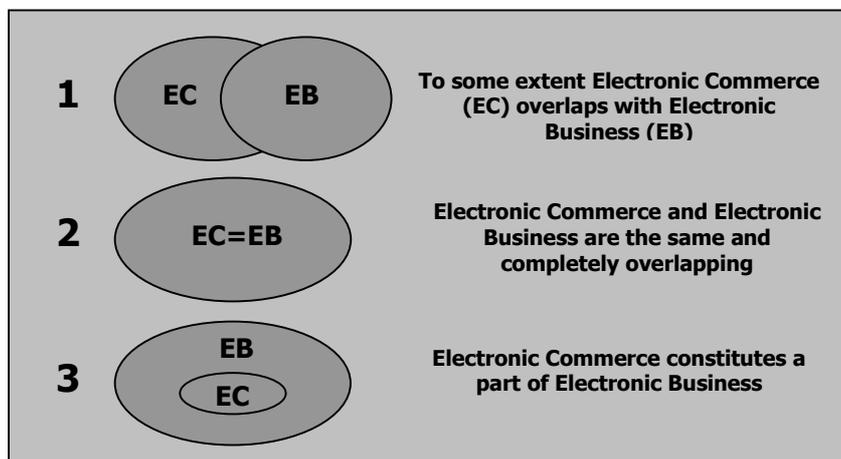
## 1.2 The Concepts of Digitalisation and E-Commerce

The new technology entails that many individual persons and organisations must adapt and implement the new technology, in the sense that many ingrained routines and methods must be relinquished. Gradually, an “e” was placed in front of many concepts in order to exemplify, that now the process was not off-line, but online or electronic. E-business, e-marketing, e-commerce, e-

learning and e-service are just some examples. Thus the many concepts were developed under the considerable attention the phenomenon obtained in the late 1990s. This also led to the development of many overlapping or contradictive definitions, and there are still no generally accepted definition of vital concepts like e-commerce and e-business (Tassabehji,2003). Therefore it is important to discuss what is meant when the different concepts are used in order to decide on the framework for the digital technology in the text.

In the literature as well as in the media the concepts *e-commerce* and *e-business* are the most used terms in the discussions concerning various company related processes. When scrutinising the increasing, comprehensive literature treating this phenomenon, one will especially find three different understandings of e-commerce and e-business. They are as follows: (1) the concepts are overlapping, (2) they are alike or (3) electronic commerce constitutes a subset of electronic business.

**Figure 2: Three Perspectives of the Connection between E-commerce and E-business**

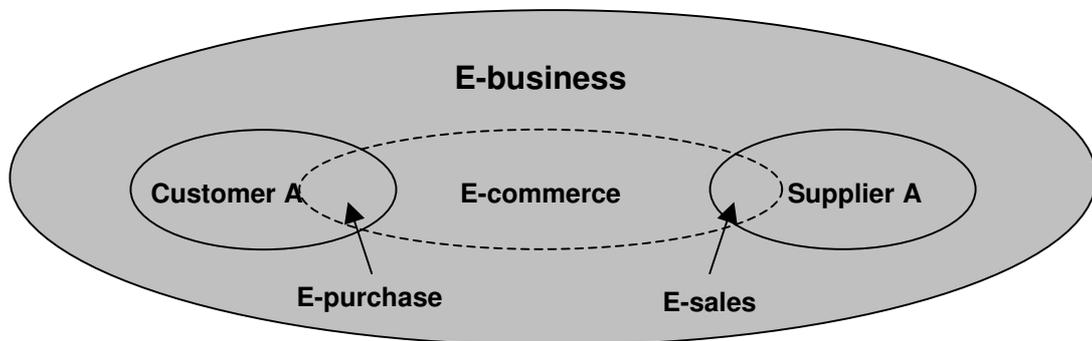


Kilde: Chaffey, D., 2004

Examples of the different understandings are as follows: “*E-Commerce includes all aspects of doing business electronically*”(Timmers, 1998) and “*E-Commerce embraces all aspects of buying and selling products and services*”(Norris, 2001) and “*E-business refers to a broader definition of E-commerce, not just the buying and selling of goods and services, but also servicing customers, collaborating with business partners and conducting electronic transactions within organizations*”(Turban et al., 2006)

Thus there is a big differentiation in the interpretation of the various concepts, and Turban et al. (2006) write that the two concepts are mutually compatible. However, I find that there is a big difference between shopping electronically and carry on an electronic business. The difference should be seen in the fact that e-commerce indicates an isolated activity, whereas an e-business refers to all aspects of carrying on a business and hence engages in various other elements than commerce alone. Thus I place myself in the third category in which e-commerce constitutes a subset of the concept of e-business. My interpretation of the central elements is illustrated in the figure below:

**Figure 3: The Difference between E-business and E-commerce**



Kilde.: Inspireret af Chaffey, D., 2004

As shown in the figure the concept of e-business covers of digitalising of different functions in the company encompassing everything from purchase, research and development, production etc. Referring to Porter (1980, 2001) one could talk about digitalisation within each of the 9 generic activities.

In this connection e-commerce represents the inter-organisational perspective or the activities between customer and supplier. In the text e-commerce is thus defined as follows: “*E-commerce includes all aspects of doing business electronically; buying and selling of goods and services, servicing customers, collaborating with business partners and conducting electronic transactions*” (Timmers 998, Turban et al., 2006). Thus this definition exclusively emphasises the processes taking place between companies as a direct part of doing business. However, the definition is broader than just placing an order, as it also emphasises collaboration and service. The biggest difference between e-business and e-commerce should thus be seen in the fact that e-business concerns digitalisation of business processes broadly defined, whereas e-commerce exclusively focuses more narrowly on the processes of selling in a inter-organisational perspective.

E-purchase and E-sale are concepts relating to different parts of the concept E-commerce. As the systems that are implemented in relation to two different activities often will appear in different shapes and the argumentation for implementation and utilization likewise will be different, the concept of e-commerce will be split in e-purchase, defined as: “*E-commerce transactions between a purchasing organisation and its suppliers*” (Chaffey,D., 2004) and e-sale, defined as “*E-commerce transactions between a supplier organisation and its customers*”(Chaffey, d., 2004). Thus it becomes evident that focus on the discussion on e-commerce and the decision are placed differently, depending on whether it relates to a purchase – or a sale context.

It is of course debatable how long there will be a need for specific definitions of the digital phenomenon: as the *golden age* unfolds and as the digital technology becomes a natural part of everyday life, the need for a definition of the digital phenomenon will decrease. A similar example serves as comparison. Today there is no longer a need for specific definitions of the telephone, and when and how to use it. On the other hand, in the beginning, when the telephone was considered a new technology, definitions were needed as it was important to communicate and describe the new technology and its potential. Hence at a certain stage it will be meaningful to talk about electronic implementation of business in stead of e-business or e-commerce. Nevertheless there is a need for

digitalisation and hence a transformation from physical to digital conditions. This subject will be treated in the next paragraph.

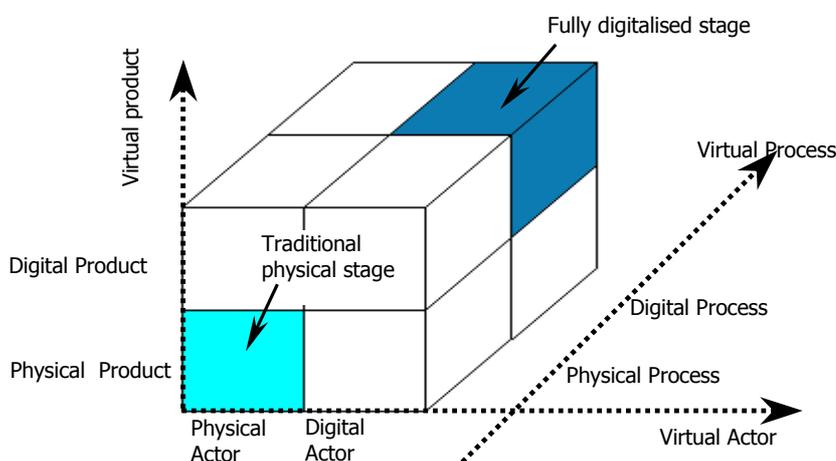
### 1.3 Digitalisation – the Development from Physical to Digital

After having defined the different concepts (e-commerce, e-business etc.) focus will be on the most important and often neglected part of the definitions, namely the little “e” that is placed in front of many traditional concepts, meaning “electronic” or “digital”. The literature leaves much space to define the different e-situations and less space to understand and define, what is meant by “electronic” and “digital”. Huizing (2002) clearly states that an important reason to the many failed attempts to transform an analogues or off-line company into a digital or electronic one is often due to lack of knowledge of the transformation process itself from the physical to the electronic status. This lack of knowledge of the transformation process also relates to the lack of organisation and strategy of the different elements that need to be digitalised in order for the company to survive the transformation process unscathed.

In other words it is often implicitly assumed that the reader knows and understands what is meant by digitalisation, and how the process develops. In reality, digitalisation is a process or a development from a physical to a digital status (Rask 2001). The transformation process is the most powerful argument which is the reason why I use the concept of digitalisation in stead of e-commerce and e-business. In my view the concepts of e-commerce and e-business to a greater extent indicate a status quo than a transformation process. If the digital technology is meant to be an inherent part of daily life in the companies, it seems to me that it would be more beneficial to understand the challenges and problems relating to digitalisation in the light of a transformation process. With regards to the description of the technological revolutions it becomes evident that to a greater extent the discussions are about a protracted transformation process where the companies’ adoption of the technology (internally, externally or in relation to the product) increases as time goes by. Therefore it seems meaningful to apply a definition that relates directly to the transformation process.

Choi et al. (1997) use a model in which the development from physical to digital can take place within three dimensions: (1) actors, (2) processes and (3) products. When the three models are compiled in one model it creates a dice with eight different possibilities. Figure 4 below illustrates these possibilities:

**Figure 4: The Development from Physical to Digital (electronically)**



Kilde.: Choi et al. (1997) og Turban et al. (2000)

The three dimensions are interdependent which means that a full or partial digitalisation of a dimension will influence possible digitalisation of the other dimensions (Rask 2001). One example could be how a website containing information on a company or a product influences both the process – and the product dimensions. The website will constitute a digitalisation of the process (it is now possible to locate the company in digitally as well as various services can be delivered digitally). Thus the product has become digitalised in the sense that a digital representation of the product has now become a reality. However, the product itself is still physical, but now it is also possible to find, see and compare the product by means of the interfaces that – all things being equal – denotes a digitalisation of the product as it is now no longer entirely physical.

As I apply the model in connection with a sales company, the three dimensions are separated.

(A) The *actor dimension* refers to the digitalisation that takes place within the company, (i.e. implementation of different IT-systems) that the customers do not have direct access to. As examples of these systems or digital applications it is relevant to mention the following: Customer Relationship Management, Enterprise Resource Planning or Intranet.

(B) Digitalisation of the *process dimension* represents the customer related context or what takes place externally in relation to the company (i.e. implementation of IT systems or digital applications especially supporting the relations to the customers, e.g. commerce platform, website and configuration tools).

(C) Digitalisation of the *product dimension* represents a digitalisation of the product or the service that the company sells. This means that the hard ware components have access to the internet, so that they can be monitored, or that the service itself can be digitalised. As examples it can be mentioned how MP3 files constitute a digital representation of the physical music from an LP record.

Thus the quintessence of the model is an illustration of the extent to which the three dimensions are physical or digital. During the extensive media coverage the digitalisation was exposed to in the period leading up to the dot.com collapse and the following years, the focus of the model was centred on the most extreme cases (the coloured quadrants where the status is entirely physical or digital). The entirely digital stages are often proclaimed as winners, and the entirely physical stages as losers (Børsen, Oct.3, 2000). In reality, however, it is evident that the situations between the extreme cases are just as interesting (Hørlück, 2000).

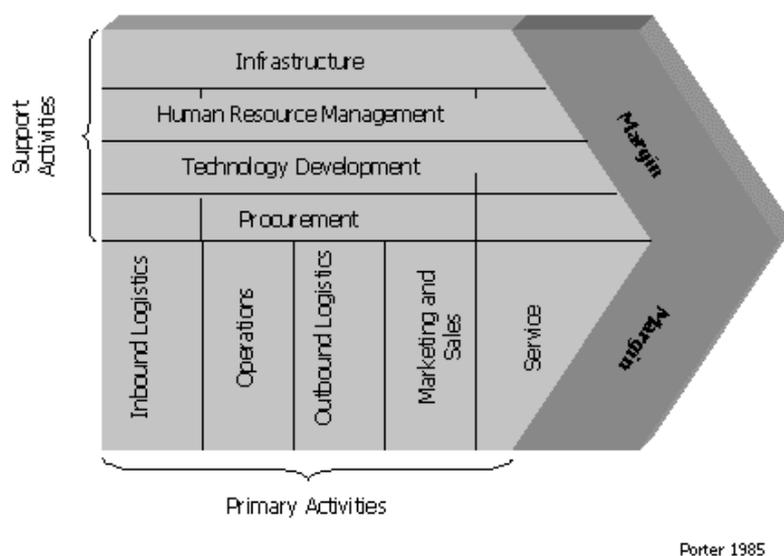
However, extreme cases are also to be found. The domain names that are the addresses the users enter as they navigate on their intranet browser, ([www.danfoss.com](http://www.danfoss.com)), are good examples of a completely digital stage within all three dimensions. The domain name is a digital product, and it is located, bought, delivered and consumed digitally. If the internet was closed down or the power was cut for a longer period of time the domain names would completely lose their value. There is no need to describe the other extreme cases as the situation where all dimensions are physical is well known. Therefore digitalisation in the text is defined as “*the process by which industrial companies within the actor, process or product dimension is transformed from physical to digital stage*” (Rask, 2001).

The transformation process in relation to the three dimensions, actors, process and product will be treated thoroughly in the following paragraph.

### 1.3.1 Digitalisation of the Actor Dimension

As the text focuses on industrial commerce, the companies constitute customers and suppliers. It is interesting to which extent these companies or actors are digital or physical. A digitalisation of the actor can be any digitalisation for internal use within the nine activities in the value chain, whereas a physical actor is a traditional, physical company. The value chain with the different digitalisation possibilities in relation to the nine activities is illustrated in Figure 5.

**Figure 5: The Value Chain as a Picture of Digitalisation of the Actor Dimension**



Kilde: Porter, 1985

As the figure illustrates digitalisation of the actor can basically signify digitalisation within each of the nine generic activities in the value chain. “*Infrastructure*” is one of the most important areas within the value chain, when digitalisation of the actor dimension and digitalisation in an industrial context is assessed in general. Especially before the dot.com bubble burst, there was a considerable focus on digitalisation of the process dimension, as digitalisation was deemed the proper way to establish a digital sales channel (Cagliano 2003, van Hoek 2001). However, many companies have come to realise that it is difficult to digitalise the commerce process, as neither the suppliers nor the customers on the actor dimension are digitalised to a level where the profits linked to digitalisation can be utilised (van Hoek 2001). In other words, there is no value in having roads and filling stations, if there are no vehicles on the roads; i.e. it is not difficult to create a website that can receive orders; on the contrary it is a somewhat bigger task to make this website work together with the rest of the company’s infrastructure (van Hoek 2001). Porter (2001) terms the new age as the age of integration. However, one has to ask what is to be integrated, if the companies’ digital infrastructure is not yet in place? Although the company infrastructure is depicted as an activity, the digitalisation of the actor dimension expands to the infrastructure that supports the company in all of the nine activities. What is critical to understand is that marketing and sale might well be

digitalised without the customer directly noticing it, as they are just a digitalisation of the internal functions in relation to the marketing and sales organisation.

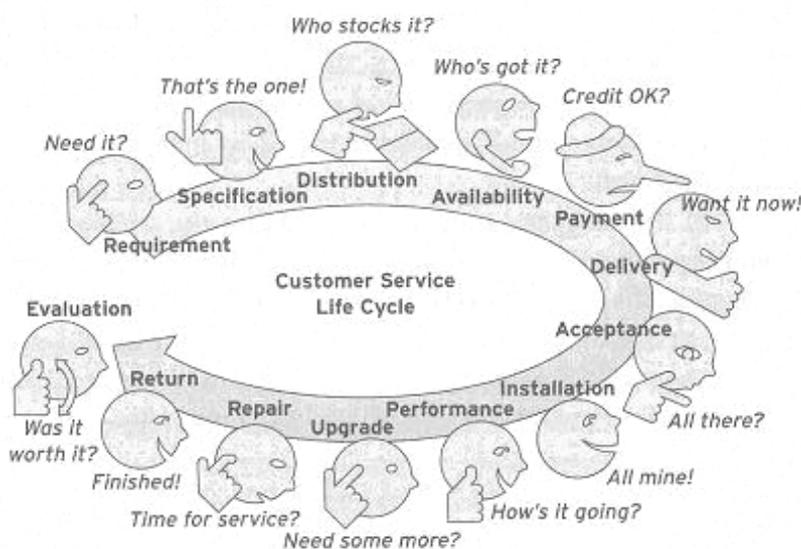
Therefore digitalisation of the actor dimension emphasises digitalisation of the actor in an internal or infrastructural perspective. In other words, concurrently with digitalisation of the actor, various possibilities of the process dimension become observable, in the way that business processes or interaction with customers and other stakeholders can become digitalised or eventually automated.

### 1.3.2 Digitalisation of the Process Dimension

The process dimension encompasses the interaction that takes place between industrial actors concerning purchase/sale and other market related activities. We are dealing with the exchange of electronic information that was previously exchanged via letter, fax, telephone or face-to-face (Rask 2001). The commerce process is thus regarded as broader than only as transactions, as transactions are often associated with: exchange of products and documents related to the concrete deal (purchase order, acknowledgement of order, dispatch documents and invoice). The commerce process covers everything from the early search and the first contact until the delivery of the product and the servicing after sale. Feeny (2001) and Ives et al. (1999) illustrate this process through the Customer Service Life Cycle (the CSLC model). What is important to notice is that the model shown in Figure 6 is a theoretically conceived process. Once the model is used in practice it must be adapted to the type of customers and relations the company is involved in.

As shown in Figure 6 the model covers the early stage of the relation between customer and supplier, as the model takes its starting point in the customer's early need, and then the model moves from specification to delivery, updating and disposal. Referring to the model the most digitalised process will be the stage where all activities can be handled digitally.

**Figure 6: Customer – Service- Life Cycle**



Kilde.: Feeny, 2001 og Ives et al., 1999

In connection with purchase of different products it is now possible for companies to support the customer-service-life-cycle more or less digitally. Examples of entirely digital processes are present within music, bank transactions or domain names. In the music business it is possible for the customer to identify and determine the need via websites, where s/he can discuss music and listen to fragments of the music. Subsequently the customer can locate the cheapest supplier, and purchase and delivery can be made digitally. S/he can play the music on the computer and choose more music in a similar genre. Hence it is possible to get suggestions to which extra numbers other persons with a similar taste in music have purchased. If the product is not digital there will inevitably be processes that cannot be 100% digitalised. However, the provision of digitalised information of supplies in real time makes it possible for the customer to follow how far the goods have reached on the itinerary from e.g. Denmark to Germany. Thus although the talk is about physical products, many of the above mentioned phases can still be digitalised to a certain extent and/or new digital activities can be added.

Van Hooft and Stegwee 2001 as well as Kettinger and Hackbarth 1997 and 2000 apply another model: Customer-Supplier Life Cycle (C-SLC) in order to understand the processes taking place between customers and suppliers within an industrial context. Huizingh's (2002) Customer Interaction Cycle (CIC) is also an alternative attempt to create an overview of the digitalisation possibilities that are available in the interaction with the customer. The CIC and C-SLC models differ from the customer-service-life cycle in the sense that the CIC and the C-SLC focus on the process taking place between the customer and the supplier, whereas the customer-service-life cycle entirely focuses on the service needs the customer encounters in the specific phases. However, the three models undergo the same basic phases (purchase, order, exchange and use).

### 1.3.3 Digitalisation of Products

Digitalisation of the product dimension provides the opportunity to digitalise the actual service the transaction between seller and buyer includes. The degree of digitalisation depends on the characteristics of the service (Rask 2001). It goes without saying that it is only some services that can be completely digitalised, such as bank transactions and legal instructions. Information and entertainment items such as books, software, music and videos can likewise be completely digitalised (Pérez-Esteve & Schuknect, 1999).

In the next paragraph we shall be acquainted with a story from Den Danske Bank (DDB) and its digital infrastructural advantages. One of the advantages that DDB could obtain through a better digital infrastructure in the purchased Irish banks would be the possibility for home banking which is a good example of digitalisation of the product. In that respect home banking would be a digitalisation of both the process and the product dimension.

This leads us to the perspective that the product must be understood in a broader sense than the mere physical manifestation of the product. Thus the product dimension encompasses:

*“(... ) anything that is offered to a market for attention, acquisition, use or consumption and that might satisfy a want or need. Broadly defined, products include physical objects, services, persons, places, organizations, ideas or mixes of these entities.” (Kohler et al., 2001)*

Hence there are examples that the physical part of the product cannot be digitalised by means of the present technology. In these cases there will be a bigger overlap between the process – and product dimensions, as it is possible to digitalise the product related processes e.g. configuration,

monitoring, reporting of defective goods or delivery of information in real time in relation to stock status or delivery.

### **1.3.4 Applying the Concepts to a Case - Danfoss**

The above paragraphs have described and defined the different concepts relating to digitalisation. It has been argued that the central feature in the many “e” concepts is the digitalisation understood as a development from physical to digital stages within actor, process and product. The three dimensions can either be physical (offline) or digital (online). In cases where both product, process and actor are digital, we are dealing with the most digitalised form of e-commerce. The actors locate each other and the product online, at the same time as the product is delivered digitally. If all three components are physical we are dealing with traditional trade, and no digitalisation of the trade has taken place. Between the two extremes there are many other situations, but generally seen, all situations in which either the actor, the process or the product is digitalised, can be characterised as a stage where digital interfaces in the trade between customer and supplier are applied.

Applying the concepts to a case – Danfoss, the above discussion shows that the company’s digitalisation initiatives can be divided with reference to the three dimensions, and hence we can reach a deeper understanding of the digital status in Danfoss. The organisational division of responsibility relating to digitalisation in Danfoss is transparent. Thus it is obvious that company is a highly digitalised actor, and the responsibility for this area is unsurprisingly situated in the Danfoss IT department and the associated decision committees etc. Similarly, the digitalisation of the product dimension is the responsibility of the different research-and development departments that on a continuous basis ensure that possibilities for digital communication with different products and components are added. On the contrary, the responsibility for digitalisation of the process dimension is not clearly defined. Therefore it is the responsibility of the specific businesses, divisions and sales companies as well as to the customers to locate and realise the value hidden in digitalisation of the process dimension.

The digital infrastructure in Danfoss is good, and it is the activities “outbound logistics, marketing and sales” in the value chain that have had the biggest attention. However, the activities relate to a great extent to the activities mentioned on the website. Basically this means that the first half of the customer-service life cycle has been digitalised, but there is still room for improvement. The possibilities to see the products that are mutually replaceable in different situations constitute an example of the improvement potential in relation to the early processes in the customer-service life cycle.

The processes that are lagging behind in Danfoss in relation to digitalisation of the customer-service life cycle, is especially found in relation to reporting and redressing of defect products. During the digitalisation journey it has been mentioned that only a few customers have access to areas on the intranet, where they can monitor the process related to defective products. There are, however, possibilities to expand this service in the way that all customers who have defective products obtain a similar possibility. Furthermore, Danfoss has launched integration projects related to concrete customers which involve that selected processes between the customer and Danfoss will be automated which implies that both the customer and Danfoss save resource on manual processes. Similarly, the customer experiences an improvement in the service, as information is now automatically released from Danfoss as soon as they are produced. This means that the customer

always receives the latest information and hence can act accordingly in relation to their daily business.

Danfoss decidedly sells physical components that are difficult to digitalise within the product dimension. The above mentioned digitalisation proposal within the process dimension will entail an experience of a digitalised product. Other alternatives would be to integrate the possibility of digitalised surveillance and monitoring in the products themselves. In fact, a few Danfoss products already contain this possibility, as it is feasible to watch how the cooling systems in big supermarket installations function. In this way the customer can be contacted before any damage is done, as these monitoring tools often will show if specific components start functioning incorrectly. Moreover these elements can open a window to new ways to consider the market, as it has now become possible to sell a temperature in stead of components and products. Thus Danfoss is now able to monitor all installations in the world and consequently sell a steady temperature to a given price in stead of the specific components.

The conceptual framework compiled and described in the paragraph above, makes us able to dig deeper into the digitalisation discussion and hence reach a deeper understanding of the challenge of digitalisation in relation to industrial companies. The conceptual framework is useful in placing the digital responsibility relating to various digitalisation dimensions, separate the different digital initiatives and hence acquire an overview of where the different initiatives overlap and where initiatives are missing. At this point we will leave all definitions relating to e-commerce, e-business etc., and henceforth only use the concept of digitalisation in relation to actor, process and product.

However, one question is still left unanswered: (1) why digitalise at all? In other words we need an answer to what happens when a transformation takes place from a physical to a digital stage. The next question is: (2) why should companies initiate a development from a physical to a digital stage especially within the process dimension, as this represents the customer related context which is the objective of the text? The answer to these questions will be sought answered in the following paragraph.

#### **1.4 Why move from Physical to digital Stages?**

A matter that is inevitably discussed pertaining to the digitalisation process is: why must industrial companies venture in digitalisation at all? The answer can be directly related to the value that according to Perez (2002) was possible to realise in the *golden age* phase in which the new technology shall amalgamate with the existing reality. Hence the paragraph is directly related to this value, and I will make an attempt to demonstrate how this value manifests itself in an inter-organisational industrial context.

Many researchers have discussed the potential inherent in digitalisation in relation to different functional areas such as 'marketing' (McKenna, 1997), 'purchase' (Boer et al., 2002; Dai & Kaufmann, 2002), as well as within 'logistics' (van Hoek, 2001). Chaffey (2004) describes a whole number of tangible and intangible advantages of digitalisation broadly viewed in a company context, and Amit & Zott (2001) present their model for value generating in relation to digitalisation. Thus there are various suggestions of advantages that can be gained via digitalisation, while there are fewer researchers who pose the question: why companies should commence the transformation process from physical to digital at all.

To this, the observant reader will stress that companies without any doubt must commence the transformation process in order to obtain the advantages the above mentioned researchers enumerate in relation to different areas within the company. This is correct, but it is my experience that the advantages the companies obtain through the transformation process depend on the specific company and the business model, markets, products etc. the company is engaged in. Similarly, the acquired advantages depend on the digital tools that are used, as well as on which dimensions (actor, process or product) the company focuses. As a consequence the advantages and the reason for commencing a digitalisation project are highly individual. In other words what is needed is a more generic framework of understanding that can be applied in the discussion concerning why companies must initiate and continue the digital transformation process as well as what can be gained through this process.

If we shift focus from theory to reality for a short while, we see many examples of a good IT technological infrastructure and a high degree of digitalisation in relation to actor, process and product being emphasised as something positive and even essential. Especially the Danish bank sector has been emphasised as an area that has been capable of gaining production profits in recent years by means of focused application of new digital technology (Børsen, Oct.19, 2005). The difference between a high and low level of digitalisation has been mentioned many times in relation to Den Danske Bank's (DDB) acquisition of two Irish banks in 2004. At several occasions Peter Straarup, the director, has emphasised the digital infrastructure in DDB as considerably better than the bought Irish banks. Hence much will be gained by converting the Irish banks to the DDB's infrastructure.

An article in Børsen, March 13, 2006 describes the difference between DDB and the bought Irish banks as follows:

*“There is a long way from Den Danske Bank's noble headquarter by Holmen's Channel in Copenhagen, imbued with a silent atmosphere of order and efficiency to the branch office of National Irish Bank on Lower Kilmacud Road in the outskirts of Dublin. Behind the safety glass at the counter employees – especially younger women – are busy most of the day filling in and stamping forms and checks. There is also an intense traffic in connection with searching and filing documents hidden in big suspension files along the walls. The backrooms show sign of haphazard furnishing and slight disorder with bundles of papers and ring binders on the desks and older computers rather belonging in an edp-museum. It is like stepping into a Danish bank 20-30 years ago, but typical for an Irish bank of today”.*

The description illustrates the big difference between a low and a high level of digitalisation. The quotation above illustrates the silence, order and efficiency in DDB that indicate that many of the manual processes have been eliminated. On the contrary daily life in Irish banks shows a picture of traditional, offline procedures, as well as it is characterised by the high number of employees who are busy handling and filing physical documents.

The difference between the two scenarios is central, as it exemplifies the difference between digital and physical information. Physical information or, in other words, information accumulated on paper, takes up a lot of space, is not easy to handle and the quality often deteriorates when replicated – e.g. a copy from a copying machine is rarely of the same quality as the original. Digital data, on the other hand, take up less space, are easier to handle and to find, it is easier to divide them, they do not deteriorate when replicated etc. Digital information thus offers many advantages

if it is saved and handled in a structured way. Last but not least, digital information cannot only be delivered to and used by people, it can also be delivered in different formats and thus be included in the specific IT-processes the recipient needs. As examples of these processes it will suffice to mention home banking and different calculation-or design software operations. It could also be information sent directly to the recipient's ERP-system, so that the delivered goods are automatically added to the stock etc.

DDB and the bought Irish banks are described very differently in the paragraph above, and the author notes that the Irish banks function as a DDB 20-30 years ago. In this connection Peter Straarup, director of DDB, states:

*“Form a Scandinavian angle their [the Irish banks] technological level is low. Thus we can offer a considerable upgrading of their processes and administrative platform by simply have them connected to our structure”* (Børsen, December 15, 2004)

Later in the article net bank and other digital products are mentioned as new initiatives that the highly digitalised platform can offer the Irish customers in the future. Thus it is obvious that DDB via the transformation process from the physical to the digital stage expects to obtain different efficiency advantages, offer new digital products as well as streamline processes and improve the service. Hence there is a value hidden in the transformation process from physical to digital, a value that goes beyond the technology itself and into the processes that is profitable for the actors, organisations as well as for external partners.

The fact that information in relation to digitalisation plays a central role is also described in the literature (e.g. Evans & Wurster, 2000), Slywotsky & Morrison (2000) and Cagliano (2003). Information is therefore the crux of digitalisation – information either in a physical or a digital shape. According to Perez (2002) a part of the value and the advantages that companies, will be able to realise in the present phase of the digital revolution, must therefore be related to these differences between physical and digital information and their characteristics. We will take a closer look at these differences. It is time to explore what happens with the physical information when it is converted into digital information, what happens with atoms when they are converted into bits.

#### **1.4.1 Why digitalise – a Perspective on Time, Place and Interface.**

As a consequence information holds a central position in connection with the development from the physical to the digital stage. It is important to keep in mind that (...) *every business is an information business. (...) Information is the glue that holds value chains and supply chains together*” (Evans & Wurster, 2000). According to Evans & Wurster (1997, 2000) the physical world of production is often organised around as well as to compensate for the lack of information. Examples of this situation are stocks entirely established to compensate for the lack of information concerning the need and demand for products.

It should be mentioned that information in different industrial contexts does not only refer to data, but also to qualified estimates. Affiliation and feelings are equally parts of the information package we exchange, and they are inextricably linked to the sharing of facts. Inspired by Rice (1993), Robert & Dennis (2005), Stephanie et al. (1998) I will exclusively underline situations where information is shared within the inter-organisational sphere among industrial companies. In other words, I will entirely focus on different situations that can often be identified as a natural part of

daily life for staff members in different industrial companies. The various situations could be exchange of information, problem solving, decision making, exchange of opinions, generating of ideas, persuasion, get somebody else's perspective and argument, conflict solution, maintaining of relations/keeping in contact, negotiation and the search for new acquaintances (Rice, 1993). The list is not complete, but is intended to serve as examples.

It is interesting that in relation to each of the situations mentioned above the staff have different interfaces (face to face, telephone, meetings and papers (e.g. brochures etc.) at their disposal that can be used to exchange the required information. I use the concept 'interface' (Humphreys et al., 2006) in different situations where information can be exchanged and delivered. Interface is often used in relation to computers and software and can be defined as:

*“Interface is derived from the English word “interface” which is an element of a computer system that makes it possible for the user to apply the programmes as well as it means contact surface or contact link where a person establishes contact between two parties” (Rask 2001).*

The concept is thus to be understood in a broader sense than just as a concept within the IT sector. I apply the concept 'interface' as a counterpoint between people or between people and computers. In that sense TV is an interface just as mobile telephones etc. Meetings taking place face to face are also an interface, as are an e-commerce system or a digital product configuration that can generate ideas, deliver and exchange information etc. In the literature 'interface' is mentioned as media (Rice, 1993, Hørlück, 2000) or as channel of communication (Westmyre et al., 1998), but they mean the same as the focus is on the interface's ability to convey information.

### ***How do Physical Interfaces function?***

Evans & Wurster (2000) describe how, historically speaking, there has been a basic law – a compromise related to information that is exchanged via physical interfaces: *Richness* and *Reach*. Typical off line interfaces are: face to face, telephone, meetings and brochures etc. According to Evans & Wurster (2000) there is a reverse relation between the two dimensions. In case of a rich highly detailed information, it is often necessary that there exist a nearness and interaction between persons concerning communication and delivery of this information. If interaction is necessary the reach is limited. Conversely, richness in the information is often limited if the reach is extensive.

Reach is thus defined as the number of persons who interact (Jelassi & Enders 2005), and the richness is defined by the ability of the interface to convey the information. Hence the different interfaces can be characterised according to the degree of richness which is a concept composed by the following elements: (1) bandwidth, (2) individuality, and (3) interactivity (Evans & Wurster, 2000, Duncan et al., 2001)

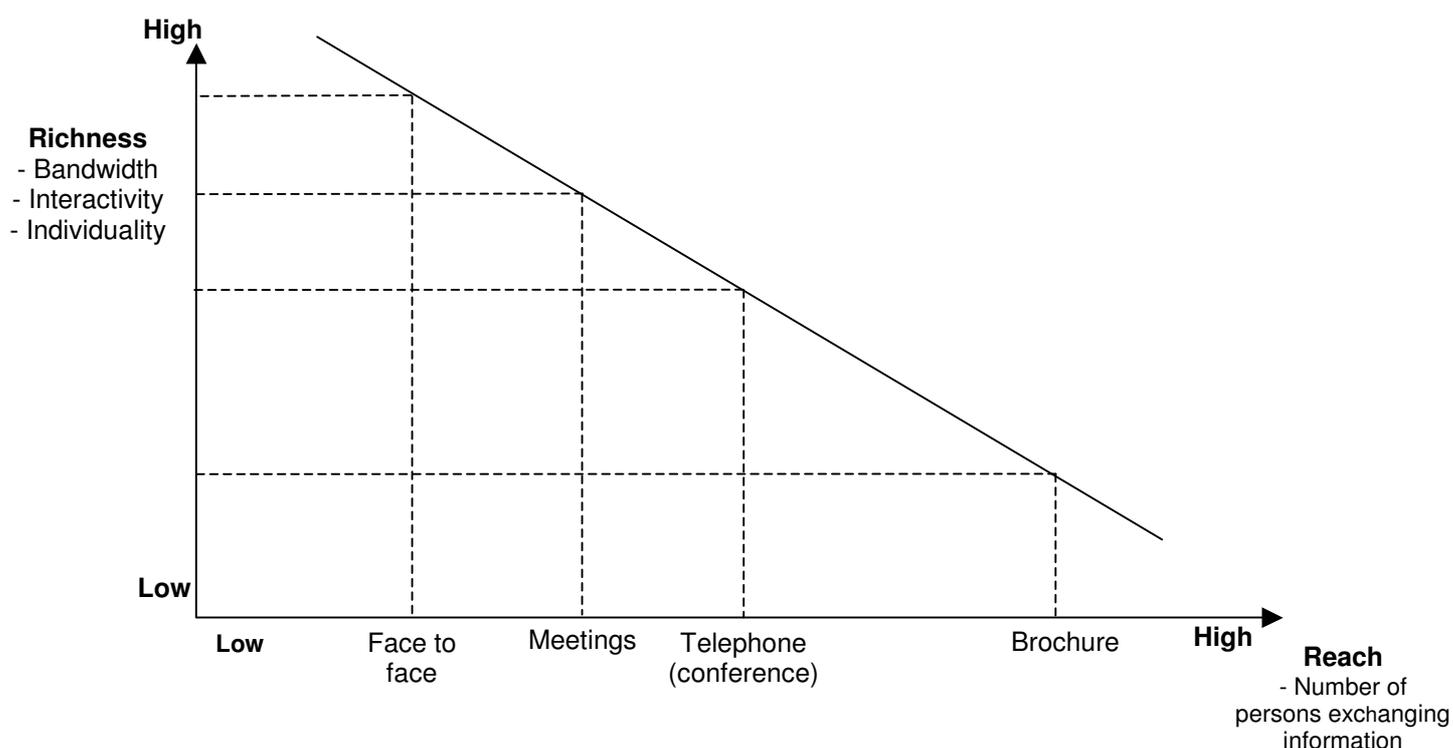
(1) Bandwidth refers to the amount of information that can be transferred from sender to recipient within a given time frame (Duncan et al., 2001). Face to face interaction has a large bandwidth, as it is possible to exchange information a part from the mere content of communication e.g. facial expression, gestures and intonation. The telephone has a more limited bandwidth, as all these extra impressions are eliminated leaving only the voice. However, the bandwidth is still bigger compared to e-mail or traditional mail. The telephone provides the possibility to send and receive information via a person's voice etc., whereas e-mail and traditional mail can use photos etc, which again means that these tools can make use of other elements than just the text based message.

(2) Customisation relates to the interfaces' ability to direct need and preferences among individual persons or groups of persons (Duncan et al., 2001). A case in point could be the following: via face to face interaction bank employees in a local branch can deliver a much higher degree of individuality than if interfaces like brochures are used.

(3) Interactivity refers to the possibility of having a two-way-communication. The brochure is an interface offering the possibility of a one-way-communication. Consequently it has a low degree of interactivity. Face to face, telephone or meetings are interactive, and information, points of view or understanding can thus go both ways.

These definitions and categories can be used to describe the various typical interfaces that are applied to convey information between sender and recipient. Thus the richness of information is evidence of the depth of information that can be conveyed through the chosen interface. The relation between reach and richness is illustrated in the figure below.

**Figure 7: Richness and Reach via Physical Interfaces**

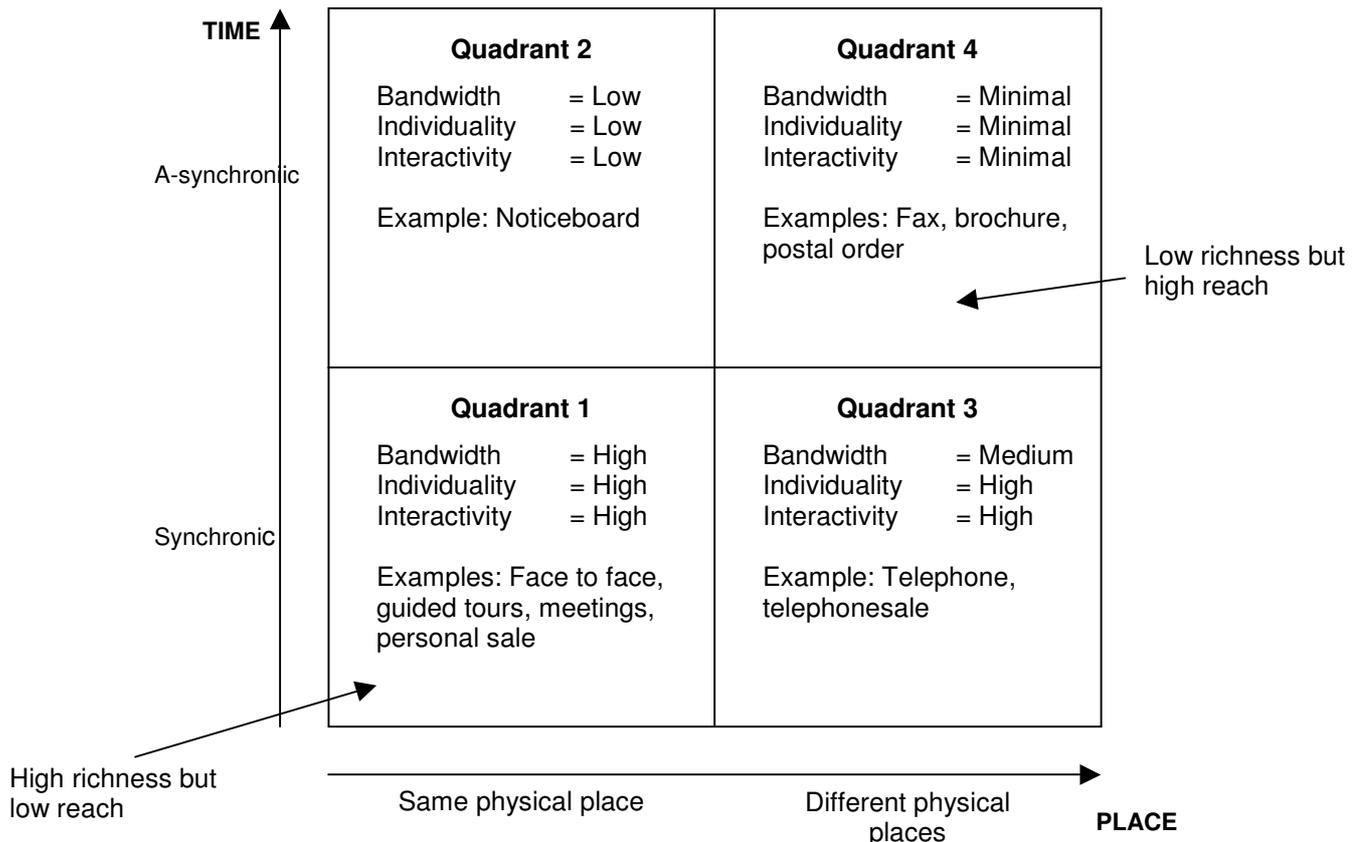


Kilde.: Inspireret af Jelassi og Ender 2005, Evans og Wurster 1997 og 2000, Rice 1993

As the figure shows off line interfaces are often encumbered with the compromise between reach and richness. This compromise mainly becomes a reality because of the limited bandwidth that traditional mass media provide (Jelassi & Enders, 2005). The limited bandwidth in various interfaces is the direct reason why the individuality and interactivity in the communicated information are limited or totally excluded. This argument has traditionally been used to argue for the relation between the number of customers and expenses. The more customers a company has the more expenses (Jelassi & Enders, 2005).

Besides the above characteristics in relation to various interfaces, the different physical interfaces vary in their ability to overcome different limitations in communication, such as time and place. Time and place<sup>4</sup> are defined according to the degree the individuals (sender and recipient) will be at the same physical place at the same time in order to participate in the communication (Robert & Dennis, 2005). Thus it makes a difference if the communication takes place a-synchronously or synchronically, and if the individual participants have to be at the same physical location in order to participate in the communication. The different possibilities are compiled in the figure below:

**Figure 8: Classification of Physical Interfaces in Relation to Time and Place.**



Kilde.: Inspireret af Robert og Dennis (2005), Evans og Wurster (2001), Rice (1993)

The figure sums up the discussion on the physical interfaces' ability in relation to the exchange of information among persons. As the figure illustrates there is a big difference in the specific abilities when they are placed in relation to time and place.

Quadrant 1 describes the situation in which the communicating persons are in the same place and the communication takes place synchronically. In this case the bandwidth, individuality and the

<sup>4</sup> The definition and discussion of time and place are exclusively related to the actors' possibility to participate in the exchange of information via various interfaces. Hence the discussion could have been extended considerably by incorporating the enormous amount of existing literature on time and place. Literature that can be dated back to the Greek philosophers might have thrown light on what is meant by time and place, and how the interpretations change as they are digitalised. However, I have chosen to discard this discussion, as my objective is exclusively to create a picture of the possible value inherent in the transformation from the physical to the digital stage. A part of this value is thus related to time and place, and this is where the concepts acquire value in relation to the text.

interactivity are high, but the expenses related to the use of the interfaces in this quadrant are equally rather high, as all persons are in the same physical place at the same time (Robert & Dennis, 2005). If we leave the dimension 'place' the communication is still taking place synchronically, but the interacting persons are now put in different places (quadrant 3). This influences the bandwidth that has now become medium size, whereas the individuality and the interactivity potentially are still at a high level. The fact that persons can remain where they are physically and hence are exempted from travelling in order to communicate, means that the expenses related to these interfaces are lower. The same is the case in the quadrant placed higher up on the time scale, where sender and recipient must be at the same physical place (quadrant 2). All things being equal it is cheaper to put the information on a notice board than to have a person contact all recipients and convey the information. However, the bandwidth, the individuality and the interactivity will suffer and therefore become low. The cheapest interfaces are those placed in the last quadrant (quadrant 4). These interfaces have a minimal bandwidth, individuality and interactivity, but the communicating parties are able to stay in different places and handle the communication a-synchronically, which means that they are not dependent on time and place. That is the reason why these interfaces are attractive, but the very limited bandwidth, individuality and interactivity hamper the use, and they are more suitable in connection with exchange of standard messages that cannot easily be misunderstood.

This discussion ends the description of how physical interfaces function. Thus there are two overriding problems pertaining to physical interfaces and their ability to convey information: (1) the problem is the compromise between richness and reach, and (2) there are problems pertaining to time and place, where the cheapest interfaces are those where sender and recipient do not have to be at the same place at the same time. But generally seen these interfaces are the least attractive, as they only leave the possibility for communication of easily apprehensible messages that are difficult to misunderstand. Could anyone imagine participating in a development seminar in which the used interface was a fax?

### ***How do Digital Interfaces function?***

Digital interfaces encompass digitalised counterpoints that people apply to contact each other or to get into contact with the information that is stored in computer systems. Typical applications that can be characterised as digital interfaces are e-commerce systems, websites, discussion fora, product configuration programmes, instant messaging etc. A common denominator for these and many more is that they are accessible if it is possible for the actor to send and receive digital information e.g. via mobile telephones and computers. Thus digital interfaces can be based on other platforms than the internet. This can be in the shape of direct communication between systems, where a network supplier is used or it can take place via mobile telephones. Hence the concept of digital interfaces does not exclusively relate to internet based digital interfaces. We are dealing with applications that companies implement with the purpose of making information more easily accessible via a digital interface. The different digital interfaces can to a greater or lesser extent be applied in the above mentioned typical situations.

According to Jelassi & Enders (2005) and Duncan et al. (2001) there are two main reasons as to why digitalisation and use of digital interfaces influence the compromise between richness and reach. The reasons are: (1) the increased possibilities of connection and (2) the development of widely accepted standards (IP/TCP, HTML, XML, WAP, GPRS etc.).

Connection possibilities and common standards make it possible to reach many individuals simultaneously and at the same time obtain richness in relation to bandwidth, individuality and interactivity. The high bandwidth is obtainable as digital interfaces make it possible to use multimedia content, introduce individual, recipient specific information and design the applications in such a way that they respond to the recipient's special needs. At the same time the same limitations on the reach are not there as these applications in principle can be used by all interested parties who have the possibility to send and receive digital information wherever they might be in the world. However, before the specific digital applications can be used, there is a need for equipment that can transmit the necessary amount of data.

Moreover, in certain cases common standards offer the possibility to automate or integrate the flow of information between customer and supplier. Thus there is a growing demand among industrial actors to integrate and automate different processes (Cagliano et al., 2003). Van Hooft & Segwee (2000) and Love et al., (1996) discuss how automation of processes can create advantages, and Feeney (2001) describes the big potential inherent in automation and in that way it becomes possible to convey information at a higher speed than what is normal in the whole chain of supply. Automation and integration are two concepts that are closely related and can be defined as follows:

*“Automation is the process of integrating enterprise applications, reducing human intervention wherever possible, and assembling software services into end-to-end process flows. Automation improves operational efficiencies and reduces risks. Automation is made possible through integration. Integration is defined as the uses of software and computer systems architectural principles to integrate a set of enterprise computer applications”*

([http://en.wikipedia.org/wiki/Business\\_process\\_automation](http://en.wikipedia.org/wiki/Business_process_automation),  
[http:// en.wikipedia.org/wiki/Enterprise\\_application\\_integration](http://en.wikipedia.org/wiki/Enterprise_application_integration))

As the above definition illustrates, *automation* is closely related to the process of *intergrating* different software systems between customers and suppliers, so that processes that were previously carried out by the staff in the organisation, is now handled automatically via the different software systems. In brief, the digital interfaces secure that computer systems automatically exchange information that in the past needed human interaction. Thus additional possibilities are then (1) improved service and (2) expenditure cut in relation to automation. The two advantages do not exclude each other, and examples can be found that they can be obtained at the same time.

Thus by applying the digital interfaces it has become possible to reach new levels concerning the compromise between reach and richness. In other words it is now possible to deliver richer information with bigger reach than via traditional physical interfaces. This means that digital interfaces have a range of capacities that make them advantageous compared to the more traditional physical interfaces. Several researchers have stressed this, among others Humphrey et al. (2006) who state: “(...) *the internet represents a powerful technology for commerce and communication at the buyer-supplier interface*”. The value that according to Perez (2002) existed in the present phase of the digital revolution thus manifests itself in the fact that digital interfaces influence the traditional compromise between richness and reach.

The two boxes below exemplify how the digital interfaces influence the traditional understanding of the compromise between richness and reach. The boxes show how the digital interfaces are used in a way that makes them superior compared with the traditional physical interfaces. The two examples are respectively a business model, eBay, and a concrete digital internet based application,

## CoolSelector<sup>5</sup>

eBay ([www.eBay](http://www.eBay)) is probably the most used auction service on a global level. There was also sale of products between private persons before the invention of the internet, but it took place through newspapers, and the transaction itself took place on the basis of the price advertised in the newspaper, if it was at all possible by means of the telephone. The newspaper as interface has likewise big limitations in relation to bandwidth, individuality and interactivity.

Through the internet it is possible for eBay to create a global auction market where consumers and companies meet across borders. Via the website it is considerably easier to show and explain one's product through pictures, video or links to other websites presenting the product. The price is decided through an auction running over a fixed time interval, and buyers as well as the seller can follow the price in real time. It is possible to see sellers' and buyers' individual rating obtainable through rating from other users in already completed auctions. Via the website buyers as well as sellers indicate the preferences they have for the specific products or product categories, and they can receive messages from eBay at the time when new products are available for acquisition or sale that match the preference of the user.

Via a digital interface it is thus possible for eBay to deliver information with big reach and dramatically improved richness than it is the case traditionally. However, it should be mentioned that the richness will never be as big as is the case with the local flea market where the customer is able to see and feel the product as well as s/he can interact with the vendor and thus get supplementary information on the product. Nevertheless compared to other, typically used physical interfaces, the digital interface in this situation breaks the traditional compromise between richness and reach.

CoolSelector (<http://www.danfoss.dk>) is a calculation programme for industrial users to apply in connection with calculation and configuration of Danfoss components to single or double cold stores. This digital application makes it possible for the user to calculate and dimension which kind of products are needed for constructing a cold store.

CoolSelector can help the user to choose the components that function best and hence present the most profitable solution. In the case where this interface should be compared to a similar physical interface then the need arises for a direct communication between a staff member from Danfoss and a customer wanting this information. The components could be chosen via different lists of information concerning the functioning of the different components. The advantage of CoolSelector versus other interfaces is that CoolSelector is always up to date. Consequently it becomes possible for the users to carry out calculations on the basis of the best and most updated information, which would not be possible through lists or the like.

The richness that was previously delivered via physical interfaces like the telephone or face to face are now available via a digital interface, and of course it can be delivered to many customers at the same time. Hence a rich information can be delivered to a big audience which is not possible by means of physical interfaces. Furthermore, in this case the users themselves can make the calculations s/he needs and more important at the time and place where the calculations are needed. The only precondition is that the users must have access to the internet. Thus it is not only possible to deliver more rich information with a bigger reach than previously known. Moreover, information delivered via digital interfaces has other capacities when it comes to the dimensions time and place.

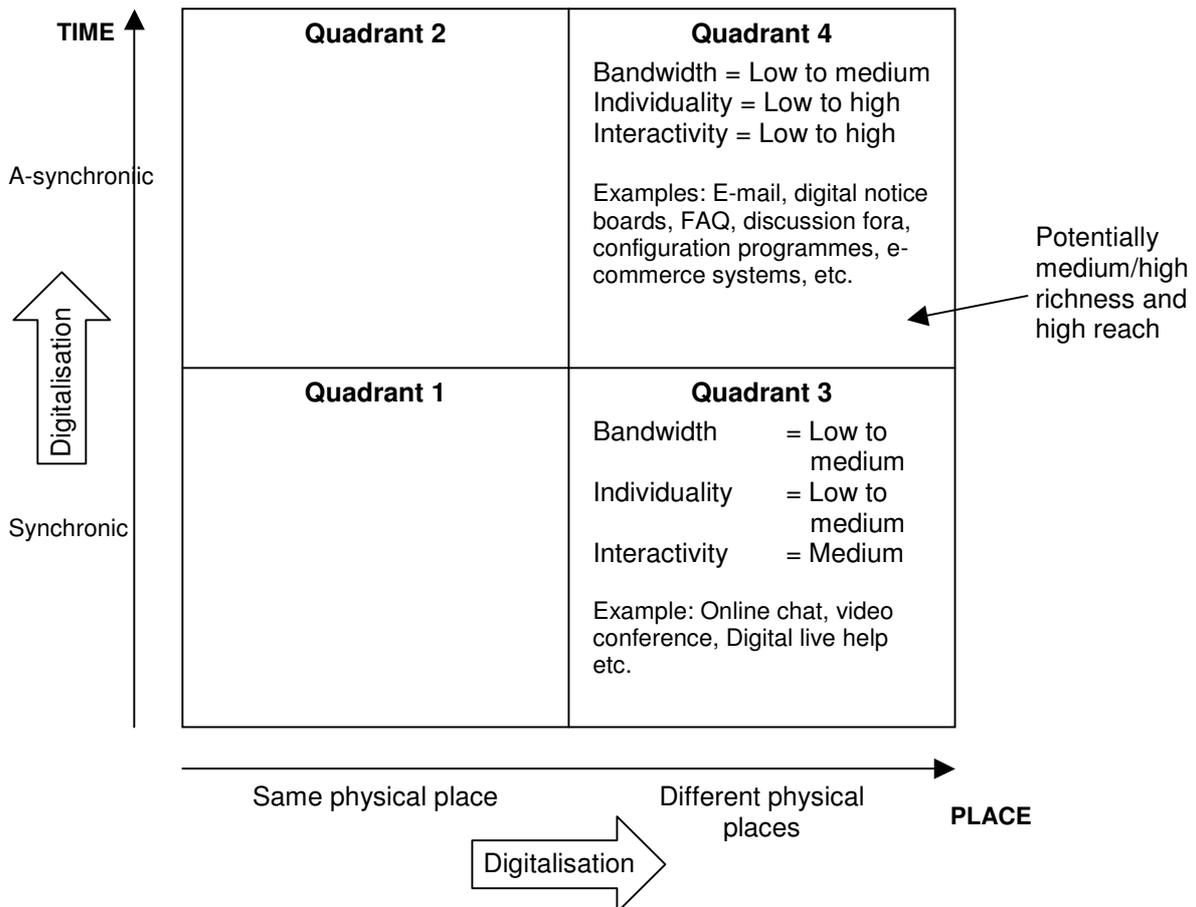
Digital interfaces do not only have capacities that influence the compromise between richness and reach. The interfaces also influence the traditional perception of time and place. Several researchers observe this phenomenon (Rask 2001), Burgelman, 2000, Hoey,1998, Mandelli, 1997). Singh (2002) states: "*The traditional constraints of space and time are disappearing*". Evans & Wurster (2000) write that digital communication "*(... )obliterates the barriers of (1) space, (2) time*". Palmer & Griffith (1998) find that organisations can get closer to customers through digitalisation.

Digital information thus influences richness and reach but also time and space. Time and space are defined according to which extent sender and recipient must be in the same place at the same time in order to exchange information. Previously, when the time and place dimensions were objects for discussion in relation to physical interfaces, the interfaces were different depending on whether synchronic or a-synchronic communication was needed, and whether the participants had to be in the same place. The cheapest were the interfaces where synchronic communication should take place from the same physical location. The figure below sums up the discussion in relation to digital interfaces.

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<sup>5</sup> CoolSelector is an internet based calculation-and configuration programme that Danfoss has developed to select components and calculate the functioning of a cooling system in relation to bigger cold stores.

**Figure 9: Classification of Digital Interfaces in Relation to Time and Space.**



One of the most basic capacities relating to digital, internet based interfaces is that they do not make demands on the physical location of the persons taking part in the communication, as long as it is possible to send and receive digital information. Thus via access to e.g. internet it is possible to get access to the different applications and consequently gain access to the information placed on the interface. This means that the section in figure 9 that illustrates situations where sender and recipient must be at the same physical location, does not have any relevant value in relation to the discussion of digital interfaces – hence the empty space in quadrant 1 and 2. Situations will naturally occur in which sender and recipient prefer to use the interface face to face, as they will be in need of a high bandwidth. This occurs typically in situations where problems arise, where there is uncertainty concerning the interpretation or where new unknown products must be developed and serviced. In these situations it will be wrong to use digital interfaces, as they cannot deliver the same bandwidth as it is possible with a face to face interface. To be in the same physical location can also be required in order to obtain the necessary empirical knowledge (Petersen, Welch &

Liesch, 2002) and to avoid virtual traps by being ignorant of the market context (Yasmin & Sinkovics, 1996) as well as it can be a natural consequence of the complexity of the market (Andersen, 2005).

The time factor, divided into a synchronic and an a-synchronic section, on the other hand is still interesting. Via digital interfaces it is possible to participate in both a synchronic and an a-synchronic communication. As the figure shows the two remaining quadrants are described in relation to bandwidth, individuality and interactivity. Concerning richness and reach it has earlier been argued that digital interfaces influenced the compromise between richness and reach in the way that digital interfaces made it possible to deliver rich information with big reach. As a consequence the interfaces in quadrant 4 hold the value: *bandwidth*=low to medium, *individuality*=low to high and *interactivity*=low to high. As demonstrated I have chosen to present the values in a range from a low to a higher value, the reason being that it depends on how the individual application is designed on the digital interface. Thus the applications can be designed in such a way that they in practice function as digital brochures, or they can be designed in such a way that individual and interactive elements are incorporated in the application. The eBay and CoolSelector examples show that bandwidth, individuality and interaction can be extremely high.

The bandwidth in digital interfaces covers the range from low to medium. The argument is that the bandwidth is high but not as high as face to face situations. Hence these interfaces hold the value medium in relation to bandwidth. Via digital interfaces it is possible to exchange information that is highly individual and interactive, and thus the interfaces in these dimensions obtain the value high. The eBay and CoolSelector clearly demonstrate this fact.

On the basis of the previous discussion on richness and reach the values in quadrant 3 is *Bandwidth*=low to medium, *individuality*= medium, *interactivity* =low to medium. The reasoning for the values is that the possible bandwidth is just as big as was the case in quadrant 4, but again it depends on the characteristics of the exact applications. The individuality is rated low to medium, as the interfaces can be designed in such a way that the users are anonymous or must identify themselves. In case where the users must identify themselves the information and answers the interface delivers can be focused and thereby more individualised. The interactivity in these applications is a matter of course, as they are entirely rated as medium, because we are dealing with synchronic communication, where it is necessary that there is a person in both ends before the interface starts functioning.

A comparison between figure 8 and figure 9 that summed up the capacities of physical interfaces, exposes the discussion on richness and reach, as quadrant 3 and 4 differ considerably in relation to bandwidth, individuality and interactivity. Robert & Dennis (2005) regard quadrant 4 as the cheapest and quadrant 1 as the most expensive. It is thus the expenditure related arguments in connection with the use of interfaces that are placed in quadrant 4. However, since the physical interfaces were encumbered with the compromise between richness and reach, these interfaces were not as applicable with regard to communication of information that demands high bandwidth, individuality and interactivity. The fact that digital interfaces are not locked in this compromise entails that tasks and situations that were previously handled by interfaces from considerably more expensive quadrants (i.e. 1 and 3), can now be handled a-synchronously and from different places.

CoolSelector, the Danfoss configuration programme, is a brilliant example of the value that digital interfaces can offer. If the task of calculating and dimensioning a cooling system shall be handled via physical interfaces, it is imperative that the communication is synchronic, and that the task can be solved where both sender and recipient are located in the same place or via telephone, where they are geographically separated. The demand for synchronic communication means that it is only possible for the recipient to dimension the cooling system during Danfoss' opening hours from 7-15. In case where a digital interface is used, the recipient can make the calculation and the dimensioning at the right time, round the clock. These capacities have previously been identified by other researchers (Quelch & Klein, 1996).

### **1.4.2 The Importance of Interfaces – a case (Danfoss)**

Within Danfoss there are many company related tasks that are comparable to the situation described above. It is an ingrained routine that the telephone as interface is used for inquiries of different types, e.g. is the product in stock, has it been delivered, what is the price, which products are compatible, can the product be replaced by another when problems occur, how shall the product be programmed etc. These are typical inquiries which would normally require a synchronic communication. However, via digitalisation they can be transferred to the a-synchronic category, as there is only a minimal risk for misinterpretation of the conveyed information. The fact that there are two products in stock can only be understood as there are really two products in stock. In this connection 'a-synchronic' means that the recipient gets an immediate answer to his/her inquiry as the answers are sought for digitally by contacting the sender's digital interface. On the contrary the sender does not need staff to handle this type of inquiries, as the digital applications deliver the answer. As for the sender, tasks are moved from expensive to cheap interfaces which often free resources and entail efficiency advantages. The exchange of information via digital interfaces is thus cheaper and more efficient than the older, traditional interfaces as fax and voicemail (Humphrey et al., 2006).

It is important to note that the advantages relating to efficiency will become more and more obvious concurrently with that fact that a growing number of users apply the various digital interfaces. Hence it becomes difficult to argue in favour of significant advantages, if one or few users apply the various interfaces. However, it is in cases where more than 50% of the company's customers order the products themselves, or where the order is automated, that the efficiency improvement will come about. Consequently, it is important that the company shows a position to these interfaces that can ensure that the necessary number of customers in one way or the other are persuaded to use available interfaces.

Besides this, it is possible for the sender to deliver this service all over the world as long as the recipient has the possibility to send and receive digital information. Moreover, the service is available all around the clock and always in such a way that the recipient can search for the answers at the time when it is most valuable to him/her, and thus not dependent on opening hours etc. This is exactly one of the arguments that the use of digital interfaces can lead to efficiency advantages and improved service simultaneously (Slywotsky & Morrison, 2000).

### 1.4.3 Summing up of the Discussion on Digital and Physical Interfaces.

The objective of the above paragraphs was to reach an understanding of what happens when physical stages are transformed into digital ones, as well as why companies in the first place should commence the development from physical to digital stages especially within the actor and process dimension. Thus the question is directly related to the values the present phase within the digital technological revolution symbolizes. On the basis of the above discussion and by means of different relevant theoretical concepts we are now able to answer the questions.

Compared to the traditional physical interfaces and information the digital interfaces and information thus expose some unique capacities. In general the digital interfaces are not fettered in the compromise between richness and reach, as are the physical interfaces. In other words, it is possible via digital interfaces to deliver rich information (high bandwidth, a high degree of individuality and interactivity) to many recipients at the same time which traditionally has not been possible via physical interfaces such as the telephone.

In relation to the empirical context this means that the use of digital interfaces makes Danfoss able to use digital, a-synchronic interfaces in certain situations in stead of expensive, synchronic, physical interfaces that traditionally needed staff to handle the communication. The communication can relate to everything from the simple question as to whether the product is in stock to when it can be delivered, or relate to the configuration of the product itself etc. These possibilities occur due to the fact that digital interfaces can deliver the same rich information as is the case with e.g. the telephone. As a consequence it is possible to transfer many of the situations, traditionally handled by means of the telephone, to digital interfaces and thus obtain efficiency advantages and service improvements simultaneously, as the customers now can carry out the different actions whenever they want. In other words, it is possible to use expensive interfaces at the time when it brings most value which often happens in relation to problem solving and innovation, and then use cheap interfaces at the time when this is most convenient. Accessibility of the right information via digital interfaces means that it has now become commonplace for the recipient to get answers to questions, where the answer is factual with technologically low characteristics. The resources (and the time) that have now become released can be used to tackle occurring problems, and hence act as problem solvers in stead of being a simple supplier of information.

The fact that digital interfaces are not confined to time and place, as is the case with many physical interfaces, means that Danfoss via these interfaces can deliver services when it brings most value to the customer and when it is not limited by opening hours etc. All things being equal this will mean improved service, as the recipient can now acquire the information s/he needs when s/he needs them. The possibility for integration and automation are the last argument for why digital interfaces have some significant characteristics that make them advantageous compared to physical interfaces. Through integration and automation otherwise manual tasks can be automated so that resources can be transferred to more productive activities.

The above discussion ends the paragraph relating to the understanding of the value that according to Perez (2002) should be represented in the present phase of the digital technological revolutions. We have thus created a picture of how this value can manifest itself and hence be utilised by companies in the industrial market. In this way the discussion relates to the new logic and understanding that must be created when the digital technology is used. In this connection the logic is linked to the possibilities occurring in relation to richness and reach when new technology is applied. In the next paragraph and chapters I will therefore relate directly to the above discussion when I use the

concept ‘value’. However, it is important to observe that the above discussion not in any way shall be understood as exhaustive for the value that potentially can be obtained in relation to the digital technology. What I have done is merely to create a picture of a form of value that exists in the inter-organisational context, or phrased in a different way: which shape the value can have for respectively customers and suppliers in an industrial context.

## 2 Strategy and Strategic Processes.

This section represents the second part of the text, and deals with the concepts of ‘strategy’ and ‘strategic processes’. The objective of the section is to establish an overview of four different approaches to strategy; four approaches that manifest themselves in four alternative processes by which the actors establish a strategy. Later in the section I will discuss how the process leading towards a digitalisation strategy unfolds.

The last 60 years there has been a great interest in the concept of strategy. This has naturally inspired me to scrutinise the literature concerned with digitalisation strategy. By far the majority of the literature dealing with digitalisation strategy is based on a traditional planning oriented approach to the strategy process (Jelassi & Enders, 2005, Turban et al., 2006). This approach is typically based on SWOT-analyses and a process consisting of the acquisition and analysis of data, the setting of alternatives and the implementation of the chosen solution based on selected preferences. As the digitalisation-strategic approaches belonging to this type previously have been applied by actors in the empirical context (e.g. the IBM project *industrial selling in the Internet*), as well as it has been deemed a limited success, I have scrutinised the literature in search for alternative methods and approaches to the process that leads to a digitalisation strategy. During this search I have found very few alternatives that will be demonstrated later in this section.

There are several understandings of the concept of strategy as well as of how the process leading to a strategy should be designed. In this connection I agree with Minzberg, Ahlstrand & Lampel (1998) that there is a need for different perspectives on strategy in order to grasp the complexity concealed within this field. Therefore the strategy section begins with a short review of various approaches to strategy and the process leading towards a strategy. The main objective is not to draw an all-encompassing picture of the strategy field but to discuss four alternatives: (1) Strategic Planning, (2) Strategic Management, (3) Scenario-teaching and (4) Strategizing.

In my opinion these four alternatives cover the strategy field and they are selected as they can contribute to create an understanding of various strategy approaches and methods. They also cover the different approaches that actors apply in the empirical context. Consequently they represent an understanding of the problems the actors experience in relation to strategy creation. Afterwards I delve into the digitalisation literature and divide it in relation to the four alternative categories.

### 2.1 Perspectives on the Concept of Strategy and Strategic Approaches

This sub-section introduces four different alternatives of and perspectives on what ‘strategy’ means, and how the process leading towards a strategy is designed. I will begin with a few reflexions on the concept of strategy, and then delve into the process leading to a strategy. Furthermore, I will describe who creates a strategy. This will lead to the four alternatives that will be described in

relation to a range of parameters e.g. the strategic process, in relation to whom creates the strategy and finally to the typical tools in the strategy.

### 2.1.1 What is 'Strategy'?

Parallel to many other concepts in the sphere of social science, there is not one single accepted definition of the concept of strategy. In this connection Magretta (2003) argues:

*“Of all the concepts in management, strategy is the one that attracts most attention and generates the most controversy. Almost everyone agrees that it is important. Almost no-one agrees on what it is”* (Magretta, 2003)

However, most researchers accept that strategy deals with circumstances of great importance for the organisation e.g. in which direction is the organisation moving in a longer time horizon, the size of the organisation including the kind of products and services that should be sold and in which markets as well as it includes the organisation's relation to the outside world and finally its resources (Johnson, 1987). Smaller matters in the organisation will only be considered as strategically important if they, for one reason or the other, influence the organisation in a significant manner, or if they constitute a new phenomenon such as the digital technology that catches the attention of the management. The dividing line between what is strategic and what is not is thus a more or less subjective judgment of what is important and what is not deemed important. As a consequence, the concept '*strategic*' becomes a term of the size of this importance (Pettigrew, 1985).

There have been several attempts to compile the various approaches to the phenomenon 'strategy' and in that way to draw the strategic map. One of the most known attempts is done by Mintzberg, Alstrand & Lampel (1998) who compile descriptive and normative approaches to strategy respectively. The *normative approaches* normally focus on the content of strategy, e.g. which strategies a company should choose, whereas the *descriptive research* focuses on the strategic processes, e.g. why the strategic processes operate as they do. The normative strategy literature is based on the assumption that senior staff can lead the company by means of rational decisions. The descriptive strategy literature considers the strategy construction as a complex organisational process where staff members at different levels in the organisation are involved, and where the strategy is influenced by phenomena such as culture, power or learning (Mintzberg 1999).

As the above paragraph demonstrates there is a big difference in the way strategy is described in the literature, not least depending on who conceives the strategy, if it is conceived on beforehand or if it can evolve as a pattern of actions. These elements will be treated in the following section.

### 2.1.2 How does the Process towards a Strategy develop and who creates it?

Strategic processes or the process leading to a strategy can be defined as:

*“The manner in which strategies come about is referred to as the strategy process (...). Strategy processes are concerned with the how, who and when of strategy”* (Wit & Meyer, 1998).

Thus the process leading to a strategy deals with how and when strategies are created as well as with which persons are involved in the strategy process. A naïve picture of a strategic process is a

group of people, probably in black suits disappearing into an office or a conference room, and then reappearing after some hours or days carrying a strategic plan written down on the basis of various analyses that define concrete suggestions. Although sessions like these can be and often is one of the elements in a strategic process, the actual creation of a strategy have more facets. The critical question to be asked in this connection is whether the strategy is a result of an intended, systematic and rational action. Researchers within the normative research tradition have great confidence in senior staff and their ability to base their strategic decisions on rational choices. Descriptive researchers on the other hand assume that here are limitations to such rational choices.

This leads us to one of the most frequently discussed elements in the strategy literature, namely if the strategy is the outcome of a meticulously planned process, or if a strategy can be a pattern of consistent actions over time (McGee et al., 2005). In other words, the question remains whether the strategy explains future actions, or whether it evolves from already undertaken, present individual organisational actions? The answer to this question is blowing in the wind and varies depending on the person who is asked, as well as in which context the strategy will be put into practice. Moreover, the answer will often be a combination of the two alternatives, as actors or organisations in most cases rarely realise their original objective at 100%. On the other hand the realised objective is rarely far away from the original objective (Mintzberg, Alstrand & Lampel, 1998). In other words the realised strategy is often a combination of planned and evolving actions. The literature on planning considers it possible that thinking precedes action, whereas the evolving understanding of strategy will argue that thinking and action are closely interconnected (Starbuck 1985). Weick (1987) adds that thinking will often strengthen action, as it will endow the action with meaning when it is seen in retrospective.

Thus it is highly debatable whether the strategic processes are to be understood as a planned or evolving process. I will keep these two possibilities in mind as I will present an overview of the various approaches to strategy and hence digitalisation strategy. However, it has implications for me as a researcher as I have to be aware of the fact that the concept of strategy cannot only be examined among senior staff; strategic initiatives can likewise evolve among the junior staff via their activities.

## **2.2 Various Perspectives on the Process leading towards a Strategy.**

Many different maps can guide the reader in the strategic landscape (Mintzberg, Akstrand & Lampel, 1998, Farjoun, 2002, Pettigrew 1985b). Every map has its strengths and weaknesses and individually as well as compiled they offer a good understanding of different possibilities in the strategic landscape. A few strategic schools of thought such as the planning- and positioning schools (Mintzberg, Alstrand & Lampel, 1998) are widely recognised and are used by both companies and consultants.

With their mechanic approaches to the formulation of strategy these schools of thought are nevertheless exposed to intensive critique, as they show a tendency to oversimplify the reality they are dealing with. Like many others Prahalad & Hamel (1994) argue that a new paradigm is needed in the strategy landscape, a paradigm that can make a stand against the mechanic strategy schools. Prahalad & Hamel (1994) enumerate a whole range of parameters that all in all point towards the need for a new paradigm. The gist of the discussion is that the world we live in is characterised by great uncertainty as well complexity which makes it difficult to plan. Nevertheless, the planning-

and positioning schools are still used in both teaching and practice. In this connection Gimpl & Dakin (1984) state:

*“There is a fundamental paradox in human behavior – the more unpredictable the world become , the more we seek out and rely on forecast and predictions to determine what we should do. It is not unreasonable to draw an analogy between weather forecasting under conditions of extreme uncertainty, and management’s continuing interest in forecasting and planning activities in a highly uncertain trading climate”* (Gimpl & Dakin, 1984)

In order to categorise the various approaches to the strategic process I have chosen two principal concepts: *to adapt* and *to create*. These concepts are closely linked to the organisations and the actors. Do they respond entirely to stimulus from the external world or do they have the possibility to influence and thus create the reality they are part of through their actions? Thus the essence of the discussion relates back to the chapter on methodology and consequently to the ongoing discussion between objectivists and subjectivists. In other words the discussion is on whether the reality and thus the environment surrounding the specific actors exist *per se* and that they can be identified, or whether actors and organisations construct the reality through actions and insight.

In the strategy discussion the two concepts: *to adapt* and *to create* are identifiable in the various strategic approaches. The individual strategy researchers’ understanding of the actors and their possibilities in the reality in which they act, thus have an effect on the strategic approaches that are described in the field of strategy. The perspectives manifest themselves in the activities, methods and procedures that the specific strategy approaches define as the process leading towards a strategy. If the reality and the environment of the organisations are understood as existing *per se*, then the specific strategic approaches bring compilation of data and description of this reality into focus. This makes it possible to create strategic alternatives on the basis of the best possible description of the reality. According to these researchers the construction of a strategy must be taken care of by senior staff in the organisation, as they, from a distance, identify relevant strengths, weaknesses, opportunities and threats. I interpret this as an *adaptable* understanding that is also reflected in the strategy literature:

*“(...) in other words, strategy must adapt”* (Makridakis, 1990)

In contrast, other researchers advocate that the understanding to a greater extent ought to reflect that the reality is a social construction. In this case, the focus is especially on the actors’ ability to act in this reality, and on how a strategy can evolve from these actions. These researchers are of the opinion that the organisation’s culture is an unexplored jungle of opportunities that can merely be understood through concrete actions and experiments. Thus the reality cannot only be observed but can also be lived and understood through social interaction. In this manner strategy becomes a *creative*, social and action oriented activity:

*“Strategy making has to be an active, dynamic process”* (Mintzberg, 2000). *“Strategy has to come out of a creative process conducted by thoughtful people”* (Mintzberg et al., 1998)

As the quotations illustrate we are dealing with an active, dynamic and creative process, where the strategy develops through creative interaction among people. I have divided these two principal categories into two additional categories, so that we are dealing with four alternative approaches. A complete picture of the four alternative approaches is sketched in figure 10.

In the sketch below and the following description of the four different approaches to strategy, I do not use the concepts 'rational' and 'irrational', although these concepts are used in the strategy literature. I do not find them appropriate to clarify the differences between the various approaches, as none of the approaches are more rational than others. In my opinion it is not the specific strategic approaches that by definition are more or less rational. The rationality in the four approaches entirely consists in different activities and actions, and consequently they are all rational in one way or the other. In other words it is wrong to consider the *creative* approaches to strategy as irrational, and the *adaptable* categories as rational.

As sketched in figure 10, I have chosen to alter the conceptual framework when changing from the *adaptable* to the *creative* strategy approaches, the reason being that a shift in language can cause a shift in actions. In other words:

*“Language transformation can be a pathway to behavioral transformation (...). Perceptual frameworks categorise data, assign likelihoods to data, hide data, and fill in missing data” (Weick, 1995)*

The two different conceptual frameworks can contribute to the exemplification of the existing differences between the two principal approaches to strategy, and hence indicate different strategic processes and activities each leading towards a strategy.

Figure 10 – Four Perspectives on Strategic Processes

		The strategy process	Central actors	The task of the strategy	Time-perspective	Environment	Typical tools
<b>Strategic Planning</b>		Conscious and deliberate. Analysis precedes action, otherwise the objectivity is compromised. Strategy is science	Top management or dedicated planners. The rest of the organisation concentrates entirely on implementation	Formulate a goal and a plan to achieve it. The plan is described as detailed as possible and is consistently followed.	The strategic process is lengthy and stretches over 3-5 years from start to achieved implementation.	Considered as stable, comprehensible and controllable. Predictions are possible if the strategist is provided with the right information	Few formalised, systematised and highly structured methods. SWOT, budgets and checklists
<b>Strategic Management</b>		Conscious and deliberate. The process adapts to changes in the environment concurrently with the implementation of the strategy	Line managers and top management. The strategy is created in the various SBUs and accepted by the top management	Formulate a goal and a plan to reach the goal. If the premises for the plan change the plan is adapted	The strategic process is shortened and stretches over 6-12 months. The plan is adapted and adjusted if the premises for it are changed.	Considered as stable and comprehensible although not controllable. Predictions are possible, but the dynamics in the environment make it difficult	A larger range of methods including scenario planning, core competence, analysis and benchmarking.
<b>Scenario Learning</b>		The strategic process is embedded in scenarios. The various scenarios are used as interpretation frameworks in the daily work.	The entire company is involved. The staff with interorganisational contact has important knowledge when scenarios are formulated	Formulate various scenarios that generate safety, freedom and capacity to be creative and innovative in the daily work.	Scenarios can be created and updated as often as it proves necessary. Daily events decides which scenarios are most applicable	Considered as dynamic and stable at the same time. Readiness towards potential events in the company context is regarded as essential	Scenarios built as small narratives described through a decision, a plot driving forces and logic. Many sources can act as inspiration to the scenarios
<b>Strategizing</b>		Actions create breeding ground for experiences that develop into strategy through reflection and conceptualisation. Actions precede analysis	All acting parties involved in the process. Conversations and social interaction across the levels in the organisation and external partners are vital	Strategy/goal create security and confidence in the concrete actions, so that the staff take action which foster meaning and realisation	The strategic process is embedded in the concrete actions and innovation in the context of internal and external stakeholders. It is constant and continuous.	Dynamic and turbulent. The context is only comprehensible through social interaction with internal and external stakeholders.	Social interaction and actions. Common reflections and conceptualisation must secure a common understanding in the organisation. Memos etc. act as anchoring.

The four alternatives sketched in Figure 10 constitute an adequate segment of the strategy literature. In their book Mintzberg, Alstrand & Lampel (1998) place the ten strategic schools of thought in relation to the schools' perception of the environment ranging from incomprehensible – unpredictable to comprehensible- controllable and to the stage where it could be asked to which extent the internal process is designed as a planned or a or natural process. In relation to this division the four alternatives in question range from strategic processes designed as a planned process in a comprehensible environment and to a natural process in an incomprehensible environment. The most extreme situations as well as the areas in between thus cover my choice. Furthermore, the four alternatives cover various perspectives that I have identified during the empirical part of my PhD process carried out in Danfoss. Here I have experienced how different actors swear by the various processes, approaches and perceptions of what strategy is. Consequently the four alternatives provide me with a solid basis to understand the experiences I have encountered during the empirical work, and hence the actors' different understanding of strategy and the processes they have applied to create a digitalisation strategy. It should be mentioned that I have often noticed, how actors in Danfoss were of the opinion that the rational planning- oriented approaches were the “proper” way of formulating a strategy, but also that very few have followed the directions from these schools of thought in their daily work. In the following I will describe each of the four alternatives.

### 2.2.1 (1) - Strategic Planning

Strategic planning <sup>6</sup> covers the planning –as well as the positioning perspective (Pettigrew, 1985) and is closely related to the three schools of thought: 1) design (Andrews, 1971), 2) planning (Ansoff, 1965) and 3) positioning (Porter, 1980). The basis for strategic planning was established in the 1960s with Igor Ansoff's book *Corporate Strategy*. To put it briefly the early purpose of this strategy approach should be interpreted as follows:

*(...) in a fundamental sense, formal planning is an effort to duplicate what goes on in the mind of a brilliant intuitive manager” (Steiner, 1979)*

Thus the objective of strategic planning is to copy the brilliant ideas conceived by entrepreneurs and visionary managers. Although entrepreneurs and brilliant managers often make decisions due to intuition or “*gut feeling*”, strategic planning advocates that managers or groups of managers can copy these thoughts and strategies via mechanical, formalised and systematised processes. This formalised process where various techniques and methods are applied, must force the planner through processes similar to those applied naturally by brilliant persons.

Thus formalisation and systematisation are central elements in strategic planning. In this connection systematisation means to apply well-known and thoroughly tested methods. Formalisation means three things: 1) to dissolve, 2) to articulate and 3) to rationalise. Strategies are results of a controlled and managed process of formalised planning dissolved in smaller steps, each restricted by checklists and supported by techniques (Mintzberg, Alstrand & Lampel, 1998). The plan is conceived at home, and the message is not “*to get out there and*

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<sup>6</sup> Planning is defined as: “a formalized procedure to produce articulated result, in the form of an integrated system of decisions” (Mintzberg, 1994a)

*learn, but to stay home and calculate*” (Mintzberg, Ahlstrand & Lampel, 1998). The SWOT-model is central to this approach, as it is divided in phases, where different checklists and techniques are meant to be applied in the categorisation of the various data.

The concern management carries the responsibility for the strategy, and the concern director is the strategist or the architect. The planner is placed on an organisational pedestal and released from the pressure related to the daily work. This situation gives them the space to conceive big thoughts and make big plans, while everybody else handles the implementation. The mental activity is thus detached from concrete actions:

*“(...) thought must be detached from action, strategy from operations, ostensible thinkers from real doers, and therefore strategies form the objects of their strategies”* (Mintzberg 1994)

To perform this task it is imperative that the strategic architect is provided with the relevant information. S/he should not spend time on participating in the creation of the information. That is the reason why quantifiable or hard data are rated high. The strategic architect learns and understands the reality through reports that are often composed by the use of structured and thoroughly tested methods written by independent persons e.g. consultants. The flow of quantifiable data from the organisation to the planners would be rewarded by a flow of plans from the planners’ side.

The result of the process is a plan that is deconstructed into strategies, sub-strategies, programmes, budgets and objectives. The plan is described in words and preferably in accounts stressing the smallest details, so that only the implementation remains. A good plan is described in the following way:

*“Plans can and should be to the fullest possible extent objective, factual, logical, and realistic in establishing objectives and devising means to obtain them”* (Steiner, 1969)

What this strategic approach especially emphasises is to set up a goal and to describe the process towards the goal via by means of budgets an implementation plans. Thus the emphasis is not on actions as action comes after the mental process. Action is “nothing else than” implementation. Good strategies are created through a controlled process caused by deliberately systematic and rational human thinking. Actions succeed the plan, once the plan has been described in details (Mintzberg, 1994)

This description substantiates that strategic planning highly emphasises objectivity, and hence assume that reality is objectively accessible. The company culture designates its latitude, and the formalised thought process acts as the weapon intended to provide the strategies that are able to indicate the most advantageous actions within this latitude. The plan is created on the basis of a whole range of quantifiable data that the architect assembles to a plan to be implemented later by the company. Therefore the focus is on the compilation of relevant data that must be analysed and converted into a strategy. In this way the reality can be identified, and hereafter it is possible to define and follow up on the company’s strategy latitude.

A customer related digitalisation strategy prepared according to the planning-based approach is a task for the top management and the attached strategists. The strategy is formulated on the basis of a large compilation of information that has been analysed and described via budgets

etc. The completion and implementation of the strategy is likewise well recorded through checklists, concrete IT-systems and platforms. Hence applications and business scenarios are described and specified. It is the task of the organisation to follow up on the plan as well as to realise the objectives specified in the strategy document.

### 2.2.2 (2) - Strategic Management

In the beginning and mid 1990s the following headlines emerged: *“Strategic Management isn’t dead – It Changed”* (Wilson, 1994) and *“The rise and fall of strategic management”* (Mintzberg, 1994), which indicates that strategic planning as described above was incapable of delivering the promised results. Strategic management or strategic leadership appears as a new potential strategy approach that to a greater extent can be applied to solve the problems that the companies increasingly face.

One of the most noteworthy problems in this connection is the growing complexity and uncertainty that are found within the companies. This unpredictability increases the need for flexibility in the planning process (Mintzberg, 1994a, Mintzberg 1994b). Hence the problem concerning strategic planning was that it required very precise descriptions and calculations. The time it took to describe and calculate had repercussions on the whole working procedure in the company. As a consequence the companies and the strategy researchers suggested the application of an adapted form of strategic planning named *“Strategic Management”*. Strategic leadership differed from strategic planning in a number of areas. Wilson (1994) summarizes to main differences:

1. *“Planning is more a matter of continuous organizational learning (scanning, interpreting, and adapting to environmental change) than it is control,*
2. *Corporate response to change can only be sufficiently rapid, flexible and pervasive if responsibility is pushed down into and throughout the organization, maximizing employees involvement and empowering them to take action”* (Wilson,1994)

Thus the big discovery is that the environment cannot be controlled, and therefore prognoses spanning several years by and large become impossible. Furthermore this entails that the rigid and lengthy process of strategic planning is not optimal in relation to these new circumstances. As a result a whole series of scanning – and monitoring facilities are introduced with the purpose of supervising the implementation of the plan as well as correcting problems that might occur. The monitoring facilities as well as the information produced through the monitoring constitute the elements that make it possible to adapt the strategy to the identified changes. Basically speaking this strategic alternative is still adaptable in its methods and philosophy as it is still possible to study and monitor the reality and subsequently to adapt. However, as the reality is more unpredictable, this has to be done more often than prescribed within the strategic planning alternative. Thus the planning process is shortened, and does no longer span over a long period of time.

Another problem the companies face is the fact that several companies at this point in time have established big planning organisations. Therefore it is no longer the top management that is in charge of the planning as was the original purpose of strategic planning. The fact that the planning has been turned over to the organisation instead of the top management has entailed

several negative implications, among others: 1) a tendency to reproduce already existing strategies and consequently risk that innovations do no longer materialize, 2) there was too much focus on the acquisition of new companies rather than on strategies focusing on the existing company, and last but not least 3) there was a tendency that strategic documents became bigger and bigger, as the staff put more emphasis on the analysis and its refinement than on proper strategic insight and innovation (Wilson, 1994).

These problems entail that the responsibility for the strategy process is moved down into the organisation, so it is no longer the top management that is involved in the planning. On the contrary, the task is now handled by the strategic business units (SBU). The decentralisation implies that the planning task is placed closer to the tactical tasks, which is a recognition of unquantifiable information and inputs as important elements in the strategy process.

The third problem pertaining to strategic planning is the implementation of the big and very detailed plans. Big plans are seldom implemented as originally planned, as they are exposed to organisational resistance and inertia. In other words it comes as a surprise that the staff in an organisation do not act as rational persons in relation to the plan. The result is that the strategic management puts more emphasis on organisational issues like motivation, culture etc. like critical elements in the hope of attaining better formulation, implementation and performance of the strategy (Wilson, 1994, Mintzberg 1994a, Mintzberg 1994b)

Finally, strategic management differs from strategic planning in the sense that strategic management uses and encourages the application of several methods. This is directly against strategic planning that often emphasised one single technique or method. Scenario planning, benchmarking and analysis of core competences (Wilson 1994) emerge as methods that altogether are meant to categorise and process the data that must be used to prepare the plans and strategies the company needs. Especially the scenario planning is interesting as this method is developed as a direct answer to the increasing turbulence within the organisation's culture. Because of the turbulence the companies cannot predict big technological innovations, change in process, droughts, wars etc. Therefore different plans are developed that can be applied if need be. The answer to the increased turbulence and unpredictability in the organisation's culture must therefore be the development of a bigger quantity of smaller plans in stead of one big plan.

The result is a more holistic, dynamic and organisation based strategy process. Hence it must be left to the different SBUs to draw up the strategies and present them to the top management whose responsibility it subsequently is to bring them in accordance with the overall goal of the company. Several different methods are applied to generate and analyse the data and the information that are necessary in order to create the plans and strategies. Organisational resistance, culture and learning become concepts that are central for a successful implementation. The basic attitudes to reality as well as the process in itself take place as prescribed in strategic planning. Still, the process is not so mechanical, and strategic leadership recognises that both quantitative and qualitative information and data are valuable. Nevertheless, strategic leadership still has an adaptable approach to strategy, as the challenge basically still is to compile sufficiently data in order to paint the picture of reality as correct as possible. Consequently the company can define and pursue the strategic opportunities. Thus it becomes apparent that it is a range of external circumstances in relation to the company's culture that decide the strategic opportunities in the company.

A customer related digitalisation strategy devised after the approach of strategic management thus becomes a task for the specific SBUs that identify the digital interfaces that are interesting in the special SBU context. However, the strategy is still formulated on the basis of a comprehensive collection of information analysed and described via budgets etc. An extensive quantity of different methods to identify and constantly monitor the applicability of the strategy is used. In case of deviation from the original plan this becomes the foundation for adapted plans.

### 2.2.3 (3) - Scenario Learning – Strategic Interpretation

Scenario learning is the third alternative. The process is composed of more alternative development possibilities in relation to the near and distant future. 3M, Boeing, Citigroup, Disney, Ford, GE, Honda, IBM, Intel, McDonald, Motorola and Sony are some of many companies that have applied this approach (Fahey, 2003).

Scenario learning has a long history, and the method is applied by e.g. Sun Tzu, the American Air Force, and recently especially Shell has applied scenario learning in their strategy processes (Stearns, 2006). Scenario learning is especially applicable in situations where the culture in the companies is uncertain and complex, which means that it is impossible to identify one single alternative. Scenario learning differs from the above described scenario planning, in the sense that scenario learning focuses on the learning through scenarios instead of planning (Stearns, 2006). The following quotation describes the difference very accurately:

*“Scenario learning: a process that helps managers develop knowledge about **the?** future and integrate that knowledge into decision making”* (Fahey, 2000) The importance is to create knowledge about future possible events. This should not be understood as an attempt to predict the future. On the contrary, it is an attempt to learn through the description of different alternative sequences of events, in order to make senior staff better able to make the correct decisions, when the expected but unpredictable occurs.

The main difference between scenario learning and scenario planning is e.g. the degree of details by which the specific scenarios are described. For this approach it is essential that the specific scenarios are not developed into the smallest details. In this connection it is important to keep in mind that scenario learning moves focus away from the process of developing and refining conclusions, plots and logics. Focus is now on different scenarios where insight can be gained concerning the potential that can move the company in different unpredictable strategic directions or present possible threats likely to derail the present strategy.

As illustration of scenario learning I have chosen to show how the Social Democrats prepare their election campaign. Party Secretary Jens Christiansen reports how the task begins:

*“Once we have decided which kind of atmosphere we would like as well as observing our rules we develop a range of different scenarios. Thus when the referendum is about to take place we have 2 or 3 approaches ready to be used in the different situations that may occur. (...) The different scenarios are not created because we believe that we can plan, but we do it in order to release energy to be creative and to be able to react spontaneously during the election campaign. The planning itself is not an attempt to control the course of the*

*campaign, this is impossible. After the campaign the winner will naturally state that everything happened according to plans. In fact this is a post-rationalization. The objective is to plan as much as you can. Perhaps you only use 40-50% of the plan, but you release a lot of decision energy, so that you can act freely as well as you are free to act spontaneously and take chances, because there is always something left in the drawer, in case something goes completely wrong”*(Krause på tværs, January 4, 2006, P1 at10am).

Thus scenario learning is more a question of going through a learning process before senior staff find themselves in situations where action is needed. In order for them to feel safe enough to take the right decisions they must have acquired knowledge of the different scenarios.

A central element in scenario learning is to create knowledge on how products, markets, industries or the economy might develop which is an essential part of decision making. The scenarios are invaluable in cases where senior staff must interpret the occurring changes and use the interpretations to create successful strategies (Fahey, 2000). Scenarios often begin with “what if”-questions, and the answer becomes a constructed scenario containing: 1) a conclusion, 2) a plot, 3) forces that drive the development and 4) a logic for the scenario (Fahey, 2000, Fahey, 2003). The conclusion is a description of what is the reality at the end of the scenario period. The plot is the narrative that describes the changes that are necessary for the scenario to become reality. The driving forces are the ones that drive the plot, such as changes in the market, technological development etc. The logic is the explanation or the rationale for the content, direction and the intensity in the changes expressed in the plot. The logic constitutes the why-questions that must be asked. Thus the scenarios constitute small narratives of alternative events and development patterns that will help the staff to interpret the reality they encounter, and hence help them to draw the conclusions they need in the daily actions.

Consequently the scenarios are only applicable if the staff choose to live in the described conclusion and through that fully understand and grasp the details as well as the implications. The development of scenarios will always force the company to identify and assess the complexity and the uncertainty related to the knowledge the company has as well as it is related to the chosen strategy. The uncertainties often lead to new scenarios that develop into strategic inputs.

Scenario learning specially thrives in cultures where the staff through their daily contact with and knowledge of customers can participate in brainstorming sessions that are meant to generate tomorrows ideas (Stearns, 2006) Scenario learning is applicable at all levels in the company, from the top to less functional areas. The literature describes the following areas where scenario learning have been applied: competitors (Fahey, 2003), financial issues (Stearns, 2006), research and development (Ringland, 2003), in relation to macro-economic uncertainties (Kennedy et al., 2003) and in relation to customers (Mason et al., 2003). Courtney (2003) discusses vision – and decision driven scenarios and furthermore he develops a frame within which he divides uncertainty into four levels, as well as he describes various learning scenarios and procedures in relation to the four levels.

Scenario learning is the third alternative process strategy process I have chosen to deal with. This alternative differs from alternative (1) and (2) in the sense that this alternative focuses on

adaptation to various forms of development, where nothing else is possible, at the same time as it focuses on the creation of opportunities for the company wherever it is possible (Courtney, 2003). This reveals a shift in the perspectives on reality and the company's opportunities to create its own reality and hence not being forced to adapt to the reality of others.

A customer related digitalisation strategy shaped according to the scenario learning approach thus becomes a task for more people in the organisation: for the top management, the management in different SBUs and not least for the staff who have the daily contact with the customers. Many scenarios focus on concrete decision-alternatives in relation to concrete digital application as well as they focus on how the applications can be incorporated in the context of customers or types of customers. Moreover, we are dealing with more vision driven scenarios focusing on the development of the digital technology and its influence on the company's business model and consequently on its basis for earnings in a longer time frame. The various scenarios become collective and constitute a common understanding that is either confirmed or disproved through interaction with the company's reality. The specific digital applications are deemed advantageous through the interaction, and implementation can begin. The identification and the realisation of the value represented in the present phase of the technological revolution is thus placed everywhere in the organisation, and the interaction with the outside world is now decisive for the direction of the strategy.

### **2.2.4 (4) - Strategizing – Strategic Behaviour**

The fourth alternative "strategizing" emphasises the daily behaviour in the company and strategy is considered a continuous process based on actions and reflections. The organisational behaviour is brought into focus, as changes in behaviour entail macro changes over time (Weick et al., 2005). The researchers addressing the issue of strategizing all take as their starting point the question of how strategy is created as well as how strategic decisions are made in a complex and uncertain environment (Canales & Vilá, 2005). Furthermore, they agree that this type of strategy has more in common with innovative processes than with traditional planning and control (de Wit & Meyer, 2000).

The strategic work should be understood as an innovative process where the result (i.e. the strategy) gradually grows from actions, reflexions, experiments and tests. The strategy is created in a milieu where several potential solutions or strategies are tested, and where the successful ones are identified. Thus the strategists take on the role as developers rather than planners (de Wit & Meyer, 2000). The reality is created through a social construction process, and the reality and the world should be understood as a construction of human interaction and development.

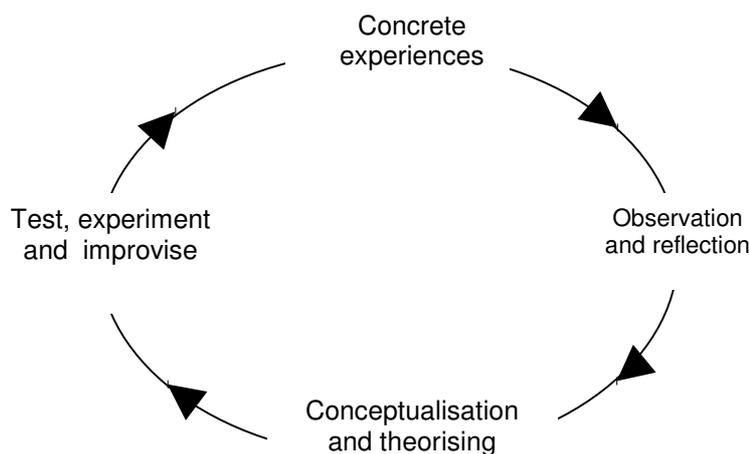
In case where the company's environments are complex and uncertain, and planning is made impossible, another tool box must be fabricated to assist the company staff in developing strategies. The changeable, uncertain and complex environment constitutes a big problem for companies and employees as it often hampers the staff's ability to act. The uncertainty increases as the changing environment hinders the creation of meaning. (Gimpl & Dakin, 1984) state:

*“(…) under conditions of extreme ambiguity, people may readily opt for helplessness. When people feel out of control there is a tendency towards inactivity – to do nothing”.*

Weick (1987) argue that in these situations the most important is to act, as action generates experiences and knowledge that contribute to reduce the experienced uncertainty. In this connection he warns against the development of too detailed strategy plans as these often have the tendency to restrict the organisation’s possible actions. This constitutes a problem as the inherent potential learning in these actions is lost.

This approach emphasises the actions carried out by the staff everyday. Likewise the emphasis is on the meaning that develops into a common frame of reference through reflection on these actions (van der Heijden & Eden, 1998). Kolb (1976) and Osland, Kolb & Rubin (2001) describe this process in their learning model through the four elements illustrated in figure 11:

**Figure 11: Four Elements of a Strategizing Process**



Kilde.: Kolb (1976)

Kolb’s model is probably the most widely know applicable- oriented learning theory within experiential learning. It shows that several learning processes take their point of departure in a concrete action entailing experience in terms of the results from the action in the concrete situation. Afterwards the learner reflects on the results as well as on the process, in order for him/her to understand the results. This makes him/her able to predict the results of the same action in a similar situation. The third phase consists in attempting to understand the general principle by conceptualising or theorising the action. The last stage is to experiment with other situations which start the process anew. Although Kolb and Rubin’s model focuses on learning at the individual level, it is applicable at group- and team level (van der Heijden & Eden, 1998; Kayes, Kays & Kolb, 2005). Thus we are dealing with organisational actions, dissemination of experience and organisational reflection etc.

In an organisational context the reflection- and observations phases are of special importance, as it is vital for organisations that experiences and the generated sense-making are divided. In this context van der Heijden & Eden (1998) argue.

*“(...) if a minimum of level of alignment of mental models has taken place within the organisation, planning becomes a joint activity. Experiences will be common, leading to a joint reflection in the group and reinforcement of a shared mental model”*

Strategies should not be described as episodes where people are gathered to make a decision, but rather be described through smaller steps (writing of memos, answering a query) indicating alternative directions for future actions and thus mark out boundaries for what is possible. Strategies are created without the knowledge of the people who are close to or participate in the process. Therefore the experiments play a major role in this strategy approach, as it is through the experiments the impossible is made possible and new meanings are generated. In this manner the experiments expand the collective frame of reference and hence define new boundaries and potential actions (van der Heijden & Eden 1998). Hamel (1977) phrases it as follows:

*“The more experimentation, the faster a company can understand precisely which strategies are likely to work. The goal is not to develop “perfect” strategies, but to develop strategies that take us in the right direction, and then progressively refine them through rapid experimentation and adjustment”*

The experiments can be of an organisational character as well as they can be carried out in close cooperation between the company and the inter-organisation partners. Especially the customer related experiments contribute to create meaning in the changeable environment, and not only meaning and knowledge that can be applied in relation to the specific experiment. On the contrary, meaning is created through updating of the existing frame of reference that passes beyond the specific experiment and hence generates new knowledge.??

Objectives and strategies are guiding, instructive symbols and only one of many elements contributing to create meaning in organisations. In this context strategies and objectives serve as an element to inspire confidence and provide the staff with an alibi in order for them to perform actions that can generate meaning and understanding for both the organisation and the staff. In other words the strategy functions as a flashing light in the fog, and the fog will step by step dissolve through the actions performed by the staff (Canales & Vilá, 2005).

Weick (1987) introduces confidence and improvisation as elements that can replace strategy, as confidence can be perceived as order. Order does not originate from thorough examination rather it is created by the senior staff and their ability to update the perception of order. The perception of order in chaos often implies that people act with more energy and determination which again contribute to increase the potential for successful actions (Weick 1987). Thus the biggest challenge for senior staff is that they must demonstrate self-confidence and trust that can diffuse to the organisation despite their awareness of the fact that the strategy or the plan in front of them is incomplete and incapable of making the organisation able to achieve its goals. This will trigger a range of collective actions leading towards the formulated goal.

Thus actions are of utmost importance in cases where the staff encounter uncertainty and chaos. On the other hand, actions are not sufficient as it would lead to e.g. an even bigger

chaos, as everybody would act and move in all directions. In situations like these simple rules can contribute to define the margin within which actions can take place (Eisenhart & Sull, 2001). The simple rules can act as guiding mechanisms as well as a symbolic reference in turbulent situations (Weick, 1987). Eisenhart & Sull (2001) describe how big detailed plans can be used in stable environments, whereas simple rules are more applicable in cases where companies operate in very changeable and chaotic environments. In short, the message is that senior staff placed in changeable environments must spend more time in the field among customers and suppliers following simple processes and rules than behind their desks. Meaning is created jointly through social interaction, and the strategy will emanate from this meaning. Eisenhart & Sull (2001) mention five different types of rules: 1) How-rules, 2) Boundary-rules, 3) Prioritisation-rules, 4) Timing-rules and 5) Exit- or Stop-rules. These five different sets of rules provide a good insight in how companies can apply rules as a part of the strategizing perspective. The rules often originate from concrete experiences rather than from analyses and thought processes. .

As conclusion to the strategizing approach it is important to mention, that this strategy approach highly emphasises conversations and social interaction both horizontally and vertically within as well as outside the organisation. It is vital that experiments and the knowledge created by the staff are based on as many sources as possible. Moreover it is important to carry out many different actions in different contexts as actions that are carried out randomly and hence not restricted to few methods are the most advantageous in a world characterised by uncertainty and complexity. The application of few methods increases the risk of recreating data and hence repeat historical events, as the investigation justify these actions (Gimpl & Dakin, 1984). In that connection Mintzberg (1994) suggests that senior staff to greater extent base strategic decisions on information generated through individual action rather than on information generated through the organisation. Thus senior staff must be more involved in the experiments as this is where meaning is created – meanings that cannot be obtained in other ways.

The strategizing approach is the fourth alternative strategy approach I have chosen to deal with. It is an alternative to alternative (1) and (2), and an elaboration of scenario learning (3), as this approach opens the possibility of applying scenarios to accumulate different potential actions although the scenarios do not hold a central position in strategizing. It is only through actions you can create meaning that can contribute to reduce the uncertainty. Experiments hold a central position as they can contribute to expand the staff's frame of references and thus prove if potential actions are sustainable or not. Thus action precedes thought processes just as they follow up on thought processes (reflection). Strategy and strategic behaviour is considered a rational game, where the frames of the game and its content develop gradually as the game proceeds. When organisations strategize in the internal and external contexts they design the frames for future strategizing. This happens in cooperation with various individuals, social groups, organisations and institutions.

### **2.2.5 Summing up of the four Approaches to Strategy**

The above sections have treated the four different approaches to and understanding of strategy and how the process leading towards a strategy is dealt with and designed within the four alternatives. The four approaches provide an overview of the strategy area, and both individually and collectively the four alternatives represent a good frame within which the

empirical experiences can be discussed. At the same time the alternative strategic approaches embody four different interpretations of strategy that will be used in the next section to categorise the literature dealing with digitalisation strategy and the process leading towards a digitalisation strategy.

The four alternatives sketched in figure 10 should be understood as alternatives in the sense that none is better or more advantageous than the others. Each of them has its *raison d'être* and areas and contexts will occur where each of them will be considered advantageous. One example is found in a context or environment that is characterised by stability and comprehensible. In this case strategic planning or management will appear to be the strategy approaches and processes that are most advantageous. In other dynamic contexts where clear structures are difficult to identify, scenario learning or strategizing might appear to be the best alternatives. Thus the difference between the four alternatives is the perception of reality i.e. whether it is perceived as objectively accessible or if it must be experienced and understood through social interaction.

In the first section of the chapter I have argued that there are clear signs that digitalisation as phenomenon in this point of time moves into the early *golden age* phase. The actors often consider this phase as extremely chaotic and uncertain, as the introduction of technological innovations entail that engrained routines and habits must be reviewed and that a few must be changed. In other words the existing knowledge must be relinquished and new competences acquired. The digital technology develops fast, and therefore it is not obvious which technologies and technological concepts will win and hence which one must be prioritised. Times like these are very often associated with a feeling of uncertainty and complexity which means that digitalisation- strategic- processes that accept the uncertainty and complexity are the most applicable. Eisenhardt & Sull (2201) suggest that various approaches are applicable according to the degree of turbulence and uncertainty in the organisation's environment. The construction of defensive positions function best in slowly developed, structured markets, whereas the search for possibilities and dynamic decision making are most applicable in rapidly changing, incomprehensible and uncertain markets. In that connection Pitt (2001) writes: "(...) *existing models of strategy are less useful because they were developed in and for a time of less turbulent change*" which points even more in the direction of a strategic approach that is dynamic and action oriented. This issue will be elaborated on in the next section where digitalisation strategy and the processes leading to the strategy will be in focus.

### **2.3 The Process leading towards a Digitalisation Strategy**

In the search for literature that describes various approaches to the process leading towards a digitalisation strategy I have found a wide range of different approaches. Concepts as IT – strategy, Strategic Information Systems (SIS), Inter-organisational Systems (IOS) and Strategic Information System Planning (SISP) were the dominant concepts especially in the early period (until the mid 1990s).

It goes without saying that the literature relating to these concepts was developed in a time (beginning 1960s until mid 1980) where IT was used relatively isolated in specific organisations and departments and especially in the beginning there was no possibility for connection between the specific administrative IT systems (Zuboff & Maxim, 2003). During this period the task for the IT organisation was to deliver the amount of systems – or hardware

resources that were capable of following the development and the growth in the remaining part of the organisation. The typical measure was transaction volume that was converted to information processing capacity. To be able to deliver this capacity to the remaining organisation the IT- organisation developed an IT strategy. The strategies were developed in such a way that there were sufficient, centralised IT-resources that were able to match the need of the whole organisation. Consequently the IT-strategy was exclusively reactive and adapted to the business driven strategies that dictated the needs for IT-resources (Boynton & Zmud, 1987).

Although IT during the 1980s started being applied in new contexts e.g. inter-organisationally via EDI (Electronic Data Interchange) in relation to both customers and suppliers, the IT-plans remained reactive and adapted (Boynton & Zmud, 1987). At this point in time organisations therefore recognise that IT is not only an internal but also an external tool in relation to customers and suppliers. It is still the business strategy that dictates the potential and need the IT strategy must respond to. The definition of Strategic Information Systems Planning (SISP) clearly demonstrates this through the following quotation: “(...) *the process of identifying a portfolio of computer-based applications that will assist an organisation in executing its business plans and realizing its business goals*” (Lederer & Sethi, 1988). The starting point is found in the IT-department, and the task is to identify which applications must be used. There is still an adjustable and adaptive perspective on digitalisation. The IT-department’s basic understanding seems to be: “*Tell us what you want, and we will identify the IT-infrastructure elements that are necessary in order to solve your needs*”.

Later, other concepts emerged and especially when the internet was introduced in the early 1990s e-strategy, e-commerce and e-business strategy were used to describe the challenges the organisations encountered at the strategic level. The fact that it was considerably cheaper to use internet technologies rather than traditional technologies like EDI entailed that IT and digitalisation were now considered vital and proactive devices on the inter-organisational front. Due to IT it had become possible to open new markets, acquire new customers, strengthen the customer- and supplier relations, generate value and obtain strategic advantages (Rangan & Adner, 2001, Hartback & Kettinger, 2000, Chang & Grover, 2003). In other words the inter-organisational perspective became an important argument to pursue and use IT-companies (Humphreys et al., 2006).

It was so advantageous to sell on the internet that all companies in fact were in need of a strategy for the way they wanted to explore these inexhaustible possibilities. E-business strategy was introduced as a concept that would give directions on how the internet can change the companies in order for them to be able to deliver competitive advantages (Cagliano et al., 2005). For the first time the IT- discussion has been moved out of the organisation, and now it were the senior staff from other departments of the organisation that were pondering on how the internet could be used to obtain the many advantages and potentials that had become known. Focus was moved from IT-technical dimensions to all the areas where the internet could be used. A significant difference from the former use of the internet was the possibility to support the selected business strategy as well as to generate new business opportunities (Venkatraman et al., 1993, Konsynski & McFarlan, 1990). E-business, as it was named should first of all be initiated, and the expenditure became secondary (Damanpour, 2001). E-business was of vital importance if the company was to survive on the new market that was extremely competitive (Newkirk et al., 2003). The internet changed

everything and created a new paradigm for company managements (Venkatraman, 2000, Ping Li & Chang, 2004). In fact it happened so fast, that many companies implemented e-business applications without carefully thinking out what the strategic implications would be (Barnes et al., 2003).

The view on IT and the interaction between IT and the business have changed dramatically during the last 40-50 years. E-business strategy is a relatively new issue that was launched as an alternative to traditional concepts like SISP, SIS and MIS. Intensive review of the literature has revealed that there seems to be no boundaries between SISP, SIS and e-business. On the contrary, the concepts seem very much to be overlapping. However, it must be mentioned that the literature treating SISP, SIS and IT-strategy tends to take its starting point in the IT-department, and consequently the focus is on how to identify and handle the challenges the IT-department faces. A part from the environment of the IT-department these approaches also includes the remaining organisation as we as the whole organisation's environment. The core in this literature is likewise to give inputs in relation to the direction and the challenges the IT-department faces and hence to design the correct IT-infrastructure in the organisation (Barnes et al., 2003).

The literature dealing with e-strategy has a more business-like approach and often it addresses the issue of the possibilities offered by the IT-technology and how it can be used internally in the company and in relation to customer and suppliers (Jelassi & Enders, 2005). Therefore it is rare that these methods or approaches to digitalisation strategy use the IT-technological dimensions as parameters in the strategy approach. On the contrary, the company's environment and especially the relation to the customers are brought much more into focus in the literature that applies this terminology.

Although the different types of literature have been written from diverse perspectives and focus on different departments in the organisation it is possible to use them both in the description of the various digitalisation strategies. Van Hooft & Stegwee, (2001) argue that many of the experiences and theories developed in connection with SISP, SIS and MIS, can be applied when the talk is about e-business strategy. As a consequence I have incorporated literature dealing with all the above mentioned concepts.

In brief, IT has infiltrated the business and the two are now inseparable units. Concurrently with the development where IT to a greater extent has become critical for business, another development has taken place. There is a general consensus that companies are in need of a proper e-business strategy (Evans, 2000, Cagliano et al., 2003, Birkhofer et al., 2000). This has also been discovered in Danfoss:

*“What we needed was an e-business strategy”*

(Klaus Jørgensen, Senior Marketing Director (13.5.2003))

It is obvious that the use of IT has developed from being mainly oriented towards administrative and supportive functions to play a more strategic role in the organisation. As IT increases its strategic potential the questions arise what a digitalisation – or e-business strategy looks like, which process is applied in creating it as well as how it is implemented. The value it has been possible to generate has developed from relating exclusively to the specific organisation and its departments to be connected with the relation between

organisations and especially in relation to the organisation's customers. Naturally there is no single answer as to how the value is realised and hence which strategic approach is most successful, as the answer generally seen is dependent on how the concept of strategy is perceived. Thus the four approaches described previously will form the basis of the categorization of the literature dealing with digitalisation strategy.

### 2.3.1 How Digitalisation is viewed in the Literature

A compilation and discussion of the literature relating to digitalisation reveal that the discussions that have been summarised in connection with the use of various strategic approaches are repeated in the literature dealing with digitalisation strategy. Many researchers discuss which approaches to digitalisation strategy (the all-encompassing and incremental) should be applied (Salmela & Spil, 2002). These two categories have similarities with three out of the four strategic approaches I have applied: strategic planning (1), strategic management (2) and scenario learning (3). Pitt (2001) argues that companies ought to apply new approaches to strategy, as traditional methods do not function in this turbulent milieu. On the contrary, Porter (2001) argues that the basic rules in already known strategy approaches are more applicable now than ever before. Ciborra (1997) challenge the application of a structured strategy process in a time of big turbulence. On the other hand Salmela et al., (2000) claim that an all-encompassing and systematised strategy process can function even in turbulent surroundings. The result of too much or too little IT-planning has also been discussed (Premkumar & King, 1992, Sambamurthy et al., 1994, Newkirk et al., 2003). According to the researchers too little planning will lead to an insufficient understanding of the planning context, whereas too much planning will monopolise a big number of resources in relation to time.

The concept of 'agility', defined as "(...) *the ability to detect and seize market opportunities with speed and surprise*" (Sambamurthy et al., 2003), enrich the discussion as to which approach is most successful (Holmqvist & Pessi, 2006), as this ability is increasingly considered as a significant competitive advantage (Ferrier et al., 1999, Sambamurthy et al., 2003)

Another discussion occupying much space in the literature on digitalisation strategy is the *alignment* between the IT-strategy and the business strategy. In fact this was not a new issue, as the first articles in this topic was published already in the beginning of the 1980s (Camillus & Lederer, 1985. Newer articles (Henderson et al., 1996, Lederer & Mendelow 1989, Segars & Grover 1998), demonstrate that the problematiqués are still debatable. A new study from Lin (2005) concludes:

*"The advent of new technologies, such as internet-based systems, makes the challenge of aligning Information Systems with business more significant and difficult than before"* (Lin 2005)

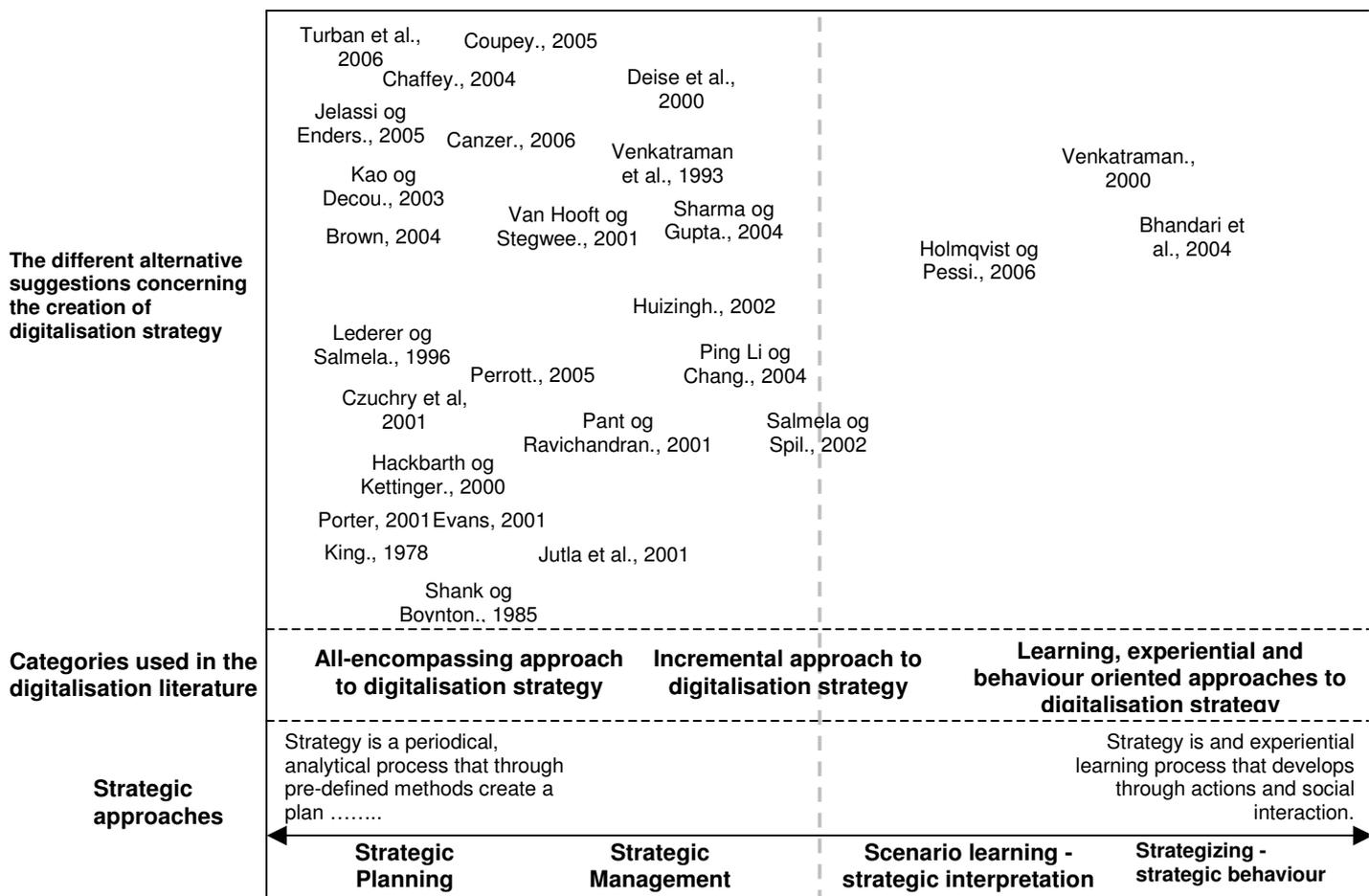
Thus the essential is still to secure that the two sets of strategies are integrated in such a way that the values between them can be utilised to their full potential (Rowley, 2002).

Based on interviews in 21 different English companies Earl (1993) describes five different empirical perspectives on digitalisation strategy. He talks about perspectives in stead of

approaches as these perspectives should not be understood as consistent methods or procedures as e.g. the strategic approaches I have treated earlier. On the contrary, the perspectives should rather be understood in relation to the way the companies perceive IT, who handles the implementation of new technology in the company and finally which types of arguments drive the process. Earl (1993) names the five different perspectives as follows: 1) business managed, 2) method based, 3) administratively, 4) technologically and 5) organisationally. Pyburn (1983) has carried out a similar empirical study, resulting in three categories covering the same span. Although these perceptions describe empirical investigations and hence not totally consistent and standardised as is the case with the four alternative strategy approaches, it is possible to detect a certain resemblance with the continuum I apply as well as with the different perspectives presented by Pyburn (1983) and Earl (1993). Thus there is empirical documentation that all four alternative strategy approaches have the potential to form and create a digitalisation strategy, and hence make it possible for the organisation to realise the advantages the digital technology and digital interfaces represent.

In that connection it is interesting that Earl (1993) substantiates that there is both qualitative and quantitative justification to consider dynamic and action based perspectives on digitalisation as the perspectives that companies experience as most successful. This is interesting as the literature on this issue is very scarce. As shown in figure 12 the literature is by far the most extensive where the digitalisation process as a planning task is concerned.

**Figure 11: Literature Overview of Approaches to Digitalisation**



The figure is sketched on the basis of the approaches to strategy described earlier. The approaches were divided in planning-and action based approaches to strategy. These categories have not been directly identified in the literature dealing with digitalisation strategy. On the contrary the categories are often 'comprehensive' and 'incremental' (Salmela & Spil, 2002). As described and defined in the literature, it is obvious that the comprehensive category basically encompass the categories strategic planning and strategic management. The methods are rarely as rigid as the ones described in strategic planning, and consequently this category is placed so that it covers both strategic planning as well as strategic management. The incremental category is described so that is placed in the dynamic end of strategic management towards strategic interpretation (scenario learning).

The reason for this position is that this category is more dynamic than the comprehensive category, but the process is still described as a mainly mental, thought- based process that precedes actions. It should be mentioned that many researchers within this category argue in favour of dynamics, learning and to some extent of experiments, but when formulating the procedure that is supposed to lead towards a digitalisation strategy, the procedure is organised in such a way that it includes data collection, analysis, planning and implementation. In other words the incremental approach is more dynamic and learning oriented than the comprehensive approaches. However, the incremental approach is far from applying the same concepts as the comprehensive approach, nor does it cover the same activities, as is seen especially in the strategizing and the scenario learning approaches.

The last category I have named myself: the learning, experiential and behaviour focused approach to digitalisation strategy. Despite intensive search the literature only presents three examples that are not incorporated in either the comprehensive or in the incremental category. The three articles argue for flexibility, dynamics and experiments as the basis for the creation of a digitalisation strategy, but the description of the process leading towards the strategy is inadequate. In that connection I agree with Salmela & Spil (2002) who note:

*“The incremental approach does not provide similar explicit step-by-step methods for IS planning, as was the case with comprehensive approaches. The process is informal and rests very much on the ability of key managers to include the right people and conduct the right analyses”* (Salmela & Spil, 2002)

Although Salmela & Spil argue in favour of the lacking description of the incremental approaches I can ascertain that things look much worse where the description of the learning and experiential approaches in connection with the creation of a digitalisation strategy are concerned.

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I do not intend to delve deeply into a description and explanation of the various approaches to digitalisation strategy as the fundamental processes within digitalisation strategy do not differ significantly from the processes described in the section relating to strategic processes. Thus the digitalisation strategic processes placed in the comprehensive category describe to a great extent the strategic process as a process in which the rationality is rooted in rigid data collection and analysis processes that must be put into practice in various strategic alternatives which are then implemented. The incremental approach has much in common with strategic management, as the strategy must be adapted to the experiences the staff acquire along the way. However, the route is chosen due to analyses and thought processes, before the process move on to the implementing phase. On the other hand the digitalisation strategic processes that are placed within scenario learning and strategizing are to a greater extent based on concrete actions, reflection and subsequently on new actions.

Thus a more detailed description of the various approaches to digitalisation strategy will only be a repetition of the already described which would be uninteresting. On the contrary I intend to focus on the areas and issues that a digitalisation strategic process must be able to handle according to the relevant literature. Hence there is a wide range of unique challenges and elements that have influence on the actors and hence their ability to generate strategies in connection with digitalisation in a customer related perspective. Consequently the digital phenomenon differs from other phenomena in many ways. The discussion will result in various theoretical statements that actors who wish to construct and implement a customer related digitalisation strategy should keep in mind. Furthermore, the selected strategic approach and following process must be able to deal with these theoretical statements. **NB. den her sætning må vi snakke om.** Thus the theoretical statements constitute an accumulation of elements that in theory are identified as potential problems impeding the realisation of the value the digital interfaces represent in an inter-organisational context.

### *Challenges to the Digitalisation Strategy*

The literature introduces a range of challenges that are unique in relation to the preparation of a digitalisation strategy. The literature presents issues and arguments that discuss why it is difficult to create successful digitalisation strategies. As the focus of the text is the customer related context, it should be mentioned that as the digital technology is introduced in an inter-organisational context there are considerably more potential pitfalls than is the case if it is introduced in an organisational context (Salmela & Spil, 2002). Hence there is nothing to indicate that it is without risks to get involved in digital customer related projects.

The paragraph below is a collection of the most important issues. There are undoubtedly more to be found in the literature. I have compiled the ones I deem most relevant in connection with my empirical reality. Inspired by Henderson & Venkatraman (1999) I have divided these unique elements into the following categories: 1) statements relating to technology, 2) statements relating to the organisation and 3) statements relating to the strategic process.

### *Technological Statements*

To a great extent to the category ‘technology’ relates to the phenomenon represented by the digital technology. In the theoretical review I have identified three statements that in the theory are mentioned repeatedly as challenges for actors wishing to establish and implement a

successful customer related digitalisation strategy. These elements are compiled in three categories relating to: 1) the development of technology, 2) the process through which the digital technology is used and 3) how the competitive advantages are realised in relation to the technology.

The first theoretical statement relates to the fact that the digital technology develops with giant strides, and what seems impossible today will be possible tomorrow. Therefore the strategic process must be prepared to manage this dynamic through constant incorporation, tests and examination of new technology within new fields. Rao, Metts & Monge (2003) describe how the field is in the early phase of development, and how the development has exploded in recent years. This explosion has entailed a similar explosion in the literature Coughlan et al., (2005) argue: *“In the current dynamic and demanding global economic climates, the worlds of Business and IT (BIT) face the constant challenge of keeping apace of the latest developments that would add a competitive advantage to their organization”*. Thus rapid development entails that actors and organisations wanting to apply the digital technology and hence realise the values that can be realised in the customer related context are faced with an overwhelming range of possibilities in the shape of technologies and applications. This contributes to create a considerable uncertainty and complexity when decisions are to be made concerning the use of the digital technology. The above discussion leads us to the formulation of the first theoretical statement.

- **The technology develops with giant strides:** The rapid development creates a high degree of complexity, uncertainty and many questions the actors must consider in their assessment of the applicability of the technology (where, why, how and when). As a consequence the projects often become risky.

The second theoretical statement relates to the fact that utilisation of the digital technology will often result in development and acquisition of or adaptation to new or existing technology which often complicate and increase the price of the process significantly (Borum & Christiansen, 2006). Projects relating to IT and digitalisation are therefore associated with big investments (Bird, 1994, Hinton & Kaye, 1996). Consequently projects containing components of digital technology tend to be resource demanding. Often they demand changes in the daily life of organisations and actors – changes that can be difficult to push through and which might lead to a decrease in productivity. Because of the many uncertainty factors it can be difficult to justify the value of these investments on beforehand (Coughlan et al., 2005). The discussion leads us to the second theoretical statement:

- **Utilisation of digitalisation is a complex and often resource demanding process:** Digital projects are often resource demanding and involve organisational change and staff with highly specialised qualifications. The value can be difficult to justify on beforehand.

The third theoretical statement relates to the fact that although the development is rapid and that there are hardly any limits to what can be achieved through the digital technology, it is not the technology itself that brings about a competitive advantage. On the contrary the competitive advantage is dependent on the organisation’s capability to use the digital technology with the intention of differentiating itself from its competitors (Henderson & Venkatraman, 1999). Hence the technological capacities cannot be directly linked to the

advantages the organisation acquires by using a given technology (Coughlan et al., 2005). In this manner an organisation can have all the correct and most sophisticated IT-systems at its disposal and even so only be able to realise limited value and vice-versa. This could be one of the reasons why the organisations subsequently do not consider many projects encompassing implementation of a new IT-system, as successful. The implementation of CRM systems is an example of this situation. Dickie (2000) substantiates how only 30% of the organisations utilising a CRM system consider it a success.

**-The competitive advantages in relation to the digital technology are associated with the organisation's capability to use the technology and not with the technology itself:** The IT-systems or digital applications is an empty box where the value is realised concurrently with the organisation's implementation of the systems in order to deliver values to the customers.

### *Organisational Statements*

The organisational statements treat the organisational and structural elements that have influence on the organisation's ability to make conclusions in relation to the digital technology and hence the organisation's ability to identify, develop and implement digital, innovative applications in a customer related perspective. In that connection I have identified a range of elements that affect the actors' ability to make inter-organisational digitalisation strategic decisions. They can be divided into three groups: 1) the IT-department's structure and orientation, 2) the cooperation between the different units with interest in digitalisation in an inter-organisational perspective particularly IT-Sales and Marketing and 3) general organisational structures that affect the ability to be innovative.

The fourth theoretical statement relates to the fact that precisely the connection between the IT-department and the rest of the organisation including the structuring of the IT-department itself, is a vital element in order to explain a successful identification and fast adoption of IT-innovations. Swanson (1994) argue that “(...) *the success of IT-innovation may rest upon an effective partnership between the IT-department and its users, and, moreover, users maybe the sources of certain IT innovations*” and Swanson (1994) further explains the difference in the speed with which various types of IT-innovations are introduced and adopted by organisations by “(...) *corresponding variance in the fundamental relationships of the IT unit to its host organization*”. The relation between the IT-department and the rest of the organisation is of utmost importance in connection with strategic decisions that include digitalisation.

The organisation of the IT-department affects the organisation's ability to identify new digital technological applications. This happens particularly in relation to the discovery of IT-innovations in an inter-organisational perspective. Swanson (1994) concludes that it is difficult for big central IT-departments to identify and implement innovations in the inter-organisational context in a successful manner. Innovations in the inter-organisational context are more often discovered and implemented in cases where a decentralised IT-department is in close contact with the rest of the organisation and the inter-organisational users. Also Rogers (2003) concludes that centralised organisations are often less innovative than decentralised organisations. The orientation of the IT-department is also of great importance concerning the ability to identify and implement IT-innovations of an inter-organisational

nature. Consequently a business- oriented<sup>7</sup> IT-department more easily understands the section of the organisation that has inter-organisational needs whereas an IT-oriented<sup>8</sup> department does not have this competence (Grover et al., 1997, Swanson, 1994). This leads us to the fourth theoretical statement.

- **Centralised IT-departments have difficulties in identifying and implementing innovations outside their own domain:** Centralised IT-departments can act as skilful supportive organisation but the capacity to innovate outside their own domain is limited.

The fifth theoretical statement relates to the fact that the utilisation of new digital technology in the customer related context relies on competencies from various organisational departments, namely the IT-department holding knowledge about the digital technology as well as about the Sales and Marketing departments with business knowledge including understanding of customers and their needs. Normally these departments do not interact, and therefore their knowledge of what goes on in other departments is limited, as well as they have limited knowledge of the existing potential for implementation of the digital technology in the inter-organisational context. Peppard & Ward (1999) identify a real “gap” between the two departments, and mention this gap as one of the most critical reasons for the scanty cooperation between the various departments. They also find that the lack of proper cooperation is the reason why the existing value between the IT-department and the rest of the organisation rarely can be realised (Coughlan et al., 2005), and consequently why some organisations find it difficult to identify and adopt the digital technology.

The problem with this “gap” and the lacking cooperation relates to the discussion on homophily (Rogers 2003). There can be a tendency in situations where actors interact exclusively with other actors with similar characteristics such as the same kind of organisation, the same level in the organisation, sex, age etc. Rogers (2003) describes how homophily can be an invisible barrier to the flow of innovation and acceptance of new ideas. This leads us to the fifth theoretical statement:

- **A good cooperation especially between the IT- and Sales and Marketing departments is crucial:** It is essential that the actors possessing competencies that are important for their specific field of operation have a positive and trusting cooperation, if customer related digital applications are to be identified, developed and implemented.

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<sup>7</sup> A business-oriented IT-department focuses on the value of its services in relation to the host organisation. Knowledge about the business’ operations is important, and the IT-staff is often recruited from and will later be placed in the organisation. The IT-function identifies itself with the goals of the organisation, and these are considered essential for the daily work. The IT-department tends to be more oriented towards the local rather than the cosmopolitan level.

<sup>8</sup> An IT-oriented IT-function focuses on the organisation’s IT-expertises. It competes for the most skilled IT-staff members that are rarely recruited from and are not likely to be placed in the host organisation. The newest IT-systems are adopted, and the organisation is proud of its ability to innovate as well as of the quality it delivers. The organisation tends to have a cosmopolitan rather than a local orientation.

The sixth theoretical statement relates to the organisational structures and the positive or negative effect these structures have on the organisation's ability to act in an innovative manner. Swanson (1994) and Rogers (2003) denote preparedness or *slack* as an important parameter of a successful identification and implementation of IT-innovations. Consequently preparedness relates both to preparedness in the IT-department in the rest of the organisation as well as specifically within the areas where the users of the new innovations are placed; in this case the Sales and Marketing departments. In that connection Bessant (2002) too, mentions three barriers to innovation, 1) denial, 2) isolation and 3) rigidity that can affect the ability to identify and implement customer related digital innovations. Also Slywotzky & Morrison (2000) denote denial as one of the most essential barriers to the application of digital technology. Thus the structure of the organisation including routines and procedures can constitute a hampering effect on the ability to identify the signals that can initiate alternative actions. The organisation might show a tendency to deny certain stimuli, isolate itself and focus entirely on the existing customers and their needs. Moreover, the organisation can be structured in such a way that in case these stimuli are perceived it becomes difficult for the actors to do something, as a range of barriers for innovative thinking is inherent in the organisational structure itself. This leads us to the sixth theoretical statement:

- **The organisational structures can hamper the innovation process:** Organisational structures, routines as well as the lack of organisational preparedness in both IT as in the rest of the organisation can hamper the organisation's ability to identify, develop and implement innovative digital applications.

### ***Strategic Statements***

The strategic statements sum up the first two categories and relates to a greater extent to the concrete strategic processes. It is also about how particularly digitalisation strategies and business strategies must be closely connected in order to create the optimal milieu for the utilisation of the digital values. These elements have an effect on the actors' ability to make strategic decisions relating to digitalisation in an inter-organisational perspective. Below I have divided the elements into three groups relating especially to the following 1) the value of a digital technology proves profitable in the long run, 2) the digitalisation strategy and the business strategy must be connected and 3) the strategy process must make the company able to respond quickly to the customers' immediate needs. Thus I have identified critical elements in relation to the time frame that the digitalisation strategy is depending on. Furthermore, I have outlined significant elements pertaining to digitalisation as a transformation process, as well as the need for the organisation to respond quickly to needs that occur in the inter-organisational context.

The seventh theoretical statement clarifies how the value of digital technology often proves profitable in the long run, and therefore not justifiable in the short run (Slywotzky & Morrison, 2000). We are dealing with a long haul, where the real value proves profitable in the long run and through many smaller projects and implementations. Thus the value is not linked to a system but to a greater extent to a process of many smaller changes extending over time. If the process can be designed in such a way that the immediate value appears quickly and if the early investments are small it will affect the actors' possibility to identify and implement innovative digital applications in order for them to become a natural part of the organisation's daily life. This leads us to the seventh theoretical statement.

**-The value of the digital technology becomes apparent in the long run:** The value of digitalisation appears over time. Thus the single customer placing a digital order will not be of great importance, but as more and more customers act in the same way the value becomes obvious.

The eighth theoretical statement relates to alignment or to whether there exists a connection between the business strategies and the IT strategies. Studies show that the greatest success pertaining to digitalisation occurs in case of a close relation between the two sets of strategies (Henderson et al., 1996, Lederer & Mendelow, 1989, Segars & Grover, 1998). Thus the theoretical discussion deals with the following issue: in order to make digitalisation a natural part of the organisation it is necessary to incorporate it in the strategies. In case there is no connection between the two sets of strategies the risk arises that digitalisation is not incorporated in the organisation's daily processes and thus we are dealing with two alternative processes. When offline and online processes are established as parallels, it is more a question of establishing an extra process than of a literal transformation. The extra process will undoubtedly increase the price of the venture considerably, as many of the advantages of the digital technology is found precisely in the value that appears when the existing merge with the digital technology. Therefore it is preferable that the strategies prepare the ground for a transformation of the organisation rather than the establishment of parallel processes.

A problem that is associated with this alignment-discussion is that digitalisation seems to be caught between several stools. Who in the organisation owns digitalisation, and who has the responsibility for the identification of digital applications and how are they implemented and used in the organisation? The answer to the question is that everybody owns the digitalisation tasks and the responsibility is dispersed in the organisation (Pitt, 2001). Thus it is only through cooperation and common responsibility that digitalisation reaches its full potential and is implemented where it generates value. The network rather than specific units and departments share the responsibility and become the creator (Pitt, 2000). This leads us to the eighth theoretical statement:

- **There must be a close alignment between digitalisation strategies and business strategies:** Digitalisation strategies and the derived initiatives should not be established as alternative processes leading their own lives isolated from the business strategies.

The ninth and last theoretical statement is associated with the discussion on *agility*. Agility means that the organisation must be prepared to react to immediate needs emerging internally as well as externally and the increasing discussion in the literature on IT and digitalisation strategy bears witness to the importance of the concept. According to the agility –discussion the strategy process must be designed and contain activities that relate to interactions with customers, development of organisational competencies and the utilisation of the company's network of external partners (Sambamurthy et al., 2003). In this context it should be mentioned that the importance of decisions is often biggest in cases where the knowledge associated with the decision is lowest (Riis & Mikkelsen, 2005). This makes agility even more important, as the strategic process must leave space for decisions to be altered rapidly. Associated with the discussion on *agility* it should be mentioned that many researchers argue that IT have a constantly increasing strategic role, the reason being that exactly digitalisation

processes increase the flexibility and agility that companies deem more and more vital (Arthur, 1996, Grover & Ramanal, 1999). This leads us to the ninth theoretical statement:

- **The strategy process must be flexible and agile:** The strategy process must be designed and organised so that it is flexible and agile. This ensures a quick reaction to immediate needs and hence their compliance.

The actors who wish to create a strategy for the digital customer related possibilities are thus confronted with a range of unique elements and challenges. The question remains which conceptual framework and which process should be applied in order to understand the challenges and hence solve them the best way possible.

### *Conclusion and Recapitulation of the Texts*

The invention of the computer chip was the starting signal to the digital evolution where the digital technology slowly but steadily day by day finds new applications among companies as well as among consumers. It is a quiet but constant process where ingrained habits and routines as well as cultural behavioural patterns must be changed and adapted to the new logic the reality is based upon. However, the question is how to understand the new logic, what it entails and how companies put themselves in a situation where they continually can identify and use this logic in relation to concrete customers?

As a consequence of the above question the texts were divided into two main sections: The first section attempted to offer a preview of the new digital logic through a discussion of digital versus physical interfaces and information. The second section discussed strategy and strategic processes, as strategy and the process through which strategy is created in an important factor in the companies of today. Consequently, various strategic approaches also define different approaches to how companies can put themselves in a situation where they can constantly identify and use the logic that digitalisation represents in relation to concrete customers.

Although the two sections are separated and described one by one there is naturally a close connection between the new logic that is introduced in connection with digitalisation and the processes that are most likely to make companies able to identify and apply this logic. The literature discuss extensively how the environment must be understood as well as the alternative strategic processes that are most likely to function in the different environments.

The literature describes the planning oriented processes as the most successful in stable and predictable environments, as these environments make it possible to identify reliable structures, logics and understandings in the company's environments. With relatively big security and accuracy the structures make it possible to locate and identify the areas where the effort should be concentrated as well as which tools should be applied. This could be in the shape of concrete tools or managerial concepts or methods. In relation to digitalisation in an inter-organisational perspective, it means that the planning oriented approaches, based on a bigger, internal and external data collection, consider it possible for the strategists to identify the technologies, customers and types of customers, interfaces and information that are most likely to create value for both customer and company through digitalisation. According to the planning approach it is likewise possible to plan and design the optimal organising that adheres to the digitalisation. In other words it becomes possible to calculate the concrete

results and implications of the selected digitalisation effort. Consequently the company should exclusively focus on the implementation of the selected digital interfaces and applications. The effort is quantifiable, and calculations account for the size of the investment to be defended as well as the amount of savings or extra sale that follow as a result of the selected digital initiatives.

As an alternative to the planning oriented processes the learning and behavioural oriented strategy approaches focus on the daily behaviour and on how best to organise the staff in the organisation as well as on which routines to apply in order for the work to be strategic. Subsequently the strategy will emerge as a result of the strategic behaviour. Theories and methods are applied just as is the case in planning oriented approaches, but now they act as reflection tools rather than as filters. Action becomes strategy through reflection. Thus a strategic routine is worked in, and hence the strategy concept should not be seen as a function nor as a job description, but rather as part of daily life. The literature describes the learning and behavioural approaches as the most successful approaches in cases where the environment is dynamic, complex and unpredictable. Consequently it is not possible to identify reliable structures, logics and understandings in the company's environment with certainty which renders prediction and hence planning impossible. The approaches are based on a **voluntaristic/voluntary** ? interpretation of reality and in the end the winner will be the company that is most successful in incorporating strategic behaviour as organisational culture.

In relation to digitalisation in an inter-organisational perspective this means that learning- and behavioural oriented approaches focus on the behaviour and the decisions the staff make everyday. These actions are expressions of reflective processes that make the staff able to identify potential connections between digital technologies, customers and types of customers, interfaces and information that are most likely to create value for both customer and company through digitalisation. However, the connections must be tested in concrete customer cases, and by the test as well as through prototypes experiences will occur that lead to new experiments via reflections. Thus it is impossible to plan and design the optimal organising that follows implementation of digital interfaces. The learning that the actions entail will have the result that various adaptations based on the learning actions will occur constantly. The various initiatives cannot and should not be calculated into the smallest details on beforehand. After the experiment has been carried out some positive as well as negative experiences and implications in relation to the use of digital interfaces and digitalised information and processes in the concrete customer situation will naturally become visible.

This brings us to two overriding understandings of how a digitalisation strategy is created, and they define various understandings of how the new digital logic is identified and how they manifest themselves in the shape of concrete interfaces in the companies. There are two different perceptions of how digital interfaces that simultaneously deliver rich information with a big reach can be identified and implemented in companies. In other words how can digital interfaces, capable of handling tasks that previously demanded contact among the staff and therefore entail cost savings and better service, now be discovered and identified.

In connection with digitalisation in a customer related perspective in the Digitalisation Journey it means that there are various approaches to how the company manages the challenges inherent in the realisation of the value in the present phase of the digital revolution.

In order to obtain the value and utilise the new logic the existing ways and routines must be thought through very carefully and changed, as the new technology offers a whole range of new possibilities and values for both customers and suppliers.