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COPENHAGEN BUSINESS SCHOOL

HANDELSHØJSKOLEN

THE IMPACT OF WORKING FROM HOME IN A DANISH CONTEXT

A STUDY OF HOW DANISH COMPANIES HAVE CHANGED DUE TO THE LARGE-SCALE USE OF WORKING FROM HOME

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Abstract

During 2020, the world was suffering from COVID-19, forcing many countries' governments to institute mandatory lockdowns. These lockdowns introduced a unique situation, as many companies were forced to institute large scale use of working from home (WFH). This scale and pace of transitioning to WFH have not been experienced in such a large magnitude and presents an existential challenge to the companies. Currently, the existing literature within the field of WFH focuses on productivity and the social aspects of work, while the topic of how WFH affects the companies' digital capabilities have been neglected. The thesis seeks to fill this gap, by answering the question *"How does general adoption of working from home affect the IT capabilities in danish workplaces, and to what extent did their digital maturity level impact this?"* The foundation of this thesis is built around interviews with six Danish companies that have all transitioned to remote work. This study's analysis is divided into two different parts. The first part is an in-depth analysis of the participating companies´ digital maturity level, while the second part seeks to uncover what improvements the companies have experienced to their IT capabilities. The findings present the results and an evaluation of the role of digital maturity in the companies´ transition to WFH. Additionally, the findings present the participants´ view of WFH and how their performance has been impacted. This thesis concludes that all the companies have experienced an increase of their IT-capabilities and their individual digital maturity level does not have a notable impact on the initial transition phase. The impact of IT maturity seems to be more related to the long-term implications of WFH in the individual companies. Additionally, the study's conclusion provides relevant business implications showing that WFH has a high possibility of being implemented as a regular part of business in the future.

Abbreviations

CEO	Chief Executive Officer
CFO	Chief Financial Officer
CIO	Chief Information Officer
GLT	The Great Leader Team
HRM	Human Resource Management
IS	Information System
IT	Information Technology
IT-CMF	IT Capability Maturity Framework
N/A	Not Applicable
RBV	Resource Based View
R&D	Research & Development
VRIN	Valuable, Rare, Imperfectly imitable & Non-substitutable
WFH	Working From Home

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1 Introduction

1.1 Introduction of working from home

Working from home or remote work has been an interesting topic for organisation in the last four decades (Duxbury et al., 1987). At the beginning of this millennium, remote work was referred to as telework, due to the combination of computers and telecommunications technologies. Organisations has become aware of the opportunities and benefits of transition to more agile work methods to adapt in the rapidly changing work environment. This has encouraged more organisations to invest additional resources into the somewhat unconventional work method in the early 2000s (Lim & Teo 2000). The idea of transition to remote work, was to provide more flexibility with telecommunications technologies and remove the geographical boundaries of centralized workplaces. Furthermore, by encouraging employees to work remotely, it was believed the employees´ knowledge and capabilities would increase based on the new approach (Olszewski & Lam, 1993). The main advocate for organisation willingness to transition employees from traditional workplaces to working remotely was due to the concern of traveling time (Siha & Monroe 2006). Employees were stuck in traffic jams hundreds of hours yearly, and this could be solved by enabling working from home. Additionally, the employees could now convert the wasteful hours spent in traffic jams to a productive fashion. Furthermore, by implementing telework, companies could reduce office cost and employees could increase their work-life balance (Bailey & Kurkland 2002). Employees benefited significantly from remote work by having a more flexible schedule during their day, as it helped them to organise work and home obligations (More 2006). As time progressed and remote work became more common among companies towards today's dynamic work environment. The numbers of organisations that have engaged in some degree of remote work varies from 7% to 37% in 2017 across European countries (Nakrošiné et al., 2019). Thus, through technological progress organisations are able to facilitate a convenient way of enabling remote work. However, organisations still hesitate to transition to a larger scale of remote work due to the management scepticism. This is because managers are missing empirical evidence, whether WFH is a more work and cost-efficient approach than the traditional work arrangements (Harker Martin & MacDonnell 2012). The ongoing discussion to enable a larger scale of WFH or not, would probably have continued if not for the COVID-19 pandemic. Suddenly in the beginning of 2020 a new reality

was beginning to dawn on the world, a time of lockdown and remote work. Many governments around the world ordered a mandatory lockdown in their respective society as a response to this new external threat. This meant that organisations had to reduce the numbers of employees working in offices, in some cases it happened overnight. During 2020 the use of WFH has suddenly changed from being a mere tool or staff benefit, to a forced part of the companies´ daily operation. The new work environment has had massive implications for both the employees, who are forced to work from their homes but also the individual companies IT-capabilities.

1.2 Motivation

As IT students at CBS, we are naturally interested in IT, and the digital aspect. The initial spark of interest in this topic for us, sees its origin in the first lockdown of Denmark in 2020. As both students and workers, our daily life suddenly changed, the new order of business was WFH, and with no time indication of the situation's longevity. But as the lockdown and WFH went on, this slowly changed from a factor of life to a curiosity. How was it possible that the tasks and processes in the school and office could be similar to normal life despite WFH? We believed that there must have happened a lot behind the scenes, since organisations still were operating smoothly. This was a shock that has forced companies to change so suddenly, surely the digital aspect of the companies had been affected as well. We wanted to investigate the phenomenon of WFH in correlation to IT.

When we dove into the existing literature of WFH we were met by a colossal amount of studies and articles looking into: performance, management, work-life balance, social aspect and the individual employee, but left the digital side of the equation mostly untouched. A common theme was that the literature acknowledged the need for IT, but it was significantly harder to find any studies about how WFH affects IT. This together forms our personal and academic motivation for this study.

1.3 Research question

Grounded in the current world events and our motivation for this study, it was decided that we would centre our master thesis on the phenomenon of WFH. After the initial review into this topic, a gap in the existing literature was found. This materialized in the research question below that seeks to fill this gap in our collective knowledge.

RQ: How does general adoption of working from home affect the IT capabilities in danish workplaces and to what extent did their digital maturity level impact this?

1.4 Delimitation

The impacts of COVID-19 are massive and so is the number of areas that have been forced to work from home. It is therefore necessary to narrow down the scope of this thesis. Geographically we have limited this study to only focus on companies located in Denmark. The reason is that different countries' governments have their own unique way of handling the COVID-19 pandemic. This factor coupled with already existing differences in the labour market and culture would introduce many variables, making any general comparison between the results harder.

The second part of the delimitation process was to narrow down the type of participants that should be included in this study. It was decided to focus exclusively on office workers. The reasoning behind our choice was that they represent a large part of people having the opportunities to work from home and are the centre of attention when traditionally discussing the WFH phenomenon.

Thirdly, Denmark is home to a large public and private sector. These sectors are similar on many aspects but are fundamentally different. Where a private company might seek to fulfil a demand in the market, while a public organisation is often made with a specific purpose and intent in mind. Likewise, these two are subject to different rules and regulations, that shape how and why they adapt to the current situation. For this reason, it was decided to only focus on one side of the danish labour, which is the private sector.

Finally, it should be noted that the focus area is the companies and not the individual employees. The reason for this, is that much of the existing literature within the field of remote work and WFH is already dedicated to uncovering the social aspect of work, and how the individual is affected by WFH.

1.5 Relevance and intended audience

We believe that this thesis can be used to gain an insight into how WFH has affected IT capabilities in danish companies. Thus, shedding light on what parts of a company are forced to evolve and improve as a response to the larger scale of WFH. This can help people in making sense of why and how their own company has changed. Additionally, in the future this can be used as a guide for preparing different areas inside a company before adopting to a larger scale WFH. Secondly, it is believed that this study can provide researchers with the foundation for further research into the digital aspect of WFH, a field in need of further studies. The intended target audience of our thesis is researchers and other IT professionals interested in WFH.

1.6 Thesis structure

This thesis is divided into seven chapters (See figure 1). The first chapter is the introduction, the purpose is to frame the context of this thesis and highlights its main objective. This is achieved by: presenting a brief introduction of WFH, explaining the underlying motivation, a clear presentation of the research question, the topic delimitation, relevancy and finally the thesis structure.

The second chapter is the literature review. The aim of this section is to explore the existing literature that is relevant to this study and document the gap in the literature. The central topics of this chapter are working from home, agility & ambidexterity, IT capabilities, digital maturity and summarizing the results of the gap in the existing literature.

The third chapter is dedicated to the methodology. Reading this section will give the reader an insight into the underlying philosophy that forms the basis of this thesis, the techniques & procedures for data gathering, and the supporting theories.

The fourth chapter is the analysis. This section forms the bulk of the thesis and is divided into two parts for each of the participating companies. The first part seeks to establish the company's digital maturity level, and the second part identifies how the company has been impacted by WFH regarding IT-capabilities.

The fifth chapter goes into the depth and presents the findings. This chapter is underlined with four sections. The first part presents a detailed overview of each company's digital maturity. The second part highlights the different types of improvements the companies have experienced regarding their IT-capabilities. The third section explores the impact of WFH on company performance, and the final section presents the participants thoughts about the use of WFH in the future.

The sixth chapter is the discussions and is divided into three main sections. The first section argues whether or not the improved IT-capabilities can be described as VRIN, and the unique factors that could have affected the outcome of the companies transitions to WFH. The second section takes a critical look at the study itself and discusses the data, researcher bias, and the inherent limitations of this study. The final sections reflect on the implication of our study and how it can be used in the future and the final chapter of this thesis is the conclusion.

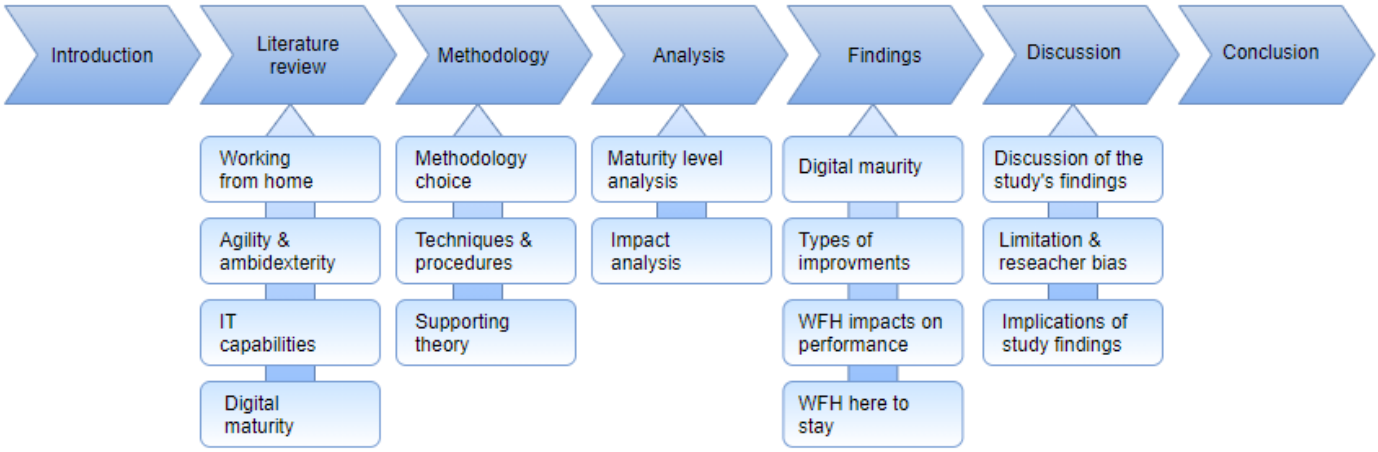

Figure 1 Thesis structure

2 Literature review

Before embarking on a new academic study, it is important to conduct a review of the existing literature within the subjects relevant for the study (Webster & Watson, 2002). The purpose of the review is to ensure that the study does not unintentionally become redundant or irrelevant before it is even conducted. The literature review thus serves the purpose of showing the existing literature and highlighting areas where more research is needed.

Following the guidelines set out by Webster and Watson (2002), our approach for making the literature review was concept centric. This is because our main area of research revolves around working from home and its impact on digital capabilities in organisations. We identified four key concepts we believed would yield relevant literature. The review intends to provide insight of how recent scholars have addressed the concepts. These concepts were working from home, agile work, IT capabilities and digital maturity. To find the most relevant articles we decided to make each review process separate with its own unique filters. A common requirement was the results must be peer reviewed and in English. This initial search resulted in a total of 352 studies. In order to further narrow down the list of results, we went through a three-phase elimination process, illustrated in the figure below (See figure 2).

Figure 2 Phases of literature review

In the first phase we examine the articles´ titles and topics. Studies deemed not relevant for our research were coded with “NO1”, the rest would proceed to the next phase in our review process.

In the second round we re-examined the titles and topics, and the overview of the abstracts. This allowed us to further eliminate irrelevant studies. For instance, the “working from home” search

had an overwhelming number of articles with focus on employees' performance and motivation towards remote work. It should be noted that through our review process samples of eliminated studies were saved, to ensure that we did not systematically overlook relevant studies. The excluded articles were coded "NO2" if they were not relevant and not interesting where "NO2-trend" was used if the article was not relevant but showed interesting concepts. Articles with promising potential, were coded with "YES2-Trend" to ensure a further detailed examination in the next phase.

In the third phase of our reviews process, the abstract and conclusion of the remaining articles were examined. Our intention with the review process was to identify the most helpful articles to showcase the extent of the existing literature and knowledge gap to shape the fundamentals of our research. The remaining articles were coded "YES3'' if they were chosen for our literature review in the following sections and excluded articles in the last phase were coded "NO3".

After conducting our review process concerning the concept of "agile work", we noted the lacking number of articles. This concern resulted in an additional search of the "agile" concept to increase the number of articles addressing the topic. The new search provided additional studies about organisational agility. Satisfied with the new amount of information, we conducted our review process. Figure 2 above shows the remaining number of articles after each selection phase. At the end of our review process 30 articles were included in our study.

2.1 Working from home

Working from home is one of the key concepts in this study and have in previous studies been used interchangeably with teleworking (Bolisani et al., 2020; van der Lippe and Lippényi, 2020). This is usually used in a way that describes the concept as when employees are working remotely from the office. This process is enabled by using IT as the bridging factor. Looking at previous studies within the field, some clear trends surfaced. Firstly, it is interesting to point out that there is a divide in the literature regarding studies conducted before and during the COVID-19 pandemic. This is a result of the global government mandated lockdowns seen during 2020, that forced many knowledge workers to work from home. Much of the literature before COVID-19 views WFH as optional and not often used in a daily context. An example of this is the 2020 study by van der Lippe and Lippényi

that points out less than 30% of employees were WFH more than once a week. They describe WFH as an option or an interesting employee benefit. The studies written during COVID-19 are in contrast to this view shaped by a new reality, where WFH is an enforced practice. Regardless of this divide the vast majority of studies are mainly structured around explaining the impact of WFH from the perspective of the individual, team performance, and management. Researchers mainly focus on the advantages and disadvantages of organisational and employees´ experiences of WFH. Ipsen et al. (2021) argues where these experiences are presented into different clusters consisting of work-life balance, work efficiency and work control as advantages, while home office constraints, work uncertainties and inadequate tools are highlighted as disadvantages. In this article the major area of focus is concerned with the individual experiences and how they are impacted by WFH. Other scholars examine the WFH phenomenon from a different organisational level which focus on team collaboration and team performance. According to van der Lippe and Lippényi (2020), the focus is on team productivity and individual´s job satisfaction. Another area of interest for researchers concerned with WFH is at the organisational level. Here the general theories and concepts are centred around leadership, an example of this is a study from Bartsch et al. (2020). This study contains an interesting insight into the digital aspect of remote work. According to Bartsch et al. (2020) digital maturity is a moderating factor between managing leadership behaviour and employee performance. They further argue the impact of digital maturity *"Finally, our results also provide evidence that more digitally mature service firms are better able to maintain high performance levels among employees in times of crisis."* (Bartsch et al., 2020, page 81*)*. Other scholars focus more on the HRM aspect of the organisation, Gigauri (2020) explores this concept through a lens of digitalization and work-life-balance. This research indicates the importance of organisational IT expertise and skills in order to successfully adapt to the challenges presented by large scale use of remote working.

The general focus of all these studies is centred around how WFH impacts the organisation through people. While many studies in this field acknowledge the role of IT in WFH as one of the cornerstones facilitating it, they rarely examine the implications of how WFH in turn impacts the organisation's IT. One of the exceptions is the study from Waizenegger et al. (2020) which focuses on how the enforced use of WFH has changed individuals' views of the affordances enabled by

specific tools. This study also highlights the need and potential for future studies concerning the WFH phenomenon with especially focus on IT. *"Working from home research to date has taken technology for granted, and a unique information systems approach is required to explore and theorise the technological aspects of working from home." (*Waizenegger et al., 2020, page 438*)* Based on the showcased studies, we agree that there is a gap in the literature regarding the technical side of working from home.

2.2 Agility and ambidexterity

The agile concept and process is an alternative to the traditional way in how organisations, projects and people operate. Scholars argue that the fundamentals of agile are based on flexibility and dynamic approaches, which enables organisations, managements, and teams to a new mindset regarding projects and cultures (Rico et al., 2020; Denning, 2019). According to Oliva et al. (2019) organisations aim to regularly use agile concepts as a strategy to assess organisational structures, processes, and products in regard to responding to rapid changing business environments. By adapting agile methods into various levels: organisational, projects and teams, enables the opportunity to capture the benefits from competitive advantages. In addition to the constantly changing business environment due to digitalization, organisations must reconsider the traditional business approach to the advantages of being agile (Takeuchi & Nonaka, 1986). Therefore, studies investigate the phenomenon of how organisations can initiate an agile transformation. Denning (2019), mentions ten different stages for an agile transformation, starting from top managers´ mindset and awareness for changes delegating to different teams in the organisation. While Annosi et al. (2020) examines the agile settings of the organisation's ability of knowledge spreadability towards the routines at various organisational levels.

However, the majority of agile studies focus on the team levels. According to Magpili & Pazos (2018) teams that possess flexibility, autonomy and multiple skills are considered as self-managing teams that yield the agile mindset. Magpili & Pazos (2018) argues that competencies as leadership, teamwork ability, and multiple technical skills plays an important role for well-functioning agile teams. Team members with numerous skills enhance flexibility, as they are able to collaborate across various departments, which result in organisational empowerment and knowledge flow.

Other theories and concepts for agile teams are focused on the adaptational process. Rico et al. (2020) states that team adaptation process can be explained by examining the team´s expected outcome in contrast to the actual outcome once an unexpected event occurs. The differences between the expected and actual outcome enables team members to assess, modify and adapt into new processes.

Other agile studies focus on the managerial discipline in today's dynamic business environment. Management needs to acknowledge flexible business processes and be ready for changes, in regard to responding to threats and opportunity in their business environment. Badakhshan et al. (2019) further developed the concept of agile business process management, due to the challenges of handling uncertainties and the lack of a holistic view towards management in a dynamic business environment. Additionally, Oliva et al. (2019) argues that the interaction of dynamic capabilities and management objectives affects the agility of the organisational mindset.

Andriopoulos and Lewis (2009) explorer agility in organisations and propose the ambidextrous virtues cycles. This study shows how exploitation and exploration can feed into each other and facilitate the long-term survival of a business. An ambidextrous organisation is capable of both exploiting their existing capabilities in order to achieve incremental innovations and explore new ideas that could be the future of the company. However, it is not an easy task to do both things at once, because of their own inherent dilemmas and challenges regarding strategic intent, customer orientation and personal drivers.

We believe that the way organisations were forced to adapt during this crisis through the use of WFH resulted in initiatives that are fundamentally agile in nature. Therefore, an understanding of the agile concepts provides a holistic view of interactions between the WFH phenomenon and the digital maturity of companies.

2.3 IT capabilities

IT capabilities find its origin in the resource-based view (RBV), and it is thus important to have a basic understanding of the main points in the RBV. According to Barney (1991), the RBV focuses on firm resources, which has the potential to enable sustained competitive advantage. A firm's resource can be identified as either intangible or tangible. Most importantly, a firm resource needs four attributes in order to be considered as a potential main factor for sustained competitive advantages. Those four attributes can be identified as valuable, rare, imperfectly imitable and non-substitutable (VRIN).

Through the years, researchers have examined and identified different IT resources that can enable firms to gain sustained competitive advantage. Mata et al. (1995) mentioned managerial IT skills as an IT related resource which serve as sustained competitive advantage. Managerial IT skills are argued to be rare and are therefore important, in order to realise the IT potential within the firm. As managerial IT skills take time to develop on an individual level, they are almost impossible to codify as the essence is about taking small decisions and building relationships and the corresponding management capabilities, which makes it difficult for competitors to imitate this IT resource.

Ross et al. (1996), focused more into IT capability and argued that IT applications itself cannot enable sustained competitive advantage, as competitors can easily duplicate applications. However, IT capabilities play an important role for using IT to meet business goals and utilize the constantly changing business opportunities. Human, relationship, and technology have been identified as three vital IT assets for developing a firm’s IT capability.

Human assets refer to IT employees who are able to solve business issues and spot business opportunities through IT. The IT staff in the asset must contain three dimensions. The first one is technical skills, the second dimension is identified to be business understanding, the last dimension is problem-solving orientation which is achieved by delegating business problem-solving responsibility to their IT staff in order to take advantage of IT.

Technology assets include technical architecture with clear rules of how to support technologies within the firm and how to handle data in regard to storing and sharing. IT managers have to balance between using standardized IT technology and not limiting other departments´ work by not using technology that is more appropriate.

Relationship assets refers to a valuable working and partnering relationship between the IT department and business department. Effective communication and coordination are vital in order to accomplish a valuable working and partnering relationship.

The idea of IT capabilities was further matured and was argued by Bharadwaj (2000) to be an extension of the traditional way of viewing the organisation's capabilities. Building on this Bharadwaj defines IT capabilities as a firm's *"(...)ability to mobilize and deploy IT-based resources in combination or copresent with other resources and capabilities."* (Bharadwaj, 2000, p. 171). These IT capabilities are then classified into three distinct categories as: tangible resources, human IT resources, and intangible IT-enabled resources.

Expanding on this view, researchers explore IT alignment in regard to the organisation's strategy. The idea of strategic alignment is to ensure that the company's internal and external operating domains are successfully connected (Henderson & Venkatraman 1993). According to Henderson and N. Venkatraman (1993) it is vital for organisations to align their business strategy and IT strategy to gain full advantage of an IT investment and allow organisations to efficiently use their IT and increase economic performance. According to Neirotti & Paolucci (2007) the aspect of IT alignment introduces the idea of path dependencies. Their study examines how IT investments shape the companies´ opportunities for further development of IT capabilities. *"This implies that the successful returns some companies have from IT investments is not based on the introduction of a ''single hit'' application, but is rooted in a continuous series of correct investment decisions."* (Neirotti & Paolucci, 2007, p. 579). Furthermore, Neirotti & Paolucci (2007) highlights the commoditization of IT to a certain degree. Building on this foundation a more recent study (Seddon, 2014) reflects on, if IT capabilities can even be viewed as VRIN and the role of the RBV in IS research. The contribution of this research is that IT can indeed be VIRN, but researchers should distinguish between potential competitive advantages and what is actually realized.

Another direction for research of IT capabilities is connection to organisational IT ambidexterity and dynamic capabilities. A study by de Ortiz de Guinea & Raymond (2020) explores how organisations´ performance is affected by IT ambidexterity. Additionally, this study demonstrates the link between IT ambidexterity and IT capabilities, showing they are interconnected in high-performing organisations. In line with this, other scholars (Gao et al., 2020) illustrate the joined effect of IT capabilities and organisational agility.

According to Teece (2007) the theory of dynamic capabilities states that under a rapidly changing business environment, imperfectly imitable resources, and traditional ways of running a successful business are not sufficient. Today´s business needs more than just quality control, ownership of tangible assets, and cost control in order to achieve long-term success and hold on to their competitive advantage, they need to build, extend, and protect internal and external competences. The framework for dynamic capabilities can be divided into three different managerial activities; sensing, seizing, and transforming.

Sensing is described by Teece (2007) as being aware of the opportunities and threats in the market, that occur as customers´ needs, new technologies, and competitors' actions are always unpredictable in a rapidly changing business environment. Therefore, firms need to constantly examine and explore different markets and the newest technology by engaging into research activities and R&D. However, examining and exploring is not sufficient for firms, as it is required for them to have individuals who possess the ability to sense opportunities or threats and then shape the development. Seizing is linked to the firm's ability to act on the information available to them. Firms execute several different investment paths in the early stage, as new technology and market opportunities are still uncertain. But once a technology or improvement arises as the dominant in the market, then firms will invest more into it. It is therefore important for decision makers to decide when to invest, in which technology or design, and how much. Firms need to continually transform their existing business in order to avoid lock-in and path-dependencies. Firms that currently experience growth, still need to continuously assess, and recombine their assets and structure in order to keep up with technology and market changes. Moreover, firms need to assess how often

they will change work routines, as changing it too often is very costly. On the other hand, short-term success usually depends on routine work and continuity which enables operational efficiency inside the firm.

Kodama (2020) argues how COVID-19 has increased the use of collaboration software in organisations and resulted in a digital transformation. IT capabilities are vastly important for companies in regard to innovating or developing existing business models and maximize value. Kodama (2020) underlines the potential of collaboration software as an IT capability and calls for further research into this.

> In light of existing research to date, as a new perspective in this era of infectious disease confronting humanity (that cannot be avoided), this article proposes the necessity to explore the business and social impacts of collaboration systems such as video conferencing tools (…) (Kodama, 2020 p. 4).

Thus, highlighting a gap in the existing research of IT capabilities in regard to collaboration software and the organisational impact of it.

2.4 Digital maturity

Business environments are rapidly changing to become more digital. Digital maturity is allowing organisations to continuously align their structures and business models with new technologies regarding meeting their stakeholders' expectations. According to Kane et al. (2017) digital maturity is a necessary ongoing process with a long-term goal for improving the chances of the organisation's survival and succeeding in a dynamic environment.

Many scholars have already acknowledged a more advanced environment and developed various framework models to assess digital maturity inside the organisations´ different levels. Teichert (2019) examined 22 different maturity models with different characteristics and argues that all the identified models do not provide a mutual understanding for the underlying definition of digital maturity models. Additionally, Teichert (2019) points-out the lack of attention towards the service

field. Schwer et al. (2018) examined how different digitalization variables affected the corporate architecture within the organisation. 15 different digital maturity models and 147 different variables were identified, all with a focus on the strategy, business, and application layers, with minimal focus on the technical layers. Both studies by Teichert (2019) and Schwer et al. (2018) suggest a more transparent and holistic digital maturity model for incorporating organisational and technical levels within different sectors.

Fletcher & Griffiths (2020) examines the relationship between external challenges and the organisation's level of digital maturity. The research highlights that organisations with low adaptation of digital maturity possess a higher fragility, while a higher maturity level provides more flexibility that allows organisations to react upon unforeseen threats and challenges. Therefore, a certain level of digital maturity is necessary for organisations to achieve, in order to stay competitive in a dynamic and digital environment.

2.5 Summarizing review

This section seeks to combine the previous four overviews into one unified gap review. The table below illustrates that there is no clear connection between WFH, digital maturity, IT capabilities and being agile in the existing literature. While many of the studies presented in this literature review have a common interest in the impact of COVID-19, few of them cross each other's field of study. This thesis identifies a gap in the WFH literature and shows how the other fields of studies relate to it. Because implementation of WFH both requires organisations to be agile to some degree and is reliant on the organisations IT-capabilities. In addition to this, the impact of the organisation's digital maturity on WFH has not been the subject of studies in previous research (See table 1).

	Articles \ Concepts	Working from home / Remote Work	Digitalization	IT capabilities	Agile work / Ambidexterity	Digital Maturity	Organisation / Management
1	Andriopoulos and Lewis (2009)				X		
2	Annosi et al. (2020)				X		
3	Badakhshan et al. (2019)				X		
4	Barney (1991)		X	X			
5	Bartsch et al. (2020)	X					X
6	Bharadwaj (2000)			X			
7	Bolisani et al. (2020)	X					X
8	Denning, (2019)				X		
9	Fletcher & Griffiths (2020					X	
10	Gao et al. (2020)			X	X		
11	Gigauri (2020)	X	X				X
12	Henderson & N. Venkatraman (1994)			X			X
13	Ipsen et al. (2021)	X					
14	Kane et al. (2017)					X	
15	Kodama (2020)	X	X	X			
16	Kolb et al. (2020)	X	X				
17	Magpili & Pazos (2018)				X		X
18	Mata et al. (1995)			X			
19	Neirotti & Paolucci (2007)			X			
20	Oliva et. al (2019)				X		X
21	Ortiz de Guinea & Raymond (2020)			X	X		
22	Rico et al. (2020)	X			X		X
23	Ross et al. (1996)			X			
24	Schwer et al. (2018)		X			X	
25	Seddon (2014)			X			
26	Takeuchi & Nonaka (1986)				X		
27	Teece, D. J (2007)			X			X
28	Teichert (2019)					X	
29	van der Lippe & Lippényi (2020)	X					X
30	Waizenegger et al. (2020)	X		X			X

Table 1 Matrix of literature review

The WFH section clearly showcased how existing literature in this area of study is mainly concerned with team management, organisational management, individual performance, and team performance. Many studies acknowledged the important role of IT in providing the foundation for WFH, but only a few of the articles have this as part of their study. The IT capabilities and infrastructure are not taken for granted but are typically not fully appreciated. People WFH need to cultivate IT-capabilities in order to work effectively, and the organisation needs to be geared towards remote work. The implication of adopting remote work puts demand on both employees, managers, and the organisational IT, which could have an impact on the digital aspect in a company. The nature and scope of this impact on organisational IT is not studied in the existing WFH literature and therefore presents a gap that this paper seeks to fill. This thesis seeks to fill the identified literature gap by interviewing IT professionals in large Danish companies. To gain knowledge and data regarding this literature gap, we divided our questions into two categories. The first set of questions are about how the forced adoption of WFH has impacted the organisation's IT, and how they have adapted to the WFH situation. The second part questions tailored to estimate their digital maturity.

3 Methodology

This chapter will provide an overview of the research design, research philosophy and data collection methods that are applied to answer our research question. *The research onion* is a valuable framework for understanding how research can be conducted and which methods are supported by different philosophical views. The model is illustrated in figure 3 (Saunders et al. 2016). *The research onion* contains important outer layers that need to be understood and examined before progressing to the central part of the model which are data collection and analysis (Crotty, 1998). These layers indicate various paths that researchers may choose, and each layer is a category on its own that needs to be explained and adapted into the research. The following sections will describe which specific path we followed, with a rational explanation behind these choices in *the research onion´s* various layers.

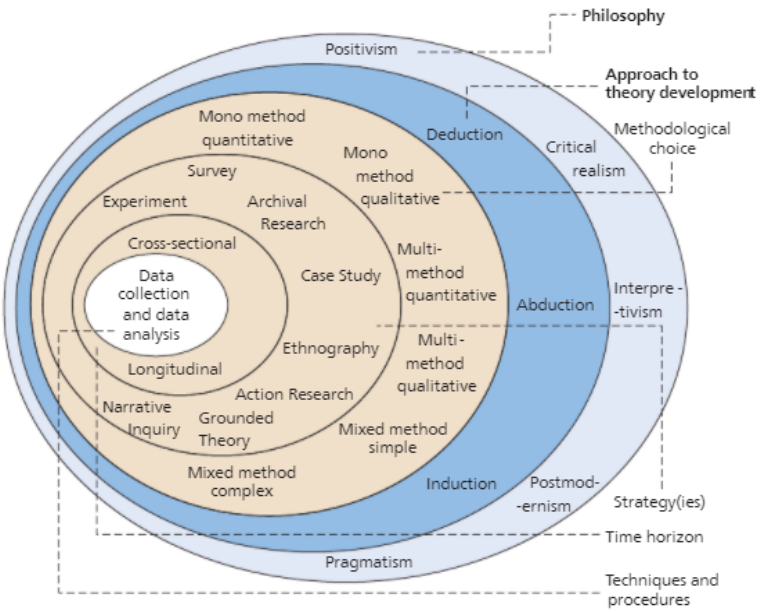

Figure 3 The research onion (Saunders et al. 2016)

3.1 Research purpose

Before diving deeper into the layers of the *research onion* it is important to clarify the nature and purpose of this study. Saunders et al. (2016) identifies four distinct types of natures that can define a study: exploratory, descriptive, explanatory & evaluative.

An exploratory study is often used when a phenomenon or topic is not well researched or understood. A study that is exploratory in nature is made with the purpose of gaining new insights about a topic. These new insights could be potential areas that lend itself for further study, or different methodology and techniques that would be better suited to study the phenomenon in the future.

Descriptive studies are conducted to gain an accurate picture of events, objects, situations, or persons. The aim here is to collect and process data in order to create a picture that can accurately describe the focus of the study.

Explanatory studies attempt to establish causal relationships. This could be to determine why more people get sunburned in the summer, or why the price of eggs affect the sales of flour. The goal in short is to determine the relationship between different variables.

Evaluative studies´ purpose is to figure out how well something works. An example of this could be that many countries are likely to evaluate the effectiveness of social policies, a sports team might want to know if the strategy they used in the previous match was effective. Even though the focus of this type of study is how effective something is, it is likely that discoveries also indicate why that might be the case.

A study does not need to be made with one strict purpose but could also seek to combine different natures. A researcher might want to describe a new animal they have discovered in clear detail and establish how that animal could be best studied in the future. This would be an example of a combination of descriptive and exploratory research. The way this combination can be achieved is

either by using mixed methods in the research design or using a single method that is structured to serve multiple purposes.

This study fundamentally seeks to combine the nature of an exploratory and explanatory study. The aim is to shed light on the phenomenon of WFH and if possible, establish a causal relationship between the use of WFH and companies´ IT capabilities. The study contains qualities that are both exploratory and explanatory.

3.2 Research philosophy - The interpretive paradigm

Research philosophy describes the underlying thoughts and assumptions that form the frame of a study. It can be described as a set of beliefs that defines how data should be collected, analysed, concluded, and validated, in order to develop new knowledge within the researched field. The assumptions of ontology and epistemology will differ based upon the applied research philosophy. Ontology is the researcher's belief in the nature of reality, while epistemology refers to how knowledge can be acceptable, valid and legitimate. Saunders et al. (2016) describes five different philosophies: positivism, critical realism, interpretivism, postmodernism, and pragmatism. This thesis is based on the interpretive paradigm.

Interpretive social science traces its origin to the German sociologist Max Weber & philosopher Wilhem Dilthey. Dilthey argued in his work *introduction to the human sciences*[1] that there were two distinct types of science: natural science and human science. Natural science is founded in the concept of erklärung (explanation) where human science is based on an empathic understanding of peoples lived experiences in a specific setting *"Verstehen"* (Neuman, 2006). Max Weber further developed this by arguing that social science should study social action with a purpose. Verstehen was at the core of this, necessitating that the researcher must learn the subjects´ personal reasons and motives that shaped that person's actions and feelings. Verstehen is today one of the central ideas in interpretive social science is shaping the ontological view. A cornerstone in the interpretive paradigm is that reality is constructed by the individual´s perspective and meaningful actions. A meaningful action is a social action in a specific setting to which a person subjectively attaches

[1] Originaltitel: Einleitung in die Geisteswissenschaften (1883), by Wilhem Dilthey (1833-1911)

significance. Meaningful actions are an important term when trying to understand the nature of social reality, because the significance of an action is subjective and thus creates the basis for different people experiencing the same reality in varying ways. The implication is that reality is unique for each person and dependent on the time and context it is perceived in.

The epistemological view is in essence anti-positivist by stating that knowledge is subjective, and a phenomenon should be studied from within. Researchers in the interpretive paradigm use qualitative data, gathered from observations and interviews, in order to achieve a deeper understanding of the empirical results. It is therefore vital for researchers to collect data through direct contact with participants involved in the study, in order to acquire an understanding of participants´ social life under natural settings (Neuman, 2006). Walsham (2006) mentions the advantages and disadvantages in regard to tape-recording interviews under interpretative research. According to Saunders et al. (2016) interpretive research aims to construct a deeper understanding and interpretation of the specific participant´s context and social world. This can be achieved by investigating e.g., an organisation through different employees´ perspectives in order to uncover and gain an understanding of each individual's perspective within the same organisation but under different circumstances (Saunders et al., 2016). The advantage of tape-recording is: 1) it enables researchers to perform alternative analysis with the recording, 2) directly quote from the interview, and 3) researchers can fully focus and engage the participants during the interviews, instead of focusing on taking notes. The disadvantages of tape-recording are, it might influence the behaviour of the participants and as a result of this, be less open during the interview. Moreover, tape-recording cannot capture non-verbal elements such as motions and body language, which will challenge the researcher’s ability to construct a reliable understanding of the participant. It is therefore important to supplement interviews with other field data (Walsham, 2006).

Human nature is defined by voluntarism in the interpretive paradigm. Humans are the architects of their own environment. They possess free will and a large degree of autonomy and are therefore capable of self-control and conscious decision making. Interpretive researchers need to learn and understand the reasons behind each human's actions, as every human has their own underlying

motives. This is true even if the motive is based upon irrationality and emotions, as it is still the defining factor for the individuals' actions.

The results are validated in the interpretive paradigm when the participants of the study are able to understand the results and it makes sense to them. The results should provide a deep understanding of the subject´s thoughts, feelings, and experiences, which allow others to enter this reality.

3.3 Research approaches

According to the *research onion*, there are three different approaches to theory development. These methods are depending on the extent of the research provided by theory testing or theory building to present the findings and conclusion. The three approaches are categorized as abductive, deductive, and inductive. Under a deductive approach the researchers are moving from theory to data. Meaning that this approach starts with a hypothesis based on theory grounded in existing academic literature. This allows the researchers to design a strategy and test the premises of the theory. The second approach is inductive which is defined as an alternative approach for developing theory. This approach focuses on collecting data at the beginning in order to examine a phenomenon. The data is then used to generate a theory. The abductive approach is a combination of the two previous and can be described as a back-and-forth method. At first, the data must be collected in order to explore a phenomenon and reveal any patterns, which can provide the grounding for a new theory or be used to further develop existing ones. The theory will then be tested by gathering additional data that either validates the theory or provides new insights. Therefore, the process moves back and forth under this approach until a theory is finally accepted or rejected.

In this thesis, an inductive approach is being implemented. A way of gaining the data needed, could be by interviewing a sample of data subjects. This would provide the empirical foundation to generate a theory. The research method of qualitative data is used to achieve an overview of the phenomenon. This matches with our approach of interviewing a small sample of managers in different organisations to gain insights on the nature of the phenomenon.

3.4 Methodological choices

According to Saunders et al. (2016) the methodological choice is based upon the selected research philosophy. Before the initial collection of data, it is important to determine the research design and the desired type of data. Saunders et al. (2016) divides the methodological choices into two broader categories, which are mono- and multi methods.

Mono method uses only one single data collection technique within quantitative or qualitative data methods. For instance, a study can only be based upon data gathered from observation and no other data collection techniques can supplement this.

Multi-method studies are carried out by using more than one data collection techniques but still within only one of the two types of data methods, either quantitative or qualitative. For instance, in order to perform a qualitative study, interviews and observations can be applied.

Mixed methods research design is a subcategory of multi-methods which combines quantitative and qualitative data. This occurs if researchers both apply quantitative and qualitative data collection techniques for the study.

Due to the choice anchoring this thesis in the interpretive paradigm and time limitations it was chosen to adopt a mono method approach. This decision was taken to ensure sufficient time and resources to go in depth with the analysis, in order to fully show the participants´ point of view.

3.5 Strategies

The research strategy describes how the researcher seeks to achieve the intended goal for the research. There are several different forms of research strategies that can be used for achieving the goal. As illustrated in figure 3 there is a correlation between the different layers which links the methodology to the chosen philosophy and the choices for data collection and analysis. According to Saunders et al. (2016) the different forms of strategies are: experimental, survey, archival research, case study, ethnography, action research, ground theory and narrative inquiry. These strategies are not superior or inferior to each other but depend on the type of research question

that needs to be answered. A comparison to tools can be made, as a hammer is not better than a saw, both are tools used for specific jobs.

In this thesis, the approach of a case study is being used to examine the phenomenon of how a rapid transformation of WFH has affected the IT-capabilities in Danish companies.

The focus point of a case study is to gain an in-depth view of the phenomenon that is being researched, through the investigation of a small number of entities which the data is collected from to provide a holistic description through an interactive process (Saunders et al., 2016). Furthermore, case study gives the opportunity to examine phenomenon in its natural settings over a given time-period. Yin (2003) adds that case study research uses various data collection methods such as: interviews, observations, and secondary data to fully understand the dynamics of the case. Therefore, it is important to understand the context and relations in the study. The context of this thesis is in relation to how danish workplaces have adapted to a rapid change in work methods while staying productive. Additionally, Yin (2003) adds that the type of research questions that suits case studies begins with either how or why, this aligns with our research question.

3.6 Time horizon

When designing a study, it is important to decide the time horizon for the study. Is this going to be a picture showcasing a specific moment in time as a cross-sectional study or is this a journal made over many years, known as a longitudinal study? Longitudinal studies work on a larger time frame and have the advantage of adaptability. As new information comes to light it is possible to change the direction or re-evaluate data with new theories. Cross-sectional studies reflect a moment in time (Saunders et al., 2016). This study is going to be cross-sectional due to the limited timeframe and the nature of this research.

3.7 Techniques and procedures

The choices and paths of the different layers within the research onion will be reflected in this thesis data collection and analysis techniques.

3.7.1 Selecting companies and first contact

When selecting representative companies for data collection needed for answering our research question, we identified three criteria for selecting the participating companies. Firstly, the company must be located and operating within Denmark. Secondly, there must be a decent amount of office workers to ensure a sufficient scale in transitioning to remote work. Lastly, we wanted to have a variation of professions and industries, so the findings of the study would result in a generic answer regarding how Danish companies have been affected by the WFH phenomenon.

After the first stage was completed, it was decided to develop an excel spreadsheet of the top 100 largest Danish companies based on revenue and numbers of employees (Erhvervsstyrelsen, 2020), that were relevant for our research. The next objective was to establish communication with the companies which was executed by finding e-mail addresses to reach our target audience. Our primary priority when initiating first contact with the organisations was to reach employees with a strategic or digital responsibility within the companies' executive board, primarily CIO's. To do this, we typically wrote to their "info mail" or other relevant contact forms. After our objective of finding all our target companies e-mail addresses was completed. We sent the e-mails to our target audience, where we informed them of who we were, the core idea in our research project and what we expected of the interviews. It should be noted that some companies explicitly state that they do not wish to participate in student projects. Furthermore, some companies did not provide any text based public contact information. This amounted to a total of 15 companies which were not contacted. The remaining 85 companies were contacted. The table below (table 2) illustrates an overview of the seven companies that wanted to participate in our study. The interview with Atea was structured as a knowledge sharing session because they recently finished a survey, concerning the effects of WFH on their customers. This survey did not have the same focus as our thesis but did serve as a good set of background information that aided us in creating our interview guide.

Participant name	Company	Position	Duration	Date	*Appendix*
Anette Otto	Atea Danmark A/S	SVP	N/A	19/3-2021	N/A
Svend Nyegaard	Royal Unibrew A/S	CIO	32:02	23/3-2021	A
Jens Rasmussen	Chr. Hansen A/S	CIO VP for Global IT	72:19	25/3-2021	B
Torben Spaabæk	DLG A.M.B.A	CIO	47:44	26/3-2021	C
Jens Skjøt-Arkil	Arkil Holding A/S	CFO	14:53	26/3-2021	D
Henrik Thystrup	Solar A/S	CIO	41:24	30/3-2021	E
Mikael Alexander Ludvigsen	Novozymes A/S	CIO	58:25	08/4-2021	F

Table 2 Participants in this thesis

The figure below illustrates the different phases we underwent in contacting and connecting with the final six participants of this study.

Figure 4 Phases of contacting and connecting

3.7.2 Creating the interview guide

The interview guide was created as a tool to facilitate the interview and give the participants an indication about what questions they could expect to be asked. When creating the interview guide it was decided that it had to cater to three major needs. Firstly, the interview guide should help ensure that all major areas of interest are covered. Secondly, it should contain questions that enable further comparison between the different companies. Finally, the interview guide should ensure a natural progression in the conversation. This was important because all the participants had fixed time constraints. The process of creating the interview guide was an iterative process with numerous cycles of tweaking and improving (See figure 5).

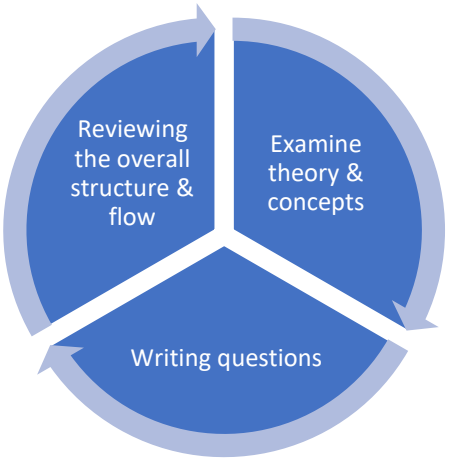

Figure 5 How the interview guide was created

To start off, the central theories and concepts about a specific idea or context were examined. The research team then brainstormed questions that would be sufficient for covering the relevant topics of our research. When this was completed, all questions were then re-examined, and it was decided which questions would be applied in the final version of the interview guide. The process was then restarted, where new areas were examined, followed by a brainstorming session for creating new questions followed by the reviewing phase to ensure that the interview guide did not contained any unnecessary redundancies, and an overall good flow. The first overarching category of questions was regarding the company's use of WFH.

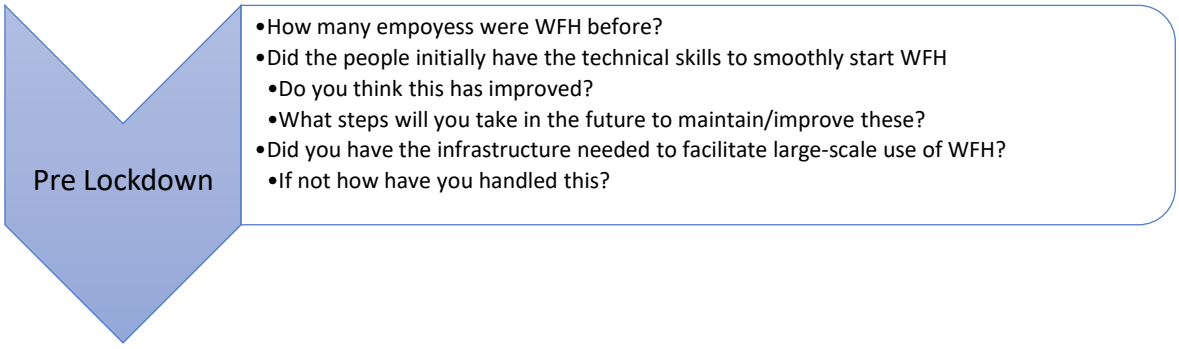

Figure 6 Questions for Pre lockdown

The first section in our interview guide was investigating the WFH situation before COVID-19 and the following lockdowns. These questions are designed to give the foundation for initiating a discussion regarding the companies' situation of WFH prior to the government mandated lockdowns. The second focus area was to gain information about the employees' technical competencies, and which strategies the companies use to improve and maintain these. Finally, we wanted information about the company's technical infrastructure and any improvements to these as a response to the larger scale use of WFH (see Figure 6).

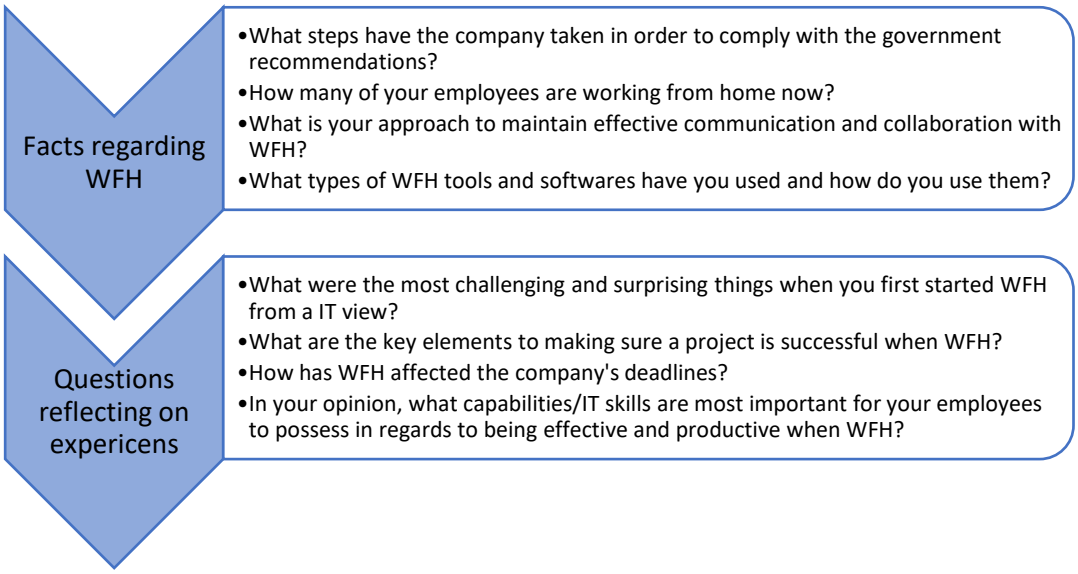

Figure 7 Questions regarding WFH and the participants own experiences

The next sets of questions follow a natural progression in the conversation and is regarding the experiences and steps taken during the lockdown. The first section of questions contains mainly factual questions that in many cases are easy to answer. These questions serve as a basis of comparisons between the different companies. The second section of questions asked the participants to reflect on their experiences during the lockdown (See figure 7). The purpose of these questions is to identify areas where the company was challenged or changed as a response to the new condition of WFH. The final set of questions regarding the lockdown and working from home is related to the post lockdown situation of the company. These questions are mainly reflective and designed to discover changes in the organisation, and any lasting impact of WFH (See figure 8).

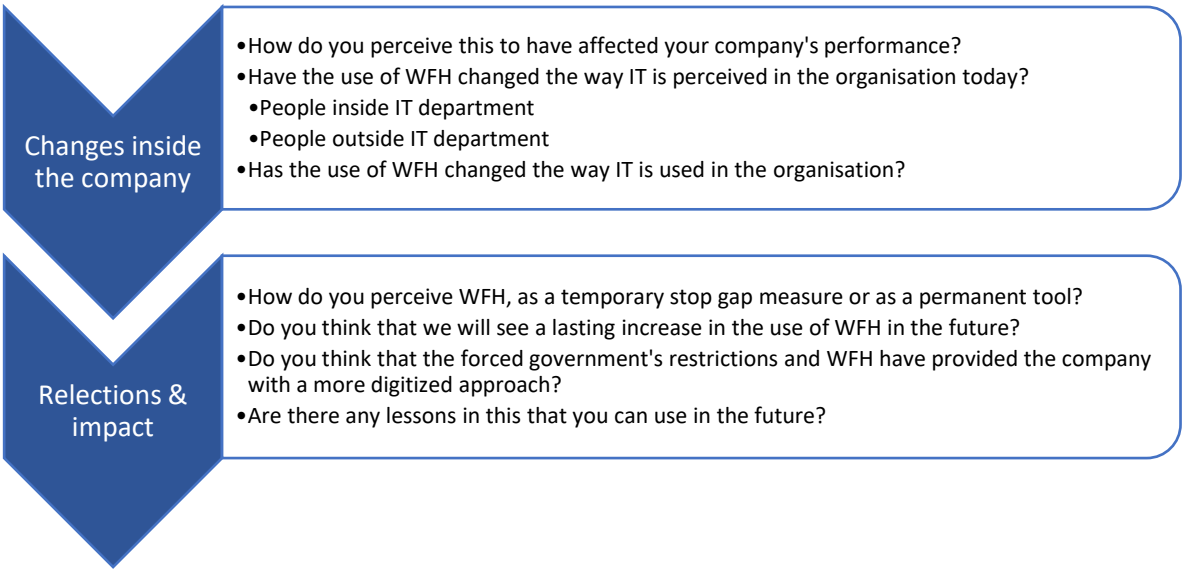

Figure 8 Questions regarding changes and impacts in the company

After creating this first set of questions, it was decided that there was a need for an additional standardized set of questions that would allow us to determine the digital maturity of the different companies. This was important because the companies came from different industries and situations. The digital maturity of the companies could help to create a basis for comparison between the companies and might function as a modifying factor in regard to the impact of the large-scale use of WFH. The questions regarding digital maturity were develop from inspiration in the IT-CMF framework created by Martin Curley[2]. Central to the IT-CMF is the four macro capabilities. The questions in the interview guide were therefore created with the purpose of gaining the most information possible about these. In practise this was achieved by creating a set of questions for each of the four macro capabilities (See figure 9).

[2] See section in supporting theories for more information.

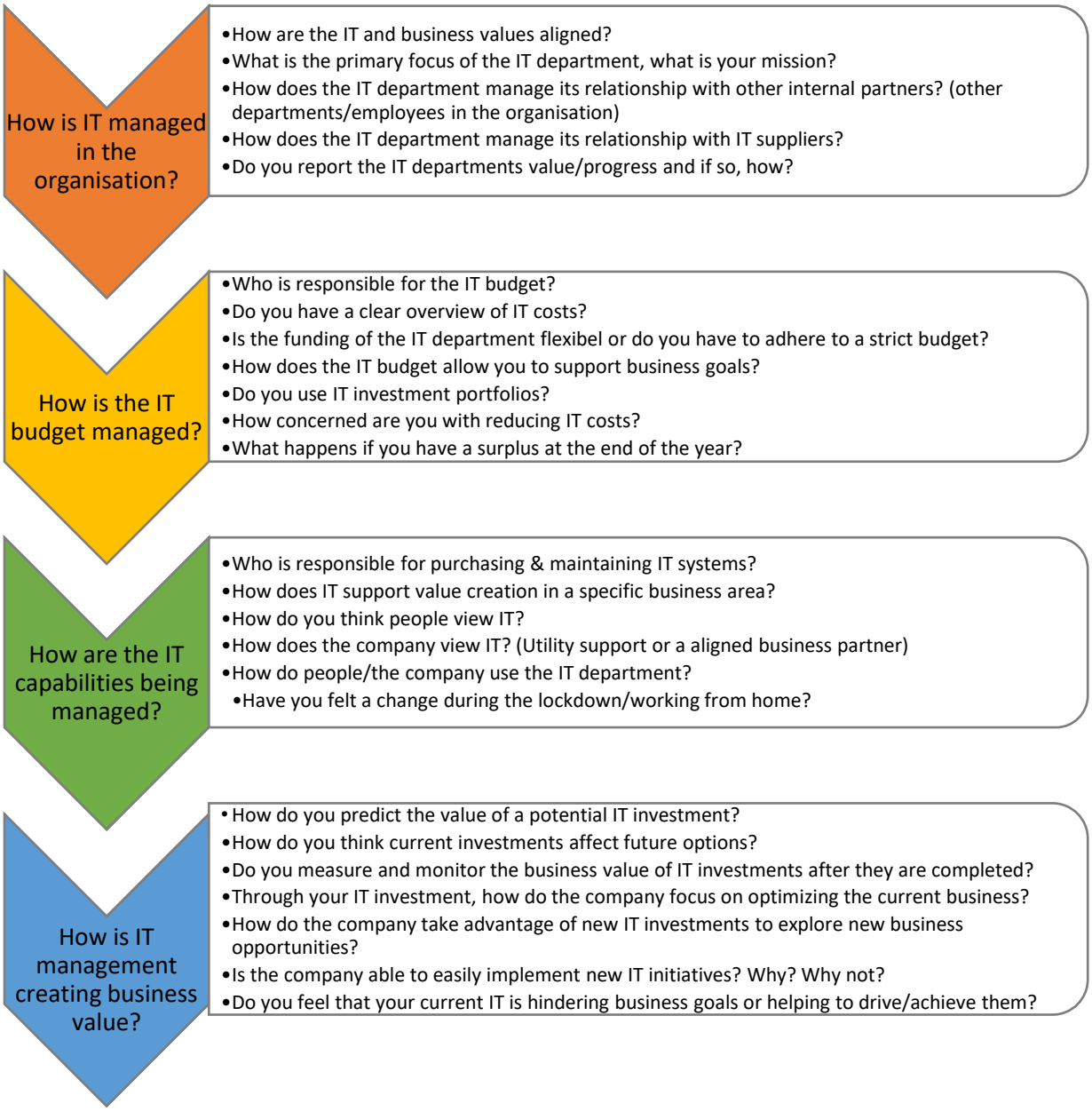

Figure 9 Questions regarding the four macro capabilities.

When the questions were finalized and the order determined, the first interview with Svend Nyegaard was conducted. Based on the experiences we gained from this interview we decided to change the structure of the interview guide. The rest of the interviews were conducted using this new structure that starts off with the questions regarding macro capabilities and ends with the questions centred around WFH. The decision of changing the structure in our interview guide was based on, that the questions regarding WFH were more open ended and provided a better pacing at the final part of the conversation in comparison to the macro capability questions.

3.7.3 Data gathering and transcription

The following part gives an overview of how data were collected and explains the transcription process of the interview. All data gathered in this study comes from semi-structured interviews with our selected participants.

By sending out the interview guide in advance, the respondents had the opportunity to prepare for the interview and provide more in-dept. answers through real life organisational examples. The interviews were conducted by using a semi-structured interview method. The interview guide served as a general guideline in order to ensure that all relevant topics were covered. After the first interview was conducted, we decided to change the order of questions to better facilitate a free conversation. This was achieved by moving the open-ended questions in the last part of the interview. The interviews were estimated to last an hour. It should be noted that one of the participants was only able to participate for a total of 30 minutes. In this case we decided to only use the portion of the questions centred around WFH. In total, data was gathered from six respondents with different durations. The shortest interview took only 15 minutes, and the longest interview lasted a total of 75 minutes while most of the interviews´ duration was about 45 minutes.

Due to the current COVID-19 pandemic, all interviews were performed online by using Microsoft Teams. Furthermore, it was decided that all interviews should be recorded in order to facilitate later use for transcription and data coding. Microsoft Teams built-in recording function was the primary software tool used for recording, while an iPhone´s built-in recording App was used to record a backup of the meeting.

The audio files for each interview were then uploaded to the software tool Otter.ai for automatic transcription. Otter.ai is able to automatically transcribe whole sentences in English and distinguish between different participants´ voices. However, Otter.ai accuracy is not perfect, it was therefore required to listen and edit some parts of the transcription manually.

Secondary data was provided from respondents that shared internal and external data from surveys and statistics. For instance, internal investigation of how many employees were WFH before the

lockdown and after, or investigation into employees' thoughts, mindset, and obstacles relevant to WFH. This was used to give us an insight into the world of WFH but has not been used directly in this thesis.

3.7.4 Data coding

This section of the report aims to explain how the gathered data was processed and coded. The practise of coding data in qualitative research can be defined as *"a way of developing and refining interpretations of the data"* (Taylor et al., 2015 p. 172). The coding process is the first step in an analysis, by sorting the data into major themes, ideas, and concepts. Taylor et al. (2015) describes two distinct types of coding: open coding and focused coding. The purpose of open coding is to generate ideas and concepts, while focused coding is made to further mature these ideas and concepts by locating the data relevant for these. The coding conducted in this paper is focused coding. The interviews were conducted using an interview guide that were made with the purpose of exploring WFH in addition to its impact on the company's IT capabilities. The categories used for coding the interviews were made to mirror this. The first section of the interview guide contained questions used to identify each of the company's degree of digital maturity. This matches with the first set of concepts used in the coding that are directly related to the company's digital macro capabilities. The second set of concepts is related to the different IT-capabilities possibly impacted by WFH.

Some of the respondents gave an impression of a fundamental change in their way of managing IT, it was therefore decided to identify any statements concerning improvements in digital maturity as a separate category. Finally, we theorize that dynamic capabilities and agility might affect how the companies adapted to WFH. This was therefore also a prime concern when coding the data. To ensure the usability of the coded data a colour coding scheme was developed. Each colour represents a specific capability, improvement or modifying factor. The table below illustrates this See table 3).

Macro capabilities	
Managing IT like a business	
Managing the IT budget	
Managing the IT capabilities	
Managing IT for business value	

WFH improvements on IT capabilities & maturity	
Tangible resources	
Intangible IT-enabled resources	
Human IT resources	
Digital maturity	

Modifying factors	
Agility and dynamic capabilities	

Table 3 Colour coding scheme

The coding was conducted in the days after the interviews´ transcriptions were finalized. All relevant statements in the different interviews were given a colour code. If a statement could fit into more than one of the categories, the statement was coded in one of two different ways. When possible, the statement was colour coded per sentence. In the cases where this was not viable the statements were colour coded with the most relevant category and had a comment affixed to it. Some statements might not fit into any categories but still show novel insights that could prove useful at later stages. These statements were highlighted, and a comment was affixed to them.

3.8 Supporting theory

Based on the literature review, this section seeks to further clarify the theory and definitions that are central to this research paper.

3.8.1 IT capability maturity framework

The IT-CMF has its origin in Martin Curley's research from 2004 published in his book *"Managing IT for business value"* and has since then been updated and refined by Martin Curley and Jim Kenneally in 2012 (Curley & Kenneally, 2012). The purpose of the IT-CMF is to provide a framework for assessing the maturity of IT in an organisation. The IT-CMF consists of four macro-capabilities that affect each other and together form the organisation's maturity level. These consist of managing: IT like a business, IT budget, IT capabilities, and IT for business value. The following four sections aim to provide an understanding of the characteristics within each macro capability. These characteristics serve to gauge the achievement within each maturity level and can be used in combination with each other to estimate the overall digital maturity level.

3.8.1.1 Managing IT like a business

This macro capability describes how the organisation´s IT leaders manage their department like a business. They develop strategies that are focused on the department's customers, products, and services and in turn seek to return business value on the investments in new and ongoing systems. (see table 4)

MANAGING IT LIKE A BUSINESS

MATURITY LEVEL	Key capabilities and characteristics
VALUE CENTRE	- IT is value centre and publishes value statements regularly - IT and business value are highly aligned - The IT organisation uses balanced score cards to drive continuous improvement - The IT organisation is strongly entrepreneurial
INVESTMENT CENTRE	- IT is focused on service and usage excellence - IT customer and supplier relationship management are excellent - Funding mechanism are flexible - IT uses dynamic resource allocation
SERVICE CENTRE	- IT is oriented to customers - Chargeback and cost accounting systems are in place - Service delivery and management practices are implemented
COST CENTRE	- IT is a cost centre - Asset and cost centre systems are in place - IT is focused exclusively on technology and process - Some IT processes have been documented
UNMANGED	- There is no IT strategy - There are no defined IT processes

Table 4 Key capabilities and characteristics within each level in managing like a business (Curley & Kenneally, 2012)

3.8.1.2 Managing the IT budget

The second capability is connected to how an organisation manages the budget. Everything in the IT department must be funded somehow. This concerns everything from the elementary such as day to day activities and ongoing projects, to the more sophisticated investment portfolios that are closely monitored. The budget can be seen as the fuel of the IT department (See table 5).

MANAGING THE IT BUDGET

MATURITY LEVEL	Key capabilities and characteristics
BUDGET AMPLIFICATION	- A stable IT budget supports the growth demands of the company - Budget allocations are balanced across appropriate portfolios that are based on value performance - IT intensity is actively managed and compared against other key corporate spending categories - Budget is driven by long-term organisation and business roadmaps
EXPANDED FUNDING OPTIONS	- IT has attracted multiple sources of funding - Cost savings are shifted to strategic investments or to the bottom line - The IT budget is in compliance with governance and with IT usage principles - The IT budget is aligned with long-term business value
SYSTEMATIC COST REDUCTION	- Systematic cost reduction processes are in place - IT unit costs are trended and reduced annually - A dynamic baseline IT budget approach is in place
PREDICTABLE FINANCIAL PERFORMANCE	- A defined IT budget exists - IT tracks performance against periodic financial and spending plans - Variance between actual and planned spend remains within a specified control limit
UNMANGED	- Financial performance is erratic - The IT budget has no clear owner - IT spend is invisible and fragmented - IT funding is not aligned with long-term business value

Table 5 Key capabilities and characteristics within each level in managing the IT budget (Curley & Kenneally, 2012)

3.8.1.3 Managing the IT capability

This is the different assets and value generating components in the organisation and their associated value chain. The management of IT capabilities consists of many different types of assets that need to be managed, ranging from the infrastructure to individual people, to organisational knowledge and business relationships (See table 6).

MANAGING THE IT CAPABILITES	
MATURITY LEVEL	**Key capabilities and characteristics**
STRATEGIC CORE COMPETENCY	- IT enables information and/or execution superiority over competition - A steady stream of solutions provides competitive advantage - IT is recognized as a differentiating core competency
STRATEGIC BUSINESS PARTNER	- IT leadership is integrated with business leadership - IT delivers solutions that provide value in specific business areas - IT delivers key competitive capabilities in targeted areas - IT leaders understand the business and proactively propose solutions to key opportunities and problems
TECHNICAL EXPERT	- IT has a track record or delivering quality services that are reliable - The IT organisation is sought out as a source of technical expertise - IT provides a reliable utility IT service that is benchmarked on performance and cost
UTILITY OR TECHNOLOGY SUPPLIER	- There is growing respect or the IT organisation - The company views IT purely as a cost centre - IT is a cost to be continuously reduced
UNMANGED	- Users purchase and maintain IT systems - There is no formal IT presence - There is no integration of IT systems

Table 6 Key capabilities and characteristics within each level in managing the IT capabilities (Curley & Kenneally, 2012)

3.8.1.4 *Managing IT for business value*

The final capability is connected to the IT department´s needs for a guideline and a proper way of measuring success. IT departments should seek to measure this closely related to business value. The important aspect of this, is how the different IT investments and initiatives impact the company's bottom line (see table 7).

MANAGING IT FOR BUSINESS VALUE	
MATURITY LEVEL	**Key capabilities and characteristics**
OPTIMIZED INVESTMENT RETURN	- IT performs sophisticated investment and portfolio analysis in order to optimize investments and spend - Returns from IT-enabled investments are equal to or greater than returns from other investment types in the company - Historical data enables accurate predictions of the value of future investments
PORTFOLIO AND OPTIONS MANAGEMENT	- IT has a proactive portfolio management programme - IT uses an options management approach to pick and manage speculative IT investments - IT weighs risk and value-at-risk as key components of business cases
SIMPLE RETURN ON INVESTMENTS AND BUSINESS CASE DISCIPLINES	- There is a disciplined use and review of business cases - IT has in place either investment governance or a business value programme - It uses multi-metric analysis of business cases to determine best quality investments
TOTAL COST OF OWNERSHIP	- IT computes total cost of ownership for major assets - IT tracks total cost of ownership regularly to ensure there is continuous cost reduction - IT computes total cost of ownership for the full life cycle
UNMANGED	- Decisions are based on cost, not value - There is no comprehension or measure of the value IT provides - Total cost of ownership is rampantly escalating

Table 7 Key capabilities and characteristics within each level in managing IT for business value (Curley & Kenneally, 2012)

These four capabilities are in the framework measured on maturity levels and changes their core characteristics as they increase in maturity. At the initial stage, the capabilities are unmanaged and without direction, processes are executed in an ad-hoc manner. At the second level, basic process functionality is used to ensure a basic set of services and functions. The third level indicates that the company has achieved an intermediate level of process sophistication and functionality. At the fourth level, the company has reached and implemented an advanced set of process sophistication and functionality. At the final stage IT is seen as a core competence of the company. The critical processes are optimized in both the process areas and in context to other critical processes. Table 8 highlight the key characteristic for each maturity level.

Maturity level	Managing IT like a business	Managing the IT budget	Managing the IT capabilities	Managing IT for business value
Optimizing	Value centre	Budget amplification	Corporate core competency	Optimized value
Advanced	Investment centre	Expanded funding options	Strategic business partner	Options and portfolio management
Intermediate	Service centre	Systemic cost reduction	Technology expert	ROI and business case
Basic	Cost centre	Predicable performance	Technology supplier	Total cost of ownership
Initial	Unmanaged	Unmanaged	Unmanaged	Unmanaged

Table 8 Different characteristics for each maturity level (Curley & Kenneally, 2012)

Part of the analysis in this thesis is based on the above presented framework. This was used in practice by assigning a numeric value to each of the different key macro capabilities, ranging from 1 to 5. When each of the four macro capabilities´ final score was established, the overall average was used for the final estimation of the company's digital maturity level. If a company landed with a total score that was between two levels on the scale, the lower level was chosen. This decision was taken from a standpoint stating that a maturity level needed to be fully achieved. The scale in figure 11 below is an illustration of this.

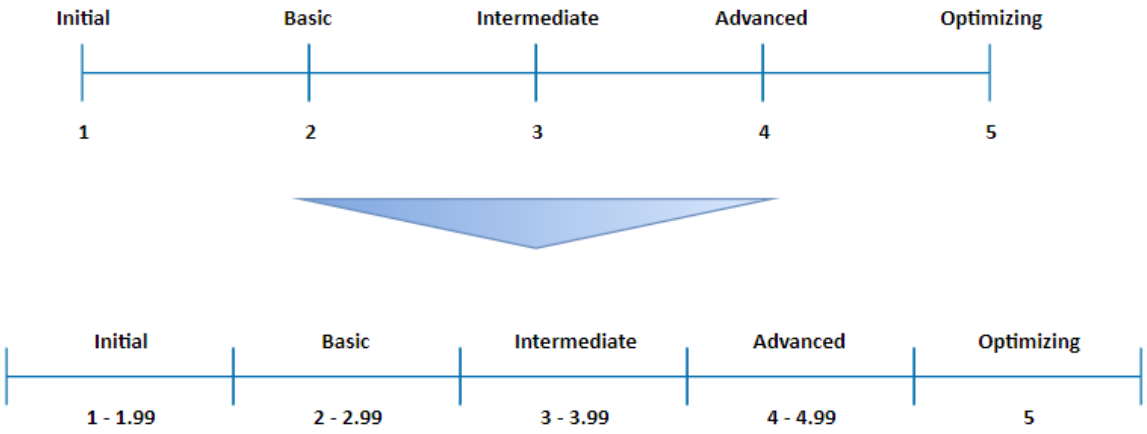

Figure 10 Scale for estimating companies' maturity level

4 Analysis

The following chapter provides an analysis of the participating companies. The analysis contributes to an understanding of each individual company's digital maturity level and how they were impacted by the WFH phenomenon. The analysis is divided into two parts, the first part is determining the digital maturity level of each company by applying Curley's IT-CMF. The second part is focused around how WFH impacted the companies´ IT capabilities.

4.1 Royal Unibrew general maturity level, based on IT capabilities

Royal Unibrew is Denmark's second largest brewery and traces its origins back to 1856. The main markets of Royal Unibrew are centred around Denmark, Finland, Italy, Germany, France, and the Baltic states. Their main product range is mainly concerned with beverages, and their revenue is split 50-50 between alcoholic and non-alcoholic products. There are 2.631 people employed at Royal Unibrew (Group) and 2.567 at Royal Unibrew (Nordic) (Royal Unibrew A/S, 2021).

4.1.1 Managing IT like a business

The estimation of Royal Unibrew´s digital maturity level is based on their ability of *managing IT like a business*. There are several key capabilities and characteristics that decide how mature Royal Unibrew is in this area. The first step in defining their macro capability of *managing IT like a business* is to examine their IT strategy and get a clear insight of the overall objectives of IT. Svend Nyegaard is positioned as the CIO of the company and is responsible of the execution and coordination of IT, where he stated the following:

> We have just accomplished a new IT strategy, where that is stated very clearly. So, I'm with the top management. And when I am talking in top management then we have the local danish top management with the CEO and then we have all the general managers in all our markets and they are all aligned in what we are going to do. (Svend Nyegaard, 13:44)

The statement made by Nyegaard indicates that the company's management has set new IT strategies that are well coordinated and distributed throughout the organisation. Nyegaard explained what the IT department´s objectives are: *"Our mission statement is to create additional value and value for our business."* (Svend Nyegaard, 13:44). These statements clearly indicate that

Royal Unibrew's management of IT is on a more advanced level rather than basic. Additionally, the company is a consumer goods provider, and it is vital for the company to maintain good IT-relationship and coordination management, in order to ensure that new IT investments are in line with each department. Nyegaard stated that the company possess a tight coupling with the IT department and their core business, and that the Royal Unibrew have implemented an intelligence reporting system, which he further explained:

> So, we have one engagement maker working on our business in our intelligence reporting system, we have one on our supply chain, we have one on our financial, and one on our ERP solutions in general. So, we have dedicated Business Engagement Managers. A Business Engagement Manager is typically a guy or a girl we employed from the business who had worked deeply in the business. And now we give them some not-IT skills, but they can translate the business need to IT terms. (Svend Nyegaard, 15:21)

The above statement illustrated a strong coordinated and relationship management of the internal alignment of IT and business. Royal Unibrew's approach with an intelligence reporting system and the use of an engagement maker helps the company to become a hybrid of both technical and business expertise. By having a business specialist in various departments, the IT department is well positioned to translate the business needs to technical terms, IT solutions, and improvements. This ensures that new innovations in the IT department are aligned with the core business. On the external supplier side Nyegaard explained that it is normally the manager of the products that has the responsibility of IT supplier relationship (Svend Nyegaard, 16:08). This indicates that external relationships are not managed by the IT department and thus not a key capability.

Due to the above statements, Royal Unibrew maturity level of *managing IT like a business* can be determined to the level in between *investment centre* and *service centre*. This is mainly because they currently have different characteristics that justifies both levels. For instance, they seem to have a high degree of alignment with the core business. Additionally, there is strong customer relationship management, but the supplier side seems to be lacking. Due to these different factors their maturity level in this aspect is estimated to be at the *service centre* level.

4.1.2 Managing the IT budget

The IT department at Royal Unibrew is responsible for the IT budget in general, which Nyegaard explained in the interview (Svend Nyegaard, 16:33). The macro capabilities of *managing the IT budget* provides a clear overview of how projects and ongoing IT activities are being financed inside the organisation. The higher level of digital maturity towards the IT budget the more complex the IT adoption is inside the organisation, with monitoring and measuring of IT related operations. When asked about if the IT budget is flexible or do, they adhere to a strict budget, Nyegaard stated:

> I have been working inside other companies. I think the budget here is, if it makes sense to for instance, a rollout, an investment in a CRM system in Denmark and Finland. We will have that approved because there is a good business value addition to it. And when we have a good business case to it. So, it'll be a combination of increasing the business value or efficiency combined with a good business case. (Svend Nyegaard, 16:54)

This statement highlights that the IT budget is flexible in a degree of how beneficial a business case is, regarding the company's bottom line. The IT budget is flexible if an IT-investment brings additional value or efficiency to the company. The key factor for an investment is to have a good business case and intensify the performance of other departments and business areas inside the company. It could be said that the budget is flexible but restricted by external factors. Nyegaard additionally explained that a team called GLT (The Great Leader team) is responsible for IT investments of the IT budget:

> I think we are pretty good because we will still have this prioritization from what we call the GLT. The Great Leader team, which is the head of the heads, and they align that both in the short term and in the long term where we are going. (Svend Nyegaard, 17:38)

This indicates a high level of control and management of the IT budget at Royal Unibrew´s top management. The company's IT-budget is well equipped in regard to funding in order to support business goals. This is further amplified by their central decision-making skills in place when executing new projects. When asked about if the company is concerned with reducing IT cost, Nyegaard replied short "*Not at all. The other way around, the budget are increasing.*" (Svend

Nyegaard, 18:28). This was further explained when asked what happens at the end of the year if there are a surplus in the IT budget at Royal Unibrew:

> We don't have. We are presenting a plan for the next year. And then from our finance department, they will follow up upon it. We have asked for money and say you are not able to execute this, what's going to happen, will they say. So, we'll follow upon our thoughts and our plans. So, I think a surplus, I haven't experienced. I have only been here for four years and haven't seen it yet. (Svend Nyegaard, 18:39)

This indicates that there is a high level of control and oversight concerning IT costs. The part of the budget that is not based on routine costs, needs to be individually defended and justified. This leads to a situation where the IT budget is fully utilized every year. When asked about if they make use of investment portfolios Nyegaard answered briefly that they do in some limited aspect. *"We're using, for instance, for maintaining our production environment, our IT infrastructure, we had the investment portfolio, yes."* (Svend Nyegaard, 18:12).

Based on the above statements it is clear, that they are not engaged in systematic cost reduction and there are few elements of the capabilities seen in the profile of budget amplification. These are however not fully matured and present. It is therefore estimated that their maturity level in this section is *expanded funding options.*

4.1.3 Managing the IT capabilities

This section set a focus on the management of IT capability at Royal Unibrew and as stated in the previous section Nyegaard is responsible for the regional IT department. Royal Unibrew has established a team of top management that are in control of decision making and approval of IT projects and programs. Additionally, Nyegaard stated GLT are meeting yearly to discuss that business and IT goals are met: *"Where we are meeting the top-level management and say what are your plans for the next year?"* (Svend Nyegaard, 13:19).

Royal Unibrew possesses a well-defined approach that focuses on IT-strategic deployment. Besides having top executives' meetings, Royal Unibrew have deployed resources and competencies in the form of employees with specific business knowledge, in various departments for successfully

aligning IT with business functions. *"Still, as we spoke earlier, we have these meetings with the business, and we have the Business Engagement Manager who is making interviews and making plans for the business and together with the business."* (Svend Nyegaard, 20:24). The statement shows that IT leadership is integrated with business leadership and that IT solutions are made for providing business value in specific areas through the deployment of engagement managers. When asked if the company views IT as a utility support or an aligned business partner, Nyegaard answered: *"It's more in the first part of it. But our new strategy is to increase the business side and to be more part of the business and understand the business, to be the preferred partner." (Svend Nyegaard, 20.51).* This answer shows that the IT department at the current moment is mostly seen as a utility support but is actively trying to shift this view. These statements in combination with their budget fits the characteristics seen at the maturity level of the *technical expert*.

4.1.4 Managing IT for business value

The management of IT for business value describes how actively impactful Royal Unibrew's IT investments has been regarding their bottom line. This is based on observation, monitoring, measuring, and reporting the business value that IT investments generate in the company. When asked how Royal Unibrew prioritize a potential IT investment, from cost or value, Nyegaard stated:

> Normally, we look at the business value first and then the cost afterward and then we start to negotiate with the suppliers to reduce the cost. Normally you have a fixed value set or additional value, you cannot increase that. So, we can reduce the cost. This is some kind of a two to face market we're looking at. Value first on then cost afterwards. (Svend Nyegaard, 24:34)

This indicates that Royal Unibrew is mainly focusing on the value side when deciding which investments to initiate. Meaning the company is aware of the value improvements of new potential IT services or technologies can bring. Nyegaard said that the typical type of an IT investment the company makes, are new IT systems which are hardware or software (Svend Nyegaard, 28.57). When asked how they predict the potential value of these IT investments, Nyegaard stated:

"Normally you're looking at are you able to save some processes, are you making to digitize anything, or are you making to automate something? (...)" (Svend Nyegaard, 23:22).

In another example Nyegaard expresses that their core process is centred around the use of business cases. Some of the core parameters in their considerations are tied to time frame, available resources, scope of the project and any incurred running costs after the project is completed (Svend Nyegaard, 25:14). Regarding these predictions Nyegaard stated that they are not entirely accurate, sometimes these predictions are miscalculated and set either too high or too low. This is hard to accurately estimate at Royal Unibrew because they do not follow up on finished investments. *"(...)we are not following up on. We don't have a function so far called the business benefit realization group or taskforce..."* (Svend Nyegaard, 26:54). This is part of their overall company culture. *"We are not a company with a mindset of making a lot of reporting for the reporting purpose, we are making reporting when it makes purpose."* (Svend Nyegaard, 28:36*).* The focus on *managing the business valu*e seems to be placed on the *total cost of ownership* level. The IT department has a good overview of the cost side of a project and calculates the total cost of ownership during the entire lifespan of a new project. It should be noted that this focus is complemented with the use of business cases.

4.1.5 Overall assessment of digital maturity

The company's digital maturity level is based on the four different macro capabilities described in the previous sections. The first macro capability examines how the IT is managed in the organisation. This capability at Royal Unibrew can be graded as a *service centre* with some distinct characteristics of an *investment centre* due to their strong customer relationship management. Secondly, their capabilities of *managing the IT budget* are considered to be at *expanded funding options*. Their IT budget is aligned with long term business goals and from Nyegaard's statements there is an indication that the IT department has multiple sources of funding. Their management of IT capabilities are equivalent to the maturity of a *technical expert*. The IT provides reliable utility in the company in various departments. The last macro capability relates to how IT is managed to generate business value and is determined to be centred on *total cost of ownership* due to the company's clear overview of cost and inconsistency of measuring value regarding implementation of IT

projects. The overall digital maturity level of Royal Unibrew can be estimated at an *Intermediate* level.

Maturity level	Managing IT like a business	Managing the IT budget	Managing the IT capabilities	Managing IT for business value
Optimizing	Value centre	Budget amplification	Corporate core competency	Optimized value
Advanced	Investment centre	Expanded funding options	Strategic business partner	Options and portfolio management
Intermediate	Service centre	Systemic cost reduction	Technology expert	ROI and business case
Basic	Cost centre	Predicable performance	Technology supplier	Total cost of ownership
Initial	Unmanaged	Unmanaged	Unmanaged	Unmanaged

Figure 11 Royal Unibrew's overall digital maturity level

4.1.6 Impact on company due to WFH

The forced lockdowns and restrictions from the government have impacted how businesses operate in Denmark. Royal Unibrew is one of many companies that have been forced to change their way of working to a new model with WFH at its centre. To comply with the government recommendations Royal Unibrew launched a press conference, in order to implement a strategic approach regarding WFH, this was touched on by Nyegaard:

> Definitely, we had a management meeting, we will call in, I think it was over the evening or night we had a call. I was contacted by my VP. And we had the discussion as we wrote to people and I informed the staff in my command that I will just don't want to see these three guys the next day, that we all should stay at home. (Svend Nyegaard, 03:00)

This initially meant that Royal Unibrew had to transition most employees to their new working environment. Around 5-10% of the employees were already WFH on a regular basis prior to the

lockdown. This suggests only a small portion of Royal Unibrew´s employees had experiences with WFH going into this new reality (Svend Nyegaard, 00:33). The new reality resulted in physical offices being replaced by peoples' homes and meetings turned into virtual ones through Microsoft Teams. With the new reality concerning most employees at Royal Unibrew and their new work situations, challenges and surprises were likely to appear. However, when asked about how employees had handled their new work environment, Nyegaard replied:

> We were just a little concerned about people are normally asking the guy next to them if they experienced something and we have seen an increase in numbers of tickets to the service desk. Because now they cannot ask the guy next to them or could not do that. So overall we have an increase of tickets by on a yearly basis with 10-15%. (Svend Nyegaard, 04:53)

Even as most of Royal Unibrew´s employees have not experienced WFH before, and conduct meetings and work through Microsoft Teams. However, their initial skills and capabilities had proven adequate to their new work environment. The low increase of tickets illustrates a minor negative impact of WFH concerning the employee side in the early stages. Additionally, Nyegaard explained that the company had not lowered the demand of their employees and their workload was being the same regardless of the new work situation (Svend Nyegaard, 05:34). When interviewed about how Royal Unibrew continued to maintain being efficient and productive under the new circumstances. Nyegaard explained that approaching WFH as a new normal, while still having the same mindset, norms, and culture as being physical in the office.

> I have made every day and we still do that after over a year, we have our daily virtual coffee break, where we can discuss operational issues, new features, new things, what has happened, what kind of projects are we running, what are the status? And that has increased the number of information meetings where we are talking in general about the company. (Svend Nyegaard, 03:56)

Nyegaard further noted how their approach to making WFH successful when engaging and conducting projects.

> You have to have a tight follow up on your employees. Meaning positive, so you are in contact with them, they know you are there. And they still can just call or send a message or chat or whatever. So, I have never received so many chat comments ever in my life. (Svend Nyegaard, 06:10)

Regarding the technological impacts of WFH, Royal Unibrew has already established a high enough digital maturity to adjust to the government regulations. As mentioned previously Royal Unibrew has existing infrastructure to ensure that employees are able to work remotely. Nyegaard explained that they have not experienced issues with adopting and facilitating remote work due to the company's infrastructure. "*Yeah, we have no problem here. Because all employees have the possibilities to work remotely through VPN, and we had that established as well, if you just monitor that we were having the right capacity on our VPN connections*." (Svend Nyegaard, 01:54) Additionally, Nyegaard stated that Royal Unibrew only experienced small start-up issues regarding the impact of WFH, which was more because of limited hardware for employees and not technological difficulties.

> You will always have some start-up issues. Every employee here has a notebook and a lot of them were lacking a monitor. That was one of the big issues and then we saw it was going to take a while, we just asked them to bring their monitors home. But from technical skills, no problems. (Svend Nyegaard, 01:07)

The possible reason why Royal Unibrew experienced minor impact during the lockdown could be due to being a manufacturing company. They were in the same situation as all other companies, where employees were WFH. However Royal Unibrew's main business area is their operational part that is available 24/7. The production lines were still kept fully operational by the reduced number of employees allowed inside the company (Svend Nyegaard, 08:54). And with smaller departments of white collars, as Nyegaard stated regarding the IT department: *"Yeah, because the IT department is like in two or three small units or minor units."* (Svend Nyegaard, 08:54). Their impact due to the lockdown were towards the early stages, where employees had to bring their office setup back home and learn the functionality and features of Microsoft Teams. Royal Unibrew´s transition of

deploying more employees to WFH has had a slight disturbance in their business, due to the distribution of hardware for their employees.

4.2 Chr. Hansen general maturity level, based on IT capabilities

Chr. Hansen is a Danish company that develops and produces ingredient solutions for food, nutritional, pharmaceutical, and agricultural industries. The company sees its origin in 1874 with the establishment of "Chr. Hansen's Teknisk-Kemiske Laboratorium" producing a liquid animal rennet for cheesemaking. This basis in cheese making is still seen today, where every second cheese produced in the world contains at least one of their ingredients. Chr. Hansen currently employs about 3.600 employees across more than 30 countries. (Chr. Hansen A/S, n.d.)

4.2.1 Managing IT like a business

This section determines Chr. Hansen´s maturity level in regard to *managing IT like a business.* To start with it is vital to determine the state of their IT management and whether it is managed. There are many clear factors indicating they have formulated a clear IT strategy and the scope of this department is well defined. Jens Rasmussen is positioned as the company's CIO and is responsible for executing the IT strategy and global coordination between local IT departments. In the start of the interview, he explained how this works:

> (...) all the IT staff are reporting to me, even though they are placed around the world, primarily Denmark, France, US, Colombia and Malaysia. (…) So, they are reporting to me, and they have a local commitment to the management there, but they receive all the goals from me or for the global IT team there. All the investments in IT infrastructure, like servers, networks, and so on, is handled by us. (Jens Rasmussen, 00:40)

This statement shows a high level of global coordination in the IT department, and well-defined responsibilities. It is therefore safe to say that IT is not unmanaged. In regards to the IT strategy they have a strong focus on developing the IT-capabilities and caters to the needs of the customers while complying with government regulations: *"Yeah, the current strategy is actually striking the balance*

between digitalization and compliance.“ (*Jens Rasmussen, 10:46*). Due to their main products being used for human consumptions they have to compile with strict government regulations. Failure to do so, would risk the entire production lines to be shut down. Rasmussen emphasizes this dual focus as a need for development and compliance: *“So we have to kind of, embrace both something that we could call slow moving IT or kind of very secure IT, but also the demand for new stuff.”* (*Jens Rasmussen, 10:46)*

When asked about business alignment Rasmussen's answer indicates a tight coupling between the core business and the IT department. One of the ways that this is practiced in Chr. Hansen is by the use of IT process boards:

> We have a, what we call IT process boards, which is kind of a governance entity. And we have one for each of the functions in the company. So, we have one process board taking care of R&D, one for production, one for sales and marketing, and one for staff functions like HR and finance, and so on. And we have an assigned IT business relation manager. And that's usually a person reporting to me. And that person is hosting these meetings on a quarterly basis.” (Jens Rasmussen, 12:31)

The statement also shows their engagement in relationship management on the internal side of the company. At this point in the interview Rasmussen continued to underline the flexibility in the IT department, and how they can respond to upcoming needs of each department and opportunities in the market.

> And again, using the portfolio to align that we are working on the right things, and a new thing might come up right, so we have this flexibilities that every quarter, we can change the portfolio or what we are actually working on right now. (Jens Rasmussen, 12:31)

In regard to external supplier management Rasmussen highlights that this is a clearly defined aspect of the organisation. He explained this is usually the role of the functional leads, and those requiring the service (Rasmussen, 14:15). When asked about how the IT department reports progress and

value creation, Rasmussen said that they are mainly focused on the progress side. *"Actually, what we report is more kind of progress on the portfolios. But not in a monetary way(...)"* (Jens Rasmussen, 15:41).

Based on the above statements, it can be concluded that the IT management in Chr. Hansen is on the level of an *investment centre*, but they do show signs of developing the capabilities seen at the level in a *value centre*.

4.2.2 Managing the IT budget

This section focuses on the management of the IT budget at Chr. Hansen. As covered in the previous section Jens Rasmussen is the one responsible for the global IT budget. When asked about how the budget is organized, Rasmussen highlighted that they have a clear organized structure in place. The IT department's budget covers investments into IT infrastructures, services, and networks. In addition to this, it also consists of maintenance of new and existing business software and licenses. When another department initiates a new project within this domain the cost is only added to the IT budget after completion.

> It's usually paid by them the first year, kind of part of the project. And then the budget is added to my budget. Then we make a chargeback based on agreement, and we´ve allocated to each cost centre, but we manage everything. So, we have a pretty good idea about all spent in IT. (Jens Rasmussen, 00:40)

Rasmussen's statement demonstrates that they have a high degree of overview and control of the IT budget. In regard to the funding of the IT budget Rasmussen explained that this is tied to the growth of the company *"Usually, we can grow with the same growth rate as our top line growth in Chr. Hansen (…)"* (Jens Rasmussen, 02:48). Regarding the funding flexibility, Rasmussen said that it is dependent on the case. Personally, he gives an example about cybersecurity: *"Because if you ask for funding for any initiative for cybersecurity, you get it immediately. And if you don't get it, then you can ask the audit committee, and then you will get it."* (Jens Rasmussen, 02:48). This statement also shows that the funding of the IT budget can come from different sources within the company. It can be derived from new development in other departments, growth of the company, and for

critical initiatives. This flexibility is further shown in the following statement by Rasmussen *"So it's adaptive in the way that the project economy of the company is run by the business."* (Jens Rasmussen, 04:05)

The IT budget at Chr. Hansen is well equipped to support the business goals, Rasmussen said this is due to two reasons. One is because new projects originating in the business side are funded by the initiating department. The other is due to the organic growth of the IT budget. When it comes to the implementation of new IT projects, the IT department's role is that of an architect and manager: *"We will typically be the main architects (…) managed by us kind of making sure that the long-term infrastructure and architecture is in place."* (Jens Rasmussen, 04:05)

When asked about if they make use of investments portfolios Rasmussen answered with a yes followed by a detailed explanation, that shows they have a well-established use of investments portfolios.

> I would say, it's very much in our strategy to push more transparency in the portfolios. (…) because we link it to enterprise architecture, actually, to make it what we call a multi-dimensional portfolio. So, we're not only considering time and resources, but also dependencies to other or other interdependencies (…) (Jens Rasmussen, 05:07)

While the cost side of IT is always a concern in any company, Jens Rasmussen is not preoccupied with reducing it. "*No, I am not concerned about it, as long as it's something that is balancing with the business strategy."* (Jens Rasmussen, 07:00). Any surplus in the IT department is funnelled back to the organisation. This does however not create a situation where the IT department rushes to spend the remaining part of the budget, due to the practice in place of reinvesting the money in the IT investment portfolios.

Based on Rasmussen's statements, the maturity level of *managing the IT budget* at Chr. Hansen shows many signs of being highly developed. The level of maturity is placed on *budget amplification*. This is mainly due to the fact that the budget grows with the business, a high degree of alignment with the core business and an advanced use of investment portfolios.

4.2.3 Managing the IT capabilities

This section contains an analysis about the maturity level connected to how Chr. Hansen manages IT capabilities. Based on the previous sections it can quickly be established that it is definitely not unmanaged. Jens Rasmussen and the global IT department is a clear sign of a formal IT presence within the company. In the interview Jens Rasmussen said that the IT department is responsible for purchasing IT systems and ensuring its integration into the existing IT infrastructure. "*We are. Global IT are. But of course, it's something done in collaboration with a business." (Jens Rasmussen, 16:31).* Chr. Hansen also shows that they are beyond the level of a utility or technology supplier. One of the clear signs of this is that the department is not driven as a cost centre and there is not a focus on cost reduction. *"So last year, we could grow by 8%." (Jens Rasmussen, 02:48).*

Chr. Hansen shows that they possess some of the key capabilities seen in the maturity level of a technical expert. The first indicator of this is their role in IT projects. Here the IT department has a role where they are sought out as technical experts.

> And then as I mentioned before the development project is funded by the business. So that could be for instance, it could be a development of a new software, whatever they will be, we will typically be the main architects, and then we will source developers from consultancies and so on in, but still be managed by us kind of making sure that that the long-term infrastructure and architecture is in place. (Jens Rasmussen, 02:48)

This is however also a statement that would fit the profile of the next maturity level, of a strategic business partner. This level contains four key capabilities and characteristics. Rasmussen´s statements in the interview gives the impression that IT and business leadership are integrated to some degree. Examples of this is the advanced use of portfolios and the IT process board. The solutions provided by the IT department in the company are highly targeted towards specific business areas. This is due to their advanced use of portfolio management.

Based on this it can be said that Chr. Hansen is at the maturity level of a *strategic business partner*. It should be noted that they also possess characteristics of a *technical expert.* This is well aligned with Rasmussen's own answer when asked about how the company views IT, as a *business partner or a utility supplier*.

> I would say it's both, because it's covering so much. It's covering what we just talked about, like really hardcore IT and old school IT. And then also being the business partner of many of our projects. So, it is kind of a jack of many trades. (Jens Rasmussen, 24:42)

4.2.4 Managing IT for business value

This section of the analysis seeks to assess the maturity level of how Chr. Hansen is *managing IT for business value*. When asked about how they predict the value of potential investments Rasmussen answered that they do not have a codified process. "*We don't have a strict model for doing that. (…) So, it's very much a case by case actually." (Jens Rasmussen, 28:09).* Rasmussen made an effort here to communicate that they try to evaluate if the case is doable and have a clear overview of the potential costs affixed to it. He emphasized that it is difficult to have a precise overview of the total value of an investment. In regard to the most important factor when deciding what investment to pursue, Rasmussen explained that it is a dynamic process grounded in available resources.

> (…) it is a combination of available resources in the business, available resources in the market, and available resources at IT. So, if we see that kind of that mix is available for this project now, then we move with that. (Jens Rasmussen, 29:43)

This would be an example of how they use multiple factors when choosing between different investments. When asked about how often their predictions hold true Rasmussen answered that the cost side is usually on point (Jens Rasmussen, 31:12), and the value side of the equation is not structurally measured. They are mainly concerned with completing the project on time and within the given boundaries. When the project is finalized, they trust in their original predictions in regard to value and do not follow up on this. The deciding factor when evaluating the maturity level of this section at Chr. Hansen is their disciplined and structured use of IT investment portfolios.

> And the way that we run the portfolio centrally. And then we try to identify all the projects in the business being dependent on IT. (...) So I would say, it's very much in our strategy to push more transparency in the portfolios. So, it's actually something that we are running in. And yeah, and all the time, if we have more time, I can explain to you how we do it, because we link it to enterprise architecture, actually, to make it what we call a multi-

> dimensional portfolio. So, we're not only considering time and resources, but also dependencies to other or other interdependencies that could be to other systems. So that's really kind of a new way of using enterprise architecture. (Jens Rasmussen, 05:07)

This is completely in line with the core capabilities in the fourth maturity level *portfolio and options management*.

4.2.5 Overall assessment of digital maturity

This section contains the overall assessment of the digital maturity level at Chr. Hansen. In the previous part of this analysis, it was estimated that Chr. Hansen managed their IT as an *Investments centre* with a focus on *budget amplification*. In addition to this the role of the IT department is categorized as a *Strategic business partner*. The IT department creates value in the organisation by using sophisticated IT investment portfolios placing them in the *portfolio and options management* category. Considering these factors, the overall digital maturity level of Chr. Hansen is estimated to be on an *advanced* level. It should be noted that their IT budget management level is above this. Should they wish to further develop these capabilities, some steps could be taken into consideration such as, following up and monitoring the value provided by IT investments after they are completed. This could be used to achieve a more accurate estimation of the value of potential investments in the future. Secondly, a structured framework to facilitate value generated reports by the IT department should be created, this would allow other areas of the business to see the value of the IT department and ensure information is accessible throughout the organisation (see figure 13).

Maturity level	Managing IT like a business	Managing the IT budget	Managing the IT capabilities	Managing IT for business value
Optimizing	Value centre	Budget amplification	Corporate core competency	Optimized value
Advanced	Investment centre	Expanded funding options	Strategic business partner	Options and portfolio management
Intermediate	Service centre	Systemic cost reduction	Technology expert	ROI and business case
Basic	Cost centre	Predicable performance	Technology supplier	Total cost of ownership
Initial	Unmanaged	Unmanaged	Unmanaged	Unmanaged

Figure 12 Chr. Hansen's overall digital maturity level

4.2.6 Impact on company due to WFH

This section of the analysis focuses on how WFH has impacted the IT capabilities and digital aspects of Chr. Hansen. In order to adapt to the new reality of having a large portion of the staff WFH, Chr. Hansen made new initiatives. One of these initiatives was training sessions that ensured the employees had the required skills and capabilities to utilize the programs needed in this transition. These training sessions were still in use at the time of the interviews. It should be noted that Chr. Hansen went from using Skype to Microsoft Teams prior to the pandemic. This would in itself necessitate training if the company wished to gain the full advantage of the new program. When asked if there had been a change in how people use the IT department Rasmussen explained the following.

> But of course, people just had to learn a new platform, we changed from Skype to Teams there. And we are still after a year now running training sessions on how to use Teams and so on, because it's changing pretty much at every revision. Microsoft is trying to keep up with Zoom and the others. So, they're copying all the things from Zoom and adding that to Teams. And people just have to constantly know what's going on and be educated and understand that Teams is much more than virtual meeting platforms. It's a collaboration

> platform where you can share documents. So definitely a huge increase in demand for virtual collaboration. (Jens Rasmussen, 25:53)

These training sessions allow the employees to fully utilize the features of the software needed for effective remote cooperation. It can be seen as an investment into human IT capabilities. This was a vital step, as the new working conditions resulted in a quadrupling of Microsoft Teams calls in the first month of the lockdown (Jens Rasmussen 42:36). This trend has only continued and at the time of the interview they were seeing more than 325.000 calls per month (Jens Rasmussen 41:46). Reflecting on this, Rasmussen also saw a need to continue the training programs once the situation normalizes.

> I think first of all, we need to continue training people. And we haven't actually done that a lot prior to the pandemic, just launching a lot of new features and expecting people to just adapt to them. (...) So, I think we will have to spend more time educating and training than whether we're done prior to the pandemic, maybe, I don't know, 5% of our total budget, 2 to 5%, something like that (Jens Rasmussen, 46:44).

This insight has been motivated by a new view of the employees and their IT capabilities. *"So, I think it has been in general awareness about digital competences required as you as an employee, I think has increased dramatically within the last 12 months"* (Jens Rasmussen, 45:35). This shows that the large-scale use of WFH has been an eye opener, and a call to action in regard to increase and maintain the employees´ IT capabilities.

In regard to the hardware side of WFH, Rasmussen explained that the needed infrastructure was in place prior to the lockdown. On the software side it went relatively smoothly except for minor software license issues, which was quickly ratified (Jens Rasmussen, 49:21). One of the challenges posed by WFH was that they went from 52 sites around the world to over 4000. This required more demand for the employees' home network than usual, in order to create and maintain a good connection to their cloud and various systems. Chr. Hansen realised it was impossible to secure a

high network standard across all employees´ private homes, but they decided to ensure this for senior management.

> But it's actually a service that we offer to our senior managers. So, we'll make a home visit also to make sure that it's configured securely. So, we actually go to them and set up the network at their homes and make sure that the default passwords are changed and stuff like that. But that's costly, because you have to send a guy there for six hours or something like that to set it up. So, we cannot offer that all for 4000 (Jens Rasmussen, 50:08).

This could be seen as a permanent increase to tangible networking capabilities of the company. In summary Chr. Hansen has seen an improvement to the human enabled IT capabilities and some tangible IT capabilities. It is notable that around 80% of the employees at Chr. Hansen is WFH at the time of this thesis.

4.3 DLG general maturity level, based on IT capabilities

DLG is a Danish company that is well entrenched in the agricultural industry providing farmers around Europe with a strong business partner. The company is divided into three different areas of core expertise: Agribusiness, Premix & Nutrition, and Energy & Retail. DLG is able to support the agriculture industry with a large selection of products from animal fodder, vitamin supplements to the fuel needed by the farmers. DLG's business model is centred around farmers, which reflects their origin as a Danish agricultural cooperative established in 1898. Through the years, the company has expanded and grown significantly into the German market, which currently is their largest customer base, accounting for around 70% of total revenue. Globally DLG employs around 6.600 employees of whom 1.500 are located in Denmark (DLG, n.d.).

4.3.1 Managing IT like a business

This section aims to identify DLG´s maturity level regarding how DLG is *managing IT like a business*. According to Spaabæk, DLG´s IT department focuses on two different areas. The first area is on a technical side, where it is prioritized to make sure IT is running smoothly with minimum server

downtime and disruptions. The second area focuses on creating a coupling between IT and business strategy, as the development of IT projects should be aligned with DLG´s business strategy. Additionally, DlG's IT department has a clear mission, it is therefore safe to say that DLG´s is managing IT like a business to some degree.

> (…) we have the operations part. And that is zero incidents, zero disruptions, and actually that we are stable, and we can run business. Whereas when we are looking into the development project, it's more linked into our strategy, business strategy. (Torben Spaabæk, 13:13)

There are clear indications that DLG's IT department is operating under a defined mission statement. The next focus point is to analyse if their IT projects development is aligned with their business strategy. This area shows that DLG is currently aiming to create a tighter coupling between IT and business. Thus, DLG is trying to implement better alignment between their IT strategy and business strategy, they are still located in the initial phase of making IT tie in with business. This might indicate DLG has a long road before their IT department is fully aligned with the current business.

> *S*o, what we are working on is that actually I need to make IT closer to business. (…). And so far, the development has been positive is that we are getting more and more links between business and IT. (Torben Spaabæk, 21:44)

When asked how they report the IT department´s value and progress, Torben Spaabæk replied they do not report the operational progress, as this is normally measured on servers´ downtime. Therefore, it is only the progress of project developments that are reported. *"And so yes, progress is reported, but that's on development, then that's more on projects and how many enhancements have we done"* (*Torben Spaabæk, 17:44).*

In regard to how DLG is managing the relationship with their suppliers, Torben Spaabæk mentioned a governance section is implemented in every supplier contract. That section states very clearly what the supplier is responsible for, and DLG's expectations. Once a supplier contract expires, DLG will routinely go to the market for new suppliers that can provide the best services and cost. This

shows that DLG has clear expectations for product, service, and cost regarding their suppliers.

> (…) we have a governance section in that contract, where we actually say, who, who's doing what, who is who? (…) When we want to outsource something, or if a contract is expired, then we are doing it by running tender processes and so on where we ask more than one, because we want to have the best conditions, the best prices. And of course, the best service. (Torben Spaabæk, 16:15)

Based on the different statements above, the maturity level of how DLG is managing IT like a business can be determined to the level of a *service centre*. This is mainly because DLG's IT department has a clear mission. However, they are still focused on minimizing technical issues in order to enable the business to run smoothly, while IT is not actively aligned with current business. But DLG is currently working towards a more mature level, as they are starting to incorporate a tighter collaboration between business strategy and IT. Moreover, their supplier management is managed well.

4.3.2 Managing the IT budget

In order to estimate the maturity level of this capability, different elements need to be examined. First of all, Torben Spaabæk is the one responsible for the IT budget (Torben Spaabæk, 00:32). It is therefore clear that the budget is not unmanaged. However, Spaabæk explained that some IT related costs occur outside the IT department, meaning that he does not have a clear overview of their total IT cost. This suggests a limited control of the IT budget. This is something Spaabæk is currently working to improve, with actions taken to identify all IT related costs, in order to create a complete overview.

> I would have to say no, because then it has to be very clear. But I'm actually looking into right now, I'm actually looking into the deep dive on all IT costs because when you have IT cost, it's not only within the IT organisations, you will also in bigger companies have IT cost outsides (…) (Torben Spaabæk, 01:06)

As for the IT budget´s flexibility, Spaabæk stated the budget is very strict and even stricter than

other industries because the margins in the agribusiness industry is much lower compared to others. *"So due to the fact of that, we are also using significant lower numbers or lower amounts of money on it compared to a lot of companies, which means we even have to be stricter" (Torben Spaabæk, 02:08).*

A strict budget can constrain the IT department´s investment opportunity, as a majority of the budget will normally cover operational costs with limited options for investments. Furthermore, Spaabæk has to address his executive if something unforeseen occurs or if he wants to implement a new IT project. A new IT project can only be initiated once the company's executives approve it, which shows a lack of flexibility and independence.

> (…) that could actually mean that we need to run an IT project in this area next year, and then we actually try to, to make a guesstimate on how big it is. And then we put it into the budget. And sometimes I get some of them are approved and some of them are rejected and That's how we deal with. (Torben Spaabæk, 03:27)

Moreover, the focus is mainly on reducing the yearly IT cost, as the IT department aims to lower the cost and still receive the same amount of services. This demonstrates that DLG is aiming to systematically reduce their cost every year. *"(…) to make sure that I can actually run the same amount of service for lower cost next year compared to this year (…)" (Torben Spaabæk, 03:27).*

If there is a surplus in the budget for at the end of a year, then the money is transferred from the IT department and brought back into DLG. *"(…) but if for some reason are getting a performance better than my budget, then of course I'm bringing that part into business. And I cannot necessarily spend that for something else."* (Torben Spaabæk, 08:02).

Based on Spaabæk's interview, DLG´s maturity level can be determined to be at the level of *Systematic cost reduction*. This is mostly due to the aim of yearly reducing IT cost and the inflexibility of their IT budget which affects the influence and view of IT in DLG. However, there are some factors that signal more mature or immature levels. For instance, the clouded overview of IT cost indicates a more immature level, while sending the budget surplus back to DLG indicates a more mature level.

4.3.3 Managing the IT capabilities

In DLG there are no specific employees or departments that are responsible for purchasing IT. Every department has the jurisdiction to decide on purchasing new IT. Spaabæk argued that IT normally can be found everywhere in the organisation which makes it difficult for the IT department to decide on behalf of other departments.

> For example, when we set up a new production line, that's also IT part of that there's also servers and clients. So that's a jurisdiction and where they actually can decide but most of it is within my organisation. (Torben Spaabæk, 18:48)

When asked about how IT investments are supporting business areas, Spaabæk answered that the IT department is not obligated for that. (Torben Spaabæk, 19:36). And further explained that the agribusiness industry normally spends a minimum of resources on research and development. This makes it difficult to support the R&D department as the primary focus is not there. This clearly indicates that IT currently provides a consistent level of value to the different departments (Torben Spaabæk, 19:39).

During the Interview, Spaabæk stated that the IT department´s primary goal is to support the business aspect, as the business cannot keep running if the IT system is down. Therefore, the IT department´s focus is on delivering reliable infrastructure to the business.

> "We are in daily work, because if we can't, if our core systems are not running then businesses are not running. So, of course, we are a big part of making sure that the normal business can run because they cannot survive for a long time if systems are not running." *(Torben Spaabæk, 20:04)*

Moreover, as stated earlier in the *managing IT budget* DLG´s department is currently focused on reducing yearly IT cost. DLG is currently undergoing a transformation and planning to implement a new process. This will in the future require the executives' approval and examine all benefits for future IT systems to better support value creation. *"But if I'm going to say yes, that we're doing this*

one, you have to read write down and say, Okay, this is actually the benefits we get out of it." (Torben Spaabæk, 20:04).

DLG maturity level of *managing the IT capabilities* can be determined to the level of *utility or technology supplier*, due to the fact the overall view of the IT department is purely seen as a cost centre for the time being.

4.3.4 Managing IT for business value

DLG is currently considering cost more relevant than the value, when deciding an IT investment. Usually, when cost is the deciding factor for choosing future IT investment, then it can indicate the IT for business value is unmanaged. However, Spaabæk explained that value will be the main deciding factor for future potential investments. *"So far it has been the cost. In the future will be the benefit." (*Torben Spaabæk, 26:05).

DLG´s IT department is currently using a simplified template for predicting the value and cost of an IT investment and is planning to implement a more advanced template in the future. The approach of calculating from templates, demonstrates a disciplined, structured, and consistent method of predicting IT investments. "*So, we actually introduced in a very simple template, and then we overtime will increase the methods about how we are measuring this?" (Torben Spaabæk, 26:19).*

Thus, having a structured approach of measuring their potential IT investments, Spaabæk expressed in the interview that there still is an uncertainty of the accuracy regarding their predictions. *"They are definitely not accurate. Because right now this is not measured in, what do you call it, in euros?" (Torben Spaabæk, 26:24).* This is because DLG focuses more on measuring how an investment is impacting the organisation, and not the value it provides. This again indicates a disciplinary review process that is in line with a mindset geared towards cost calculations.

> What kind of benefits on a global version is that you actually have? How will it impact your organisation? Can you actually save some people? Or do you actually need more? Is this something that positive or negatively will impact the turnover? That is these kinds of things

> we are focusing on (Torben Spaabæk, 26:24).

The next natural step was to investigate DLG's approach of measuring and monitoring running costs and maintenance. Spaabæk explained that due to running costs and maintenance having a significant impact on the next year's budget. It is necessary to track them in order to have a somewhat indication of the future budget. This again shows how IT cost is more important than the value of an IT investment.

> (…) every IT things that you invest, and you do, you will always have a running cost afterwards. And then of course, you have to focus on the running cost because every time you set a server up, it will always cost something to run that server going forward. (Torben Spaabæk, 28:51)

Currently, the IT department is trying to come up with IT solutions in order to optimize the current business. But According to Spaabæk, it is difficult for the IT department to get involved in the discussion. This is mainly due to the limited involvement of DLG's IT department when initiating new business projects. By not involving the IT staff in the early phases of a new business project, DLG are unconsciously creating a misalignment of business and IT. As the business department chooses new IT solutions. The IT department has difficulties supporting the projects and generating business value, as they have limited influence and involvement in the early stages.

> (…) I try to strive for that we from IT gets into that discussion very early. But most of it is actually driven from business because it is business that have to drive and make sure that they're part of the organisation are working efficiently. (Torben Spaabæk, 29:45)

Based on the interview with Torben Spaabæk, DLG´s maturity level in how they manage IT for business values can then be determined as the level of *total cost ownership*. This is because DLG is very disciplined in predicting and measuring the costs of IT investments, and similarly cost-focused in regard to how it will affect the future budget.

4.3.5 Overall assessment of digital maturity

DLG´s overall digital maturity level is based upon the above four sections. First of all, it was estimated that DLG is managing IT like a business in the *service centre* level, due to their focus on minimizing technical issues and lack of process to ensure IT alignment with their business. The IT budget is managed at the level of *systematic cost reduction*, this is mainly due to the fact that DLG strives to continuously reduce IT cost. DLG maturity level of *managing the IT capabilities* is at the level of *utility support or technology supplier.* While the maturity level of *managing IT for business value* is considered as *total cost ownership* due to DLG's consistency regarding value prediction and cost-focused mindset of IT investments. From the combination of the four macro capabilities DLG's digital maturity level can be estimated to *basic (see figure 14)*.

Maturity level	Managing IT like a business	Managing the IT budget	Managing the IT capabilities	Managing IT for business value
Optimizing	Value centre	Budget amplification	Corporate core competency	Optimized value
Advanced	Investment centre	Expanded funding options	Strategic business partner	Options and portfolio management
Intermediate	Service centre	Systemic cost reduction	Technology expert	ROI and business case
Basic	Cost centre	Predicable performance	Technology supplier	Total cost of ownership
Initial	Unmanaged	Unmanaged	Unmanaged	Unmanaged

Figure 13 DLG's overall digital maturity level

4.3.6 Impact on company due to WFH

The COVID-19 pandemic has forced DLG´s employees to start WFH, in order to comply with the government's recommendation. According to Spaabæk one of the biggest changes is the use of Teams. "*The simple answer is we are living through Teams" (Torben Spaabæk, 23:25).* As the company did not have significant experience in transitioning and operating with WFH on such a large scale, this raised concerns about their infrastructure and network. DLG faced the challenges of pushing out updates to employees´ computers and new IT security procedures. Initially, all computers could only be updated once they were connected on a VPN connection, which introduced new security risks, as computers without the newest updates were vulnerable to cyber threats. DLG solved this problem by deploying updates via the cloud instead of VPN connections, which enabled all computers to be updated regularly.

> But at that time, we were not able to distribute patches and updates to the computers when they were sitting remote. It could be when they were working on a VPN connection, we could do that. But if they were not, then we could not deploy updates. So that became actually a significant security risk for us. We have now changed that so we can actually from the cloud, push out updates. (Torben Spaabæk, 32:26)

In addition to the infrastructure, it was necessary for DLG to increase the number of connections to the data centre in order to facilitate the large-scale use of WFH. Spaabæk raised the concerns of experiencing a bottleneck in their system, due to the massive increase in traffic by having employees operating remotely.

> So instead of the traffic came from all our sites, all our offices towards our data centre, it actually came into the data centre on one single point, and that was the one firewall and VPN connection we had. (…) So, we had to do some very quick fixes and increasing the number of connections and so on that we need to set up for being able to, for people to work from home. (Torben Spaabæk, 34:57)

Looking at how the pandemic has affected the employees, Spaabæk explained that not all employees had the technical required skills to start WFH. This was illustrated when employees had to disassemble their office setup and re-assemble it at their home.

> Not fully, I think as you know, when it was 11th of March, last year was more or less from zero to 100 in a day. And I think that, first of all, we had a lot of colleagues that actually need to take down the equipment at the office, some of them couldn't do that, and then going home, and figure out how they actually could hook that up. (Torben Spaabæk, 32:56)

Spaabæk further explained that DLG offered online training sessions for their employees to enhance their IT capabilities. *"So, we ran during the spring and a few times in the autumn, a number of webinars, people actually could get in and then we actually gave them introduction and training in how to work from home"* (Torben Spaabæk, 32:56).

Once DLG started WFH, the company had to explore other methods to collaborate and communicate effectively, as it was no longer possible for employees to meet and communicate at the office. This was a significant impact due to their limited IT human capabilities. The employees at DLG were used to communicate and collaborate primarily through social interactions (Torben Spaabæk, 23:32). To overcome this obstacle, DLG chose to implement short online meetings called “stand-ups” meetings in order to nurture the employees' sense of belonging in their new work environment.

> (…) we developed it throughout the period of Corona by setting up stand-up meetings on Teams, for example. So, I think the change has been that instead of we have been working at office, where we communicated over the desk or when people meet, we managed to put these types of things into shorter stand-up meetings, for example, Monday, Wednesday, and Friday for half an hour. (Torben Spaabæk, 37:53)

In general, DLG has improved their human IT capabilities as online training sessions for their employees have been introduced. While regular updates are being pushed out on the cloud instead of the VPN connection, in regard to improving cyber security.

4.4 Novozymes general maturity level, based on IT capabilities

Novozymes was founded in 2000 when Novo was de-merged into three companies: Novo Nordisk A/S, Novo A/S and Novozymes (Novozymes A/S, n.d.-b). Novozymes is the market leader in biological solutions with the emphasis on being environmentally focused. Novozymes produces a wide range of products, from animal supplements to human consumer goods. Novozymes strives to meet customers' needs through innovative and sustainable solutions, as they reinvest 13% of every year's revenues into R&D (Novozymes A/S, n.d.-a).

4.4.1 Managing IT like a business

This analysis seeks to estimate the maturity level of the macro capability *managing IT like a business* at Novozymes. It can quickly be decided that the IT is not unmanaged, evidence of this can be found in the organisational structure. Mikael A. Ludvigsen is the CIO of Novozymes, and they have a defined IT strategy and processes. When asked how the IT department is aligned with the business, Ludvigsen answered that they strive to achieve a high degree of alignment between IT and business.

> But just to underline that, we always look at business value, and the corporate committee, I mentioned they always assess value and cost, before anything is approved. So, I think we actually have the same target and the same agenda when it comes to value. So, it's not like the business says one thing, and the IT is the other. It's more like two sides of the same coin. (Mikael Alexander Ludvigsen, 07:53)

The value of the new IT investments is in line with each other, both on the business side and in the IT department. This degree of alignment is often seen in more mature IT departments. Ludvigsen further underlined this when asked about the primary mission of the IT department. "*Well, basically, to contribute to the execution of the corporate strategy of Novozymes"* (Mikael Alexander Ludvigsen, 09:06). This shows that the high degree of alignment seen, could be partially due to the core mission of the IT department. Based on this it only seems natural when Ludvigsen explained that the IT

department manages its relationship with internal customers through dialog. An interesting factor concerning relationship management is highlighted by Ludvigsen, as they adopt a more agile mindset when working on internal projects.

> Yeah, well, we try to have a reasonable and sensible dialogue with all our colleagues. And basically, try to align and set expectations. One example is that we work more and more in an agile concept where the product owner is actually colleagues from a line of business. So, they have a say, and they take decisions on what matters most. And the privatization of our resources, for example. So that's also a way of collaborating and working together. (Mikael Alexander Ludvigsen, 10:06)

It is likely that this high degree of agility in internal projects is made possible by their close alignment between business and IT. When working with external partners they prioritize to have more control on both the commercial and legal side. It is possible that these steps are taken to ensure the close alignment and is also present when working with these external suppliers. In regard to the relationship management, they strive to ensure a good condition for collaboration, and where possible try to integrate them into the team.

> We do have the usual steering committee meetings and inspirational settings, and the day-to-day collaboration with partners, and sometimes, some of them even, sit and work in our buildings, together with us, depending on which country we're in. So, yeah, it's a little bit of everything. I mean, you could say, we have everything between vendors, that we have never used or seen before, to partners that we've worked with for the last 10 years. And then a lot in between, right. So, it depends on who we're talking about. (Mikael Alexander Ludvigsen, 10:57)

Novozymes demonstrates that the relationship management part of the IT department is well thought out, and stable. The deciding factor for estimating the maturity level in this respective capability comes down to the fact that they publish regular value statements. These statements ensure that all relevant people in the organisation have a viable chance to follow the progress of the IT department. The implication of this is that people outside the IT department can use the

information to raise awareness of issues. At higher levels this initiative demystifies the IT department, so it is not just seen as a black box.

> Yes, I do that every month, we make a small newsletter to my boss and, and his colleagues and those stakeholders and also to a couple of, whoever basically is interested, a couple of the finance leaders and, and others. So basically, what we do is just a three-page thing, we share a couple of success stories or highlights, and then we sort of give a small overview of the top 10 projects we're executing in Novozymes that has an element of technology. (Mikael Alexander Ludvigsen, 12:11)

Novozymes show that they possess the capabilities which are expected to be at a high maturity level. It is therefore estimated that the maturity level of a *value centre* is achieved. They are highly aligned with the core business and the regular value statements indicate that stakeholders within the organisation follow the progress of the IT department closely.

4.4.2 Managing the IT budget

The budget is a cornerstone in any IT department, it both shapes the opportunities of the CIO and gives a sense of direction. At Novozymes this is no different, when asked about the budget and whether Ludvigsen has a clear overview of the IT cost, he simply replied yes, as it is divided into different cost centres and accounts (Mikael Alexander Ludvigsen, 01:12). This shows that the budget is organized, and it is able to cover every relevant IT costs, such as data centres, servers, infrastructure, etc. In addition to this it also proved a clear overview of the cost tied to new initiatives and projects.

> You could say that the budget itself is sort of a traditional budget that covers everything from developmental operations to, hosting of data centres and configuration, etc. And the employees, we have roughly 165 employees in Novozymes IT. That's the scope. And it's everything from licenses to more development tasks. (Mikael Alexander Ludvigsen, 00:24)

The above statement reveals that Novozymes is capable of predicting the financial performance in the IT department because they have a clear cost overview. When questioned about if the IT department has to adhere to a flexible or a strict budget, Ludvigsen answered: *"It's mostly the latter. But there is a certain element of flexibility in our setup, because the budget itself is very much what we call an OpEX budget." (*Mikael Alexander Ludvigsen, 01:24). Later, Ludvigsen further explained that there are some flexibilities in the budget as they can seek additional funding from different sources.

> (…) maybe on that note, I should just recap a little bit on the flexibility because, we do have that investment pool on the side that enabled us to do things we maybe didn't think of when we did the budget. So, it's not as strict as that, it's not set in stone. And we also do have, let's say, a corporate pool, that is actually designed for taking into account what happens during the year, because it is a dynamic thing. (Mikael Alexander Ludvigsen, 06:49)

The different sources of funding allow the IT budget to be focused on the operational cost, and let investments be drawn from a purpose made pool. This is useful because it provides multiple parameters to measure the performance of the IT department without limiting their ability to react to changes in the market. Novozymes' IT budget is based on the business strategy, as Ludvigsen in cooperation with the CFO negotiates and determines next the year's budget. *"Well, the budget year from year is something I agree with the CFO of the company with, and naturally, we always look at the business strategy and take an offset in that." (Mikael Alexander Ludvigsen, 02:29).*

The fact that the business strategy provides the fundamentals for the IT budget, once again underlines the strong alignment between business and IT. When asked about whether Novozymes uses an IT Investment portfolio, Ludvigsen stated that the portfolio is being managed by the IT Portfolio and Security Committee influenced by the top management (Mikael Alexander Ludvigsen, 03:37). In regard to how concerned Novozymes is in reducing IT costs, Ludvigsen answered it is not their top priority, however they are still aware of constantly optimizing costs. One of the places they are striving to optimize their cost is within their contracts. Novozymes, have a contract manager in place, with the simple focus of assessing the IT related costs.

> It's not top of mind, to be honest. The task of constantly optimizing your cost base is a recurring challenge. So, it's something we do, and we have a vast set of contracts globally, and we try to optimize that every day, every week, every month. That's a recurring task. And we also do have specific contract managers that are placed in IT. So, I have my own contract managers with the own focus of our cost. (Mikael Alexander Ludvigsen, 04:19)

Novozymes´ maturity level of how their IT budget is managed can be placed at the level of e*xpanding funding options*. This is mainly because of the strong alignment towards the IT budget and long-term business value. In addition, Novozymes' IT department possesses a flexible budget with various funding sources. This provides the IT department with the necessary resources and capability to influence the company's business areas.

4.4.3 Managing the IT capabilities

Novozymes´ macro capability level of *managing the IT capabilities* is estimated from several key characteristics. The first characteristic is to identify who is responsible for purchasing and maintaining their IT solutions. Novozymes is a company that is founded on technology and has various entities within the organisation that are dependent on digitalization and IT. The organisation is complex with multiple digital transformation and digitalization teams Mikael Alexander Ludvigsen argued that it is not one department that has the responsibility of IT and is allowed to make decisions on behalf of other departments. This is due to the company's overall need for IT and technology, and therefore it is a corporate business decision.

> In Denmark, it's the line of business that purchases all equipment, all devices, all PCs, etc. But it's done throughout corporate agreements that are being negotiated by the sourcing organisation and Novozymes IT. So, we set the frame. And then people can do whatever they want within this frame. (Mikael Alexander Ludvigsen, 13:35)

The statement does indicate that the IT leadership is aligned with the business aspect of the company due to their strategic purchase of IT and technologies in different departments. It also shows that the role of the IT department is more on the grand scale of things and not the minor

details. When asked about how IT support value creation inside the company, Ludvigsen replied that it variates quite a lot:

> (…) HR, our biggest concern is probably, besides keeping the lights on there, everything that their employees need in terms of basic technology, it's probably, helping execute their projects that matters most to them. So, they just launched a new learning platform, for example, and we've been part of that. So, we are part of the project and helps in that way. When it comes to R&D, it's more a matter of network and infrastructure, ensuring that the basic capabilities are in place that they can tap into. So, whenever we need an expansion somewhere in the world, or we need bigger capacity, or we need to talk about architecture, in a new project. That's the way we help! But the day-to-day operation, they handled themselves. (Mikael Alexander Ludvigsen, 15:32)

The various entities inside Novozymes are reliant on IT as a resource ensuring to provide the company with competitive advantage. The IT department delivers everything from basic everyday technology to advanced networks and infrastructures. Furthermore, the statement indicates that IT leaders have an understanding for the different entities´ needs regarding technology and IT to solve challenges and problems. During the early stage of the interview Ludvigsen pointed out that Novozymes' top 10 of most successful projects executed all includes the element of IT and technology for utilization of their core capabilities (Mikael Alexander Ludvigsen, 10.57). As Novozymes develops new strategies, IT is being recognized as the enabler of providing competitive advantage. This mirrors back to Ludvigsen statement when asked if Novozymes views IT as a business partner or utility support.

> If you take a unit like R&D globally, it's a company founded on research, right? So, they basically do their own thing. And they have more than 30 employees, specifically working with R&D data, and they have a data lake that they run specifically on scientific data. So, they would say, they provide the infrastructure and network and that's okay. But other areas like the supply chain, logistics, quality, the labs, the entire production sides, they would probably more say it's a trusted business partner because we can't do our projects without them. (Mikael Alexander Ludvigsen, 18.22)

The statement shows that most business areas in the organisation view IT as a business partner with few exceptions such as the R&D department. Furthermore, the forced lockdown from the government has not changed the company's view of IT, which only furthers their existing trend of implementing WFH. Going into the lockdown they have already begun the transition of using remote work software. *"(…) we had already initiated sort of the transfer from Skype to Teams when the lockdown started in March, so we could quite easily beam up the VPN around the world, and also implement the project"* (Mikael Alexander Ludvigsen, 19.37).

Novozymes illustrate a high level of digital maturity due to their ability to utilize IT as a key capability. They are constantly producing solutions that provide them with competitive advantage. Furthermore, it is noticeable that IT leadership is integrated into the business and therefore IT is recognized as a differentiating core competency. The statements made by Ludvigsen clearly demonstrate that Novozymes are at the digital maturity level of *strategic core competency*.

4.4.4 Managing IT for business value

The following part aims to assess and determine the maturity level at Novozymes of how they are *managing IT for business value*. According to Ludvigsen, Novozymes is currently using a template and traditional financial business case calculation when predicting the potential value of an IT investment. Moreover, specific criteria and requirements for IT investment must be met before an investment can be approved.

> Well, first of all, we have the usual, financial business case calculations of whenever someone asks for an investment, there is a certain criteria, and there's a certain template you need to fill out. So, it has to meet some requirements and criteria otherwise it's not approved. (Mikael Alexander Ludvigsen, 23:49)

This is the first sign of a structured process for reviewing business cases within Novozymes. Later in the Interview, Ludvigsen further explained these criteria for investments and stated that IT projects use different KPIs compared to business projects. IT projects' KPIs are focused on fixed cost and resources, in order to monitor the ongoing process, and the future obligations of the IT department.

> But if we talk about an IT project or business project (…). So, it's run and executed in different way. And it also means that the KPI setting is different. So, you don't have a KPI on time, for example, to the same extent, but you have fixed costs and the fixed number of resources instead. (Mikael Alexander Ludvigsen, 25:57)

Novozymes consistent ways of predicting value and monitoring the ongoing process of IT investments, indicates a mature level in how business value is managed. When asked about whether cost or value is the most important factor for deciding between IT investments, Ludvigsen said value is the most important factor. “It's more the value for sure. It's not really the cost.” (Mikael Alexander Ludvigsen, 25:14). Once a project is finished, Novozymes do not consistently monitor or measure the ongoing business value of the investment, but they still attempt to do so. According to Ludvigsen, unplanned projects require more focus than projects that are well initiated.

> Yes, at least we strive to do so. I would say in real life. It's not top of mind, to be honest, if things go roughly as planned, it's not really something that keeps people awake at night, I have to be honest and say it's more the cases where something unforeseen happens, then it takes focus. (Mikael Alexander Ludvigsen, 31:53)

This attitude is perhaps a leftover from their original rigorous review process of the business case made before undertaking the new project. After the project is completed, they trust the initial estimations and do not see an outright need to measure this further. When questioning how Novozymes aims to optimize current business through IT investments, Ludvigsen stated the IT department strives to achieve this, by executing their corporate strategy, as IT plays an important role in digitizing and automating the company.

> (...) if you take the entire corporate strategy, [Better Business, with Biology] it has a couple of key enablers, and one of them is called optimize, automate, and digitize Novozymes. So, a lot of our activities is about process improvements, for example. That's a way of optimizing the company. (Mikael Alexander Ludvigsen, 34:04)

Additionally, Novozymes IT department has invested heavily in infrastructure to support and aid the business to achieve their goal faster. "*To give you one example, we've invested heavily in our global infrastructure last couple of years. So, we've tried to reverse it from being something that hinders faster business development to something that underlines and supports the exact same*" (Mikael Alexander Ludvigsen, 35:49).

Novozymes digital maturity level of *managing IT for business value* can be estimated at the level of *portfolio and options management*. This is because of their portfolio committee and their strategy to pick future optional investments by prioritizing value instead of cost.

4.4.5 Overall assessment of digital maturity

The overall digital maturity of Novozymes is somewhere between *optimizing* and *advanced.* In *managing IT like a business* Novozymes showed they have developed capabilities that justify the level of a *value centre*. Where their high degree of business alignment, relationship management, and reporting progress was a deciding factor. The budget is managed with focus on *budget amplification*. The key characteristics seen, is a stable budget that supports growth, and the use of portfolios that are based on value. In regard to how the IT capabilities are being managed, Novozymes has a position as a *strategic business partner*. This is seen, as the IT leadership has insight into the core business, the close alignment, and the way IT creates competitive solutions. Finally, IT is ensuring business value by focussing on a management style anchored in *options and portfolio management*. The deciding factor for this was the heavy use of IT portfolio management. In total the IT maturity level at Novozymes thus lands in the middle, somewhere between *optimizing* and *advanced (See figure 15)*.

Maturity level	Managing IT like a business	Managing the IT budget	Managing the IT capabilities	Managing IT for business value
Optimizing	Value centre	Budget amplification	Corporate core competency	Optimized value
Advanced	Investment centre	Expanded funding options	Strategic business partner	Options and portfolio management
Intermediate	Service centre	Systemic cost reduction	Technology expert	ROI and business case
Basic	Cost centre	Predicable performance	Technology supplier	Total cost of ownership
Initial	Unmanaged	Unmanaged	Unmanaged	Unmanaged

Figure 14 Novozymes' overall digital maturity level

4.4.6 Impact on company due to WFH

As the lockdown became a reality and government restrictions resulted in limited employees in offices and business. Novozymes operates in the biotech industry and are heavily reliant on technology for business purposes which reflects on their large investments into the IT field. Ludvigsen stated that in recent years Novozymes have increased the IT investments for business purposes *"(…) we've invested heavily in our global infrastructure last couple of years. So, we've tried to reverse it from being something that hinders faster business development to something that underlines and supports the exact same"* (Mikael Alexander Ludvigsen, 35:49). Novozymes have prior to the lockdown experimented with a limited scale of employees WFH (Mikael Alexander Ludvigsen, 36:44). However, the lockdown and forced government regulation meant that Novozymes had to facilitate and expand the scale of WFH. Novozymes had already expanded their global infrastructure and network, which allowed them to harness the benefits of a smooth transition, due to the timing of the lockdown.

> Yes, fortunate we.... or not fortunately, but as consequence of less investments in previous years, we have over the last couple of years or three years, invested very heavily in the global

> infrastructure. So, in March 2020, fortunately, the answer was easily… Good thing, we didn't have the pandemic a year or two earlier, because then it would have been a different case. (Mikael Alexander Ludvigsen, 40:55)

Novozymes had proven to possess the technological foundations to initiate and facilitate the large scale of WFH. However, they had to invest in additional hardware to meet the demand of the increased scale of WFH from 10% to roughly 50% (Mikael Alexander Ludvigsen, 43:05).

As WFH became a new reality for many employees, Novozymes chose immediately to have a meeting with top management and the response crisis team for developing a strategy in order to keep up productivity. The employees' differences of IT skills and technical competencies towards fully utilizing new communication software had an impact on their new work environment (Mikael Alexander Ludvigsen, 38:14). To eliminate this threat Novozymes chose to implement a strategy where all employees had the opportunity to receive technical education and training regarding their new approach in communication software.

> We offer technical training to all employees in Novozymes on these more corporate tools, like Teams, Office 365, and stuff like that. So, we do that a number of times every year. So, it's posted, and people can enter and participate. And so, it's hosted on a regular basis. And we do that with our own employees in IT. (Mikael Alexander Ludvigsen, 40:11)

The following statement from Ludvigsen indicates that Novozymes initiated initiatives to reduce the chances of having a negative impact of facilitating a significantly increased scale of WFH. By having employees participate in training and education Novozymes developed the required IT capabilities to stay effective and productive in the new work environment. Ludvigsen noted that the company was concerned of how the new reality would affect the company's bottom-line, but with the new initiatives and the previous upscale in network and infrastructure this was not the case. *"(…) We talked a lot about, is there a risk of productivity loss in 2020. But as the year progressed, we saw that wasn't really the case."* (Mikael Alexander Ludvigsen, 48:16). However, the initiation phase of WFH resulted in a different work procedure than many employees were accustomed to. Ludvigsen explained that this had a negative impact on the employees.

> Everyone said, sort of the same, that the number of meetings exploded in your calendar, and you sat in 9-10 hours of Teams meeting every day. Everyone was fed up with that. So I think now it's come to a more natural level, more balanced level. So I think we just all needed to get through that initial phase. And now it's, I think it doesn't seem to be an issue anymore. (Mikael Alexander Ludvigsen, 50:59)

The early phase of WFH had its toll on the employees, but it also impacted the business areas due to the lack of human IT capabilities at that period. The employees´ absence of basic understanding regarding the new software programs resulted in complication towards new projects. Ludvigsen further stated:

> I would say, it was really proven to be tricky in terms of larger projects is the kick-off phase. The initial kick-off phase of larger projects with larger groups of employees, that is really difficult to do online. So, the whole notion of brainstorming and setting up the team and the initial ideas and all of that part is difficult to do online. (Mikael Alexander Ludvigsen, 48:16)

As the phenomenon of WFH progressed, it clearly illustrated that the human aspect of the IT capabilities has been mainly impacted. Throughout the lockdown Novozymes has initiated strategies to improve the human IT capabilities. Novozymes had prior the lockdown invested in new infrastructure and network which provided the company with a smooth transition to remote work when the lockdown began. This meant the lockdown did not force Novozymes to explore new IT solutions, but instead exploit their current IT investment to enable remote work through their VPN. There had been some minor tangible IT cost, in the initiating phase of enabling WFH, but the focus point of the impact has been towards the human IT capabilities.

4.5 Solar general maturity level, based on IT capabilities

Solar is as Danish company that supplies both sourcing and services within the fields of electrics, plumbing, industry, and climate & energy. The company were founded in 1919, originally selling power meters to powerplants. Today, Solar employs around 3.000 employees across 6 countries (Solar A/S, n.d.).

4.5.1 Managing IT like a business

This part of the analysis looks closer into the macro capability of *managing IT like a business* at Solar and seeks to estimate a maturity level. This is based on an interview with Henrik Thystrup VP and CIO of group IT at Solar. The IT at Solar is managed with an IT strategy structured around servicing the business *"But anyway, we support the business through conceptualization and make sure that we deliver value so the business can grow. I think it's all about that we need to support the business."* (Henrik Thystrup, 11:00). This shows some degree of business alignment at Solar which is further emphasized when Thystrup was asked about how the IT and business values are aligned.

> How we align it is that of course, we have a close relationship with the business. So, we know what the business is looking into. And I normally don't say business because as I normally say IT is business and business are IT so it's kind of merged together. (Henrik Thystrup, 10:00)

This shows a large focus on aligning value between the IT department and the core business. It can be said that this alignment seems to be a key concern in the IT department. The strong alignment of business is also reflecting in the company's engagement of customer relationship management. The customers of the IT department are the other entities in the organisation and are reliant on their services and expertise. Thystrup expressed this alignment and explained how they have developed the IT department in order to better facilitate this in the following statement.

> Yeah, I think the way we have transformed ourselves is from being a traditional IT department where we have, business partnering and this kind of stuff. We have moved to an agile setup, where we have product owners. So, we are very closely aligned with the business and what ideas they have and as a full transparency between IT and business, so they understand exactly what we are working on, what are the problems we have? So that's, how we have set it up. And it worked perfectly. (Henrik Thystrup, 11:43)

The full transparency ensures that alignment goes both ways, so the IT department and the business have a solid relationship based on a mutual understanding. On the supplier side, the IT department has a focus on considering them as business partners. In order to better manage these relationships, they decided to reduce the number of IT suppliers.

> I think what we have done is that we have reduced the number of suppliers in IT. When I came to Solar, we had a lot of suppliers. So, I have got rid of a lot of them. So, we have fewer. And the idea is that we instead of having suppliers, we like to call them partners. (Henrik Thystrup, 12:30)

Thystrup then goes on to explain the advantages of this approach. One of the noteworthy benefits is that the trusted relationship with their IT suppliers, allows the internal IT department to focus on their core competence. This ensures that their IT is constantly up to speed with current developments in the industry. It should not be neglected that this move is possibly also motivated by cutting costs. When asked about how they report value and progress in the IT department Thystrup answered that they do not.

> We don't use reporting. We try to minimize the administrative task. I think since we have very close relations with the business or the product owners, they know exactly what's going on. So, I don't need to report on how things are because business knows what's going on. (Henrik Thystrup, 13:29)

This indicates that the IT department is not run as a value centre. In regard to the IT budget Thystrup explained that the IT budget allows some degree of flexibility (Henrik Thystrup, 01:22 – 02:58).

The way the IT department is managed in Solar is somewhere between an *investment centre* and a *service centre*. They are in the progress of transitioning from *service centre* to an *investment centre*. This is based on the high degree of business alignment and the initiatives taken to strengthen customer and supplier management. However, they have not fully developed these capabilities and are missing some of the other capabilities seen at this level. The estimated maturity level of this capability is therefore on the level of a *service centre*.

4.5.2 Managing the IT budget

Thystrup explained in the interview that he is the one responsible for the official IT budget, which includes all costs related to the IT department. There is also another side to IT costs at Solar that Thystrup does not have control over. It is referred to as the unofficial IT budget inside the company. It consists of IT projects that are initiated with limited influence from the IT department.

> I'm the one who is responsible for the IT budget. And of course, you need to understand there is an official IT budget and then there is an unofficial. The official is because all the IT stuff that we do in the IT department was cost covered by the IT budget, and the unofficial is all the other IT projects that the business is doing outside IT, which is called shadow IT. But the official IT budget is managed by me. (Henrik Thystrup, 00:26)

When asked whether Henrik Thystrup has a clear overview of all IT costs, he simply replied *"Yes. Down to the smallest pc."* (Henrik Thystrup, 01:26). Thystrup further described that the budget is set by assessing two factors – CapEX and OpEX. They are therefore looking at IT relevant costs for development, investment, and IT operational cost, when setting the IT budget. This illustrates a dynamic baseline IT budget approach at Solar.

> (…) but the way the budget is done, is that we look at how much money we have spent last year. And that's normally how you do it. And then we have a good discussion in the board of directors or executive board and how much money do you want to spend on things, and you need to divide the budget into two areas. One is called CapEX and one is called OpEX. (Henrik Thystrup, 01:22)

Furthermore, Thystrup argued that the budget is flexible, as unforeseen events are supported through additional funding by the CFO.

> There is some kind of flexibility in it. But of course, if something goes completely wrong and I need to invest the money then I go to the CFO and say, I need to spend 50 million DKK or

> something because otherwise the one system won't work, right. So that's how it works. (Henrik Thystrup, 04:35)

In regard to whether Solar makes use of IT investment portfolio, Thystrup explained that their SAP system provides them with a clear overview of cost and resource allocated for current projects. This illustrates an organized approach following the on-going projects´ status.

> I would say, of course we do. In our SAP, we have all this financial controlling stuff going on. So, we know what we have spent on budgets, and we know how much we have allocated. So, we have a good overview of the portfolio of IT projects. (Henrik Thystrup, 06:40)

When asked whether Thystrup is concerned about reducing IT cost. He simply responds that reducing IT cost is not his top priority, because his job is to operate within the allocated budget and focus on value creation. This hints that values are more important than cost within the IT department, but not in the overall company. The following statement does indicate that the company is reducing IT costs, as part of their normal operation.

> I don't mind reducing IT costs, because I think it's a matter of directive from the executive board saying we want to spend this amount of money on IT, and then it's up to me to make sure that we can fulfil that. So, I'm not so concerned, and I'm not concerned that Solar is reducing IT cost. I think that's fine. That's how it is. You need to be lean and make sure you deliver value for what you invest. (Henrik Thystrup, 07:32)

Solar´s maturity level of how their IT budget is managed can be estimated at the level of *systematic cost reduction*. This is mainly tied to the way the IT budget is created where the company sets a target budget and IT follows. In setting this target cost reduction seems to be an integrated part of the company's normal operations, it is not something that is discussed but just a fact of the business.

4.5.3 Managing the IT capabilities

To get a deeper understanding of how Solar manages their IT capabilities it is important to understand how the IT is viewed inside the company. There are several key elements to determine the state of Solar's digital maturity through their utilization of IT. The company is heavily reliant on technology to provide better business solutions and gain competitive advantage. Thystrup is the CIO of the company and explained that IT is viewed as an important entity in the organisation, due to being dependent on IT as a business provider regarding their product.

> I think they see us as a working partner. They understand that they cannot do business without IT. And I think they see us as part of themselves. To be honest, I know there's another department, but they see us just on equal terms like everybody else, which is good. (Henrik Thystrup, 14:56)

However, there is an uncertainty of how IT is viewed throughout the whole company, even if it is a key resource for their IT department and product solutions. This diverse view of IT in the organisation may be due to the different properties of IT and the inherent trade-offs in IT projects.

> That's the different properties of the IT department you can say for that, of course needs to be in line with what the business because the business is (…) So it's always a trade-off how much money or how much time and effort Are you going to spend on new development and how much time and effort are going to spend on maintenance things. (Henrik Thystrup, 14:59)

This statement indicates that the IT department is a deciding factor when planning new investments in the company. Taking this into consideration it is likely that the company has a large respect for the IT department. Even if the IT department helps implement new projects and products, IT may be viewed as a utility supporter, due to the amount of references to IT cost reduction. As IT services give the company reliable utility, the company is benchmarking based on performance and cost, which Thystrup explained in the interview.

> (…) We of course monitor. So, let's say we change from one technology to another technology that can save us. We do a calculation of the number of servers or whatever its

> support and maintenance. And then we follow up on it and say, okay how does it actually go? (Henrik Thystrup, 17:59)

Furthermore, Thystrup stated that the company understands the potential a higher digital maturity can bring to the company. In recent years, Solar has undergone a transition of how they structure and manage IT projects. This is done in order to extract more value from IT by ensuring an overall better alignment.

> (…) The way we have transformed ourselves is from being a traditional IT department where we have business partnering and this kind of stuff. We have moved to an agile setup, where we have product owners, so we are very close aligned with the business and what ideas they have and as a full transparency between IT and business. (Henrik Thystrup, 11.43)

Solar is in the transition of enhancing their IT capabilities by integrating the IT department as a business partner. Thystrup further explained through his time in the organisation they have reduced the number of unnecessary IT suppliers. This was executed partially to reduce IT costs, but mainly intended as a step towards bringing the external suppliers closer to the IT department as business partners. By partnering up with IT suppliers that have a deeper understanding of Solar´s business aspects and current IT developments, they are better positioned to help Solar with staying ahead of current technological trends in the market. (Henrik Thystrup, 12:30)

To summarize the company's management of IT capabilities, it is clear that Solar is undergoing a transition of stronger integration between IT and business. Solar is tracking and monitoring their IT investment but are also concerned about cost reduction. The IT has a growing respect throughout the various entities in the company and are providing reliable services. However, the company mainly views IT as a support for their business and is not fully aligned with their business leadership. Therefore, Solar's level of *managing the IT capabilities* can be defined as a *technical expert.*

4.5.4 Managing IT for business value

When interviewed about business value and how the company decides IT investment from the standpoint of the value IT provides or the cost itself, Thystrup answered: “I think it's more or less the same, but maybe a little bit more value than cost” (Henrik Thystrup, 18.41). In regard to the actual process of deciding what investments to pressure, Thystrup highlighted that they need to be aware of the existing process and infrastructure.

> Because you of course need to look, when you do something, you need to have a 360 overview of what's going on, you need to look ahead, and you know everything. Yes, of course it is something we look into. (Henrik Thystrup, 19:58)

As shown in the statement Solar is focusing on option management for initiating the most beneficial IT investments in the long term. Thystrup further stated that they examine the different investment options provided, and pick the most relevant one for their current business at the given time:

> (…) then we have a good discussion with the business and say, Okay, what do you have, these options, which one is bringing the most value to Solar? That's how we do it. We have an open discussion about it, it's always an effort versus the benefits. (Henrik Thystrup, 16:13)

When asked if they use any specific methods for measuring or monitoring the chosen IT investment, to get a clear overview of the value it has brought the company. Thystrup argued that Solar is tracking the cost of the investment to ensure they can regularly reduce the cost of IT through their financial department.

> (…) for example, if we get rid of a lot of servers, or we do something in some investments, and we say we can save money, then our financial controller, we asked him to measure that it can also be, number of transactions when we do functionality that gives us more revenue, not so much about revenue, but more transactions, we can measure that. (Henrik Thystrup, 20:23)

Additionally, there is no indication that the company predicts the potential value of IT investments. Thystrup claimed that they do not predict the value of pure IT projects. Projects are only predicted

if they contain business elements, as the company will be able to estimate earnings of it (Henrik Thystrup, 17:03). However, when implementing a new technology, Solar is monitoring and calculating the IT projects to ensure maintenance cost.

> "(…) so, let's say we change from one technology to another technology that can save us. We do a calculation of number of servers or whatever it is support and maintenance. And then we follow up on it and say, Okay, how does it actually go? (Henrik Thystrup, 17:59)

Solar's maturity level for managing IT for business value is determined as *simple return on investment and business case disciplines*. This is based on their use of option management and the discussions process inside the company. This discussion is formed as a review of business cases for initiating IT investments.

4.5.5 Overall assessment of digital maturity

Based upon the above analysis of Solar´s macro capabilities, the company is currently estimated to manage their IT like a business at the level of a *service centre*, as they are mainly focused on customers and services. In regard to *managing the IT budget* it was decided that Solar is at the level of *systematic cost reduction*, due to the fact that the IT budget is created based on a dynamic baseline. In the way of how they are *managing the IT capabilities*, it was estimated to be at the level of a *technical expert* because Solar is constantly tracking IT investments and the IT department has a growing reputation for providing reliable IT solutions inside the company. Lastly, Solar´s maturity level for *managing IT like a business* is estimated to be at *simple return-on-investment and business case*, because of their disciplined review of business cases before initiating IT investments. Therefore, by categorizing each macro capability at Solar their overall digital maturity can be estimated to the level of *Intermediate (see figure 16)*.

Maturity level	Managing IT like a business	Managing the IT budget	Managing the IT capabilities	Managing IT for business value
Optimizing	Value centre	Budget amplification	Corporate core competency	Optimized value
Advanced	Investment centre	Expanded funding options	Strategic business partner	Options and portfolio management
Intermediate	Service centre	Systemic cost reduction	Technology expert	ROI and business case
Basic	Cost centre	Predicable performance	Technology supplier	Total cost of ownership
Initial	Unmanaged	Unmanaged	Unmanaged	Unmanaged

Figure 15 Solar's overall digital maturity level

4.5.6 Impact on company due to WFH

Solar previous experiences with WFH are minimal, as only a small scale of employees was WFH prior to the pandemic. However, the lockdown forced Solar to heavily increase the amount of office workers WFH to 80-90% during the pandemic (Henrik Thystrup, 24:52 - 29:11).

During the interview Thystrup mentioned efficiency as one the impacts during WFH. He stated that people at the beginning needed to adapt to a new way of cooperating, as collaboration happens in the digital world instead of in the office. Solar therefore experienced an efficiency drop in the beginning of the pandemic, but once the employees got familiar with the digital environment and new software, a higher efficiency level was established.

> It's probably higher now than it was. Of course, there are some collaborations where you can just go to a person and stand in front of a whiteboard and make some drawings, that's something that is a little bit more difficult. But you can do that using Teams or call people, I think people have adjusted. There was maybe a small drop in the beginning, but I think now it's at least as good as it was before. (Henrik Thystrup, 31:29)

According to Thystrup, the WFH phenomenon did not have a significant impact on Solar, this was mainly because the employee already had the technical skills and the infrastructure in place to start WFH. Only a few employees had minor problems at the beginning, but most of the employees did not experience any problems with the transition. (Henrik Thystrup, 27:09). Because solving the work assignments at home required the same technical skills as in the office. *"I think most of the people have the benefit, because the setup we have and (…) there was no real difference working from home or working in the office. From a technical point of view."* (Henrik Thystrup, 25:31). Thystrup further described the minimal impact with WFH by explaining the use of Citrix which made it easier for the employees to adapt. Citrix enables employees to perform the same task outside the office.

> When we made our lockdown in all the different countries we are in, people could just continue work because we're using Citrix. So, people just work from home. So, there was no difference. The only thing was that they needed to go to their own refrigerator to get food and not into the canteen get her food. So that was different. (Henrik Thystrup, 26:07)

Overall, Solar has made small improvements in their human IT capabilities. Those employees who initially did not have the technical skills to start WFH, have now adapted to this phenomenon, as the efficiency level is higher compared to the beginning of the pandemic.

4.6 Arkil

Arkil is one of Denmark's leading construction companies with more than 80 years of expertise. Arkil carries out a large number of versatile construction projects across the entire country, and are currently cooperating with Vejdirektoratet, BaneDanmark, and other large utility companies. The majority of the company's 2000 employees are operating at construction sites with a small number of white-collar employees at offices (Arkil Holding A/S, n.d.).

Jens Skjøt-Arkil the owner and CFO at Arkil could only participate for half an hour in the interview. In order to adapt to the limited time available, it was decided to only use the part concerning the impact of WFH from the interview guide. This analysis part is thus structured a bit differently than the others. Here the focus will solely be on the impact of WFH in Arkil. It should be added that most of the employees at Arkil work on construction sites and do not have the possibility of WFH. Skjøt-Arkil estimated that around half of the employees whose tasks were suited for remote work, were WFH at the time of the interview (Jens Skjøt-Arkil, 03:06).

Going into the lockdown only a small portion of the employees were already used to WFH. As a result of this, many of the employees did not initially have the required skills to fully utilize their software, in order to be effective when WFH (Jens Skjøt-Arkil, 00:55). This improved over the year as the situation became a new normal. One of the reasons behind the increased success over time was due to the focus on educating the staff. *"We did have some educational sessions to teach people how to use Microsoft Teams and how to use it more frequently."* (Jens Skjøt-Arkil, 02:51). This initiative helped the company to develop the necessary IT capabilities required for effective use of the central software in their WFH solution. Additionally, they also invested capital into new hardware in order to facilitate remote work. *"(...) and also, on the IT side, made sure that people have the things they need: headphones, access to cameras, and the infrastructure."* (Jens Skjøt-Arkil, 01:48).

When asked about if they had the infrastructure needed for this change, Skjøt-Arkil answered: *"Yeah, we did. Luckily, we started last year to the year before last year to implement Microsoft Teams, so we were quite ready for that."* (Jens Skjøt-Arkil, 02:10). Later in the interview Skjøt-Arkil

explained that they were already in the progress of enhancing their digital capabilities, and that the external shock of government regulations served as a burning platform to further push this strategy.

> I don't really think there was anything that was very surprising, of course, the need to instruct people on how it works is always a barrier but actually, it's been more an opportunity to actually teach people how to do stuff we have. We had it on our agenda to improve our online working skills. That was one of the strategic targets and we were really helped by this burning platform to actually get it implemented a lot quicker than we were hoping, so it's actually been more of a help than an issue in that regard. (Jens Skjøt-Arkil, 04:06)

In summary Arkil used this crisis to quickly adapt to the new working conditions by furthering their already in place IT strategy. In more concrete terms, they invested into human IT capabilities through training and tangible IT capabilities in the form of the equipment needed for professional online collaboration.

5 Findings

This chapter is dedicated to present the findings of this thesis and merge the different analysis together into one coherent overview. In order to best present this, the findings have been divided into four distinct sections. The first section presents a detailed overview of each company's digital maturity level and evaluates the role of digital maturity in transitioning to WFH. The second part highlights the different types of improvements the companies have experienced regarding their IT-capabilities and highlights the commonalities and patterns. The third section explores the impact of WFH on company performance, this is used as an internal way of evaluating if the new improvements to IT-capabilities are improvements. The final section presents the participants thoughts about the use of WFH in the future, their attitude towards this helps define the future value of the current investments and improvements seen during 2020-2021.

5.1 Digital maturity

Throughout the analysis chapter the five participating companies' maturity levels have been determined from various key characteristics respective to the four macro capabilities. This was examined in order to gain a better understanding of how the chosen companies are managing and measuring their business value of IT investments. Additionally, how the companies reacted during the WFH phenomenon and whether a high-level digital maturity had provided the companies with adequate knowledge and tools to handle the mandated lockdowns better in comparison to companies with a lower digital maturity. As each macro capability level was determined through the five levels in their own respective categories, which gave an overall digital maturity level (figure 10). The IT-CMF suggests the companies can achieve different maturity levels such as Initial, basic, intermediate, advanced, or optimizing depending on their overall score of the individual macro capabilities.

In the figure below, the five companies' individual macro capability is illustrated. These scores are based on the executives' statements regarding how they and their respective organisation utilities and views their own IT capabilities (see figure 17). Moreover, each companies' digital maturity level and the impacts are summarized below (see table 9).

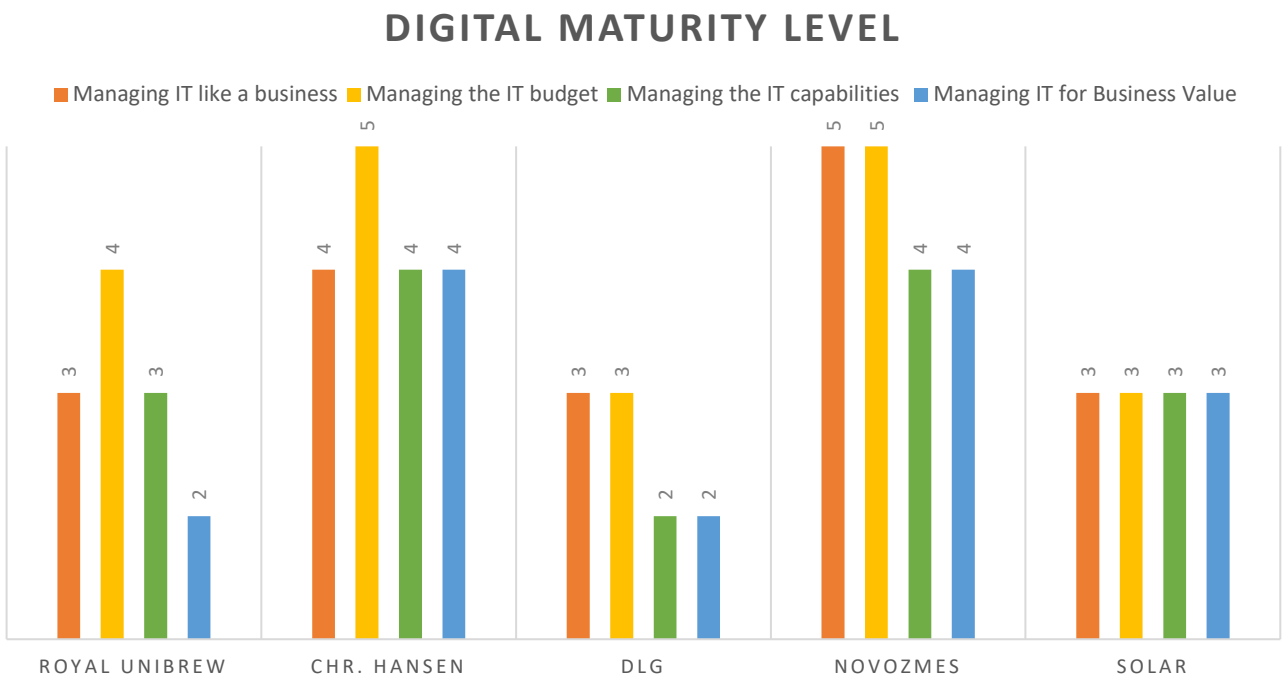

Figure 16 The participating companies´ individual macro capability

Company	Digital Maturity level	Impacts
Royal Unibrew	Intermediate	Human and Tangible IT capabilities
Chr. Hansen	Advanced	Human and Tangible IT capabilities
DLG	Basic	Human and Tangible IT capabilities
Novozymes	Advanced	Human IT capabilities
Solar	Intermediate	Human IT capabilities
Arkil	N/A	Human and Tangible IT capabilities

Table 9 Each companies' digital maturity and impacts

Royal Unibrew was given an overall maturity level of *intermediate* which indicates there is room for further improvements. The company illustrated a high-level maturity of *managing IT like a business* and *managing the IT budget* with great alignment of IT leadership and business leadership, in addition to their strong customer and supplier relationship. Royal Unibrew has shown the abilities

to align their IT budget with long term IT investments to enhance their business performance. However, the company is limited in the categories of *managing IT capabilities* and *IT for business value*. This is primary due to the mindset of monitoring and measuring the implemented IT investments. Royal Unibrew is aware of how new IT investment can provide additional value in the company but falls short of monitoring and reporting when the implementation is completed. Royal Unibrew has a growing respect for IT but are primarily exploring opportunities of digitizing or automating their manufacturing processes. Furthermore, Royal Unibrew has a tendency to view IT as a cost centre. Meaning the company is focused mainly on optimizing existing processes and reducing cost, and not proactively searching out new IT solutions for various business areas. However, with Royal Unibrew´s level of being intermediate, the company has not experienced any significant impacts of using WFH in their departments. Nyegaard said that some of their employees lacked basic IT skills and experienced trouble in the initiating phases of WFH.

Chr. Hansen is rated as one of the highest companies regarding digital maturity, due to their overall global coordination in the IT department and strong focus on developing IT capabilities. In addition to this, they possess a tight coupling between business and IT including an excellent IT customer and supplier relationship. With these key characteristics Chr. Hansen is under the macro capability of *managing IT like a business* considered as an investment centre. Furthermore, the management of the IT budget is at the level of *budget amplification* with a stable budget that is reflecting the company's success and growth. This is a systematic approach Chr. Hansen is practicing for stronger alignment of IT and business leadership, which further enhances their ability to manage the IT capabilities. Hence to their strong integration of IT in business areas. Chr. Hansen has a sustainable competitive advantage originating from new technologies, which positions them in the organisation as a *strategic business partner*. As for *managing business value*, it is determined that Chr. Hansen are at the level of *portfolio and options management,* with an overall digital maturity level of *advanced*. As a result of their respect of IT capabilities, Chr. Hansen is aspiring to bring more value into the company with the use of WFH in comparison to other companies. Some of the companies with a lower digital maturity just desire to have a smooth transition to WFH. While, Chr. Hansen aims to learn and grow from this phenomenon, this is illustrated by their approach of continuously

running education and training lessons for their employees and improving their infrastructure for facilitating the large scale of WFH.

DLG's digital maturity level is summarized as *basic*. The company has a view on IT shaped by a mindset that primarily sees IT as a cost centre. This is linked to the conditions of their industry with razor thin margins, thus not leaving a lot of excess resources for IT. DLG has not spent significant efforts in ensuring alignment of their business and IT leadership. The focus of their IT department is to support other processes in the company. Their level of *managing IT like a business* is viewed in the category of a service centre, meaning the structure of the IT department is geared towards providing service and utilities. Management of the IT budget is at *systematic cost reduction* due to their strict IT budget and limited sources of funding. The focus point of the IT budget is to reduce IT cost every year. The last two macro capabilities *managing the IT capabilities* and *IT for business value* are both scored in the lower end. The IT department has limited influence on decision making regarding new investments and technologies. This is potentially a source of tension and risks creating a basis for misalignment between the IT and business, which indicates a lack of respect for IT in the organisation Spaabæk explained in the interview that they started working remotely the day after the restrictions were announced. However, the company experienced a significant impact on their communication and cooperation abilities through their new online environment. The company's employees were used to interacting socially in the office and halls but due to the new environment, this aspect was lacking due to their immature state in human IT capabilities.

Based on the interview with **Novozymes** CIO Mikael Alexander Ludvigsen, it was determined that the company operates at a high digital maturity level. This was categorised as a*dvanced*, with minor improvement needed for reaching the top tier level of *optimized*. Novozymes have scored highest in both *managing IT like a business* and IT budget. This is primarily due to the company's strong alignment of IT and business, with an IT department that regularly provides value statements. Furthermore, the value of new IT investments is often supplementing previous investments which brings additional value into the company. Novozymes have a capable IT budget that is well suited

to support the overarching business strategies. New IT investments are being pursued on a regular basis, in order to support the company's growth. The two last macro capabilities are both set at level four which is *strategic business partner* and *portfolio and options management*. Due to Novozymes' high level of digital maturity, they have sensed possibilities within their new work environment. Instead of just transitioning the affected employees to WFH, Novozymes provided technical training regarding software for all employees. This also included lab technicians and other employees that had to operate inside the company even during lockdown. This strategic approach was implemented for better communication between the different departments, when normal meetings could not be held due to the restrictions and majority of their employees working remotely. This initiative is still in practice at the time of the interview.

Solar's maturity level was scored at an overall of *intermediate* by all four macro capabilities falling in the categories of level three. Their management of IT like a business is oriented towards IT customers and services. The IT budget is mainly focused on *systematic cost reduction*. One of the deciding factors in evaluating these two capabilities was the clouded overview of IT costs. The organisation has an official and unofficial budget, Thystrup only has limited control and overview of the latter. In the interview Thystrup argued that Solar is currently undergoing a transformation, for better alignment of their IT and business in the future. But as for now Solar is considered a *technical expert* that provides reliable IT services that tracks and monitors the quality of these services. As for new IT investment, Solar's approach is to have a strong business case towards new projects in order to determine future investment. Their employees have improved IT human capabilities in regard to a larger scale of WFH, as they previously had minimal experiences with that.

5.2 Types of improvements

Looking at the analysing section of how the WFH phenomenon has impacted the participating companies, some of the same improvement patterns occur across the majority of the companies. Human IT capabilities were during the lockdown an important factor for the companies to improve in order to quickly and smoothly adapt to WFH. Rasmussen mentioned that Chr. Hansen is still providing training sessions for their employees. This indicates they strive to continuously maintain or improve their employees´ technical skills to aim for a better outcome of WFH. *"But, of course, people just had to learn a new platform, we changed from Skype to Teams there. And we are still after a year now running training sessions on how to use Teams."* (Jens Rasmussen, 25:53). At Novozymes, Ludvigsen also explained that they offer technical training on a regular basis provided by their own IT department.

> We offer technical training to all employees in Novozymes on these more corporate tools, like Teams, Office 365, and stuff like that. So, we do that a number of times every year. So, it's posted and people can enter and participate. And so, it's hosted on a regular basis. And we do that with our own employees in IT. (Mikael Alexander Ludvigsen, 40:11)

Arkil implemented a similar initial approach to Chr. Hansen and Novozymes in the form of training sessions during the first phase of the lockdown. These three companies all offered training sessions, even though they had experiences with WFH prior to the pandemic. *"We did have some educational sessions to teach people how to use. We use Microsoft Teams how to use it more frequently." (Jens Skjøt-Arkil, 02:51).* However, in contrast to Novozymes and Chr. Hansen, Arkil only used the training programs to bring their employees up to speed. While Novozymes and Chr. Hansen's aim is to achieve a higher return from the investments in digital platforms, by continuously providing training sessions for their employees.

DLG was at an entirely different level, and it was necessary to run online training sessions as some employees needed basic knowledge for operating under WFH. "*So, we ran during the spring and a few times in the autumn, a number of webinars, people actually could get in and then we actually gave them introduction and training in how to work from home." (Torben Spaabæk, 32:56).* This

shows a general trend across the different participants towards securing a minimum set of skills as a response to WFH. Gaining these skills enabled the employees to start WFH on a sufficient level, that can maintain the normal level of performance.

On the opposite side, Solar is the only participating company that did not provide any training sessions for their employees. According to Thystrup this was mainly because there were no differences for employees whether working onsite or remotely at Solar. As the key human IT capabilities needed for remote work were in place from the beginning. *"(…) that there was no real difference working from home or working in the office. From a technical point of view." (Henrik Thystrup, 25:31).*

Chr. Hansen and Novozymes, was identified to be among the more mature companies in the analysis section, were aiming for more than just preparing their employees through training with basic technical skills and knowledge. They wanted a greater utilization of the software compared to the other participating companies. "*And with Teams, you have so many opportunities there to use it as a collaboration tool. So, we have increased activity, our effort, in training, to make sure that we also harvest the investment in Teams.*" (Jens Rasmussen, 44:40). This decision might be shaped by their overall view on IT. This approach is in line with some of the key capabilities shown in the maturity analysis and is thus likely linked.

The other element that was improved besides the employees´ technical skills were companies´ tangible IT capabilities. In the initial phase, many of the companies felt that they did not possess the IT capabilities to implement a large-scale use of WFH. In fact, it was typically only minor issues that needed to be resolved. The participating companies had to improve their tangible IT capabilities, as the lockdown became a reality from one day to another. At DLG the transition to WFH happened so rapidly, that the employees had to disassemble the office setup in order to have the necessary hardware for initiating remote work:

> Not fully, I think as you know, when it was 11th of March, last year was more or less from zero to 100 in a day. And I think that, first of all, we had a lot of colleagues that actually need

> to take down the equipment at the office, some of them couldn't do that, and then go home, and figure out how they actually could hook that up. (Torben Spaabæk, 32:56)

As the statement shows there were not many problems related to the hardware side of the equation. The capabilities that needed to be developed were tied to the individual employees´ knowledge of the tools they use. They needed the knowledge to assemble their workspace at home. Other companies had to acquire and allocate equipment such as cameras, laptops, and screens in regard to enabling the majority of their employees to start WFH. Ludvigsen at Novozymes stated it was fundamental for their employees to have the necessary hardware before they could start WFH.

> Well, I think the first basic foundations or things that needs to be in places is basically the infrastructure and network. (…) And then we've had all the usual hand-outs of screens and keyboards and mouse's and whatever peripherals you need to, in order to be able to work from home. But all of that was taken care of in the first couple of months. (Mikael Alexander Ludvigsen, 46:03)

When Jens Skjøt-Arkil was asked which steps Arkil had taken to facilitate employees' ability to WFH, he replied that education and tangible IT resources were important: *"Yeah, we've done a lot of educations. And also on the IT side, made sure that people have the things they need headphones, access to cameras, and the infrastructure"* (Jens Skjøt-Arkil, 01:48). At Royal Unibrew, they faced the same problem of hardware issues, as their employees needed more than a notebook to initiate WFH. Therefore, they recommended the employees to take down their monitors at the office and brought them back home.

> You will always have some start-up issues regarding every employee here has a notebook and a lot of them was lacking a monitor. That was one of the big issues and then when we saw it was going to take a while, we just asked them to bring their monitors home. (Svend Nyegaard, 01:37)

Another company that had challenges in the initial phase of the transition to the large-scale of WFH, was Chr. Hansen. In contrast to other companies, the hardware and infrastructure was already in place prior to the pandemic, which meant they were able to provide their employees with the necessary hardware to start WFH. However, they lacked licenses to host larger meetings with more than 1.000 attendants.

> And that was as I mentioned, it was not because of the pandemic, it was just part of, we have a project going on already before the pandemic, replacing the entire infrastructure globally, making it on it as putting on the same hardware and so on making it scalable. So luckily enough, we were almost done with that. The only thing we kind of got caught up in was lack of licenses. So, we didn't have enough licenses to hold host meetings with more than 1000 people. (Jens Rasmussen, 49:21)

Besides providing their employees with hardware and licenses, Chr. Hansen also wanted to prevent network issues for senior managers, while they were WFH. Therefore, they offered to set up the senior managers´ network infrastructure at their private home. Everything from network password to the connection was set up, as it is important to have a stable and secure network connection for remote work and online meetings.

> But it's actually a service that we that we offer to our senior managers. So, we'll make a home visit also to make sure that it's configured securely. So, we actually go home and set up the network at their homes and making sure that the default passwords are changed and stuff like that. (Jens Rasmussen, 50:08)

In general, all participating companies have experienced some degree of improvement in their human IT capabilities and tangible IT capabilities. It should be noted that the majority of companies aimed to improve their human IT capabilities skills through training sessions. While, the more digital matured companies, such as Chr. Hansen and Novozymes aimed for more than just being able to perform remote work. They wanted to fully utilize their chosen platforms and software in order to take advantage of the current situation for a greater return in the future.

In regard to the improvements to tangible IT capabilities many of the companies were well equipped to handle the challenges of WFH and only smaller acquisitions in addition to their existing infrastructure. As a consequence of this all the companies achieved a similar basic level, consisting of hardware and licenses. The only outlier in this aspect was Chr. Hansen created additional improvements which increased senior managements' network capabilities at their homes.

5.3 Working from home impact on performance

In order to better validate the impact of WFH and the changes of IT-capabilities seen in the participating companies, they were asked how WFH, and COVID-19 have affected the company wide performance. Many of the companies experienced some start-up difficulties in the beginning that were quickly overcome, Skjøt-Arkil briefly touched this "(...) Of course, the first couple of weeks, we need to adjust but, in our world, it hasn't really affected that much." (Jens Skjøt-Arkil, 06:06). Solar had similar experiences as Arkil in the initial phase, which was explained by Thystrup "There was maybe a small drop in the beginning, but I think now it's at least as good as it was before." (Henrik Thystrup, 31:29). At Novozymes, Ludvigsen experienced an initial explosion of meetings, which over time stabilized into something more normal as new work routines were established.

> (…) So, in the beginning when I talked to some of the peers that I'm in networks with. Everyone said, sort of the same, that the number of meetings exploded in your calendar, and you sat in 9-10 hours of Teams meeting every day. Everyone was fed up with that. So, I think now it's come to a more natural level, more balanced level. So, I think we just all needed to get through that initial phase. And now it's, I think it doesn't seem to be an issue anymore. (Mikael Alexander Ludvigsen, 50:59)

In general, many of the companies had a transitional phase in the beginning of the large-scale use of WFH which they had to overcome. The majority of the participants were surprised about how quickly they were able to make the transition to WFH. Novozymes was one of the companies in this thesis that scored highest in regard to digital maturity. When interviewed about the most surprising aspect in regard to the change to WFH, Ludvigsen reflected on this.

> I think one of the first surprises we talked about was actually how smooth it went. No, it went surprisingly smooth. No, there weren't really any major hiccups or challenges or issues or difficulties that I think a lot of us had actually been a little anxious about. So, it went better than planned, basically. (Mikael Alexander Ludvigsen, 45:23)

On the other hand, DLG lands in the lower end of our maturity analysis, but still had similar experiences as Novozymes, regarding transitioning to WFH. When asked about surprises Spaabæk said this:

> I think most of us was actually pretty amazed about how fast people were able to adapt. So even though that we asked them on the 11th, for that matter on the 12th, and say, guys, you need to go home and so on. They were more or less working on the day after. (Torben Spaabæk, 40:32)

This indicates that the digital maturity level of the different companies has not been the defining factor of how well the companies have initially adapted to WFH. The experience of transitioning into WFH is in stark contrast to what they expected. Going into the lockdown, the fear of a potential performance loss was on the mind of many. When asked about if the new situation had affected deadlines Ludvigsen answered *"Not really, I mean, as I mentioned, we talked a lot about, is there a risk of productivity loss in 2020. But as the year progressed, we saw that wasn't really the case."* (Mikael Alexander Ludvigsen, 48:16). All the companies in this study had experienced stable or above normal performance. At Royal Unibrew they managed to meet the expected targets and even expand production facilities "*So, in fact, the company performance we came up with yearbook with the expected target as before COVID-19. So, we really have the busiest period ever." (Svend Nyegaard, 07:52).* At Solar, Thystrup explained their situation as a result of an increased focus.

> I think that the efficiency actually was, I would maybe say higher than going to work. Because when you are sitting at home, you are much more focused. So, we managed to kind of work and have a bit of throughput. That was probably a surprise to many people that this was possible. I think there was a scepticism that, when people are working from home, they don't

> work. People are just going to the beach or whatever, instead of working, but that was not the case. (Henrik Thystrup, 30:37)

This feeling of an increased dedication and focus is not unique to Thystrup, the CIO at Chr. Hansen has experienced a similar situation at his company.

> I think that we have actually seen that people are working more than they expected to, because either you're working or either you're looking at another screen. So, you either Netflix or working. So, I think we've probably had, a 10 to 20%. more effort. (Jens Rasmussen, 58:46)

This paint a rather rosy picture of mass scale use of WFH, but at the time of the interview, many of the participants also experienced the downsides of WFH. All the participants argued that the social aspect of working was missing and were fatigued by it to some degree. In regard to creating new projects and change management Rasmussen saw that WFH was not as suited as the normal situation.

> (…) But I'd say it's difficult to start new things. It's difficult to hold kind of start-up of a complex project or something that we need to bring people together around and new goal. Change management is really difficult on Teams, I would say. So, but in general, all the running projects are still delivering. (Jens Rasmussen, 58:46)

The dynamic process of initiating projects and change management have proven to be an obstacle for Chr. Hansen when WFH. This is similar to the insights given by Spaabæk, which highlighted WFH is well suited for routine work with fixed frames, but not well suited for non-routine tasks.

> Okay, so you're doing very routine work, structured work, and so on. I think you can actually keep up. But if you are doing things that are not necessarily routines that you do every day and so on, you will overtime decline. (Torben Spaabæk, 43:32)

In general, it can be stated that all the companies went through an initial phase of adapting to WFH where technical and cultural issues were rather quickly overcome. After the initial phase the companies were able to keep up normal performance efficiency or even surpass it. The unique situation concerning lockdown meant the employees were severely limited in their leisure time

activities, and as a result of these limitations and WFH, the employees were working more and had less distractions. In addition to this the unique situation surrounding the transition to WFH, could serve as a burning platform thus creating a strong motivation for succeeding in the transition. The alternative would in many cases be devastating for the companies and employees. Over time, the use of WFH and the general lockdown seems to have given rise to a feeling of social isolation. In addition to this, remote working might not be a sufficient substitute for onsite cooperation in regard to more dynamic processes such as starting new projects and general change management. The remaining question in this, is WFH here to stay, and in which form?

5.4 Working from home here to stay

The companies in this study have now been forced to use WFH in one form or another for over a year. As the previous sections have shown, the companies were both able to keep up performance and, in some cases, even exceed the expected level. Most of the companies have invested in enhancing the employees´ IT knowledge for better facilitation of remote work. Additionally, some companies are still running active education courses to ensure full utilization of the various features regarding their platforms. With the ongoing vaccinations programs across the world, the forced government lockdowns and restrictions are expected to finally be repealed in the near future. In the wake of the forced lockdowns and thereby the WFH phenomenon one question remains, how big a role will WFH have in the future? Though, this is not the main focus of this thesis, all the participants revealed their thoughts and plans about this matter. Many have seen this period as a proof of concept for WFH *"Because now we have proved that people are able to do that. And in fact, they are producing what we expect them to do." (Svend Nyegaard, 10:49).* The majority of the participants were familiar with WFH prior to the lockdowns and used it on a limited scale. However, the companies have not facilitated WFH on such a large scale before, which is a completely different experience. Ludvigsen from Novozymes described the experience as going from knowing something to actually doing it:

> Yeah. A lot. I think we now have a different and maybe more flexible and modern view on what is working? Working is not, by definition, a place, a physical location maybe anymore, but it's more the activity you do. So, it's not a secret, or it wasn't a surprise that younger

> generations, especially in the nomads that travel the world and work from anywhere, it's not because we weren't aware of that. But from knowing to actually doing on your own side is something else, something different, and now we've tried it and it actually works surprisingly well. So, I think the new normal will be a combination of working on site and working from home. (Mikael Alexander Ludvigsen, 57:10)

Thystrup said that one of the lessons they learned was that they need to be more open towards new possibilities in the future, as managers need to explore and try new things (Henrik Thystrup, 38:55). In addition to this, he also found that people do not need to be physically present in the same office in order to effectively cooperate. This decreased need for physical present is echoed by Skjøt-Arkil *"(...)that you don't need to meet all the time. But I think the need for travel will be less, I'm pretty sure."* (Jens Skjøt-Arkil, 10:46). All of the participants are also looking into what role WFH might play in their workplace regarding the future. Spaabæk's statement about this, highlights the general mix of uncertainty most people felt going into the lockdown and the direction many see as a future option.

> (..) I think most management actually was very insecure if they were able to run their business where people are working remotely, I think corona have shown for most of them that you can actually do that. Yes, and I think we will utilize it, (…) we will most likely look into that they might be working from home one or two days. So, whatever it takes, I think we will be more flexible as a company. I also think that that's part of the development. (Torben Spaabæk, 45:47)

Rasmussen from Chr. Hansen also sees how this can be a permanent tool for the company and the individual employee.

> I think it is a permanent tool for some. But personally, I hope that it will be kind of one or two days a week for most people and not like having some of the workforce working always from home because there will be like having individual contractors and you're not really building up a culture or kind of the social aspect of going to work. (Jens Rasmussen, 1:09:00)

The social aspect of working and WFH both plays a vital role in the existing literature and the experiences of the participants. Skjøt-Arkil further argued when asked about the future role of WFH and puts an emphasis on the need for balance.

> I think we'll find a balance we will probably have more than we had before. But it won't be a full change to just working from home because that's at least my feeling is that people are social beings, and we need to have some sort of social relationship with our colleagues. Otherwise, you lose the grip on what's going on. So, it'll certainly go back towards normal, but maybe start a little before. Where we were before. (Jens Skjøt-Arkil, 09:20)

At Royal Unibrew, Nyegaard is examining the possibilities provided by WFH. One of the initiatives discussed in his organisation is a free seating scheme.

> We're looking into making some to save some office space and say, could we make free seating for the people meeting in instead, while I'm having my own desk with my own monitors? Could we make them more uniform and say this is a standard receiving place, and you can just join and sit wherever you want. We are looking into that. (Svend Nyegaard, 11:07)

At Solar they have had a similar discussion but with a different outcome. Making the change where WFH is a structural part of the work culture, would also have an impact on what is considered as part of the workplace. The implication of this could be that the home office would need to be considered in the APV and might need further investments to fulfil the requirements and standards of being work locations. Grounded in this rationale, they decided to not officially allow WFH. That being said, the employees can still work from home if they need to, just not on a structural basis (Henrik Thystrup, 36:56). This experience has left Solar more open towards the possibility of enabling WFH in the future. *"(...) it's an eye opener saying that we are more open to do it. But in IT, we have always been open for you to have people working from home, to be honest" (*Henrik Thystrup, 36:56). When asked about the new normal, Ludvigsen predicts that before a larger degree

of WFH is normalized there will likely be a period where people need to be at the office in order to catch-up on projects and the social aspects of working.

> There will definitely be a need for catching up and social contact and collaboration and coordination. So, I think when we do get back, there will probably be a month or so where people are asked to be at the office. And then following that, there will be room for a lot of flexibility and more than we had in the past. So, I easily see people working two days from home, for example. And that was not the case before. The assumption was before you are work, physically at your workplace. And then if you need to work from home, you ask your manager, can I work from home? Going forward, I think it would be natural to work from home a couple of days per week. (Mikael Alexander Ludvigsen, 54:25)

Right now, it is difficult to say what the new normal will be, but the current evidence points towards WFH playing a larger role in the future, and even a normalization of working regularly at home for part of the week. The fact that all the participants in this study think we will see an increase in WFH in the future, somewhat validates the success of WFH. This increase in the use of WFH also has some vital implications for the IT capabilities the companies have built up as a response to the pandemic and WFH. They will likely be considered as key capabilities in order to run a competitive company in the future.

6 Discussion

This chapter contains the central discussions of this thesis, which is divided into three sections. The first section relates to the findings presented in the previous chapter and discusses some of the questions and implications that arise from these. In this section the first area of interest takes the findings regarding the IT-capabilities back to the roots, and asks the question: are the IT capabilities created as a response to large scale use of WFH VRIN? This discussion is interesting because it is part of a recurring debate in the literature that asks if IT can be VRIN. The second part acknowledges that the context of this study is embedded with special circumstances surrounding the COVID-19 pandemic and the lockdowns. This can be seen as part of the due diligence process in the interpretive paradigm which seeks to answer what role does these events play and what part of the result, we would expect to be applicable under normal circumstances. The second section takes a critical look and tries to address any possible flaws in the research. This is achieved by discussing the data, researcher bias, and the inherent limitations of the study. The third section addresses how the study relates to the real world, its implications, and the direction of future studies.

6.1 Discussion of this study's findings

6.1.1 Are the IT capabilities created as a response to large scale use of WFH VRIN

Through the analysis and findings chapters it was discovered that all the participating companies have mainly enhanced their human and intangible IT capabilities. The existing literature concerning IT capabilities originates in the idea of the resources-based view. With that in mind, it is fruitful to circle back to the origins and discuss if these new capabilities the companies have developed are VRIN? To start off, it can be highlighted that all the companies in this thesis have seen an increase in performance during the last year. The companies´ fast response and focused initiatives was the reason behind their success. Previous studies have proclaimed that a successful transition to WFH is not a given. An example is the study from Gigauri (2020) that showed 17% of companies admitted to not possessing the necessary skills needed to make the change. It can therefore be argued that companies can derive a competitive advantage from WFH through the IT capabilities that make it possible. This raises the question: are these capabilities VRIN?

Valuable. The increased performance and the successful adoption of WFH are factors which indicate that the IT capabilities are valuable. Most of the companies have utilized some forms of training courses as part of their first response to the situation. This is aimed at building up their human IT capabilities and enables them to remain productive while WFH. An example of the tangible IT capabilities can be taken from Chr. Hansen, that ensured senior management had a stable and secured internet connection at home. While it is hard to establish the exact value of their initiative, there is definitely a value in the increased security, professional network, and hazel free situation for the management. The above initiatives have shown that some form of value can be derived from these improvements, they are therefore considered as valuable.

Rare. Having established that the capabilities are indeed valuable, this leads to the second part, to answer whether they are rare? There are two answers to this question but for the tangible IT capabilities the answer is no. The reason being is that most of the solutions are off the shelf products that all companies have access to if they desire. In the case of the enhanced network capabilities at Chr. Hansen, these are more complex capabilities to mimic, because it requires the personnel and know-how to implement. However, this is again something that can be acquired at a consultant or developed inhouse. For the human IT capabilities, it becomes more complicated. Much of what has been developed is know-how and experiences, while they are not rare, they are unique for each employee. A lot of what has been learned can be taught at an education course, so these capabilities are not categorized as rare, however, some of the unique individual insights can be.

At this point it becomes a discussion of, are the individual experiences and lessons learned during this phenomenon imperfectly imitable and non-substitutable? The lessons, insights and knowledge of the individual employee has not been a notable focus of this study, and we are therefore not qualified to provide the answer due to the lack of data. The question is nonetheless still interesting and might reveal many insights.

As a rounding remark to this topic, it can be argued that, while the capabilities the companies have developed as a response to WFH are valuable, they are generally not rare and thereby not VRIN. There might be some cases or individual experiences where the lessons learned are VRIN, although this study has not identified any. This can be an interesting area for future study.

6.1.2 WFH factors

During the interviews, the majority of the companies explained that they expected a lower performance efficiency in the initial phase. This was due to the time consumption of transition to WFH in such an increased scale, and a general sense of insecurity in regard to the employees work ethics. So far, this thesis has explored how the participating companies were able to keep up or surpass the normal performance efficiency. The pandemic and lockdowns have been unique for societies. All social activities have been limited, as the entertainment industry, the restaurant industry and shopping malls have been forced to close. While only groceries stores and other essential organisations were still allowed to operate with certain restrictions for their customers. People that were WFH had therefore less distractions due to the limited leisure time activities, which potentially enabled them to focus more on the tasks assigned by their employer. In addition to this topic, a few participants showed awareness and concerns during the interviews. This was due to their employees' unhealthy work life balance during the lockdown periods, which could have a negative impact in the long term.

> So, I'm just considered because we talked about it last week at the manager meeting that we have probably seen like 10% more effort than expected last year. So, we have to remember that we will not see that 10% going into the new year because people need to get out and have more work life balance (Jens Rasmussen, 58:46).

However, once the pandemic is over and all the industries are not imposed by any restrictions it is uncertain whether the employees will be able to keep up the performance efficiency while WFH. Other external factors could possibly affect the employees´ focus and attention, such as planning social activities, restaurant dining and vacations will be occupying some of the individual´s focus compared to during the lockdown.

Therefore, this thesis´ findings are based upon the factors and circumstances during a pandemic lockdown. It is likely that the option of not being able to engage in other activities than work related ones, have affected the employees´ focus to some degree. The limited options of other activities could also have an adverse effect on performance, due to the social isolation. It is therefore

unknown to what extent this affected the employees´ performance, it should be noted that most of the participants said they were able to focus more on their work when at home.

However, it is important to notice that the findings in this thesis are still applicable under normal circumstances. The improvements of IT capabilities experienced in all companies seems to be fundamental to effective use of WFH. Regardless of the lockdowns, the participants found the organisational culture and technical skills to be important factors in regard to maintaining the existing performance level while WFH on that account it is highly probable that any company transitioning to large scale WFH will need to develop similar IT capabilities.

6.2 Limitations and researcher bias

6.2.1 Data validation

This thesis is centred around semi-structured interviews as a primary data source. The data has been collected from six different interviews and the same interview guide has been used for all six participants. It should be noted that after the first interview, the order of the questions was changed to facilitate a better flow in the conversation. The interview guide was an important element to ensure a sufficient coverage of all the relevant topics and enabling a better comparison between the different participating companies.

It is important to notice that we requested the respondent to have a strategic or digital responsibility within their organisation, preferably upper management. This was done in order to gain a deeper understanding of how the different participating companies experience their own digital maturity, and WFH during the lockdown. It was important to create a complete overview of the large changes and factors in the organisations. We believe that all the respondents had the necessary knowledge to inform and shed light on their own company's digital maturity, and experiences of WFH. In the interviews we experienced all the participants as trustworthy and did not detect any signs of deceptions. As mentioned in the method section, one of the flaws in collecting data through online interviews is the minimal use of body languages. The implication of this is that any such signs would

be difficult to detect. We were aware that the participants might tend to provide biased answers that pictures their organisation and area of responsibility in a favourable light. It should be noted that we did not pick the respondent inside the participating companies ourselves. In the majority of the cases our initiating e-mail was forwarded from the “info mail” or any relevant contact. The companies thus had full control in regard to choosing the employees they found best suited for this study. This materialized in participants that were exactly what we asked for.

Arkil declared in the initial contact that they could set aside 30 minutes for the interview. Based on the durations of previous interviews, we knew it would be problematic to cover the whole interview guide within the given timeframe. Consequently, it was therefore decided to deviate from the interview guide and focus more into the WFH questions. Additionally, follow-up questions were not frequently used in this interview in order to keep to the time schedule.

As mentioned earlier, the interview guide was sent to all participants before their interview, which enabled them to prepare and present more in-dept. answers. Spaabæk from DLG, deliberately answered the question in written form and returned it by email before the interview. This affected the flow during the online interview, as the answers were short and precise, while he often looked at his written answers before answering our questions.

When looking at the amount of data collected in this thesis, one important question remains. Is there sufficient data to picture a general line of how the adoption of WFH has affected Danish workplaces? We believe this thesis has collected sufficient data, to argue that the findings are representative. Because we have experienced a general set of patterns in the participating companies, regarding how WFH have affected them and their approaches for adapting to this. For instance, this is applicable when all participating companies had to reach a basic level of hardware and licenses in the initiating phase of WFH. Furthermore, all participating companies are operating within several different industries. This enables our thesis to draw a generic image across industries instead of being limited to one specific industry. Although, it should be noted that the topics in this thesis´ could be examined more deeply by increasing the numbers of participating companies within

new and current industries. This would be especially true in the case of establishing how IT maturity has modified their behaviour.

6.2.2 Limitation of research method

The nature of qualitative data is tied to the individual participant picturing a phenomenon from their own eyes and is thus shaped by their worldview. This provides answers that are in-depth and contains insights regarding the case companies. The implication of this is that it can be difficult to create general theories that would fit a multitude of companies. As mentioned earlier, the data was gathered using a semi-structured interview method, which made the study vulnerable to several common method biases. The behaviour of the participants could be influenced through a bias, which impacts the research result. For instance, an important bias was the examination of data, that was heavily reliant on personal statements and opinions, is the *social desirability bias*. Participants possessing this bias have a tendency to respond to certain questions with an ulterior motive of what is culturally and socially appropriate. The implications for this study may be that some of the participants could find it more culturally appropriate to express a positive answer of the transition to WFH and their IT capabilities. The reason to express a positive response is that the participants want to appear loyal to their respective company. Another form of bias is the *positive and negative affectivity bias*, which is defined as some people experience and view themselves, and their surroundings as generally positive or negative (Mackenzie 2003). If some of the participants expressed positive affectivity towards their work or company, the transition to WFH would be viewed as a generally positive phenomenon. The implications of positive *and negative affective bias* for this thesis can be that the research and findings are incomplete, hence the one-sided opinions regarding WFH and the companies' IT capabilities. Thus, one of the most vital factors of the analysis is to rely on the participants to provide a critical and relatively accurate assessment of the challenges, changes, and issues WFH have generated in the companies. The positive perceptions of participants towards transition to WFH could raise concerns about whether more timely data can reveal other insights of adaptations to WFH. Furthermore, all our participants were CIO's or CFO, which may raise concerns about how objective their statements were regarding the overall view, including employees' transition to WFH. The participants might express an overly optimistic bias, the perceptions of the participants should be treated carefully and not as the objective truth. As

both biases can have an influence on the research result, we ensured that all questions were phrased as naturally as possible. As an example of this take the following question: *"How concerned are you with reducing IT costs?"* The question itself does not give an indication of any correct answer, but the answer was used to access their digital maturity. The subjects' own perception of what is correct would likely reflect their company's true opinion and strategy, thus not falling victim to any bias.

By operating under the interpretive paradigm and using qualitative methods for sampling information, another vulnerability is the *researcher bias* that originates from this method. Therefore, it was crucial for us to be aware of this when working with a qualitative study since the risk of *research biases* could arise. Meaning we could personally influence the finished result of the project when examining the sampled data. The reason for this is that the majority of work is focused towards preparing, retrieving and processing the qualitative data, where the interpretive element plays a major factor. Due to these complications, it is important to stay self-critical and frequently ask questions concerning alternative explanations and interpretations of our findings to avoid the bias in the study (Andersen 2014).

6.3 The implications of this study on future research

After having delved deep into the world of WFH with an IT perspective, many questions and topics for future research become apparent. As already touched upon in the previous sections, there is an opening for future studies examining the experiences of the employees affected by lockdowns and WFH. To establish whether these experiences and insights are VRIN. As noted in the previous sections, it is unknown how large a role the lockdowns play in the increased performance seen in the majority of the companies. It can be argued that the surrounding situation and the burning platform for the adoption of WFH has played a large role in the success seen. Therefore, it would be prudent to make a follow up study to clarify these factors. Such a study can either examine companies that have implemented a large-scale use of WFH before 2020 or be undertaken in the years after the end of the global lockdowns.

Based on the results of this thesis, it should be possible to make a follow up study to see if the resulting improvements in IT capabilities are indeed, a general response to large-scale use of WFH.

This can be conducted by using a questionnaire based upon this thesis' interview guide, or a similar study with an increased number of participants. All around the world, companies have been forced to send their employees home to some degree. Furthermore, this study has only examined the impacts of WFH in Denmark, and it could therefore be interesting to see the results in other countries. An example of this was seen in Chr. Hansen, where their local office in Columbia greatly benefited from WFH due to the employees saving their daily commute, around 4-5 hours (Jens Rasmussen, 42:36). This is a case where there may be many differences depending on the country due to local concerns and factors.

This thesis focuses on the general trends in the different companies seen through the lens and perspective of the executive managers. The results from our findings are based upon people that are concerned with the bigger picture, and not the minor details. This provides a general idea about how the overall organisation has been impacted, but not the lived experiences of the everyday worker. Does the average person in the IT department have the same view of the changes experienced in the organisation as the upper management or do they view things differently? On a similar set of thought, the average employee might feel that their IT has moved more than what the executive has pictured. This study can be used as a general baseline regarding the nature of changes from WFH and then compare the employees' experiences to it. Does it differ and if so, how much?

A subject that often came up in the interviews is that of social isolation and the need for human interactions. The implications of this subject were that many of the lingering challenges and issues seen in the different organisations were not directly IT related, but more related to the social aspects of working. This underlines the importance of research into this field of study.

7 Conclusion

This thesis has examined six Danish companies with unique backgrounds, all operating in different industries. In order to fully understand how WFH have affected each of the company's IT capabilities, the IT-CMF was used for assessment of their digital maturity level. Through the findings it was identified that the participating companies possessed different IT maturity levels. The variation of the achieved maturity levels and industries suggests that the experiences of WFH have had a generic impact towards the Danish companies. Furthermore, it was clarified how IT capabilities have been impacted by WFH.

Two types of IT capabilities have been improved as a response to WFH. The human IT capabilities have seen a general improvement across the organisations. The increased involvement of training and education was significant for employees' knowledge to fully utilize the software while WFH. The companies have experienced a general improvement to tangible IT capabilities by purchasing hardware and equipment used for remote work. These types of improvement were the most common regardless of the companies´ IT maturity. Additionally, the majority of the impacts occurred in the initial phase of adapting to WFH.

On the performance level, several companies have experienced either a normal level of performance or increase despite being forced to use WFH. This validates that the changes in IT capabilities are improvements. The IT maturity level of danish companies suggest that it did not play a significant role in the initial adoption to WFH. Despite the similarity in transitioning to WFH, companies that possess a higher IT maturity level appear more focused on exploiting the future opportunities regarding remote work. This suggests that there is some connection between WFH and IT maturity level regarding the long-term impacts on a company. This contextual factor would need further research to be fully established and validated. Many of the executives expressed that this experience served as an eye opener and a proof of concept. Despite the companies' different approaches of exploiting the WFH phenomenon, there are clear indications that WFH is here to stay but at a lower scale than seen during the lockdowns.

8 Bibliography

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