

LEVERAGING DYNAMIC MANAGERIAL CAPABILITIES TO CAPITALIZE ON DIGI- TAL TRANSFORMATION

**An Exploratory Multiple Case Study Through the Lens of Dy-
namic Capabilities**

Master's Thesis in
Information Technology for Enterprise
Management
ITEM

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30.07.2022
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ABSTRACT

Digital transformation (DT) is a popular research theme in literature as well as an imperative for firms to withstand the increasing environmental turbulence. At the same time, it has been emphasized that DT remains a challenge. As DT is a source of change and disruption, linkages have been made with the organizational dynamic capabilities (DC) concept which help firms to address rapidly changing environments. This has led to the fit between DC as a conceptual foundation and DT as a phenomenon of interest. As a result, literature has been describing how organizational DC enable a firm to capitalize on DT. However, this does not provide the individual (i.e., managers) with ways for how to ensure the organizational DC are embedded in a firm. The dynamic managerial capabilities (DMC) concept was identified as a potential response to this issue.

With this as motivation for writing this thesis, a multiple case study was set up to investigate the DMC phenomenon in more detail. By extensively examining prior literature on DT and DC, making the connection between the two concepts, and conducting two expert interviews, six in-depth interviews, and two validation interviews, this thesis gathered an amount of data which has been analyzed according to a within-case analysis and a cross-case analysis.

As a result, a set of DMC are found that contribute to the development of organizational DC. This in turn enables a firm to integrate, build, and reconfigure competences, which enables a firm to capitalize on DT. Accordingly, this thesis provides managers with guidelines for how they could examine their current set of capabilities used for DT. Were applicable, they could adapt their current set of capabilities to the identified DMC in order to lead DT initiatives to success. Additionally, a conclusion is that managers should consider the factors underpinning the three underlying attributes, as this will actually ensure they are capable of performing the DMC appropriately. Concludingly, this thesis illustrates how to leverage DMC to capitalize on DT.

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1 INTRODUCTION

1.1 Research topic

While researchers have been investigating digital transformation (DT) since the beginning of this century (Hanelt et al., 2021), it is only in the last five years that the number of publications has really increased exponentially (Vial, 2019). This underlines its relevance in the current digital era. As the definition of DT in many cases is still conceived as ambiguous (Warner & Wäger, 2018; Wessel et al., 2021), in this thesis Gong and Ribiere (2021) their comprehensive and thoughtfully formulated definition of DT is used. As such, in this thesis DT is conceived as *“a fundamental change process, enabled by the innovative use of digital technologies accompanied by the strategic leverage of key resources and capabilities, aiming to radically improve an entity and redefine its value proposition for its stakeholders”*. In this definition, an entity could be an organization, business network, industry, or society.

Despite the growing importance of DT in a world where change is appearing and ongoing (Gong & Ribiere, 2021), it has been highlighted in literature that DT remains a challenge. This is reflected in literature by the high failure rate of DT initiatives (Marx et al., 2021). For instance, Bucy et al. (2016) revealed approximately 70% of all DT initiatives do not reach their objectives. Likewise Bughin et al. (2019) showed that 45 percent of the DT initiatives that do end up being successful, nevertheless deliver less profit than estimated beforehand. Moreover, Wade and Shan (2020) included several studies that quantified DT's failure rate, and concluded with their calculation that seven in eight DT projects fails. To this end, DT can evidently be considered a challenge. Since DT often means huge investment, firms actually waste serious amounts of money (Tabrizi et al., 2019). As Porter (1985) already claimed: *“high technology does not guarantee profitability”*.

As the high failure rate of DT has been acknowledged, studies have been trying to find causes and responses to find ways for successful DT. Firms find themselves in an ever-changing environment with new digital technologies (DTechs) triggering continuous disruption (Vial, 2019). The emergence of DTechs makes that markets get more competitive (Ilinitich et al., 1996). This can be seen in an increase of new market entrants, and competition becoming tougher and smarter (Moravveji et al., 2007). Owing to this, the majority of today's markets are hypercompetitive and are characterized by a high level of environmental turbulence (Ansoff & McDonnell, 1990; D'Aveni, 1994). The ability of firms to withstand, and even thrive in these circumstances, is of paramount importance to retain competitive advantage (Marx et al., 2021). The concept of 'dynamic capabilities' (DC) is widely discussed because it bears this potential. DC are *“the firm's ability to*

integrate, build, and reconfigure internal and external competences to address rapidly changing environments” (Teece et al., 1997, p. 516). This definition demonstrates that DC are capabilities at the organizational level. Noteworthy is that the individuals (i.e., managers) play a crucial role in the development of these organizational DC. This finding has led to the introduction of the concept of dynamic managerial capabilities (DMC), defined by Adner and Helfat (2003, p. 1012) as *“the capabilities with which managers build, integrate, and reconfigure organizational resources and competences”*. The DMC concept is an extension of the DC perspective by focusing on the role of the manager in building and maintaining DC (Helfat & Martin, 2015; Vial, 2019). DMC have three underlying attributes: managerial human capital, managerial social capital, and managerial cognition. These attributes solely as well as combined underpin DMC (Adner & Helfat, 2003).

Originally, the DC and DMC concepts stem from strategic management literature rather than information systems literature. But since DT calls for a solution for its high failure rate, it has been linked to DC. The fit between DC as a foundation for DT is seen as an insight-provoking research avenue. Among others, this has been argued by Vial (2019, p. 133), who suggested the following:

“There is an interesting fit between DC as a conceptual foundation and DT as a phenomenon of interest. The literature highlights the nature of DT as a source of continuous change and disruption in a firm’s competitive environment. The ability for firms to design mechanisms that enable repeatable, continuous adaptation in spite of such rapid changes is therefore an important question. The contributions of DC have been found most useful in contexts fraught with environmental turbulence or hypercompetition as ordinary capabilities cannot explain – on their own – how firms build and sustain competitive advantage”.

1.2 Research question

Although the link between DC and DT has been addressed in already existing research, only a few studies have directed attention to this. For example, Ellström et al. (2022) identified six organizational routines of DC that enable digital transformation in firms. Similarly, the article by Warner and Wäger (2018) got much attention as it exposed a set of nine organizational DC that contribute to making DT successful. Although these articles dispel the void that existed, the findings are rather difficult to implement in a firm. This is due to the focus on organizational DC for DT. Focusing on the individual instead, complements to the body of research because this provides managers with more tangible capabilities. Put differently, instead of having the unit of analysis at the organizational

level, like Ellström et al. (2022) and Warner and Wäger (2018), the unit of analysis of this thesis is set at the individual level. Consequently, the concept of DMC was seen as a potential response to the lack of understanding pertaining to ways how individuals (i.e., managers) can contribute to the development of organizational DC for DT.

Based on this problem statement, the research question is formulated as follows:

“How do dynamic managerial capabilities enable a firm to integrate, build, and reconfigure competences to capitalize on digital transformation?”

To come to an answer to this research question, a multiple case study was set up to investigate the DMC phenomenon in more detail. By extensively examining prior literature on DT and DC, making the connection between the two concepts, and conducting two expert interviews, six in-depth interviews, and two validation interviews, this thesis gathered an amount of data which has been analyzed according to a within-case analysis and a cross-case analysis. By means of this study design, this thesis tries to answer the formulated research question.

1.3 Research objectives

With regards to the scientific relevance, Figure 1 illustrates the structure of how this thesis builds upon extant literature. The question mark depicts how this thesis aims to fill the existing knowledge gap. As Figure 1 presents, the three underlying attributes given by Adner and Helfat (2003) are used to give initial direction. They underpin DMC, that in turn contribute to the development of organizational DC. Prior literature has already found was to build DC for DT, albeit at organizational level. For instance, Warner and Wäger (2018) have already identified nine organizational DC needed for successful DT. In contrast, this thesis focuses on the individual rather than the firm, by exposing how DMC contribute to the development of organizational DC that enable a firm to capitalize on DT. With this, it aims to fill the current knowledge gap. The distinct unit of analysis denotes the innovative angle of this thesis. In addition, Marx et al. (2021) state that examining DT through the lens of DC helps understanding DT and its success factors more thoroughly. In this thesis, the three underlying attributes of DMC combined with the organizational DC concept is used as lens for studying DT.

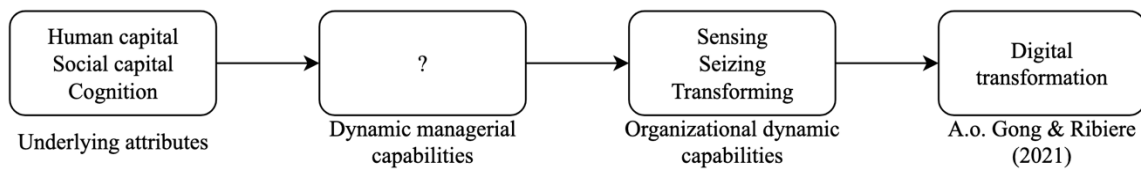


Figure 1: Analytical framework

In terms of business relevance, this thesis provides managers with a set of DMC (the question mark in Figure 1) which are easier to adopt compared to the findings from a.o. Warner and Wäger (2018). In addition, having exposed the DMC that contribute to the development of organizational DC makes that there is a more profound understanding of wherein organizational DC for DT are embedded. By connecting managerial human capital, managerial social capital, and managerial cognition to the organizational DC for DT, managers are provided with capabilities that give guidance to how they could adapt their current set of capabilities in order to lead DT initiatives to success.

1.4 Thesis structure

The remainder of this paper is organized as follows. To begin with, the second chapter entails the literature review which explains the concepts and theories relevant for this thesis in more detail. Digital transformation is discussed first, followed by dynamic capabilities. Then, in the third chapter of this thesis, the research methodology elaborates on the research design, data collection, and data analysis. Subsequently, the fourth chapter presents the findings from the empirical part of this thesis by discussing the interview analysis. The thesis closes with chapter five which focuses on the discussion and conclusion. This involves key findings, the main conclusion including an answer on the research question, the thesis' limitations, and further research.

2 LITERATURE REVIEW

To come to an answer to the research question, prior literature needs to be studied. In this chapter, literature from mainly Information Systems studies and Strategic Management studies is considered. Ultimately, these theories largely form the basis of this thesis. Therefore, the literature contributes to the quality of this thesis. Hence, literature is studied with a critical mindset. Contributing to this critical mindset are the two discussion sub-sections that will be presented in this literature review. Additionally, for every paper, the impact factor, h-index, and SCImago Journal Rank indicator will be taken into consideration. The latter measures the influence of journals, which is partially based on the number of citations a journal received. Next to this, the number of citations of the authors will be taken into account when selecting literature, together with whether a journal had been peer-reviewed.

Figure 2 depicts the topics to-be discussed, and in which section they can be found. Subsequently, the sections are decomposed in several sub-sections. Section 2.1 explains digital transformation. It focuses on and examines related concepts, characteristics of digital transformation, and eventually illustrates the formal definition that has been followed in this thesis. Subsequently, section 2.2 moves on to the second concept of this thesis. The concept of dynamic capabilities is explained, which involves its origin, the formal definition that has been used throughout this thesis, and the importance of managers in building and maintaining dynamic capabilities. The latter is a major part of this thesis. Therefore, the concept of dynamic managerial capabilities is also defined. Lastly, section 2.3 connects the literature which is the motivation for conducting this thesis.

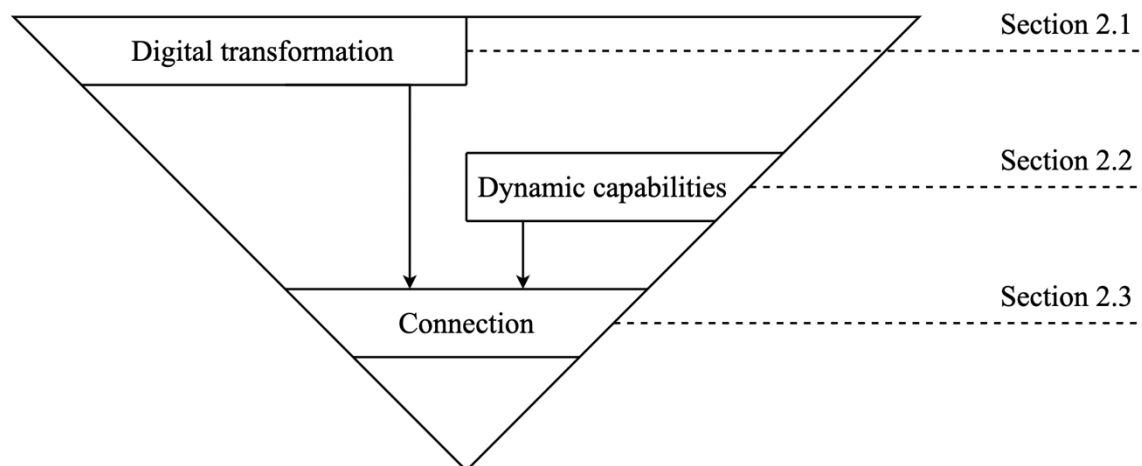


Figure 2: Literature review structure

2.1 Digital transformation

A consistent theme in academic research has been digital transformation (DT), a term which has got significant attention in the last five years (Hanelt et al., 2021). This is the result of the growing importance of DT in a world where change is appearing and ongoing (Gong & Ribiere, 2021). However, it seems there is not always an unambiguous understanding of this term. It frequently gets used inconsistently and it gets confused with related concepts. Moreover, it has been argued that current literature on DT is lacking a comprehensive and unified definition (Gong & Ribiere, 2021; Hanelt et al., 2021; Warner & Wäger, 2018; Wessel et al., 2021). In this section, literature is assessed to come to an appropriate definition of DT for this thesis to ensure there is a shared understanding of what DT encompasses.

2.1.1 Digitization and digitalization

Before delving deeper into the formal definition of DT, it is necessary to clarify the difference between the two closely related concepts digitization and digitalization because they sometimes get misused. Digitization is described as a technical transition of analog signals into a digital format that can be used by a computer system (Mergel et al., 2019; Tilson et al., 2010). This makes it more efficient to search, process, and manage data (Gong & Ribiere, 2021). On the contrary, digitalization involves more than just a transition into bits, as it is concerned with using DTechs in social and institutional contexts, making it a sociotechnical process (Legner et al., 2017; Tilson et al., 2010). Digitalization has the purpose to improve or replace business (processes) and create revenue (Gong & Ribiere, 2021).

The description of digitization shows that one cannot digitize an entire business as this means you want to transform all employees into bits as well. As mentioned, in this context the concepts are incorrectly interchangeably used. Instead of digitizing a business, it gets digitalized. All three concepts are a process of change, but digitization's magnitude of change is the smallest (Schallmo & Williams, 2018). Therefore, DT is closest related to digitalization. The difference as described by Gong and Ribiere (2021) is that "*digitalization is mainly focused on the work at the operational level, whereas DT emphasizes the results at the strategic level*". In this vein, they categorize digitization and digitalization as non-fundamental change processes, as opposed to DT which is defined as a fundamental change process.

2.1.2 Traits of digital transformation

Zooming in on the fact that DT is a fundamental change process, it must be emphasized that this process is ongoing. According to Munns et al. (2022), firms are inclined to see DT as a once-off initiative. Moreover, they outline that firms react to opportunities and threats emerged due to new DTechs in an ad-hoc manner. As opposed to this way of thinking, it has been argued that DT must rather be seen as a continuous process, also known as sustained DT (Munns et al., 2022; Warner & Wäger, 2018). As new DTechs trigger continuous disruption in the external environment of a firm, ad-hoc decision-making will not lead to the desired (and needed) adaptation (Hanelt et al., 2021; Vial, 2019). Continuously adapting by the innovative use of DTechs is the new stream of thinking. In this way, along with already existing and new resources and capabilities, DT has the potential to significantly improve an organization (Gong & Ribiere, 2021).

More precisely, this organizational improvement is not necessarily only about improving operational efficiency, but rather about enabling major business improvements (Horlacher & Hess, 2016). This involves improving customer experience, but also enabling new business models (Fitzgerald et al., 2014). Warner and Wäger (2018) argue that the renewal of a firm's business model is one of the three dimensions of the scope of DT. The renewal to a more digital business model implies that people collaborate in a different manner; broader changes in the collaborative approach is the second dimension. Eventually, a different way of collaborating results in deeper changes in a firm's culture; the third dimension of the scope of DT. This is in line with the dimensions of the digital transformation framework (DTF) presented in the works of Matt et al. (2015) and Hess et al. (2016). In this DTF, only the financial aspect is added as a fourth dimension. Also, in the DTF, the business model renewal dimension is referred to as changes in value creation. Since a business model "*describes the design or architecture of the value creation*" (Teece, 2010), this is conceived as the same thing (Bharadwaj et al., 2013).

Although the major business improvements could be reached by exploiting DTechs (Horlacher & Hess, 2016), DT is "not about technology, but about strategy" (Rogers, 2016). Likewise, Tabrizi et al. (2019) explain that DTechs only provide firms with possibilities (or threats), but DT should not be guided by these technologies. Strategy is what should guide the DT of a firm.

2.1.3 Formal definition of digital transformation

Formal definitions given in literature all differ slightly from each other. Moreover, some definitions are more all-encompassing than others. For instance, concise definitions are given by Bughin et al. (2019) who describe DT as "*an effort to enable existing business*

models by integrating advanced technologies”, and Fitzgerald et al. (2014) who describe DT as *“the use of new digital technologies to enable major business improvements”*. In fact, some articles do not even mention how they perceive DT while they clearly discuss it in their article, such as Tabrizi et al. (2019) and Kane et al. (2017).

Most articles published in journals do define DT thoroughly. Gong and Ribiere (2021) for instance, who analyzed 134 reputable definitions of DT, have conducted research with the contribution to develop a unified definition of DT. After their review, they formulated their finalized definition of DT as *“a fundamental change process, enabled by the innovative use of digital technologies accompanied by the strategic leverage of key resources and capabilities, aiming to radically improve an entity and redefine its value proposition for its stakeholders”*. In this definition, an entity could either be an organization, business network, industry, or society. Considering the traits of DT that are discussed earlier, this definition mentions ‘fundamental’, ‘digital technologies’, ‘radically improve’ and ‘value propositions’ which all comply with regards to the traits. Interesting to see is that Hanelt et al. (2021) formulate DT as organizational change rather than a fundamental change process. In addition, Vial (2019) rather mentions DTechs more explicitly. He defines DT as *“a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies”*. Similarly, Warner and Wäger (2018) also list DTechs in DT’s definition. In their paper, they have considered several definitions and eventually described DT themselves as *“the use of new digital technologies, such as mobile, artificial intelligence, cloud, blockchain, and the Internet of Things (IoT) technologies, to enable major business improvements to augment customer experience, streamline operations, or create new business models”*.

Additionally, Vial (2019) goes beyond his definition only and argues that we still lack a comprehensive depiction of DT’s nature and building blocks. Having this as main incentive for starting his research, he examined 282 works and built a framework of DT revealing its building blocks. This inductive approach led to a framework giving deepened understanding of DT. As depicted in Figure 3, DT consists of 8 building blocks (Vial, 2019). The central building block is the use of DTechs. The DTechs that are most applicable to DT (because of their digital properties) are social media platforms, mobile, analytics, cloud computing, and Internet of Things (IoT). These technologies are known under the acronym SMACIT (Hanelt et al., 2021; Legner et al., 2017; Vial, 2019) and cause disruptions. Strategic responses are demanded to react to the emerged disruptions by means of capitalizing on new DTechs. This enables the adaptation of value creation paths. However, changes in these value creation paths come with structural changes in for instance the organizational culture. Also, organizational barriers might be encountered while changing value creation paths. Ultimately, positive outcomes like improved organ-

izational performance are expected. Though, negative impacts may arise even so. Furthermore, after responding strategically to DTechs according to the DT building blocks, there is a prevalent chance a firm does not achieve the desired results.

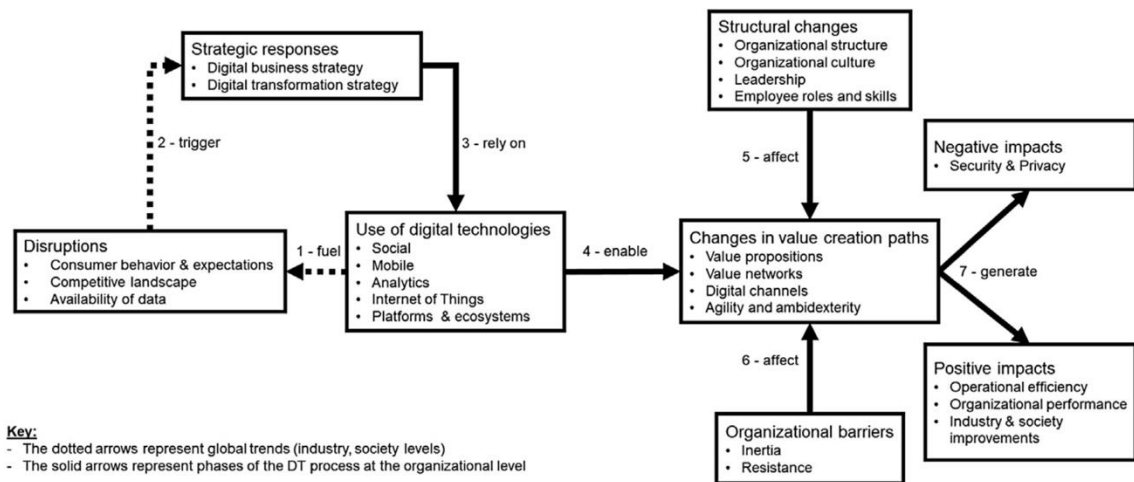


Figure 3: Building blocks of the digital transformation process

Based on the previous, it turns out the definition of DT gets more and more unified. Nevertheless, the negligence of the word ‘continuous’ incorporated in the DT definitions is remarkable. Although literature does underline DT must be perceived as a continuous process rather than a once-off initiative (e.g., Hanelt et al., 2021; Hess et al., 2016; Munns et al., 2022; Vial, 2019; Warner & Wäger, 2018), this important aspect tends to be neglected in the formulations of the definitions. Nonetheless, because using an already defined definition contributes to the validity of this thesis, the definition as formulated by Gong and Ribiere (2021) is used. As such, in this thesis DT is conceived as:

“A fundamental change process, enabled by the innovative use of digital technologies accompanied by the strategic leverage of key resources and capabilities, aiming to radically improve an entity and redefine its value proposition for its stakeholders.”

There are several reasons for why this specific definition is chosen. First, the authors have examined 134 reputable definitions of DT to come to this specific formulation. Hence, it is a comprehensive definition that is thoughtfully formulated. Moreover, the paper was published in 2021. As explained, the availability of DTechs changes rapidly and so does the meaning and impact of DT. Choosing a decade-old definition would therefore not be a sensible decision since it might be an obsolete one. Third, Gong and Ribiere (2021) mention in their definition the “*strategic leverage of key resources and capabilities*”. ‘Key resources’ involves human resources, financial resources, and knowledge resources.

This is closely linked to the concept of dynamic managerial capabilities (see 2.2.4). Moreover, ‘capabilities’ involves digital capabilities and dynamic capabilities. Hence, this definition fits the thesis’ dynamic capabilities perspective it has on DT.

2.1.4 Difference from IT-enabled organizational transformation

Now that DT has been defined, this sub-section elaborates on how DT differs from IT-enabled organizational transformation. Since DT eventually transforms an organization which is enabled by DTechs (i.e., IT), it can be said there is overlap between the concepts. In fact, literature on IT-enabled organizational transformation occasionally gets used to explain traits of DT (Vial, 2019). Nonetheless, it is relevant to deliberate on the difference to avoid confusion.

In essence, DT differs as its outcome is more fundamental rather than incremental as with IT-enabled organizational transformation. In addition, DT seems to be connected to organizational change in a more sophisticated manner. For this reason, it should be compared to literature in a different way (Hanelt et al., 2021). Additionally, DT is seen as an evolution of the IT-enabled transformation concept (Vial, 2019). Wessel et al. (2021) conducted research and merged literature from different fields to expose the difference between the two concepts. They found two characteristics in which the concepts differ.

First, DT results in the renewal of business models (Warner & Wäger, 2018). In other words, the way in which an organization creates value for their customers changes due to DT (Teece, 2010; Vial, 2019). This thought of Wessel et al. (2021) is in line with what has been previously discussed. However, this is not the case with IT-enabled organizational transformation. More specifically, according to Wessel et al. (2021), with IT-enabled organizational transformation, the focus is on exploiting DTechs to support the current value proposition.

Secondly, DT leads to fundamental changes and hence a new organizational identity. Conversely, IT-enabled organizational transformation consolidates the current organizational identity (Wessel et al., 2021). These two distinctions between the two concepts emphasize that DT is about fundamental and radical change indeed, while IT-enabled organizational transformation comprises more incremental, limited-sized changes.

2.1.5 Difference from business process reengineering

Not only IT-enabled organizational transformation is a research theme that is closely linked to DT. The same goes for business process reengineering (BPR). Interestingly, BPR is defined as “any radical change in the way in which an organization performs its

business activities” (Besson & Rowe, 2012). Evidently, this definition denotes that BPR is about radical change. Because DT revolves around radical change as well, it seems like the concepts are very much related. As a matter of fact, BPR aims to automate rule-based processes by means of technologies (Schallmo & Williams, 2018), which fits DT too.

Nevertheless, DT still differs from BPR. The distinction can be found in the approach. While BPR focuses on processes which are automated by technologies, DT goes beyond this and has a more data-oriented approach. Consequently, DT has the potential to generate and maintain more knowledge inside an organization. The gained knowledge in turn enables renewal of business models and operations. Though, one remark is that for DT, it is of crucial importance how employees handle and profit from the generated knowledge (Schallmo & Williams, 2018).

The renewal of business models and operations is comparable with Warner and Wäger (2018) their definition of DT. Although, Warner and Wäger (2018) do not explicitly mention DT has a data-oriented approach while in contrast, Schallmo and Williams (2018) formulate this data-oriented approach as the main cause of the renewal of business models and operations. Furthermore, a difference can be found in that DT aims to renew processes and decisions whereas BPR only improves, or rather ‘rethinks’ current processes (Schallmo & Williams, 2018). As described, IT-enabled organizational transformation equally has this characteristic of only ‘improving the current’ rather than renewing the current.

However, BPR is considered a fairly simplistic method compared to IT-enabled organizational transformation. The distinction can be found at the level of where the change occurs. BPR is more concerned with rethinking processes and therefore at a lower level, whereas IT-enabled organizational transformation pertains to changes at a higher, organizational, level, albeit incremental changes (Baiyere et al., 2020; Schallmo & Williams, 2018). These organizational level changes are also known as deep structure changes. One can only speak of organizational transformation when the deep structure of the organization is altered (Besson & Rowe, 2012), which is not the case with BPR.

2.1.6 Discussion

Clearly, DT as a concept has been given shape over the years and although it is becoming a more and more established research theme, thoughts and perspectives still differ. For example, opinions are divided as to whether DT is a process, and if so, what kind of process (e.g., ongoing, fundamental, organizational). Similarly, the formulation of the outcome of DT varies among research papers. Moreover, several other concepts are closely conceptualized to DT, which provokes questioning the actual existence of the

concept. Still, this thesis is of value because whether such a concept exists is abundantly clear, though one may question the relevance of having so many closely related concepts.

Narrowing down to the closely related concepts, it could be said indeed, that DT is rather a hype term and buzzword (Mergel et al., 2019; Warner & Wäger, 2018). As views on a research theme are inclined to change over time, it may be argued that it is needless to invent a new buzzword. To elaborate on this, the idea of DT being an ongoing process rather than a once-off initiative is reasonable new. In other words, what DT entails has been evolved and changed over time. Having IT-enabled organizational transformation as a concept which is so closely related, one of the terms can be seen as redundant. In addition, after having delved deeper into the difference between DT and IT-enabled organizational transformation, it gives the presumption that IT-enabled organizational transformation has much overlap with digitalization; they are both concerned with rather incremental changes enabled by DTechs. However, a distinction can be found in that digitalization has the characteristic that it has the purpose to improve business processes too, and not necessarily a whole business. But now, the difference from BPR has shrunk to a doubtful scenario because BPR pertains to lower-level changes (i.e., operational, process level).

All of this makes it justifiable to scrutinize literature that revolves around the discussed topics. Not to mention the noticeably lengthy formulation of the definition of DT. On the one hand, this long definition is required to express DT as accurately as possible. On the other hand, it does in fact not help with making this research theme more tangible. Nevertheless, the vast majority of the literature considers DT as a legitimate concept. Accordingly, the same is applicable to this thesis. Therefore, a comprehensive definition has been given to assure unambiguity in this thesis.

2.2 Dynamic capabilities

Although it had not yet become an actual theory, at around the 1990s the concept ‘dynamic capabilities’ got gradually shaped (e.g., by Barney, 1991; D’Aveni, 1994; Porter, 1980; Teece & Pisano, 1994). When one delves deep into extant literature on this theme, it is apparent that in the body of research, dynamic capabilities got only perceived as a legitimate concept after Teece et al. (1997) published their paper. Their research has led to discussion, criticism, and further research going through the ceiling even to this day.

‘Dynamic capabilities’ (hereafter DC) has its roots in the strategic management literature but has become a research theme of paramount importance in information systems literature as well. This section covers the origin of the term, the formal definition, the reason for why it is deemed so important, and how managers are involved. In addition,

literature will be examined with a discerning lens throughout this section, including the relationship to closely related concepts.

2.2.1 Origin

In this sub-section, the origin of DC will be presented. The purpose of this, is that in this way there will be created a connection with the concept's nature. This will ensure the formal definition of DC (sub-section 2.2.2) is more comprehensible. As the DC theory plays a significant role in this thesis, a profound understanding is of paramount importance. First, this sub-section outlines the environment has become more turbulent. Subsequently, it describes two prior theories that came as an answer to the more turbulent environment firms operate in.

In the current digital era, markets have become highly competitive (e.g., Lee et al., 2008; Marx et al., 2021; Nadarajah & Kadir, 2014). As a result, industries were described to find themselves in environments named 'hypercompetitive environments' (D'Aveni, 1994) or 'high-velocity environments' (Bourgeois & Eisenhardt, 1988). A hypercompetitive environment refers to the phenomenon of industries shifting from stable and predictable to an environment which is characterized by uncertainty and turbulence (D'Aveni, 1994). For instance, DTechs emerge at a fast pace, pressure from new market entrants has risen, and hence organizational change is an imperative for incumbents (Ilinitch et al., 1996). This does not only result in more competition, but also smarter and tougher competition (Moravveji et al., 2007). How to generate competitive advantage has changed radically and has become a challenge because of hypercompetition. However, DC is a theory that is argued to still result in and sustain competitive advantage, even in the contemporary hypercompetitive environment firms operate in (Wang & Ahmed, 2007).

As most theories, the DC concept has developed over time and is inductively built upon prior literature. Two theories in particular have been a foundation for DC and are rooted in the same research theme. The first theory was developed by Porter (1980) who concerned himself about competitive strategies. The resource-based view is the second theory developed by Barney (1991), which is predominantly an elaboration on Porter's theory. DC's origin lies in these two theories. However, before the illustration of Porter's and Barney's theories, the concept of environmental turbulence will be explained. With this concept, the linkage between the two prior theories and DC becomes easier to comprehend.

2.2.1.1 Environmental turbulence

In this ever-changing environment, firms get challenged with high levels of turbulence (Annarelli & Nonino, 2016; Bhamra et al., 2011). Turbulence implies that it is hard to make predictions for the future and thus uncertainty has prevailed. Environmental turbulence considers the degree of turbulence in an environment. When there is less predictability and a higher pace of change in the environment of a firm, there is more turbulence. In this description, ‘change’ refers to factors that need to be considered (Kipley et al., 2012). Examples of these factors are the developments of DTechs, new market entrants, and government regulations (Kipley et al., 2012; Vial, 2019) as well as the actions of competitors and the changed needs of customers (Pavlou & El Sawy, 2010). When dealing with turbulence in a wrong manner, a firm can for example lose customers, its way to distinguish from competitors, and eventually its reputation (Rego et al., 2022).

Environmental turbulence is composed of three elements. First, dynamism entails the frequency and the severity of change of environmental components. Second, complexity indicates the number of elements and interdependencies between them. Third, predictability describes the lack of resources for making predictions and is also referred to as uncertainty (Bhamra et al., 2011; Kipley et al., 2012). For this concept, Ansoff and McDonnell (1990) developed a model which classified five levels (Figure 4).

		Turbulence Level				
		1	2	3	4	5
Predictability	Environmental turbulence	Repetitive	Expanding	Changing	Discontinuous	Surprising
	Complexity	National Economic	–	Regional Technological	–	Global Socio-Political
	Familiarity of events	Familiar	Extrapolable		Discontinuous Familiar	Discontinuous Novel
	Rapidity of Change	Slower than response		Comparable to response		Faster than response
	Visibility of future	Recurring	Forecastable	Predictable	Partially Predictable	Unpredictable surprises

Figure 4: Environmental turbulence levels

2.2.1.2 Competitive advantage by Porter

Porter (1980) provided a framework with certain techniques for formulating an appropriate competitive strategy. This framework, known as ‘Porter's Five Forces Framework’, was designed to help firms with analyzing the environment. For instance, it provides techniques for identifying competitors and other participants in the market such as buyers and suppliers.

Together with Porter's 'generic strategies' concept (Porter, 1980), literature had been filled with aids to strive for competitive advantage. Competitive advantage has been a widely debated term. Although the term was said to not have a well-defined definition two decades ago (Ma, 2000), it is thereafter accurately formulated, albeit in different ways. One approach is that a firm is said to have competitive advantage (CA) when it can outperform others in the same market due to the utilization of certain resources and attributes (Lee & Yoo, 2019; Porter, 1985). Others have a different view and mention that CA has been achieved when a firm is implementing a value creating strategy that is not being implemented by a competitor at the same time (Barney, 1991; Rose et al., 2010). A third approach, which is more customer-centric, emphasizes that CA is achieved when a firm creates more economic value than its competitors. Economic value refers to the difference between the economic costs made for the customer, and the benefit perceived by the customer (Peteraf & Barney, 2003; Sigalas et al., 2013).

Complementary to this, literature started to acknowledge that technologies become more pervasive in value creating activities. Consequently, it has an impact on the competition. Differently put, technology plays an important role in creating CA (Porter, 1985).

2.2.1.3 Resource-based view by Barney

While generating a competitive advantage is a first step, it is temporary and thus transient, especially in hypercompetitive environments (Ambrosini & Bowman, 2009). Sustaining the competitive advantage requires more. An approach that elaborates on sustained competitive advantage is the resource-based view, which became more and more recognized (Rose et al., 2010) after Barney (1991) had established this view.

According to Barney (1991), sustained competitive advantage (SCA) has been achieved when a firm is implementing a value creating strategy that is not being implemented by a competitor at the same time, and when these competitors are not capable of duplicating the benefits of this strategy. Comparing this definition to the definition of CA (Barney, 1991; Rose et al., 2010), the impossibility of duplicating the value-creating strategy makes the CA sustainable. Accordingly, sustainability does not refer to a certain period of time, or even to environmental sustainability. In fact, it refers to the (im)possibility of duplication. Only when the CA continues to exist even after (failed) attempts of competitors to duplicate the value-creating strategy, it is considered SCA (Andersén et al., 2015; Barney, 1991; Nadarajah & Kadir, 2014). This characteristic differentiates the two concepts.

Taking a closer look at the value-creating strategy, the importance of firm resources reveals itself. After all, firm resources are the enablers of accomplishing the value-creating strategy. There has been debate around the explicit understanding of a firm resource

(Wade & Hulland, 2004). Nevertheless, Daft (1983) has defined firm resources as the attributes, capabilities and knowledge that help to devise and realize strategies that make the firm more successful.

However, not all firm resources contribute to the value-creating strategy. A firm resource can only contribute if it meets four requirements (Nevo & Wade, 2010). First, the resource must be valuable which means it enables a firm to devise strategies that make a firm more successful. Second, the resource must be rare and thus unique compared to competitors. Third, the resource must be inimitable which implies it is hard to duplicate. Fourth, the resource must be non-substitutable, or in other words irreplaceable. A resource has already the potential to create CA when it meets the first two requirements. For SCA, the resource must also comply with the last two requirements (Barney, 1991; Wade & Hulland, 2004).

The four requirements can be seen as empirical indicators regarding the extent to which a resource is heterogeneous and immobile. Firm resource heterogeneity entails the resource is not simultaneously possessed by another firm. Firm resource immobility describes the cost disadvantage a competitor must face during the attempt to develop, acquire and eventually use the specific resource (Mata et al., 1995).

This theory, which expounds the building blocks behind SCA, is incorporated in one model shown in Figure 5. It considers firm resources as the means through which a firm can create SCA. Hence, the theory is called the resource-based view (RBV) (Barney, 1991).

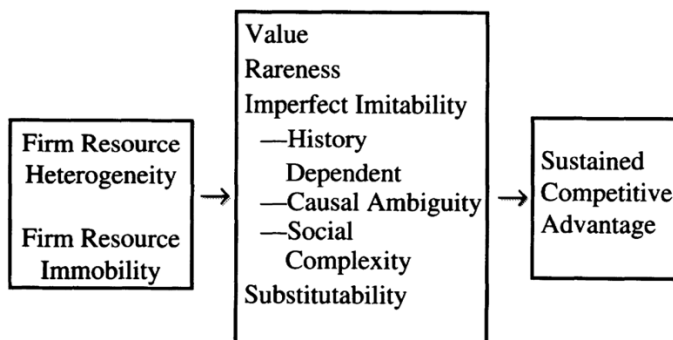


Figure 5: Resource-based view

Despite its evolution into a mature theory, the RBV has come under scrutiny for its static nature (Nadarajah & Kadir, 2014; Wang & Ahmed, 2007). Instead of assuming resources get surrounded by many factors of the external environment, the RBV utterly neglects this phenomenon (Nevo & Wade, 2011). Furthermore, the RBV does not focus on the underlying mechanisms of how exactly a firm can benefit from key resources that improve efficiency and effectiveness (Wade & Hulland, 2004). Because it under-emphasizes the role of the firm's external environment, the concept of dynamic capabilities has been introduced by academia to fill the shortcomings of the RBV.

2.2.2 Formal definition of dynamic capabilities

When looking at the five environmental turbulence levels (Figure 4), the concepts of CA and SCA (or rather the RBV) reflect themselves prominently. Environmental turbulence levels 1 and 2 match the traditional CA theory. Meanwhile, the RBV adds that the resource should be heterogeneous and immobile. Therefore, it can be placed in level 3. DC goes even beyond the RBV. DTechs create an impetus for firms to respond to the hyper-competition (Vial, 2019). Having this said, DC provides the important extension to the RBV by assuming a firm generally operates in an uncertain, rapid changing environment (Nevo & Wade, 2011). This assumption is required to understand today's high-velocity environments (Bourgeois & Eisenhardt, 1988), in which SCA seems unlikely (Wang & Ahmed, 2007). Following this statement, DC can be placed in levels 4 and 5 (Alexiou, 2021; Kurtz & Varvakis, 2016). These two most fierce environmental turbulence levels are characterized by an increasingly frequent occurrence of unpredictable and major environmental shifts in technological, competitive, and regulatory areas (Barreto, 2010; Pavlou & El Sawy, 2010).

The DC concept is originally defined by Teece et al. (1997, p. 516) as:

“The firm’s ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments.”

In this definition, competences also involve resources. Besides, not only is the goal of DC to address, but also shape rapidly changing business environments (Matarazzo et al., 2021; Teece, 2014). Likewise, DC can be used as an approach to understand and achieve newer sources of CA (Teece et al., 1997).

Existing of three main capabilities — sensing, seizing, and transforming — the concept is said to enable firms to create, deploy, and protect intangible assets that help a firm to maintain exceptional business performance (Teece, 2007). The phenomena that are the foundation of DC are, amongst others, skills, organizational structures, and decision rules. These so-called microfoundations underpin *sensing* of unexpected opportunities and threats, *seizing* required to address opportunities and neutralize threats, and *transforming* its resource base (Helfat & Peteraf, 2009; Teece, 2007; Teece et al., 1997). The three main capabilities are also conceived as entrepreneurial activities (Ambrosini & Altintas, 2019; Teece, 2014).

Following this, DC are conceived as enablers. The value of DC lies in how they alter the resource base, not necessarily in the capabilities themselves. Instead of acquiring new resources that fit the newly changed environment, reconfiguring them to ensure they are again (and thus still) a resource of CA is how DC provide advantage (Eisenhardt & Martin, 2000). Consequently, this is where it becomes apparent that the RBV is obsolete.

The aim of the RBV has been to create SCA with current resources. However, the severe shifts in industries force firms to acquire new resources, because the former resources are not a source of CA anymore in the newly changed environment. At some point, acquiring (i.e., investing in) new resources is unfeasible. Hence, DC aim to reconfigure resources already possessed by the firm. That is, another way of guaranteeing the firm possesses resources that are and will continue to be a source of CA (Teece et al., 1997; Warner & Wäger, 2018).

Decomposing the DC concept will also help to comprehend it. The term ‘dynamic’ refers to the ability to revise capabilities that are already developed to adapt to the changing environment (Teece et al., 1997; Zahra et al., 2006). The term ‘capability’ has more than one view. Teece et al. (1997) denote that ‘capability’ entails the indispensable role that the strategic management of a firm plays in enabling the firm to adapt its organizational capabilities to the changing environment. It has been pointed out that this definition is hardly different from Teece et al. (1997) their definition of DC (Wang & Ahmed, 2007). In contrast to Teece et al. (1997), in strategic management literature, ‘capability’ refers to the capacity to undertake a particular activity in a reliable manner when required. A reliable manner means the activity is carried out in a “minimally satisfactory manner” (Helfat & Winter, 2011). Another view on capabilities is that they consist of resources, but only the value-creating resources. It has even been argued that capabilities can result in CA (Nadarajah & Kadir, 2014).

In this thesis, DC will be approached in accordance with the original definition of Teece et al. (1997). The reason for this is that the body of research on DC tends to refer to this exact article when they define DC, also particularly in top journals covering Information Systems (IS) studies (e.g., MIS Quarterly and Information Systems Research (ISR), see e.g., Pavlou & El Sawy, 2010; Wade & Hulland, 2004) as well as in top journals publishing management and organization studies (e.g., Strategic Management Journal (SMJ) and Strategic Organization, see e.g., Adner & Helfat, 2003; Eisenhardt & Martin, 2000; Helfat & Peteraf, 2009). In contrast with DT, the definition of DC seems to be generally agreed upon.

2.2.3 Ordinary capabilities

Ordinary capabilities, in literature also known as zero-level capabilities or operational capabilities, are highly intertwined with DC but still distinguishable (Warner & Wäger, 2018). The distinction between the two is considered to be a critical issue (Helfat & Winter, 2011) and it is perhaps easier to understand the concept of DC when it is put side by side with ordinary capabilities (Teece, 2014). Therefore, this sub-section clarifies how the two are related.

Ordinary capabilities enable a firm to perform operational tasks to maintain the current position of a firm. Because ordinary capabilities are easy to replicate, they do not meet the requirements of firm resource immobility and are consequently not a source of SCA (Mata et al., 1995; Warner & Wäger, 2018). In addition, ordinary capabilities 'make a living' in the short term. This matches with a capability's evolutionary fitness, which refers to how well the capability enables a firm to make a living (Teece, 2007). Based on this, it can be said that ordinary capabilities help to achieve evolutionary fitness, but only in the short term. They cannot alter how a firm makes a living (Warner & Wäger, 2018).

On the contrary, DC enable a firm to alter how it makes a living. In fact, DC ensure that the ordinary capabilities of a firm change over time so that they are valuable in achieving evolutionary fitness again (Matarazzo et al., 2021). As a result, it has been argued that DC extend, adapt and create ordinary capabilities (Winter, 2003). In a high-velocity environment, DC function to reconfigure ordinary capabilities to fit the environment again (Matarazzo et al., 2021). Concludingly, ordinary capabilities are about doing things right, while DC are about doing the right things (Warner & Wäger, 2018).

2.2.4 *Dynamic managerial capabilities*

This sub-section outlines the importance of managers in building and maintaining DC. Ultimately, the concept 'dynamic managerial capabilities' will be defined.

DC themselves are capabilities at the organizational level. This is reflected in the definition of DC, namely "*the firm's ability to [...]*" (Teece et al., 1997). This definition illustrates DC are not the ability of an individual, but the ability of a firm. Similarly, Helfat and Peteraf (2009) stated that DC pertain to organizational skills and resources. In addition, after his publication in 1997, Teece (2007) indicated that the microfoundations of DC underpin the "*enterprise-level sensing, seizing, and reconfiguring*". Yet, it is at the managerial level where these microfoundations are being developed (Helfat & Peteraf, 2014).

The performance of routines is what DC is built upon (Feldman & Pentland, 2003). In other words, the firm's DC rest on the actions of individuals (de Souza & Forte, 2021; Yeow et al., 2018). Eisenhardt and Martin (2000) already stated that owing to how managers integrate, build, and reconfigure the resource base, a firm is able to achieve new sources of SCA. Moreover, managers play a crucial role in the sensing, seizing and transforming activities (Ambrosini & Altintas, 2019; Roberts et al., 2016). Ultimately, this prior research has led to a specific type of DC, introduced by Adner and Helfat (2003) as dynamic managerial capabilities (DMC). This concept has been defined by Adner and Helfat (2003, p. 1012) as:

“the capabilities with which managers build, integrate, and reconfigure organizational resources and competences.”

The DMC concept is an extension of the DC perspective by focusing on the role of the manager in building and maintaining DC (Helfat & Martin, 2015; Vial, 2019). DMC have three underlying attributes (Figure 6). First, managerial human capital refers to the acquired skills, knowledge, and experience of an individual. Second, managerial social capital involves internal (within the firm) and external relationships (i.e., social ties) that can exert a certain amount of influence, power, or control. These social ties are also commonly used to obtain information. For example, a manager might obtain information from the internal operational level or use his external network to obtain information about (best) practices in other firms. Third, managerial cognition indicates the competences needed to make strategic decisions (Adner & Helfat, 2003). Cognition entails processes like knowing, reasoning and processing information (Helfat & Peteraf, 2014) and therefore managerial cognition refers to an individual’s vision, perception, and interpretation needed for the sensing, seizing and transforming activities (Ambrosini & Altintas, 2019). As these three factors differ among managers, DMC are characterized by their heterogeneity. In fact, the three managerial attributes are intertwined in the sense that they may consolidate each other. This interplay of the three managerial attributes highlights DMC’s heterogeneity even more. For instance, the internal and external relationships a manager has provides access to information based on which a strategic decision can be made. Hence, a manager’s social capital has the potential to augment his managerial cognition for decision making (Adner & Helfat, 2003).

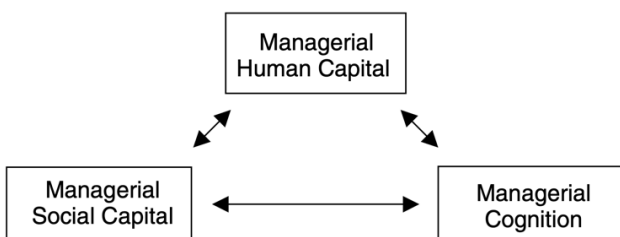


Figure 6: Underlying attributes of DMC

2.2.5 Discussion

Despite that academia in general have agreed with the formal definition of DC, the concept does not go without flaws. For instance, the definition has been criticized for its vagueness (e.g., Barreto, 2010; Winter, 2003), because it does not describe what DC actually are. As a consequence, literature tends to perceive DC in different ways. To demonstrate, DC have been considered to be simply processes (Wang & Ahmed, 2007), a set of

specific processes (Eisenhardt & Martin, 2000), created by processes (Ambrosini & Bowman, 2009), a set of routines (Ellström et al., 2022), and as an ability to modify routines (Zollo & Winter, 2002).

Yet, as illustrated, literature does consistently use the original definition (Teece et al., 1997), and with the exploratory approach of this thesis it might become more clear what DC actually are. Furthermore, this thesis directs attention to dynamic capabilities on managerial level (DMC), denoting that it can permit this issue. For this reason, the vagueness does not detract from the pertinence of this thesis.

With respect to the capacity of DC to create and sustain CA, several papers express a deviating belief. Even though DC hold the potential to create and sustain CA, this is not guaranteed (Helfat et al., 2007, chapter 3). In line with this, DC are more homogeneous “than is usually assumed” (Eisenhardt & Martin, 2000). This implies that they are not a source of SCA, as this requires heterogeneity. In addition, Eisenhardt and Martin (2000) outline that DC are useful for both moderately dynamic markets (i.e., lower environmental turbulence levels) and high-velocity markets (i.e., higher environmental turbulence levels). It is only that the pattern of the DC depends on how turbulent the market is. However, it has been argued that DC are principally applicable in higher environmental turbulence levels (Alexiou, 2021; Kurtz & Varvakis, 2016).

Contradicting to this, is that DMC are characterized by their heterogeneity. Expressed simply, one manager may be better in building and maintaining DC than one other (Adner & Helfat, 2003; Ambrosini & Altintas, 2019). Ultimately, the majority of the literature delineates DC as a source of SCA (e.g., Marx et al., 2021; Teece, 2007, 2014; Teece et al., 1997; Wang & Ahmed, 2007). For this reason, this is assumed to be the case in this thesis as well, although SCA is not part of the research design.

2.3 Connecting digital transformation with dynamic capabilities

After a diligent examination of the literature from the Information Systems Research field and Strategic Management field, a thoughtful connection can be made. As DT becomes increasingly important owing to the fact that it comes with serious opportunities and challenges that result in profound shifts, internally as well as in a firm’s environment (Kutzner et al., 2018; Scott & Orlikowski, 2022), studying it through a lens with a great potential can provide the body of research with innovatory findings. That is, the lens of DC.

DT is a source of change and disruption. The DC concept has been found fruitful in environments with a high turbulence level, meaning the two phenomena have an intriguing fit (Vial, 2019). However, with Warner and Wäger (2018) and a few smaller researches in other journals (e.g., Ellström et al., 2022; Li et al., 2018), DT has not yet been

extensively studied through the lens of DC. Warner and Wäger (2018) suggested a process model (Figure 7) consisting of nine organizational DC that explain ways of how firms can build DC for DT.

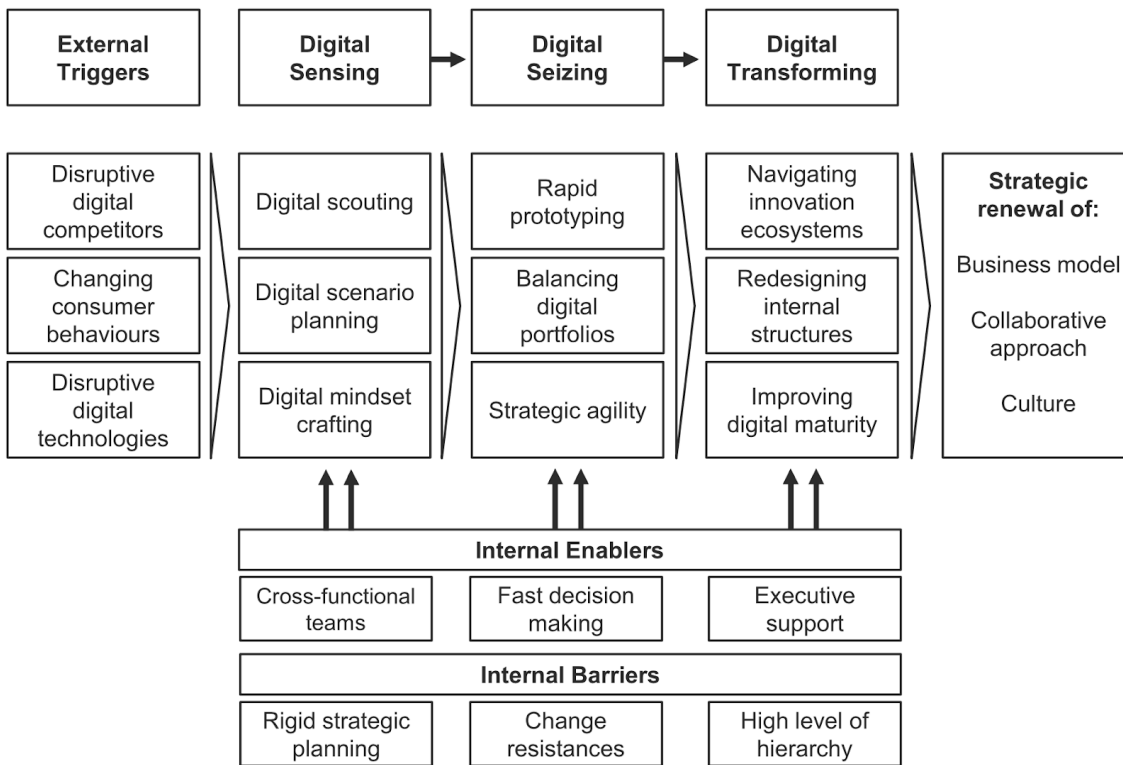


Figure 7: Building dynamic capabilities for digital transformation

Warner and Wäger (2018) have investigated concepts for how firms can build DC for DT. As these concepts are at the organizational level and hence rather intangible, directing attention to the managerial level adds to existing literature. This thesis focuses on the individual rather than the firm.

3 RESEARCH METHODOLOGY

Among others, Adner and Helfat (2003) have identified three underlying attributes of DMC. On the other side of the spectrum, ways to build organizational DC for DT have been identified in prior research. For instance, Warner and Wäger (2018) found nine organizational DC for DT. The research methodology of this thesis is designed to expose the DMC that are situated in the middle of the three underlying attributes of DMC and the organizational DC for DT. Accordingly, Figure 1 depicts what the empirical part of this thesis aimed to investigate.

Prior literature was used as foundation to come to the observation that these two sides of the spectrum potentially can be connected. For that reason, a deductive approach was used to put in place this thesis. Subsequently, the objective was to explore DMC contributing to the development of organizational DC for DT. Hence, the empirical part of this thesis has followed an inductive approach. Moreover, an attempt was made to relate the newly investigated DMC to the aforementioned prior studies. Thus, the inductive empirical part was complemented by a deductive approach to establish links between the newly investigated DMC and prior studies. In other words, the inductive and deductive approaches complemented each other throughout this thesis for a more complete understanding of the studied concepts. Initially, the organizational DC theory was already known and served as a lens. With openness of the researcher, findings can be linked back to prior research and new concepts can be found (Blackstone, 2018; Perry & Jensen, 2001).

The research methodology describes the way in which an answer to the research question is found. To begin with, the research design explains the qualitative approach, why a multiple case study is the preferred method, and boundaries of the cases. Furthermore, the unit of analysis is discussed. The second section elaborates on the data collection process and presents figures of the case studies and participants. Subsequently, the third and last section of this chapter discusses the data analysis methods. In this last chapter, emphasis is given to the three types of interviews used, as well as the transcribing- and coding process, and the within- and cross-case analysis. Again, arguments are given for each choice made for the research methodology.

3.1 Research design

3.1.1 Qualitative approach

The research design provides a framework for the collection and analysis of the data required for answering the research question (Maxwell, 2012). The research design for this thesis followed a qualitative approach. As this thesis sought to explore DMC contributing to the development of organizational DC for DT, a qualitative approach suited well as it is exploratory by nature. That is, finding out what is happening, investigating new insights, and generating ideas for new research (Robson, 2002). Translated to this thesis, ‘what is happening’ and ‘new insights’ refer to the newly investigated DMC. In addition, the newly investigated DMC led to ideas for new further research.

Beforehand, it was unclear which DMC might be possessed by IT managers. Using quantitative methods, like a survey, would therefore not have provided the data needed for answering the research question. Quantitative methods are rather restricted in terms of gathering new insights that complement already established studies, like insights as just mentioned. A qualitative method seemed therefore more fruitful (Kaplan & Maxwell, 2005). In addition, Miles et al. (2018) describe several strengths of qualitative data:

“One major feature of well-collected qualitative data is that they focus on naturally occurring, ordinary events in natural settings, so that we have a strong handle on what ‘real life’ is like. Qualitative data, with their emphasis on people’s lived experiences, are fundamentally well suited to locating the meanings people place on the events, processes, and structures of their lives and for connecting these meanings to the social world around them. [...] Another feature of qualitative data is their richness and holism, with strong potential for revealing complexity.”

This shows that qualitative data has the characteristic of carrying an individual’s experience. It is exactly that, what made this data form so applicable in this thesis. DMC are embedded in individuals’ actions. Getting to know their perspective, experience, and reasons for why they do what they do, is what was required to answer the research question. Qualitative methods offer a wide range of options, like observations, focus groups, and several types of interviews. Interviews should be chosen when you are interested in how something is or has been experienced or done by someone (Brett & Wheeler, 2021). Hence, in-depth interviews provided the most valuable data. In addition to experiences, the interviews also aimed to learn from participants’ feelings, thoughts, memories, interpretations and knowledge. Brett and Wheeler (2021) outline in which situations these thorough conversations are applicable:

“If you want to know how people understand their world and their lives, why not talk to them? Conversation is a basic mode of human interaction. Human beings talk with each other; they interact, pose questions, and answer questions. Through conversations we get to know other people and learn about their experiences, feelings, attitudes, and the world they live in. In an interview conversation, the researcher asks about, and listens to, what people themselves tell about their lived world.”

Next to this, Brett and Wheeler (2021) also demonstrate that the in-depth interview is the most popular qualitative research method because it offers a unique access to rich and nuanced data. This enables a researcher to capture in-depth details. Details are helpful for defining DMC in the highest detail level. This is the way how this thesis tried to stand out compared to other studies; it aimed to formulate detailed capabilities rather than abstract organizational-level capabilities. An acknowledged weakness of in-depth interviews is that participants may present inaccurate information. For this reason, the interviews are drafted with utmost precision. In addition, two participants per case study (hereafter just ‘case’) were interviewed to double the amount of perspective gathered within one case. Inaccuracy was therefore reduced already. Additionally to this, prevention of interviewer bias and interviewee bias was applied in order to generate higher research validity (Brett & Wheeler, 2021).

Interviewer bias was avoided as much as possible, by formulating questions that are not loaded (no assumptions nor pressure, and only applicable to the in-depth interviews), not double-barreled (only one question incorporated per question), unambiguous (only understandable in one way), and not double negative. Moreover, questions were formulated in an objective way to avoid expressing opinion and judging. Lastly, to avoid interviewer bias, all interviews were recorded and transcribed to avoid selective perception. After an interview, reasoning happens according to the information the interviewer absorbed. However, the interviewer may have missed pieces of information, e.g., due to a lack of concentration. Replaying the interview and transcribing every single letter spoken helped avoiding selective perception.

Similarly, interviewee bias was avoided as well. Obedience can have a negative impact on the reliability of questions. That is why each interview started with an introduction, a few notices, and asking for permissions. In this way, a comfortable atmosphere was created without any feeling of authority. An example is that in each interview, it has been mentioned that every answer is correct, so an interviewee does not have to be concerned about lacking knowledge. A question like *‘What does digital transformation mean?’* might give pressure, because an interviewee may be afraid of giving a wrong answer. The

convenient start of each interview contributed to avoiding this situation (Brett & Wheeler, 2021).

The research design followed a semi-structured interviews approach. This created the possibility to anticipate on participants' answers and deviate from the question list, with the purpose of gathering more in-depth information. While there was an initial direction of which data would be gathered, this semi-open approach capitalizes on gathering details about how a manager acts and performs. For this purpose, interview questions typically started with 'how' and 'why' (Myers, 2019). Before these open questions, several general questions about the firm and the participant themselves were asked to gather information about the firm, its domain and perhaps intriguing facts (Miles et al., 2018). All interviews, including the expert- and validation interviews which are discussed later in this chapter, were conducted in Dutch for the reason that participants can best express themselves in their mother tongue. For all interviews, a face-to-face meeting was given preference because nonverbal communication may positively influence the interpretation of answers as this adds an extra dimension. Nevertheless, not all participants were available on site (e.g., because of working remotely). Hence, eventually five of the ten interviews were conducted via MS Teams. For each interview, permission was requested for recording the interview and processing the data obtained.

Two other widely used qualitative methods are observations and focus groups. Nevertheless, for this thesis in-depth interviews would result in more meaningful results because the topic is relatively complex. A focus group with more people would have meant that not every participant has the required knowledge about the topic. In addition, the interaction a focus group brings would not add anything because the purpose of the empirical part is to gather capabilities from individuals. Moreover, focus groups impede participants to talk thoroughly about a topic, as they only have limited time. Devoting the full interview time to one individual means this person can discuss events in more detail. Regarding observations, a researcher does study an individual's behavior in detail which seems to have fitted this thesis. Though, the reason behind the behavior does not get exposed. Therefore, observations would not have led to the desired data, because this thesis intended to link capabilities to organizational DC. To be able to make this link, reasons for certain behavior are required (Brett & Wheeler, 2021). Finally, interviews were also the most feasible method due to resource constraints.

3.1.2 Multiple case study

This thesis followed a case study research design. In businesses, case study research is designed to use empirical evidence gathered in one or more cases. The goal is to study the case in its context (Myers, 2019). A case study is the preferred method when 'how'

and ‘why’ questions are being posed, and when the investigator has its focus on a contemporary concept within a real-life context (Yin, 2018). As these type of questions were needed to investigate the contemporary concept ‘DMC’ within its real-life context, a case study was the preferred method. In particular, this thesis followed a multiple case study design rather than a single case study design. Using multiple cases for evidence has several advantages over a single case study (Yin, 2018). Multiple case studies have more objective results, gather data about events rather than how people interpret events as with single case studies (Langley & Abdallah, 2011), allow wider exploring of research questions, create a more convincing theory since suggestions are based on more than one case context, and thus the findings are better generalizable (Eisenhardt & Graebner, 2007). Moreover, multiple case studies enable a researcher to analyze the data both within each situation and across situations. This can uncover contrasting results and similarities, preventing premature conclusion-drawing (Yin, 2018). For this reason, this thesis used multiple case study rather than a single case study.

It has been stated by Baxter and Jack (2008) that single case studies can lead to deeper understandings because one case gets investigated more thoroughly. However, this was not applicable for this thesis because dynamic *managerial* capabilities were investigated. Not many firms have several managers that can exert an influence on the DT of the firm. Having studied several cases allowed for interviews with managers that fitted better to the research. A drawback of multiple case studies can be seen in the costs of resources, resulting in less observation time per case (Baxter & Jack, 2008). Therefore, a balance was pursued to adopt the benefits of multiple case studies while simultaneously avoiding superficial analyses. Three cases were selected, with two interviews per case.

3.1.3 Boundaries of the cases

During the selection process of the cases, two boundaries were taken into account. First, the case had to concentrate on DT. Before contacting the firms, all available information was considered in advance to find out to what extent the firm is innovative with respect to DTechs. In addition, during the interviews, this was verified with several questions. The DT definition that this thesis followed was used to ascertain whether the firm was truly engaged in DT, and Figure 3 (Vial, 2019) was used to anticipate on answers. This implies that in answers on questions like ‘*What does DT mean for your firm?*’ focus has been on changes in value creation paths (e.g., renewed business model, positive external impact, etc.) and structural changes (e.g., changes in internal collaboration, changes in internal processes, etc.). All participants specified that DT has an impact on the firm. Therefore, with the unloaded question “In what way does DT have impact on your firm?” an even more detailed elaboration was gained. This contributed to finding in what way

DT has led or will be leading to radical business improvements for the cases. With this, all participants described that their firm made use of DTechs accompanied by the strategic leverage of key resources and capabilities, that resulted or will be resulting in radical improvements of the firm. As this matches the used definition in this thesis, namely the one formulated by Gong and Ribiere (2021), it was said that all firms found themselves in a DT.

Firm size (in number of employees) has had less attention, as long as a manager that has influence on the DT was available for an interview. As a result, mainly smaller firms have been part of this thesis as managers of multinationals are rather unreachable. For exploratory purposes, firms in different industries have been selected in order to gain broader insights. As explained in the previous sub-section, the sample size of the multiple case study was set at three to benefit from the strengths of multiple case studies as well as to avoid the weakness of having too little time for a thorough analysis. With this, the firms were sampled in line with the convenience sampling method.

3.1.4 Unit of analysis

As described in section 1.2, the unit of analysis was set at the individual level. This is an important fact because it is also one of the areas in which this thesis differentiates itself. Conducting interviews means that the unit of observation is set at the individual. This has also been the case with studies like the one Warner & Wäger (2018) conducted. In terms of the unit of analysis, however, they present their research question: “*How do incumbent firms in traditional industries build dynamic capabilities for digital transformation?*” (Warner & Wäger, 2018, p. 327). This demonstrates their focus has been on how incumbent firms build DC, in this thesis referred to as organizational DC. For this reason, they have been able to draw back conclusions to incumbent firms, not to individuals. After all, the unit of their findings is at the organizational level. This thesis aimed for the individual, to explore how managers in turn build organizational DC for DT.

3.2 Data collection

Data was collected within three cases. Details about the case studies are shown in Table 1. Before the in-depth interviews and validation interviews, two expert interviews were conducted with IT consultants (see Table 2). Judgment sampling is used, as there was chosen for IT consultants with at least several years of experience. The purpose of these interviews was to explore potential bottlenecks, biases, and other areas of concern which

could have occurred during the in-depth interviews. As IT consultants typically have experiences within a variety of firms, a wide range of contexts were taken into account. In contrast, the six in-depth interviews (see Table 3) were taken with roles like business development manager, IT manager, and managing director. For each of the three case companies, the manager in charge of IT (and DT) within the firm was selected, and a manager who does play a decisive role in the DT of the firm but is more business-oriented compared to the other participant within the same case study. This unfolded itself in obtaining two perspectives, allowing for deeper and more critical analysis. Even though it was a semi-structured interview, a structure was used for the interview which also prescribed how much time would be spent on a topic. The interview protocol is presented in Appendix 1: In-depth interview protocol. The topics mentioned were not explained to the participant. By not explaining the constructs in advance, an exploratory approach is pursued. This ensures a participant does not get biased during the interview and results in the most objective way of investigating crucial DMC. However, if the situation occurred that a participant truly did not understand a concept, it got explained in high detail to assure questions were understood. After which, two validation interviews were conducted to add to the reliability of this thesis (see Table 4). For this interview, participants were selected based on their experience for the reason that participants with more experience can recognize capabilities more easily. Hence, judgment sampling was used for this third interview type.

	Case A	Case B	Case C
Industry	Marketing and communications	Greeting card and stationery	Medical specialist care
Size (employees)	29	19	650 (100 non-healthcare)
Market focus	The Netherlands	Global	The Netherlands

Table 1: Sample overview

Participant	Position/role	IT consultancy experience	Duration
E1	Senior technical consultant	13 years	35 min.
E2	IT consultant	6 years	48 min.

Table 2: Expert interviews overview

Participant	Case	Position/role	Leadership experience	Duration
ID1	A	Head of IT Operations Manager	5 years	57 min.
ID2	A	Co-owner Marketing and New Business development	6 years	39 min.
ID3	B	International Marketing and Business Development Manager	2 years	42 min.
ID4	B	Managing Director	17 years	39 min.
ID5	C	Manager Digital Care & ICT	7 years	50 Min.
ID6	C	Manager Business Development	8 years	48 min.

Table 3: In-depth interviews overview

Participant	Position/role	Leadership experience	Duration
V1	ICT Manager	15 years	39 min.
V2	Chief Digital Transformation	12 years	45 min.

Table 4: Validation interviews overview

3.3 Data analysis

3.3.1 Expert interviews

First, the expert interviews were analyzed to find potential bottlenecks, biases, and other areas of concern which could have occurred during the in-depth interviews. In addition, keywords were sought to know more precisely how DMC can be exposed. This added to the validity of this thesis. First, the interviews were transcribed to not miss any details of the interview. For all interview transcriptions, a purchased version of Amberscript software was used. This software allows for transcription of Dutch recordings. The ten interviews resulted in a source of data of 154 pages of transcript (67.808 words). The transcription was carefully analyzed. No coding was performed as this is a time-consuming process against which the benefits do not outweigh.

3.3.2 *In-depth interviews*

3.3.2.1 *Coding method*

In-depth interviews were transcribed similarly to the expert interviews. There is a wide variation of qualitative data analysis techniques within case study research. Eventually, patterns need to be found that lead to themes or categories as this is part of the inductive approach of the empirical part. For this purpose, a coding method was preferred for the analysis of the in-depth interviews (Schoch, 2019). A student license of ATLAS.ti software was purchased for the coding process. The coding method as described by Strauss and Corbin (1998) was chosen in order to ensure a systematic coding process. Strauss and Corbin (1998) developed a coding method comprising three layers of codes. First, they describe open coding as an analytical process through which first order concepts are identified. This enables the discovery of the concepts' properties and dimensions. Subsequently, axial coding is the process of linking these identified concepts to categories. This is called 'axial' since this term refers to a middle point. The category is constituted of concepts at the axis or around the axis. In this way, each axial code contains concepts with similar properties and dimensions. After having conducted axial coding, clear patterns and theories get more and more established. Lastly, selective coding involves the process of integrating and refining these patterns and theories. Strauss and Corbin (1998) distinguish the three types of coding as follows:

“In open coding, the analyst is concerned with generating categories and their properties and then seeks to determine how categories vary dimensionally. In axial coding, categories are systematically developed and linked with subcategories. However, it is not until the major categories are finally integrated to form a larger theoretical scheme that the research findings take the form of theory. Selective coding is the process of integrating and refining categories.”

The process was executed as follows. After transcribing the interview, the transcript was uploaded in ATLAS.ti. Subsequently, open codes were added to phrases clearly stating a capability. On a rare occasion, the lack of a capability was stated. An open code was added to these phrases as well, as long as the importance of the capability got stressed (Eriksson & Kovalainen, 2008). In this way, a valid analysis could be performed. As this thesis studies the phenomenon through the lens of DC, the three organizational main capabilities sensing, seizing, and transforming were used as 2nd order categories. Additionally, a group of DMC was found that could not be assigned to one particular main capability. They were not applicable to only one main capability (e.g., managerial sensing),

but rather found within all the three main capabilities. Hence, a second data structure was constructed depicting fundamental capabilities as 2nd order categories. Moreover, as this thesis is exploratory from origin, participants from all three types of interviews also started to describe factors that underpin the three underlying attributes of DMC (i.e., human capital, social capital, and cognition). To convey these separate factors, a third data structure was built.

The DMC that could be linked to only one of the three main capabilities is depicted in Appendix 2: DMC underpinning Main Capabilities. Secondly, the DMC that are not solely linked to one of the three main capabilities but are applicable to all three main capabilities, are named the fundamental capabilities, illustrated in Appendix 3: DMC underpinning Fundamental Capabilities. The 2nd order categories serve as fundamental capabilities, and this data structure shows the DMC underpinning these fundamental capabilities. At last, Appendix 4: Factors underpinning Underlying Attributes demonstrates the factors underpinning the three underlying attributes of DMC. In other words, factors are identified that help improving the underlying attributes of DMC. Next to the three data structures, a pattern matching technique was used (Eriksson & Kovalainen, 2008) to link the found DMC that underpin the three main capabilities to the 1st order concepts defined by Warner and Wäger (2018). This data structure can be found in Appendix 5: . It should be noted that the DMC underpinning the fundamental capabilities are not linked to the 1st order concepts defined by Warner and Wäger (2018), as they linked their 1st order concepts to either one of the three main capabilities, which is not possible with the DMC underpinning the identified fundamental capabilities.

For the analysis, ATLAS.ti its functionalities were used to their fullest extent. For instance, the charts from the ‘quotation manager’ (see Appendix 6: ATLAS.ti quotation manager functionality) were used to keep track of incrementally emerging trends and the code-document table from the ‘reports’ module (see Appendix 7: ATLAS.ti reports functionality) was utilized for analyzing within- and across cases. This ensured that the interviews could systematically be analyzed in meticulous detail.

3.3.2.2 *Within-case analysis*

Analyzing data is considered to be the heart of generating a theory. Simultaneously, it is seen as the most difficult part (Eisenhardt, 1989). Therefore, rather than just diving deep into the analysis to find contrasting results and similarities, a more advanced technique is used. Namely, after the coding process, this thesis followed the within- and cross-case analysis method. Langley and Abdallah (2011) have performed a study where they compare the Gioia single-case study method with Eisenhardt’s multiple case study method which includes the within- and cross-case analysis technique. In this comparative study,

it is argued that Eisenhardt's theory is more about finding associations and finding causal relationships between concepts which you might have chosen before you collect the data. As this thesis uses the concept of organizational DC as lens, DMC will be identified accordingly, and linked to the three capabilities.

Moreover, according to Eisenhardt (1989) a within-case analysis enables a researcher to get familiar with data before conducting the heavy cross-case analysis. This contributes to gradually shaping a theory. Another strength of the within-case analysis is the systematic way in which it deals with the bulk of data gathered. Yet, the genuine main idea of the within-case analysis is to become intimately familiar with cases on their own. Therefore, a meaningful advantage is that a researcher becomes incrementally familiar with the gathered data. This allows for better pattern analysis of the cases separately, to avoid that a researcher draws premature generalizations without having studied each case solely. Moreover, by focusing on each case separately, a researcher has become acquainted with the data already before having conducted the cross-case analysis which assures a more accurate analysis of the cases together (Eisenhardt, 1989). Within-case analysis was thus the method resulting in the most accurate findings, and also comes as a solution to what according to Eisenhardt and Graebner (2007) is so important in multiple case studies:

“Central to building theory from case studies is replication logic. That is, each case serves as a distinct experiment that stands on its own as an analytic unit. Like a series of related laboratory experiments, multiple cases are discrete experiments that serve as replications, contrasts, and extensions to the emerging theory.”

3.3.2.3 Cross-case analysis

A cross-case analysis supplemented the within-case analysis to make the analysis process complete. This enabled to find patterns across cases. Patterns can either be similarities or differences (Langley & Abdallah, 2011). Regarding the characteristics of a cross-case analysis, it forces the researcher to look beyond the initial results of the within-case analysis. Again, this avoids premature conclusion-drawing (Khan & VanWynsberghe, 2008).

With regards to the three tactics for cross-case analysis described by Eisenhardt (1989), the cross-case analysis followed a similar approach as the first tactic. That is, categories were used to look for similarities and differences within groups and across groups. As this thesis comprised only three case studies and two different types of roles (i.e., one IT-oriented, and one more business-oriented), choosing purely for the first tactic makes the analysis unnecessarily complex and does not lead to more fruitful findings. Hence, no groups were compiled. Apart from this, according to Eisenhardt (1989), the

combination of within- and cross-case analysis allows for examining data through multiple lenses, or “*divergent ways*”. She mentions that the latter is key for a high-quality analysis:

“The tactics here are driven by the reality that people are notoriously poor processors of information. [...] The danger is that investigators reach premature and even false conclusions as a result of these information-processing biases. Thus, the key to good cross-case comparison is counteracting these tendencies by looking at the data in many divergent ways.”

3.3.3 *Validation interviews*

After the expert- and in-depth interviews, two validation interviews were conducted to add an extra control layer. Both interviews were taken with the objective of verifying whether the six participants of the in-depth interviews did not present inaccurate or false information. No coding was performed as this is a time-consuming process against which the benefits do not outweigh. Experience was the most important selection criteria because this ensures the participants could recognize and imagine in which scenarios they have or have not used the found DMC. As with the expert interviews, the validation interviews followed another interview protocol than the in-depth interviews. That is to say, the identified 2nd order categories were asked, and in the explanation, linkages were tried to make with identified DMC underpinning a particular 2nd order category. This extra control layer supplements the measures already taken for securing validity, and mainly reliability. By having had confirmation of the findings, validity increased because the validation interviews showed that the right constructs were measured. Reliability got even more significantly improved because indeed the findings were consistent with the validation interviews. While expert interviews aimed to increase the validity, the validation interviews have mostly improved the reliability of this thesis. It should be noted that for the validation interviews, occasionally loaded questions were asked; otherwise, the findings could not be examined. To know whether V1 or V2 recognized a specific DMC, the question had to be formulated in the structure of ‘*Do you recognize of [DMC] in your work activities too?*’. However, measures were taken to keep assumptions and pressure as minimal as possible. For instance, the word ‘important’ in questions was avoided. Additionally, before formulating a question, phrases like ‘*Some participants have mentioned the following DMC, and some haven’t...*’ were used to let the participant know that it is not the standard to possess or to not possess a certain DMC.

4 INTERVIEW ANALYSIS

This chapter discusses the findings of the three types of interviews each in a separate section. The expert interviews are discussed in the first section. The findings of the expert interviews are used for enhancing the in-depth interview protocol. Subsequently, the in-depth interviews are discussed in the third section, divided into two sub-sections for the within-case analysis and the cross-case analysis. This chapter closes with the third section, illustrating the findings and contribution of the validation interviews. Additionally, an attempt was made to establish associations between the 1st order concepts, internal enablers, and internal barriers defined by Warner and Wäger (2018). This pattern matching technique complements the inductive approach of this thesis.

As DMC are managerial capabilities, and DT is mostly a concern for roles situated toward the IT side of a firm, the ‘IT manager’ is generally the person who should possess the identified DMC. Therefore, the role ‘IT manager’ is used throughout this chapter. However, it might be that in a firm, the person who should possess the DMC has a different role in the firm. Additionally, it might be that there are several managerial roles who would fit the DMC. Nevertheless, in order to be consistent and clear, this chapter refers to this person as ‘IT manager’.

4.1 Expert interviews

The analysis of two the expert interviews has resulted in NUMBER findings. Senior technical consultant E1 kept emphasizing the importance of knowledge. With this, E1 referred to the knowledge an IT manager should possess, but also to the lacking knowledge of employees in a firm. Besides, managers usually do not possess the required knowledge about DT either. This fact was used during the interviews in a way that the keyword ‘knowledge’ immediately received utmost attention.

A second finding that emerged from both expert interviews, is that people tend to speak with ‘we’. However, this thesis aims to discover dynamic managerial (i.e., individual) capabilities. Thus, several questions were re-written before the first in-depth interview. Questions were modified in a way, so that participants noticed the interview is really about them. In addition, follow-up questions like *‘And how did you contribute to this?’* were prepared.

Thirdly, E2 outlined how miscommunication within DT initiatives frequently inhibit the speed of execution. Communication skills are deemed very important. As this is a skill, attention was directed to this topic when the interview moved on to the human capital subject. Not only knowledge and communication, but several other keywords could

be defined after the two expert interviews; agility, scrum, support-base for DT, no digital mindset among employees, too little time for DT, and insurmountable complexity are topics discussed during the expert interviews. With these keywords defined in advance, optimal preparation for the in-depth interviews was ensured. The keywords were assigned to phrases during the coding process. These codes functioned as ‘facts’. Together with the internal enablers and internal barriers that are empirically grounded by Warner and Wäger (2018), eight facts were found in the six in-depth interviews. These facts are used for the cross-case analysis, and are together with their frequency shown in Appendix 8: Identified facts.

4.2 In-depth interviews

In this section, within-case analysis and cross-case analysis are elaborated in two separate sub-sections according to the outcomes of the coding process. For each case, the first mentioned participant (odd numbered) is in charge of IT (and DT). The second mentioned participant (even numbered) does play a decisive role in the DT of the firm but is more business-oriented compared to the other participant within the same case study, allowing for obtaining two perspectives.

During and after the in-depth interviews process, the coding process was performed, meaning that the analysis involved an iterative process. Eventually, this has led to three data structures. The first and second data structures illustrate DMC. The difference is that the DMC in the first data structure underpin only one main capability. That is, either *managerial sensing*, *managerial seizing*, or *managerial transforming* (see Appendix 2: DMC underpinning Main Capabilities). On the contrary, the DMC in the second data structure could not be linked to either one of the main capabilities and are therefore named as fundamental capabilities, meaning that they underpin at least two of the three main capabilities (see Appendix 3: DMC underpinning Fundamental Capabilities). It should be noted that the term ‘managerial’ in the 2nd order categories of the first data structure has an important function. It implies that the DMC underpinning *managerial sensing* contribute to the development of organizational sensing, and the same goes for the other two main capabilities.

Next to the DMC underpinning main- and fundamental capabilities, a third data structure was constructed as participants described ways how they improve their *human capital*, *social capital*, and *cognition*. As a result, the third data structure depicts the factors that underpin these three underlying attributes. Additionally, as explained in the expert interview analysis, the identified facts were used for the analysis to be able to find underlying reasons for why certain DMC or factors were mentioned more frequently than others. Lastly, the established associations between the 1st order concepts defined by Warner

and Wäger (2018) and the identified DMC underpinning the main capabilities have resulted in a preliminary association structure depicted in Appendix 5: , which also shows three suggested modifications with regards to the 1st order concepts formulated by Warner and Wäger (2018).

4.2.1 *Within-case analysis*

In this section, each case is analyzed separately. This is done according to the five most frequently mentioned 1st order concepts within each case, as these five 1st order concepts illustrate the most important DMC and factors within the case. Although only one factor (i.e., not a DMC of the first- and second data structures) appeared in the list of five most frequently mentioned 1st order concepts, it was still included to ensure each 1st order concept was treated equally. Moreover, during the analysis of the five most frequently mentioned 1st order concepts, associated DMC and factors are used in order to elaborate more thoroughly as well as to demonstrate how strongly intertwined the DMC and factors are. Therefore, having the data structure Appendices (2, 3, 4 and 5) on a second screen might help comprehending the analysis. Each case starts with an introduction, and then presents the five most frequently mentioned 1st order concepts. The analysis continues with analyzing each of the five 1st order concepts solely. Finally, each case closes with a final remark paragraph.

4.2.1.1 *Case A*

Case A is a firm operating in the marketing and communications industry. It employs 29 people and focuses on the Dutch market (see Table 1 above). Within case A, ID1 (Head of IT | Operations Manager) is in charge of the IT infrastructure and is responsible for *analyzing the fit between sensed DTechs and internal resources*. For this, it turned out *cognition* is key, as well as *considering DT as an imperative*. Conversely, ID2 (Co-owner | Marketing and New Business development) has main responsibilities like consulting to customers, managing the marketing department, *formulating the (digital) strategy*, and directing employees toward this strategy so that they *accept redirection and change*. As case A has a strong digital focus, ID2 plays an important role in *ensuring the firm collectively wants to work toward DT*. In addition, ID2 emphasized the importance of *human capital*. The most frequently mentioned 1st order concepts that are identified are depicted in Table 5.

Data structure	Frequency	Dynamic managerial capabilities
Main – sensing	8	Brainstorm with colleagues
Main – sensing	7	Eagerly scan for potential DTechs
Main – sensing	7	Have a goal-oriented mindset
Fundamental	6	General communication skills
Main – seizing	6	Understand why employees have difficulties with DT

Table 5: Most frequently mentioned 1st order concepts within case A

Brainstorming with colleagues is ranked the most frequently mentioned 1st order concept of all in-depth interviews (mentioned 16x in total). It implies that employees and managers talk with each other about DT ideas they have on their mind. This can be discussed during informal lunch sessions, but also during strategic sessions with the management team. It involves brainstorming about sensed DTechs to gather different perspectives and opinions about an idea. This results in better decision making regarding choosing whether the sensed DTech genuinely has potential for the firm. Moreover, it contributes to DMC like *directing attention to DT* and creating a *coherent mindset* and helps with *understanding consequences of decisions*. ID2 about *brainstorming with colleagues*:

“I have seen this [DTech] somewhere at a customer's office, I can't remember exactly where, but that was really cool. And then I talked about it with colleagues. At a certain point someone said “that's great, I can definitely do something with that”. And not much later we started displaying all kinds of management information on screens so that it can always be seen real-time in the office.”

Before brainstorming, one should have identified a potential DTech by *eagerly scanning for potential DTechs*. For instance, this involves *leveraging your network*, meaning you actively raise topics revolving around DT while talking with your network. This can be with friends, business partners or customers. Besides, other resources like the internet or literature can be used to scan for potential DTechs. ID2 about *eagerly scanning for potential DTechs*:

“I have an RSS feed, Feedly, and there I am following several things topics like technology, business, and marketing. Certain blogs are very interesting, and you get to see things about that on a daily basis. It can be about blockchain to something Elon Musk is doing, or what's happening in the aviation industry right now. But either way, it keeps you up to date, and it enables you to envision something onto

your own business. That's what I find very helpful; to keep looking at how we could use something within our company."

Furthermore, after the brainstorming sessions, serious action has to be taken. In other words, an IT manager should *create urgency for DT* to address the sensed opportunity. To come to this stage, an IT manager should *have a goal-oriented mindset* meaning that motivation, determination, and perseverance are key for creating organizational DC like *scanning where to internally improve*. This goal-oriented mindset must also be exuded to employees, so that an IT manager *leads by example*. This will help with e.g., *creating enthusiasm among employees*. *Initiating cross-functional teams* is common within case A, and a goal-oriented mindset helps initiating these teams effectively. In addition, postponing DT initiatives also gets avoided. ID1 about *having a goal-oriented mindset*:

"We still have a static ERP system in use at present. This system still works with a client and has to be installed on a PC. So it's not online, and that's really a limiting factor for our future plans. We want to get rid of that before 2025. So action really has to be taken right now, because we still need to make serious progress."

The last two DMC in the five most frequently mentioned 1st order concepts within case A are *general communication skills* and *understanding why employees have difficulties with DT*. These two go hand in hand. First, general communication skills refer to capabilities like verbal- and nonverbal communication, clear- and transparent communication, and listening and writing. This capability is not added to *human capital* as it became more and more fundamental and is thus not solely associated to *human capital*. Therefore, it is part of the fundamental DMC. One reason for why communication is so important, is to *understand why employees have difficulties with DT*. As such, last mentioned DMC goes hand in hand with *general communication skills*. An IT manager should be able to *sense the current mindset of employees* to know how to act in a way to eventually ensure employees *accept redirection and change*. In case A, it has become apparent that *showing empathy* complements *understanding why employees have difficulties with DT*. Both are deemed very important, as this helps to *ensure the firm collectively wants to work toward DT*. ID2 about *general communication skills* and *understanding why employees have difficulties with DT*:

"[...] Again, that's communication. I recently took a course in neurolinguistic programming. The skills you learned there also apply to this very well, because you can use it when you want to see whether people are succeeding, or what kind of feeling they have about it [the DT initiative]. And asking the right questions to them."

Then they really will tell you in the end how they think about it. [...] This is the way you will find each other and come to a solution.”

This quote also emphasizes the importance of having an *active attitude toward learning*, underpinning *human capital* which is a 2nd order category that was notably emphasized by ID2. This stands to reason, as one of ID2's main tasks is to direct employees toward the formulated digital strategy. DMC belonging to this clearly require experience over the years, and knowledge gained by education. Remarkably, ID2 has not mentioned any of the identified DMC *consulting advice from external experts*, *initiating cross-functional teams* and *preparing a project implementation plan*. On the contrary, ID1 did frequently mention these three DMC. Moreover, *creating urgency for DT* is also a DMC only performed by ID1. Conversely, ID2 *concentrates more on communication* and on *eagerly scanning for potential DTechs*. To close the analysis of case A, a concluding remark is that the two participants nicely complement each other regarding the division of labor.

4.2.1.2 Case B

Case B is a firm operating in the greeting card and stationery industry. It employs 19 people and focuses on the global market (see Table 1). The value proposition of case B is described as creating “*value for the end consumer by providing a product with emotional value*” (ID3). Next to delivering value to the end consumer, case B also operates in one layer lower in the supply chain. In other words, they sell their products to distributors that subsequently sell the products to the end consumers. As it is a rather small firm, ID3 (International Marketing and Business Development Manager) its responsibilities can be split in two. On the one side, ID3 is responsible for international marketing, i.e., managing customer relationships with distributors all around the world except Afrika and Latin America. On the other hand, ID3 is responsible for business development, involving activities like *scanning internally where to improve* and looking for new markets with new products that fit their area of expertise. For this, *establishing a long-term digital vision* was described as important. ID4 (Managing Director) is responsible for “*everything*” (ID4). Since case B finds itself in a digital transformation which started a few years ago, ID4 is dedicated to *identifying the digital workforce maturity* and *external recruiting of digital natives*. The most frequently mentioned 1st order concepts that are identified are depicted in Table 6.

Data structure	Frequency	Dynamic managerial capabilities
Main – sensing	6	Assign an ambassador
Attributes – cognition	6	Don't glorify; be realistic
Main – sensing	6	Eagerly scan for potential DTechs
Fundamental	6	Timely involve the right people
Fundamental	5	Encourage employees to take initiative

Table 6: Most frequently mentioned 1st order concepts within case B

Both participants indicated that assigning an ambassador to a particular DT initiative is of paramount importance. Case B does not have a dedicated role for DT, which stands to reason given its size. Consequently, DT does not always get priority while *considering DT as an imperative* is seen as important within case B. Therefore, an IT manager should be capable of *assigning an ambassador* as it provides a solution to remedy this issue. An ambassador has several requirements. For instance, they should (be provided with the resources to) take the lead, have time for DT, have the right knowledge, and be in *awe* to be able to exert influence on the stakeholders. Examples of ambassadors are a Chief Digital Officer (CDO), digitally minded people, or the IT manager can assign themselves to a particular DT initiative. ID3 about *assigning an ambassador*:

“If you want to change something in that area, you need someone to give it a try and be enthusiastic about it. A kind of ambassador for a project, so to speak.”

An important factor for a successful DT is that you *don't glorify* it. An IT manager should be *goal-oriented* yet not underestimate how difficult it is to achieve the goal. Hence, this factor goes hand in hand with *recognizing DT's difficulty*. As you need *cognition* to estimate DT's difficulty, the factor of *not glorifying* is categorized as an underpinning factor of the underlying attribute *cognition*. An example within case B revolved around how to capitalize on a newly implemented system. ID4 indicated that employees should be *provided with trainings*, or an IT manager should *provide help* themselves. ID4 used a metaphor to describe how important it is to train employees and not *glorify; but be realistic*:

“I can go and buy a Ferrari, but if I haven't learned how to drive that thing on a track, I'll crash it.”

Third, an IT manager should *eagerly scan for potential DTechs*, corresponding to the organizational sensing capability. Next to what has been mentioned about this DMC in the analysis of case A, it is interesting to see how this capability helps with *analyzing the*

fit between sensed DTechs and internal resources. Although last mentioned is not a 2nd order category of the aforementioned DMC, they do have a clear association. This is further elaborated by ID3:

“You need to scan for what is available in the external environment. Subsequently you can think 'what will work for us?' Well, then you should scan where inside the organization we need this. Then you take a look at the available systems and find a fit. In this way, you can link the components to make it fit.”

A fundamental capability within case B pertains to *timely involving the right people*. This is, together with *brainstorming with colleagues*, the most frequently mentioned 1st order concept of all in-depth interviews (mentioned 16x in total). Brainstorming does even contribute to involving people, as you involve them in your perception. In this way, people are informed, feel relevant, and can complement with their expertise. After having sensed a DT opportunity, and you want to seize it, ensure as an IT manager you involve the right people from the beginning until the DT initiative has been implemented and even further. The ‘right’ people refers to all employees getting affected by the transformation and having input owing to their knowledge, experience or other expertise. Therefore, related DMC are *considering how the DT initiative will affect the firm, consider employees' demands, and searching for colleagues with required knowledge*. ID4 about *timely involving the right people*:

“What we did was already involving people who have to work with it in the preparation phase [of the CRM-system initiative]. Because if you don't do that, and you start figuring it out on your own, then they are not informed, and you can overlook things. Then the project is doomed to fail.”

Case B’s DT started to advance three years ago. At that time, the firm employed a number of specialists in the field that had worked there for years already. They can be described as laggards. While the firm recognized and *created urgency for DT*, the specialists needed to be retained. One exceptionally well working method is to spread the enthusiasm by capitalizing on people that already are excited. *Showing excitement for DT* has a positive effect on the laggards within the firm. This was apparent within case B, as ID4 emphasized the strategy of *encouraging employees to take initiative*. This implies an IT manager should provide the resources, e.g., budget and time, and space for trial-and-error. In particular, this means an IT manager should give the space to make mistakes in order to eventually find a desired result. As mentioned, case B employed several laggards who

needed to be retained for their specialism. Therefore, encouraging the people already excited about DT has a positive influence on the laggards. With this, an IT manager also *pursues an entrepreneurial mindset*. ID4 about *encouraging employees to take initiative*:

“In the first instance you try to motivate people to take initiative themselves, in order to let them think: ‘I want to know more about this, what advantages can this bring?’ Then they get to work on it, and they will also tell other colleagues: ‘look, if you do it this way, you can work much more efficient’. [...] To that end, you have to give them the space not only to take initiative, but also to make mistakes. Because I can say: ‘well, I think that’s not going to work, so don’t start with it’. No, let them figure it out themselves, because then they’ll learn. And by giving them that encouragement, they will stay in that entrepreneurial mindset. And that’s what you need.”

Remarkable within case B is the distinction in roles between ID3 and ID4 while they both work toward the same goal, namely, to let DT succeed in a firm with noticeable resistance (see Appendix 8: Identified facts). ID4 uses their *cognition*, like *not glorifying DT but being realistic* and their *belief*, to eventually *ensure the firm collectively wants to work toward DT*. ID4 has also mentioned the importance of *providing training to employees* and *hiring young professionals to improve digital maturity*. It has been acknowledged during the interviews that young and digitally minded people are more inclined to take initiative, of which its importance has just been outlined.

ID3 clearly concentrates on communication (mentioned 7x), and *anticipating internal responses to DT* in particular. In addition, ID3 tries to *design team-based structures* by *assigned an ambassador* to DT initiatives and *initiating evaluation sessions after implementation* to “*collect comments*” (ID3). This helps for example with bending the newly implemented system to the taste of the users to ensure they actually are going to work with it properly. It has been found that if a system does not meet the taste of the user, them is unlikely to use the system to its full potential.

4.2.1.3 Case C

Case C is a firm operating in the medical specialist care industry. It employs 650 people of which 100 non-healthcare and focuses on the Dutch market (see Table 1). Within case C, ID5 (Manager Digital Care & ICT) is in charge of IT (and DT) and is responsible for the IT department. Besides, an important role is to *analyze the fit between sensed DTechs and internal resources*. As such, *critical thinking* is a crucial factor for ID5, as well as *analyzing how internal resources are interconnected*. ID6 (Manager Business Development) has overlap with ID5’s role, albeit a more business-oriented role. ID6 is responsible

for digitizing healthcare in general, and market exploration. The latter refers to looking at what is happening in the market, and how the firm can respond to it. Due to the project driven approach, the most frequently mentioned 1st order concepts that are identified (depicted in Table 7) are also found in that area.

Data structure	Frequency	Dynamic managerial capabilities
Fundamental	10	Timely involve the right people
Fundamental	7	Direct attention to DT
Main – transforming	7	Ensure colleagues are up-to-date on each other’s work
Main – transforming	6	Prepare project implementation plan
Fundamental	5	Create support-base

Table 7: Most frequently mentioned 1st order concepts within case C

As a result of the project-driven approach, *timely involving the right people* was the most frequently mentioned 1st order concept within case C. Predominately, the low level of hierarchy enables short lines of communication, making it easier to *involve the right people* from the start of a DT initiative. This capability also contributes to *analyzing how internal resources are interconnected* as you gain multiple perspectives and *employees’ demands* at an early stage. ID6 about *timely involving the right people*:

As an organization, what we really excel at is involving the right people internally at an early stage. That goes for the healthcare staff as well as the [board of] directors. The directors are very accessible; they walk by and are therefore very present at the locations. That shows that we are an organization with very short lines of communication. Everyone knows where to find each other and therefore an implementation process is often easier.

Involving people also indirectly means you are *directing attention to DT*. Given this point, it can be said that the 2nd order category *considering DT as an imperative* is key within case C as both DMC are placed therein. Overall, it has been mentioned that DT is not always seen as highest priority. With this in mind, *directing attention to DT* is a fundamental capability contributing to the development of organizational DC for DT. To elaborate further, an example given within case C was the distribution of a company newsletter. This means of communication proved to be effective because it contributed to *creating a coherent mindset*. Apart from this, *convincing colleagues* also benefits from *direct-*

ing attention to DT. As colleagues are more aware of DT's priority as well as more informed about DT, convincing them is perceived to be easier versus randomly telling people they have to change their practices and habits. ID6 about *directing attention to DT*:

"I believe that's the only way, to include people in the [DT initiative] project. Because I am sure that healthcare workers choose healthcare because they want to help people and make healthcare better. And the moment you can convince them with arguments that the new DT initiative will enable them to help their clients better, you'll get them to support you. Because that's what drives them. But then you have to involve them. If you approach it from that angle, then it will work."

Furthermore, *designing team-based structures* appeared to be an essential organizational DC. In addition to other DMC belonging to this organizational DC, *ensuring colleagues are up-to-date on each other's work* and *preparing a project implementation plan* were both frequently mentioned during the empirical research within case C. An IT manager should perceive within the firm how DT initiatives are going, and whether colleagues inform each other about their work activities. This ensures alignment within the firm. Colleagues need to meet up to discuss status-updates, current work activities, impediments, and other relevant issues regarding a project. Therefore, an IT manager should ensure he has *access to information* in pursuance of taking measures in time.

It has been said that the skill of sensing whether *colleagues are up-to-date on each other's work* will be improved over time. That is to say, *human capital*, and in particular *learning from previous DT initiatives*, helps recognizing certain situations in which colleagues are not up-to-date. Moments of contact, which help ensuring aforementioned DMC, also need to be captured in a *project implementation plan*. Additionally, responsibilities, expected benefits, critical success factors, stakeholders, budget, and deadline are components a project implementation plan is composed of. ID5 about *ensuring colleagues are up-to-date on each other's work* and *preparing a project implementation plan*:

"Things like success factors need to be translated into a plan. You prepare such a document, and not only with 'we will start on that day', but also the stages in between and moments of contact. [...] As part of my role, it is crucial that the planning runs smoothly, so I need to receive the right information to take measures in time if needed. [...] When there is a moment of contact, and I'm noticing that the planning is no longer in accordance, then I can take measures in time."

In connection to *directing attention to DT*, *creating support-base* for a certain DT initiative is considered fundamental within case C. As mentioned, *convincing colleagues* benefits from *directing attention to DT* and so does *creating support-base*. According to Appendix 3: DMC underpinning Fundamental Capabilities, this is a logical conclusion as *convincing colleagues* and *creating support-base* both are appropriately placed within the 2nd order category *ensuring the firm collectively wants to work toward DT*. Typically, an IT manager needs to be confident and have *knowledge about the right things to create support-base*. ID5 about *creating support-base*:

“You need support-base within your business. Support-base is very important and as far as I'm concerned, it starts at the top and slowly trickles down into the organization. By this I mean that you also need to create support within the board of directors. That's why we involved them in the process, so that they are aware of what is going to happen and that they already support it. You will notice that if the board of directors are enthusiastic about it [the DT initiative], they will spread it throughout the company.”

Strikingly, none of the DMC underpinning *managerial sensing* were reflected within the five most frequently mentioned 1st order concepts within case C. Both participants directed most attention to the other two main capabilities. Nevertheless, DMC like *brainstorming with colleagues* and *deciding on future software requirements* were discussed as well, albeit less than the other two main capabilities.

4.2.2 Cross-case analysis

Now that the within-case analysis has been conducted, this chapter discusses the cross-case analysis according to the first analysis tactic (Eisenhardt, 1989), which makes use of categories (see 3.3.2.3). For this reason, a visualization is made to make patterns across cases more conspicuous. Patterns can either be similarities or differences (Langley & Abdallah, 2011). In this visualization, the three aforementioned data structures are separated. The 2nd order categories of the data structures function as categories used following the first analysis tactic (Eisenhardt, 1989). For the DMC underpinning the main capabilities (see Appendix 2: DMC underpinning Main Capabilities), the three 2nd order categories *managerial sensing*, *managerial seizing*, and *managerial transforming* are chosen as categories. For the identified DMC underpinning the fundamental capabilities (see Appendix 3: DMC underpinning Fundamental Capabilities), the five 2nd order categories are used as categories. For the factors underpinning the underlying attributes (see Appendix

4: Factors underpinning Underlying Attributes), the three 2nd order categories are selected as categories.

The cross-case analysis visualization is shown in Figure 8 below. Each case amounts to 100% within one data structure. To elaborate with an example, for the Main Capabilities data structure, *managerial sensing* (49%), *managerial seizing* (29%), and *managerial transforming* (22%) DMC were found within case A (grey bar). The percentages are determined as follows. For each case, the total amount of open codes assigned to the DMC corresponding to the 2nd order category *managerial sensing* (e.g., *brainstorming with colleagues*, and *interpreting future software requirements*) were divided by the total amount of open codes assigned to DMC within one data structure (the Main Capabilities data structure, in this example). For case study A, 45 open codes were assigned to DMC corresponding to *managerial sensing*. In total, 92 open codes were assigned to DMC underpinning the three main capabilities (i.e., *managerial sensing*, *managerial seizing*, and *managerial transforming*). Concludingly, *managerial sensing* forms $45/92 = 49\%$ of all DMC underpinning the three main capabilities.

Solely, this percentage is difficult to analyze within cases as not every category has the same number of DMC. For instance, in the case of the main capabilities data structure, 12 DMC were identified corresponding to *sensing*, 10 DMC were identified corresponding to *seizing*, and 13 DMC were identified corresponding to *transforming*. When one analyzes a single case, it could be that *transforming* is averagely more present than *seizing* as there are 3 DMC more in the first mentioned category. However, for a cross-case analysis, this fact can be neglected as this is only about the differences within one category across cases. Moreover, normalizing the values according to the number of DMC per category eliminates the valuable fact that one category is more significantly present than others.

For this purpose, a clustered bar chart was chosen. This chart, depicted in Figure 8, presents the case companies within one 2nd order category next to each other in order to demonstrate the similarities and differences as conspicuously as possible. In addition, patterns across 2nd order categories (which is only possible to do within the same data structure) can easily be perceived as they are placed one below the other. When looking at Figure 8, it becomes apparent that in general there are mostly similarities. Only in a rare occasion, the bars show a contradiction. It is crucial to note that the data structures cannot be compared to each other. That is, e.g., stating that *managerial sensing* (part of the main capabilities data structure) is a more important 2nd order category than *having a vigilant mindset* (part of the fundamental capabilities data structure) is an incorrect conclusion. As the data structures are highly intertwined, and as the DMC contribute to and complement each other, the 2nd order categories can only be compared within the same data structure. Furthermore, it is rather a coincidence that there are five 2nd order categories formulated within the fundamental capabilities data structure. This could have been

ten 2nd order categories as well, which would have resulted in the statistic that a 2nd order category of the fundamental capabilities data structure is extremely likely to be considered less important than *managerial sensing*, for example. Hence, the earlier explained calculation considers the number of DMC within one data structure.

Based on this, it can be said that the only drawback of the clustered bar chart is that if one takes only a brief look at the chart, they might draw incorrect conclusions. For all other purposes (improved comparability, more conspicuous patterns, enhanced overview), the clustered bar chart still offered an appropriate way for conducting the cross-case analysis. This sub-section further elaborates on Figure 8. The three data structures are used to divide the cross-case analysis into manageable portions. Moreover, within each data structure, every category is solely discussed, ending with a quote.

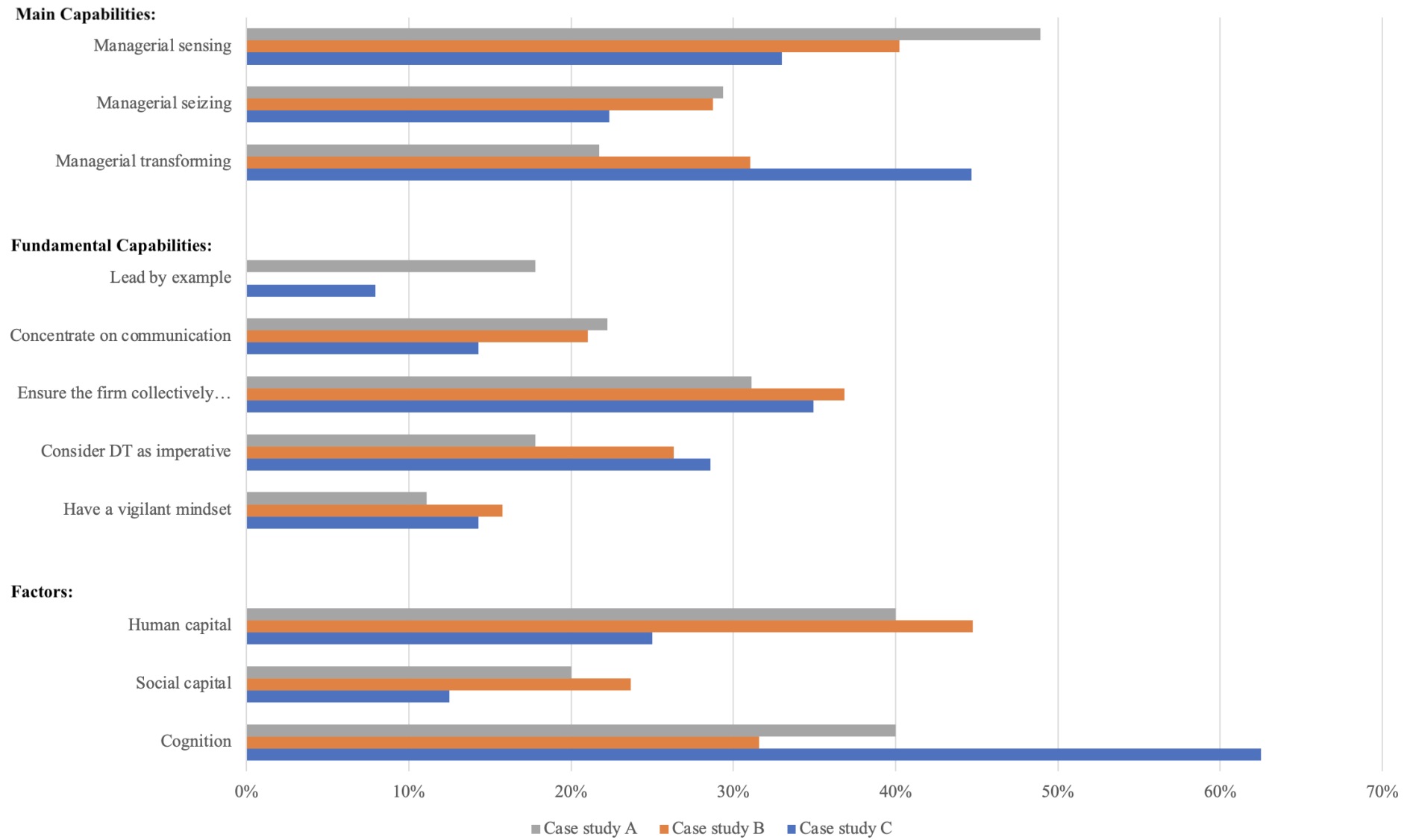


Figure 8: Cross-case analysis

4.2.2.1 DMC underpinning Main Capabilities

As Figure 8 exposes, case A is most focused on *managerial sensing*, and least focused on *transforming*. Contrarily, case C is identified as a more *transforming*-focused firm while case B is positioned in the middle of the two extremes. This fact is clearly reflected in the within-case analysis; case A has most frequently mentioned 1st order concepts like *brainstorming with colleagues* and *having a goal-oriented mindset*, while case C mentioned DMC like *ensuring colleagues are up-to-date on each other's work, preparing a project implementation plan*, but also *considering outsourcing IT* which is also part of the *managerial transforming* category. Striking is that the *managerial sensing* capability *consider employees' demands* is outlined three times in case A, zero times in case B, and only once in case C. ID1 about why this is so important:

“For the production department, of course, very different things [for a future IT system] are important and so you will get very different input than from someone working in the office, or in any case working on it in a different way. [...] So you have to include every perspective. That's the most important thing. Because I'm looking at it very differently compared to someone who will be using the system all day every day.”

An interesting result in terms of *managerial seizing* is that only case A did not mention that one should *only digitize if necessary*. Alternatively stated, an IT manager should be capable of making the right decision regarding starting or rejecting a potential DT initiative. Some may or may not be beneficial in the end and digitizing without a defined purpose may lead to disadvantageous outcomes. About this issue, ID6 outlined the following:

“It [the DT initiative] must add value to the healthcare process. It should not be a case of digitizing for the sake of digitizing. Nor should it be at the expense of the quality of care. [...] That's why I think a hybrid model sometimes offers a solution.”

An organizational seizing capability identified by Warner and Wäger (2018) is *accepting redirection and change*. During the interviews, three corresponding DMC were identified and together seen as similarly important within all three case companies. One has already been explained in the within-case analysis of case A, namely *understanding why employees have difficulties with DT*. In addition to this DMC, an IT manager should be capable of *showing empathy* and *showing advantages of DT*. For both DMC, *general communication skills* (like listening) are needed, as well as other communication capabilities like

anticipating internal responses on DT and sensing the current mindset of employees (which are DMC underpinning fundamental capabilities).

With respect to *managerial transforming* capabilities, a difference can be noted. This might have to do with the fact that case C employs more people. Accordingly, it was noted that there are by default more mechanisms for *organizational sensing* and hence fewer *managerial sensing* capabilities needed, while *transforming* the resource base is becoming increasingly difficult because case C expanded exponentially in the last few years. Therefore, it was stated that an IT manager should be capable of *preparing a project implementation plan* and *initiating cross-functional teams* to not only seize on the sensed potential DTechs, but as such also transform the firm's resources if needed. It was found that both aforementioned DMC contribute to enabling a firm to *design team-based structures*, which is an organizational seizing capability identified by Warner and Wäger (2018). Apart from this, it was stated in all three firms, albeit most frequently in case C, that an IT manager should *consider outsourcing IT*. Regarding this DMC, a comprehensive perspective was given by ID5:

“We really want to concentrate on what we're good at. And taking this part in-house would not contribute to that. [...] Also, I think that when you provide a service that has an SLA on it.... So that means that if you don't deliver what you have promised, then you will really get screwed... In that case, I would prefer to take care of it in-house, because I want to be able to give guarantee. And in the case of managing it in-house I'm not afraid to give this guarantee because I have it more in control. In other words, at the moment that things do go wrong, you can take immediate action instead of having to contact the outsource partner for this.”

4.2.2.2 DMC underpinning Fundamental Capabilities

Lead by example is a category which was evidently present in case A, slightly less present in case C, though not present at all in case B. The 2nd order category implies that an IT manager should guide employees through its own behavior. *Pushing people* to change is not a solution and thus saying that they must change does not lead to the desired result. Hence, the identified category *leading by example* with the intention to inspire employees to copy the behavior of the IT manager was seen as a better approach. More specifically, three DMC were identified that ultimately were grouped together to form this category. *Showing dedication to DT*, *showing a digital mindset*, and *showing excitement for DT* are ways to *lead by example*. With regards to factors underpinning the underlying attributes

of DMC, it has also been found that an IT manager should exude self-confidence (formulated as being *awe-inspiring*) and have an *active attitude toward searching for DTechs* in order to successfully *lead by example*.

Strikingly, case B did not mention any of the three identified DMC underpinning *leading by example*. However, it should be noted that no loaded questions were asked during the in-depth interviews, meaning that no assumptions nor pressure was used in the way questions were formulated. Asking the question ‘*do you lead by example?*’ can be seen as a loaded question, as individuals would be inclined to answer with ‘yes’. Typically, questions like this lead to biased results and have therefore been avoided (see 3.1.1). As such, it is not per se that case B does not *lead by example*, but it appears in any case that this is not one of the most important DMC because it was not named in either of the two in-depth interviews. In contrast, *leading by example* was seen as prominent in cases A and C while the same interview protocol was followed within all three cases. In summary, the category *leading by example* shows interesting results. An elaboration on one of the DMC underpinning this category, *showing dedication to DT*, was given by ID2:

“You have to show that you are dedicated to it [DT]. I don't know if that's really a skill, but it's certainly crucial. You have to make sure that it is apparent that you are contributing to it as well. Perhaps that is also a form of [nonverbal] communication.”

For *concentrating on communication*, no extraordinary results are observed. Nevertheless, one difference can be seen when considering the number of open codes assigned to the phrases of the interviews. That is, *anticipating internal responses to DT* was considered more important in cases B and C compared to *general communication skills*, while the opposite goes for case A. In case B, ID3 outlined the importance of *anticipating internal responses to DT* and *ensuring transparent communication*:

“I also try to think very hard before I raise something intern, about what the reaction to it might be. That way I can anticipate this before I raise an idea. [...] So you have to know from every aspect how it's going to fit together. Then you make sure that you have covered everything as much as possible. And this ensures that it is easier to withstand a setback if something goes wrong and to communicate transparently about it.”

With respect to *ensuring the firm collectively wants to work toward DT*, nothing but similarities can be seen. Although the distribution of the six DMC underpinning this category differs slightly among the cases, it is evident that this category is deemed very important. *Creating enthusiasm among employees* is the most frequently mentioned 1st order concept

within this category. To elaborate further on this specific DMC, it has been identified that *general communication skills* are important to create enthusiasm, illustrating that DMC within the same data structure also complement each other. Additionally, a strategy to create enthusiasm is incorporating small achievements. In this way, employees will feel sooner and more often rewarded in the process. This makes them excited and also leads to *perseverance among employees*. In addition, *sensing the current mindset of employees* contributes to knowing what employees' incentive is. This makes an IT manager can allude to their incentive in order to create enthusiasm. Once again, this denotes how strongly intertwined the DMC are. Lastly, giving more responsibilities, *encouraging employees to take initiative*, and *assigning an ambassador* result in a natural distribution of enthusiasm because in this manner, these employees at the operational level will spread their enthusiasm to the less excited group. This was described by ID4 as follows:

“We basically want it [the idea for a new ERP system] to be supported by several people. At least one person. And then it's key that this person also keeps the enthusiasm going. In this way he keeps the fire burning, so to speak. People like that are kind of firelighters, one might say.”

While for the category *consider DT as imperative* the pattern of all three case companies matches, case A clearly did not *consider DT as imperative* as much as the other two cases did. That is, for all three cases, a decrease in frequency can be seen compared to the previously discussed category, but case A certainly decreased the most. This translates itself clearly when considering the DMC *timely involving the right people*. Cases A, B and C mentioned this DMC respectively zero times, six times, and ten times. Nevertheless, when considering facts derived from the expert reviews, as well as the internal enablers and internal barriers identified by Warner and Wäger (2018) (see Appendix 8: Identified facts), no specific reason can be identified to elucidate this phenomenon. For instance, *creating urgency for DT* also means an IT manager should ensure there is sufficient time for DT or should perhaps appoint a person responsible for DT in a role dedicated to it (e.g., digital transformation officer). According to Appendix 8: Identified facts, no extraordinary results are identified with regards to having too little time for DT.

Though, looking at the open codes more thoughtfully, it can be noted that the three DMC underpinning the category *considering DT as imperative* are predominantly (or should be) possessed by more IT-oriented roles. Approximately 70% of the open codes within this category were assigned to the in-depth interviews of ID1, ID3, and ID5 (i.e., the managers in charge of IT and DT within a case). Based on intuition, it can be stated that this is sensemaking, as a more IT-oriented role should generally *consider DT as imperative* compared to more business-oriented roles (i.e., ID2, ID4, and ID6). It should be noted that open codes were also added to phrases that indicated a lack of a particular

DMC. However, this still implies that this category was stronger emphasized by IT-oriented roles. Based on the sample of this thesis, it can thus be said that this category is more relevant to IT-oriented roles. To close this category with a quote, ID1 stated the following, which also refers to *leading by example*:

“The main point now is that it must simply be given priority. And currently, I’m not giving it [renewed ERP implementation project] priority myself, so the others won’t give it priority either.”

Finally, the fifth category shows that an IT manager can contribute to the development of organizational DC for DT with its capability of *having a vigilant mindset*. It should be noted that in this thesis, this category refers to a vigilant mindset regarding DT rather than a vigilant mindset in general as this thesis focuses particularly on DT. Elaborating further, this category is underpinned by two DMC. That is, *recognizing DT’s difficulty* and *sensing future DT threats*. Again, for this category, a remarkably large percentage (75%) of the open codes were added to phrases belonging to ID1, ID3, and ID5. This statistic illustrates that predominantly IT-oriented roles are concerned about *having a vigilant mindset* regarding DT.

Furthermore, taking into account all five categories within this data structure, the bars in Figure 8 demonstrate that all cases consider a vigilant mindset nearly similarly important. An interesting statistic is that case A mentioned *recognizing DT’s difficulty* as frequently as the other two cases, while *sensing future DT threats* was not mentioned by the two participants of case A. Indeed, this is reflected in Figure 8, which tells that all three cases emphasized that *recognizing DT’s difficulty* is important, meaning that they are all conscious about the fact that DT is not a straightforward process. Hence, the interviews showed that *cognition* is required to actually be able to recognize this. *Sensing future DT threats* takes a slightly different approach. This DMC implies an IT manager should constantly be sensing, measuring, and verifying whether future threats might emerge. This DMC is applicable to all main capabilities, not only for sensing. The analysis shows that cases B and C acknowledge the importance of this identified DMC, as opposed to case A. Both DMC within this category are touched upon in the following quote derived from the interview with ID5:

“The moment I participate in one of these meetings, and I notice they are behind schedule, action must be taken. And you see that people are sometimes too optimistic when it comes to making a planning. They think ‘we can do this in two weeks’. But often it takes three or four times longer. Because if, for example, a test phase shows weaknesses, the planning will never be met.”

A closing remark for the cross-case analysis of the DMC underpinning the fundamental capabilities is that the pattern of how similar the five categories behave across the cases is noteworthy. When turning Figure 8 ninety degrees counterclockwise, a triangle can be seen with *ensuring the firm collectively wants to work toward DT* as the highest bar and therefore the most present DMC. Moving to left and right, the DMC become less significantly present. Having this pattern applicable to all three cases, the findings pertaining to the DMC underpinning the fundamental capabilities are rather significant.

4.2.2.3 *Factors underpinning Underlying Attributes*

Where the previous data structure analysis closed with a remark regarding the similarity of the bars within the last category across the cases, this third and last data structure analysis continues with this same finding, albeit a triangle upside down this time. When turning Figure 8 ninety degrees counterclockwise, a triangle upside down can be seen with *social capital* as the lowest bar and therefore the least present category in this last data structure. Moving to left and right, the categories become more significantly present. Contrasting with this pattern-similarity; the greatest deviation of the cross-case analysis is also apparent in this last data structure. That is, a difference of 30% is seen between cases A and C regarding the category *cognition*.

Starting with *human capital*, the two cases that employ the least people described this category as most important. Having an *active attitude toward learning* and *learning by doing* are both for cases A as B the most frequently mentioned factors. The first factor entails that an IT manager should have an active attitude toward following trainings, achieving certificates, and being eager to learn in general. The second factor shows that an IT manager should think in a ‘trial-and-error’ manner. This is closely linked to *pursuing an entrepreneurial mindset* (part of the DMC underpinning the main capabilities). Although, *learning by doing* is applicable to the mindset of the IT manager themselves, while *pursuing an entrepreneurial mindset* denotes that an IT manager should create (i.e., pursue) this type of mindset among the employees. Moreover, *learning from previous DT initiatives* ensures an IT manager consciously gains experience and thus improves their *human capital*. One of the closely related DMC underpinning the main capabilities is *initiating evaluation sessions after an implementation*. ID2 illustrated *learning by doing* as follows:

“That was during Corona actually, that's a really good example where we responded very quickly. [...] And eventually we launched a website, and that worked out really well. This was a typical trial and error project.”

The same way as the previous category behaved across the cases is applicable to *social capital* as case C again did not emphasize this category as much as the other two cases. Although this category is not deemed very important, the three identified factors that underpin this category have a very crucial role. To begin with *accessing information*, it was found that this factor has a key role regarding DMC underpinning main- and fundamental capabilities like *consulting advice from external experts* and *sensing future DT threats* as it was mentioned in context with these DMC during the interviews. The following quote by ID5 regarding *accessing information* in order to *sense future DT threats* is also used in the within-case analysis of case C:

“As part of my role, it is crucial that the planning runs smoothly, so I need to receive the right information to take measures in time if needed.”

The last category shows the difference of 30% between cases A and C. Noteworthy, all five identified factors that underpin *cognition* are evenly distributed. In contrast to case A, where *problem solving* was clearly the most frequently mentioned factor compared to the other four. As *problem solving* is an abstract factor, it helps to look at the DMC that are assigned to the same phrases as *problem solving* to get a comprehensive view. For instance, *sensing future DT threats* and *stimulating knowledge sharing within the firm* are mentioned along (which the quote below illustrates). Moreover, it is remarkable that case B did not discuss anything related to *problem solving* while within the same case and same category, *don't glorify; be realistic* is even present in the five most frequently mentioned 1st order concepts. Concludingly, this category is rather unevenly distributed across cases. ID5 stated the following about *problem solving* and *stimulating knowledge sharing within the firm*:

“To have diversity at the locations is something really important. This comes in all shapes and sizes, but especially age because that's healthy for your department. The young people can help the older ones who are having trouble with digitalization to find their way in the digital world, and vice versa; the older ones of course have a lot of knowledge in many areas that they can help the younger generation with.”

4.3 Validation interviews

Two interviews were conducted in order to validate the findings from the six in-depth interviews. These two interviews had a different approach compared to the expert- and in-depth interviews. After a thorough analysis of the in-depth interviews, the preliminary

findings got examined during the validation interviews. This prevents the study of drawing premature conclusions. Questions were formulated as such that the findings got examined. In this way, V1 and V2 helped with making the findings more reliable, and mostly also more significant, because the findings got mainly confirmed. Additionally, new insights were found which required a re-analysis of the in-depth interviews. Eventually, this has led to the addition of two DMC and one factor underpinning the underlying attributes.

V1 has as role ICT manager, while V2 is Chief Digital Transformation of a firm employing approximately 2500 employees. Having 15 years of leadership experience as an ICT manager, V1 discussed several themes which can be linked to Warner and Wäger (2018). Also, connections were made with the three attributes of DMC (Adner & Helfat, 2003) and the identified fundamental DMC. To begin with sensing themes, the DMC *brainstorm with colleagues* is conceived as crucial in the DT process. In this way, the IT department gets an understanding of how the business wants to digitize. With this, V1 does not explicitly indicate that brainstorming with colleagues does contribute to *scanning for technological trends*, *screening of digital competitors*, or *sensing customer-centric trends*. However, it is emphasized how *scanning where to internally improve* benefits significantly from brainstorming with colleagues. In addition, *analyzing the fit between the sensed DTechs and internal resources* benefits as well, and the importance of *interpreting future software requirements*, *decide on future software requirements*, and *considering employees' demands* is reflected:

“As ICT, your role is to find out, based on the questions from the business, what is best suited to them in terms of technology. On the other hand, the role of the business is to clearly indicate what you can do, what you want and what is needed to bring about the transformation. This requires a lot of coordination.” (V1)

With this, *digital scenario planning* is brought to light. V1 outlines how IT managers must be capable of *estimating DT's opportunities and threats* to be able to *formulate digital strategies* and *have a goal-oriented mindset*. Identifying risks is mentioned, which refers to the fundamental capability describing that an IT manager should *have a vigilant mindset* by *recognizing DT's difficulty* and *sense future DT threats*. To add to this, there are cases in which benefits are seen on the process side rather than on the people side. This makes that a DT initiative may seem to enhance a process in terms of controllability and efficiency, but eventually slows down the process because it is becoming too complex. Another reason for the existence of too much complexity is that processes get digitized solely, while they are interconnected. As a result, the IT infrastructure can become complex. Briefly said, DT can lead to a complex IT infrastructure which only frustrates

employees in the long run and hence does not lead to the desired outcome. Also remarkable is that attention is directed to the *social capital* of an IT manager to *access information* which is required to perform this analysis diligently:

“An ICT manager must have the skills to identify the current and desired situation. You simply need to possess this capability. An ICT manager must be able to estimate what the opportunities are, what the risks are, and what the revenue model of the DT initiative is. Of course, part of this is that he must ensure that he has access to the required information in order to make this analysis.” (V1)

With this, V1 emphasized the importance of the DMC belonging to *digital scouting*, *digital scenario planning*, and *having a vigilant mindset*. Moving on to seizing themes, both *balancing digital portfolios* and *strategic agility* are identified. V1 describes that a firm should not digitize without goal, reflecting the DMC of *only digitizing where needed*. With regards to this, *human capital* (e.g., *knowledge about the right things and experience*) is required to genuinely know whether you digitize to achieve the desired results, or whether you actually digitize to digitize. During the interview, again DMC corresponding to *analyzing the fit between the sensed DTechs and internal resources* come to light. For example, an IT manager must be capable of describing how the DTech will have a beneficial impact, and how it will impact the firm in general:

“Digital transformation as an end in itself is pointless. Hence, it is very important that an ICT manager with his knowledge of the business and of ICT can indicate how a digital technology can bring benefits. [...] An IT manager must be realistic in terms of resources. The budget and the impact must not be underestimated.” (V1)

Furthermore, *setting an appropriate speed of execution* is crucial. As discussed in the in-depth interview analysis, incremental transformation contributes to a more successful DT. One should not rush a DT, for example to ensure that all employees will actually use the new system, and to avoid taking too big a step that makes it impossible to turn back. Besides, an IT manager can *decide to outsource IT*. Because of the expertise of an external partner, a firm has more certainty pertaining to the DT:

“Every firm has a certain absorptive capacity; what can it handle in terms of transformation? Therefore, you should opt for small steps, or outsourcing is also a good possibility. Outsourcing can definitely be a part of your digital transformation” (V1)

The latter points in the direction of transforming themes, of which DMC corresponding to all three second order themes formulated by Warner and Wäger (2018) are mentioned. Considering *redesigning internal structures, initiating cross-functional teams* is deemed necessary, with an *ambassador assigned* to lead the DT initiative. Cross-functional teams make sure everyone's perspective is included. This is key throughout a project, as it helps maintaining a *coherent mindset*. In consequence, an IT manager should always *ensure colleagues are up-to-date on each other's work*. Additionally, an ambassador ensures more certainty for a DT initiative to succeed for the reason that in some cases employees are made responsible for a DT initiative, while they often must combine this with their normal work activities. They do not have the resources available to pull the DT initiative. Therefore, it is of utmost importance that an IT manager assigns the right ambassador. This has to be someone who has sufficient time, the right knowledge, and preferably also prestige. The latter makes it easier to *create a support-base among employees*, and to *convince employees about DT* who are resistant to the transformation. In addition to the in-depth interviews, V1 outlined that the ambassador must have the authority to make decisions and determine directions, so that there is no need to constantly ask for approval as this slows down the process considerably. *Giving initiative to employees* has been mentioned as fundamental capability, though not necessarily for the reason that the process will slow down otherwise. Rather, this ensures that the firm collectively wants to work toward DT. Nonetheless, there is an overlap. An IT manager in turn can enforce this by exploiting his *social capital*, more particularly his *network* and his ability to be *awe-inspiring*. A strong internal network, characterized by many social ties, in combination with an awe-inspiring position, makes that an IT manager is capable of assigning the right person, or to make the decision to be the ambassador for a certain DT initiative themselves. Regarding to *designing team-based structures*, V1 states:

“You always need different roles, at least someone from the business and someone from ICT, so that what has been devised can also be implemented. It is necessary to align all the parties involved, even during a [DT initiative] project, in order to know if everyone is still on the same page. During a project, things will always change, but that doesn't matter if everyone is up to date with each other. [...] Quite often someone has to do the DT tasks on top of that [normal work activities]. But it is important to have someone who has time available, and someone who is a representation that also has authority towards colleagues and management. He must be allowed to make decisions and indicate directions within a team. If he first has to ask a manager for everything he is asked to do, the whole process is blocked, of course. Mandate for the one who leads the project is very important.” (V1)

Moving on to the last transforming theme, improving digital maturity is seen as a success factor too. As IT might be difficult for employees, especially when the IT infrastructure has become sophisticated, an IT manager must think of *giving employees training* or guidance for how to work appropriately in the systems. Next to that, an IT manager can consider *hiring young people* to improve the digital maturity of a firm:

“While there used to be an information system that could be completely fathomed with high school knowledge and perhaps two weeks of training at most, you see that some of these systems have now simply become so complex that after years people still don't understand exactly how to use it properly. [...] You then need new blood in a firm, in order to accelerate the transformation. They have a different mindset and different insights.” (V1)

In regard to fundamental capabilities, of which a few have been mentioned already, involving the right people is mentioned as most critical capability. This already prevents most of the difficulties a firm may encounter, such as resistance, miscommunication, and ambiguous responsibilities:

“The more you involve your user population in the changes you want to implement, the easier it is to actually implement them, because then they also understand why something will be changed.” (V1)

Regarding the second validation interview, V2 has highlighted three crucial points. For instance, *hiring young professionals* could help with making DT successful:

“Knowledge is key to digital transformation. But with that, I also would say that it is often sensible for companies to hire this knowledge. Because you cannot assume that people in the existing company will always be open to learn. It is advisable to recruit people who already have this knowledge. Often this are people from a consultancy job, or with experience with various customers, so they know the pitfalls of the domain. And they also know why projects go wrong.” (V2)

This also led to the discussion about *stimulating knowledge sharing within the firm*. Initially, this DMC was not added to the data structure. However, after the interview with V2, the importance came up. Therefore, the data structure depicting DMC that underpin the three main capabilities have been revised according to this point. In addition, V2 outlined the importance of *establishing knowledge diversity*. This means the younger people should complement the older generation with their mindset. The other way around, the

older employees carry valuable experience that can be conveyed to the younger generation. Both DMC are added to the data structure underpinning the three main capabilities as they were strongly emphasized during the interview with V2, who said the following:

“I would say you should go for a mix. Not only young people, because then you miss a bit of experience, also in areas that you don't learn at school. So dealing with people, with their personal situations, personal motives, that's hard to learn from books. [...] But the knowledge part is generally easier to pick up from a younger generation, than the older generation, absolutely. And the older generation often has the human side of things a bit more in them. So they often know the people, they know the sensitivities. So an ideal situation is a mix between those two as the younger people can help the older ones with it [digital transformation]” (V2)

5 DISCUSSION AND CONCLUSION

5.1 Key findings

By providing a multiple case study in which inductive research was complemented with deductive research, this thesis has identified two data structures with DMC that contribute to the development of organizational DC for DT. In addition, factors were found that underpin the three underlying attributes of DMC. Recalling the analytical framework (see Figure 1) and turning it 90 degrees counterclockwise, the following exploratory model can be established which incorporates the analytical framework with the findings from the empirical part of this thesis:

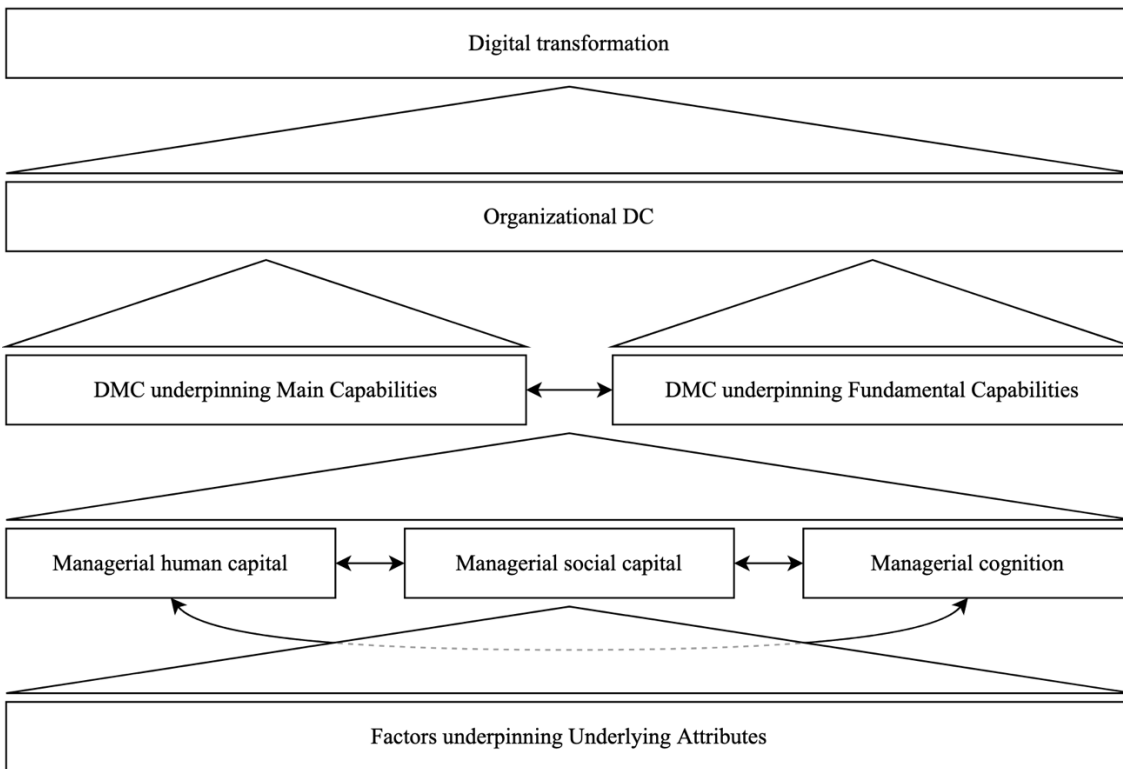


Figure 9: Exploratory model

Figure 9 illustrates that the question mark depicted in Figure 1 has been filled with DMC, categorized in DMC underpinning main capabilities and DMC underpinning fundamental capabilities. Furthermore, factors underpinning the three underlying attributes are found. Each of the three form a data structure. Additionally, the DMC underpinning the three main capabilities have been linked to prior literature to gain a deeper understanding. Moreover, Figure 9 portrays how highly intertwined the three data structures are. What

this means, is that DMC underpinning main capabilities might also contribute to the success and the execution quality of the other DMC or factors. In addition, DMC within one data structure also complement each other.

5.2 Conclusion

Digital transformation is a popular research theme in literature as well as an imperative for firms to withstand the increasing environmental turbulence. At the same time, it has been emphasized that DT remains a challenge. A major part of DT initiatives does not reach their objectives, and the DT initiatives that do end up being successful deliver less profit than estimated beforehand. As Porter (1985) outlined: “high technology does not guarantee profitability”. Academia have been searching for ways to make DTs of firms more successful. As DT is a source of change and disruption, linkages have been made with the organizational DC concept. After all, organizational DC have been found fruitful in environments characterized by high levels of turbulence. To this end, it has been described how organizational DC enable a firm to capitalize on DT. Until here, this is everything already known about the two concepts of interest. However, this does not provide the individual with ways for how to ensure the organizational DC are embedded in a firm, leading to the fit between DC and DT. With this as motivation for writing this thesis, a multiple case study was set up to investigate this phenomenon in more detail. By extensively examining prior literature on DT and DC, making the connection between the two concepts, and conducting two expert interviews, six in-depth interviews, and two validation interviews, this thesis gathered an amount of data which has been analyzed according to a within-case analysis and a cross-case analysis. Consequently, this thesis aimed to answer the following research question, to which the answer is given after formulating the research question:

“How do dynamic managerial capabilities enable a firm to integrate, build, and reconfigure competences to capitalize on digital transformation?”

DMC contribute to the development of organizational DC. This in turn enables a firm to integrate, build, and reconfigure competences, which enables a firm to capitalize on DT. To elaborate on this answer to the research question, a top-down explanation will be used which matches Figure 9. Starting at the top, where DT is seen as an imperative for firms in order to withstand the increasing environmental turbulence. However, DT is considered to be a challenge for firms. With this incentive, literature has been searching for ways to make DT initiatives more and more frequently successful, so that a firm can withstand

the increased environmental turbulence. This has led to the fit between DC as a conceptual foundation and DT as a phenomenon of interest. In other words, DC are ought to be embedded in firms for successful DT. The reason for this, is that DC create a firm's ability to integrate, build, and reconfigure internal and external competences to address DT. DC are composed of three main capabilities: sensing, seizing, and transforming. That is, the firm's capacity of sensing opportunities and threats, seizing required to address opportunities and neutralize threats, and transforming its resource base. These three main capabilities create a firm's ability to integrate, build, and reconfigure competences successfully, to be able to address DT. As sensing, seizing, and transforming are capabilities at the organizational level, it was still unknown how these three organizational DC are being built. As a consequence, researchers tried to find ways how firms build these three organizational DC. For instance, Warner and Wäger (2018) identified nine microfoundations for building DC for DT. However, these nine microfoundations are ways how firms build DC for DT, as their unit of analysis has been at the organizational level. Because literature outlines that managers play a crucial role in the development of organizational DC, the unit of analysis of this thesis was set at the individual level (i.e., level of the manager). As a result, this thesis has found a set of dynamic *managerial* capabilities that contribute to the development of organizational DC. In addition, factors were identified that underpin the three underlying attributes of DMC. More specifically, factors underpinning managerial human capital, managerial social capital, and managerial cognition were found. This has gained a deeper understanding of what the three underlying attributes actually imply.

To underline the contribution of this thesis, a bottom-up explanation will be used which again matches Figure 9. Starting at the bottom, this thesis exposed factors that underpin the three underlying attributes managerial human capital, managerial social capital, and managerial cognition. This provides managers with ways to improve their underlying attributes needed for DMC. In this way, managers have an approach for how to ensure they are actually capable of performing dynamic managerial *capabilities*, as a capability refers to the capacity of an individual to undertake a particular activity in a reliable manner when required. The empirical part of this thesis has led to the identification of DMC. The whole set of the identified DMC contribute to the development of organizational DC, hence giving managers guidance of how they ensure a firm can build organizational DC for DT. After which, a firm now embodies organizational DC needed for successful DT. In turn, these organizational DC, composed of the three main capabilities sensing, seizing, and transforming, create a firm's ability to integrate, build, and reconfigure competences successfully, to be able to address DT. Eventually, with this, DMC have enabled a firm to have this ability. That is, the research question of this thesis has been answered.

The DC concept has served as a lens for studying DT. Therefore, it was tried to assign the identified DMC to the three main capabilities. This has led to the data structure depicted in Appendix 2: DMC underpinning Main Capabilities, showing DMC that underpin either *managerial sensing*, *managerial seizing*, or *managerial transforming*. The set of DMC that underpin *managerial sensing* contribute to the development of organizational sensing, and the same goes for the other two main capabilities. However, a group of DMC was found that could not be assigned to one particular main capability, as they are found in at least two of the three main capabilities. This group of DMC is categorized as fundamental capabilities, because they have a rather fundamental characteristic as they underpin at least two of the three main capabilities. For this group of DMC, a separate data structure is constructed, depicted in Appendix 3: DMC underpinning Fundamental Capabilities. For the factors that underpin the underlying attributes of DMC, a third data structure is built shown in Appendix 4: Factors underpinning Underlying Attributes. Lastly, the DMC underpinning the three main capabilities (i.e., the first mentioned data structure) are linked to prior literature, complementing the inductive approach of this thesis. More specifically, the mentioned DMC are linked to the 1st order concepts defined by Warner and Wäger (2018) by means of a pattern matching technique. This is illustrated in Appendix 5: Preliminary association structure. This preliminary suggests potential links to the prior literature, providing a deeper understanding of which DMC contribute to the development of which organizational DC.

The main conclusion of this thesis, which is also the way how managers should interpret the findings of this thesis as the unit of analysis has been on the individual (i.e., manager) level, is as follows. Managers, and in particular people in firms that are in charge of DT, should compare their current set of capabilities used for DT with the identified DMC in this study. Were applicable, they could adapt their current set of capabilities to the identified DMC in order to lead DT initiatives to success. Additionally, a conclusion is that managers should consider the factors underpinning the three underlying attributes, as this will actually ensure they are capable of performing the DMC appropriately.

5.3 Limitations and further research

This thesis has to acknowledge a number of limitations. First, data triangulation was not applied due to time constraints, meaning that only qualitative data was used. Further research can therefore complement this thesis with different types of data, e.g., quantitative data. This fact has limited the internal validity of this thesis. Moreover, with only three cases of which every case was composed of one firm, the findings of this thesis can hardly be generalized, limiting the external validity. Also, the firms were sampled by means of

convenience sampling. Although two selection criteria were defined, it could be that the selected firms that participated in this thesis would not have met the selection criteria if this thesis would have set higher standards, like Warner and Wäger (2018) did. For instance, the definition of DT as formulated by Gong and Ribiere (2021) was used to verify whether a participating firm found itself in a DT. If there would have been more time, more attention could be spent on this to select e.g., ten firms of a sample of twenty firms. After twenty initial meetings with the firms, the ten firms finding themselves the most in DT could then be selected. Additionally, the multiple case study was not set up with the purpose of comparing the cases with the reason that the cases differ significantly. Hence, further research can conduct a similar study, with an extra dimension. That is, defining differences between cases. To show this by means of an example, separating cases based on their size can lead to insights like having certain DMC being more applicable to smaller/larger firms.

In addition, conclusions have been drawn regarding the importance of 2nd order categories. However, this has only been verified by means of two validation interviews. The reason for why certain identified DMC were mentioned more frequently than others could be because of the length of the interview or the understanding of the participant regarding the discussed topics. In addition, the semi-structured interviews approach was an extremely important part of this thesis, as this helped to explore DMC. However, it resulted in that the interviews were not exactly similar, apart from the interview protocol which was completely the same for all in-depth interviews. Consequently, one topic might have been discussed slightly longer in one interview than in the other interview. This limits the conclusions drawn regarding the importance of 2nd order categories within each data structure.

Further research could also explore other ways of developing organizational DC for DT. As DMC is not necessarily a full mediator, it is valuable to investigate other ways that help to the development of organizational DC for DT. This could be elements that have nothing to do with managerial roles, as it has only been emphasized that managers play a role in developing organizational DC for DT. Albeit a crucial role, other elements can also contribute to the development of organizational DC. Moreover, further research could investigate DMC in order contexts than DT. As DMC are the core of strategic change and firm renewal, other DMC which do not necessarily focus on DT exist as well. This thesis has focused on DMC for DT only, but DMC could be studied in other contexts too. For instance, further research could investigate how DMC play a role in the implementation of a new business model, as this implementation also leads to change and disruption, just like DT. Apart from this, further research could investigate to what extent the DMC contribute to the factors underpinning the underlying attributes. For example, with creating a support-base (which is a DMC), an IT manager ensures he is awe-inspiring

(which is a factor). Hence, perhaps this DMC improves the underlying attribute managerial social capital. This was already found in this thesis, but in a sense that it was too insignificant to include this in the conclusions.

Regarding the research method of this thesis, it might be interesting to consider the Qualitative Comparative Analysis (QCA) research method for studying the link between DC and DT. As this research method seemed to be too complex for this thesis, it has not been used. However, having its focus on investigating causality research questions, the potential of this research method regarding this research theme could be examined. Lastly, it was found that literature argues the organizational DC sensing, seizing, and transforming are not necessarily executed in this particular sequence. However, no hard conclusions have been drawn regarding this aspect. In this thesis, it seemed that DMC underpinning managerial transforming also consolidated DMC underpinning managerial sensing, giving an extra incentive for further research in this direction.

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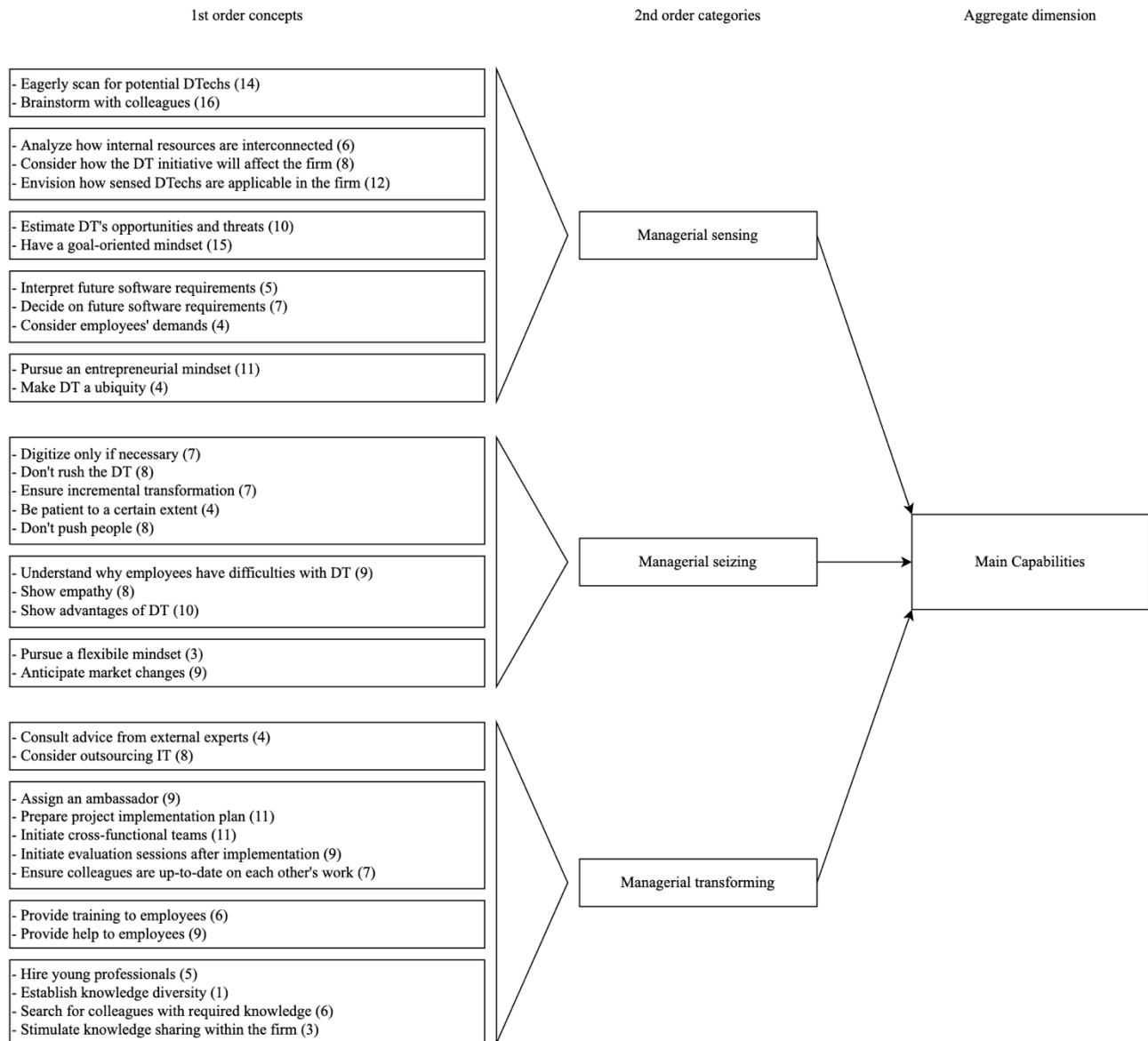
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APPENDICES

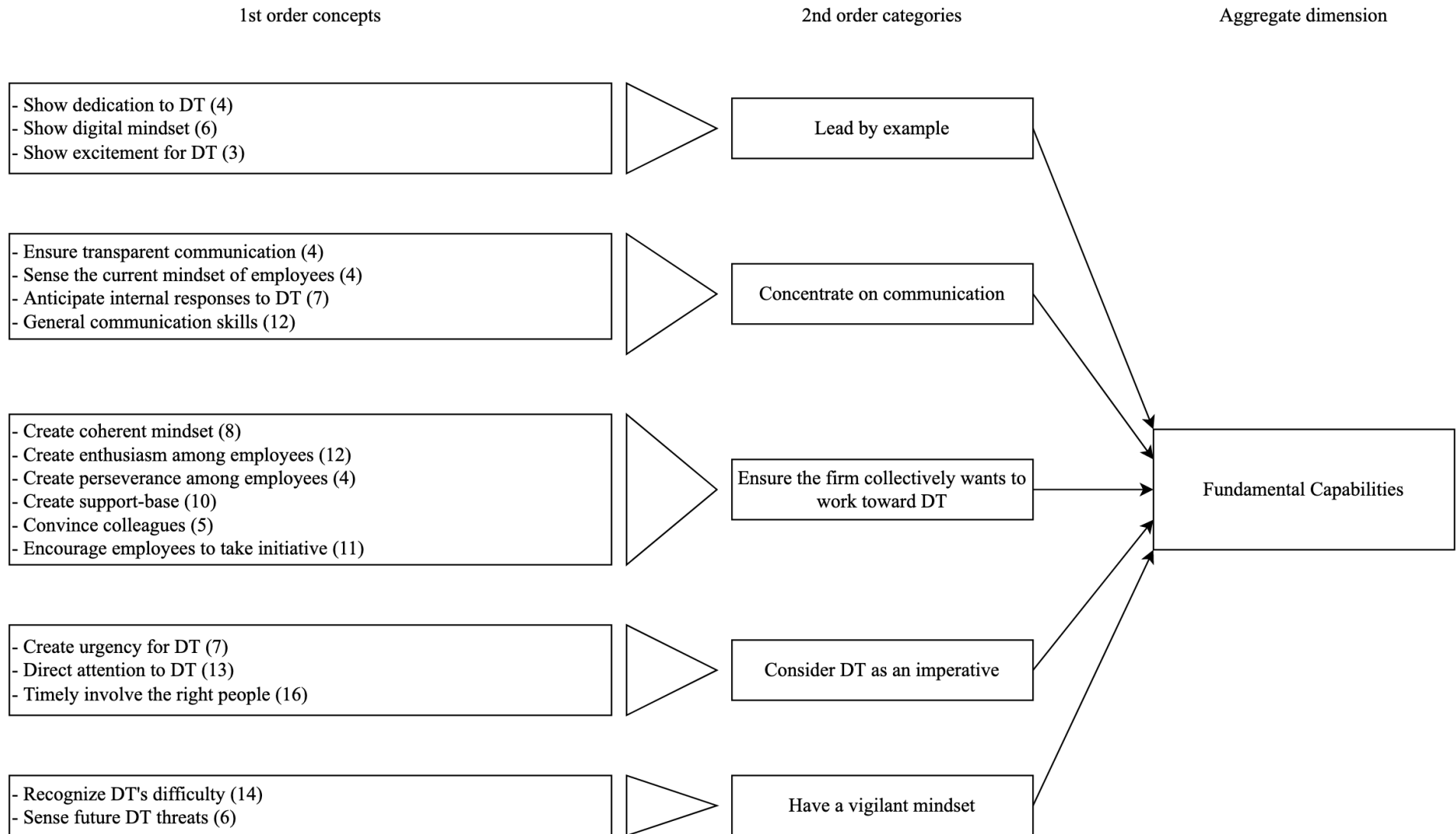
Appendix 1: In-depth interview protocol

Topic	Structure of the questions
1. General questions (5 min.)	a. About the firm: industry, size (employees), market focus, business model b. About the participant: position, responsibilities, leadership experience
2. Digital transformation (DT) (10 min.)	a. Personal meaning b. Impact on the firm
3. Dynamic capabilities (organizational DC) (10 min.)	a. Sensing: identifying opportunities and threats b. Seizing: addressing opportunities and neutralizing threats c. Transforming: modifying resource base, realizing full potential of the transformation
4. Dynamic managerial capabilities (DMC) (20 min.)	a. Own role in organizational sensing, seizing, and transforming b. Human capital, social capital, cognition c. Three most important capabilities throughout sensing, seizing, and transforming

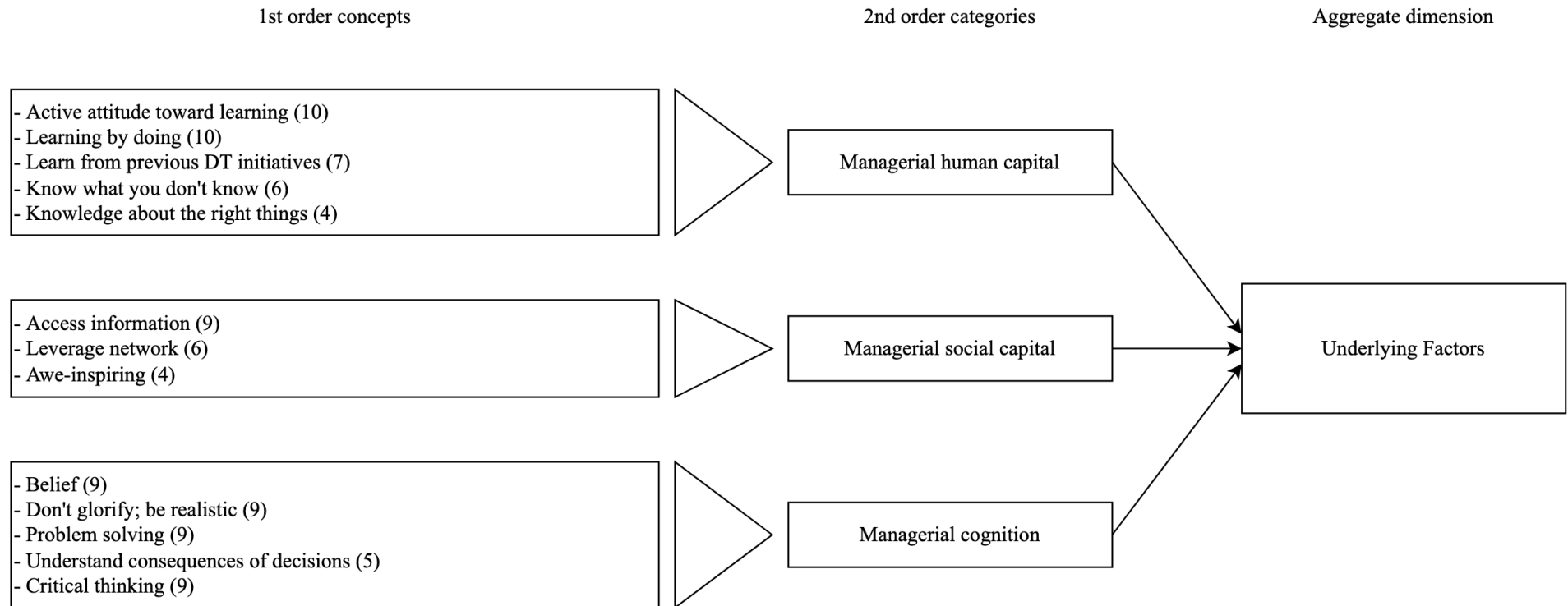
Appendix 2: DMC underpinning Main Capabilities



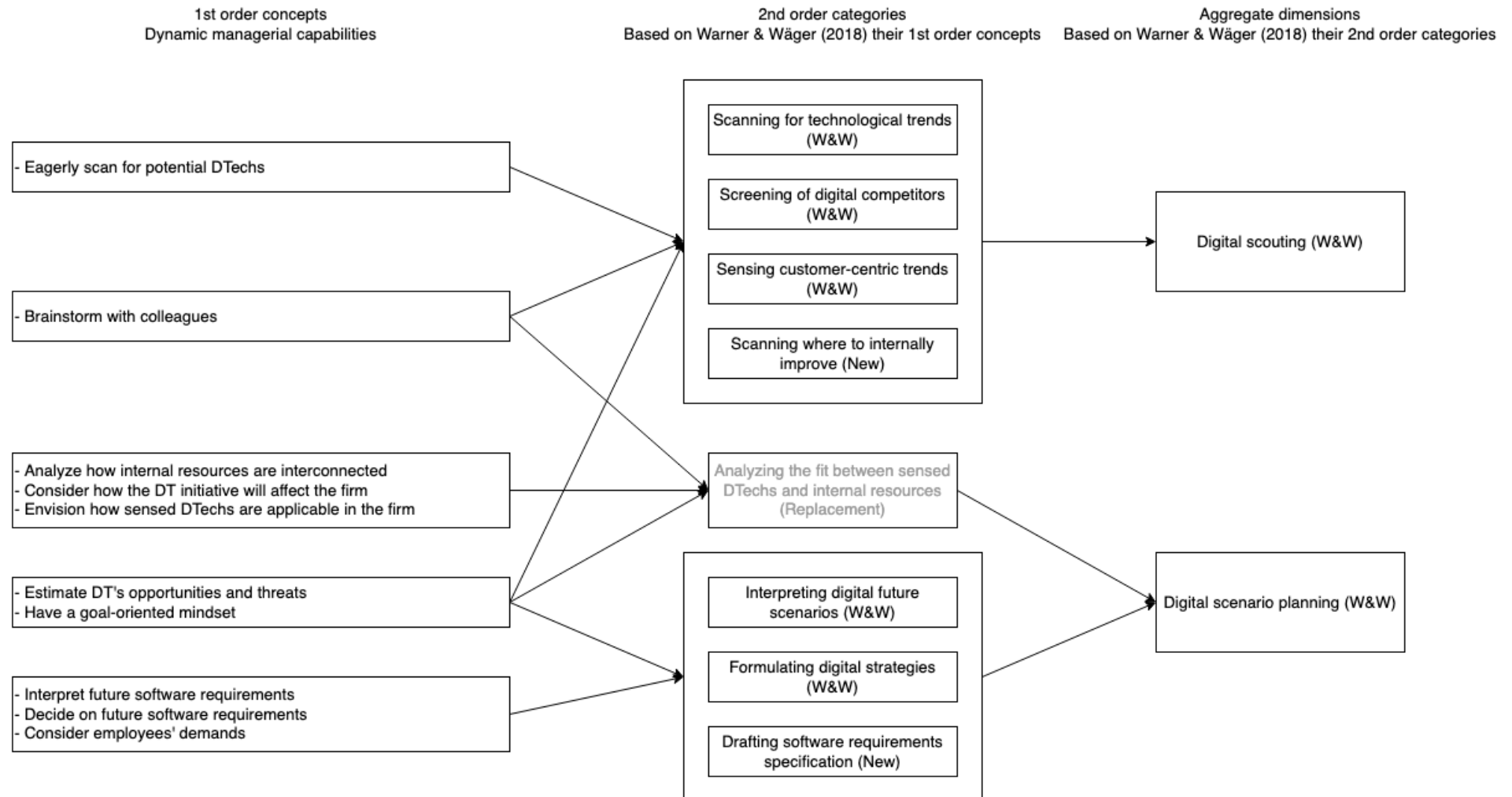
Appendix 3: DMC underpinning Fundamental Capabilities

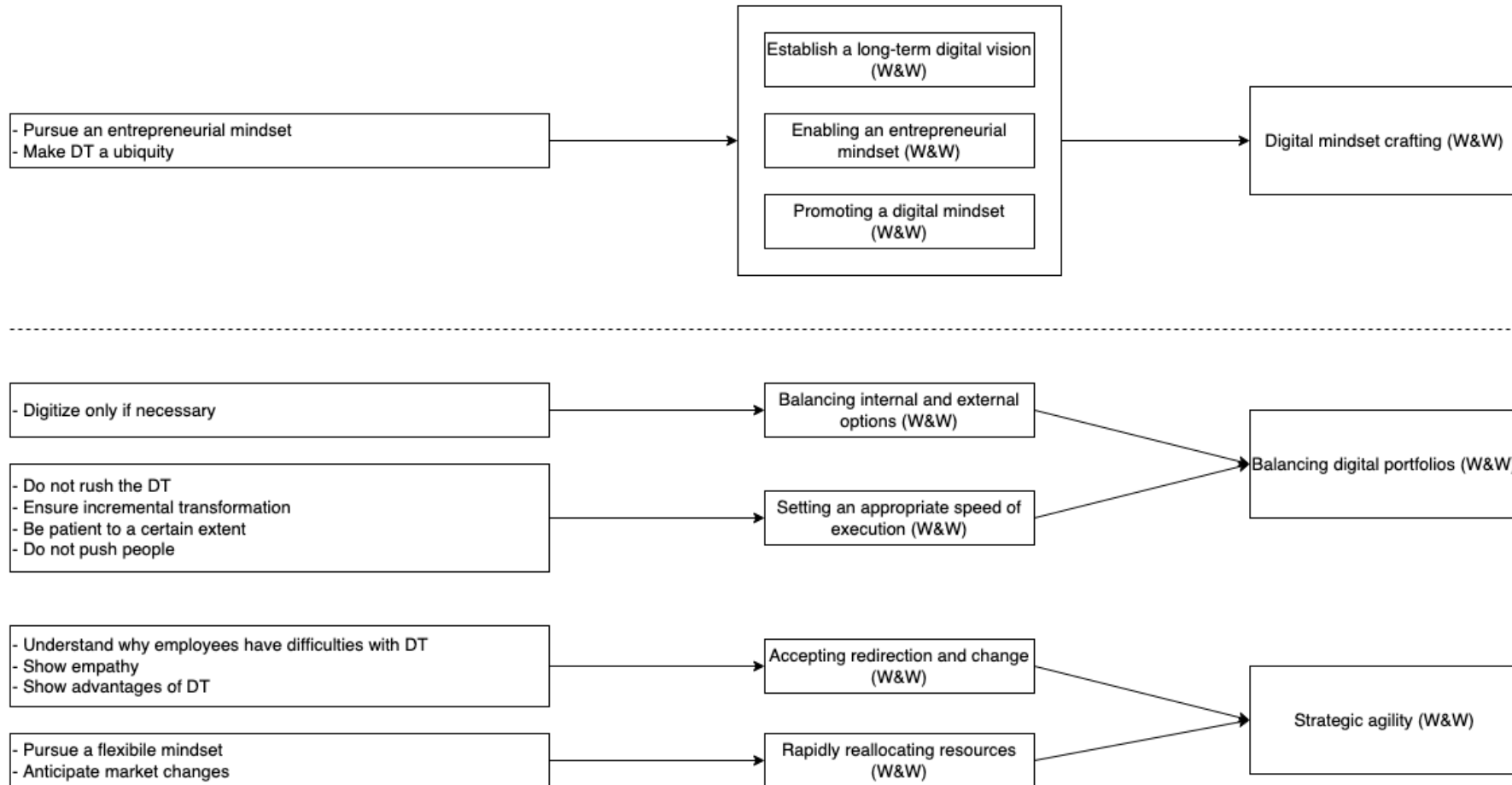


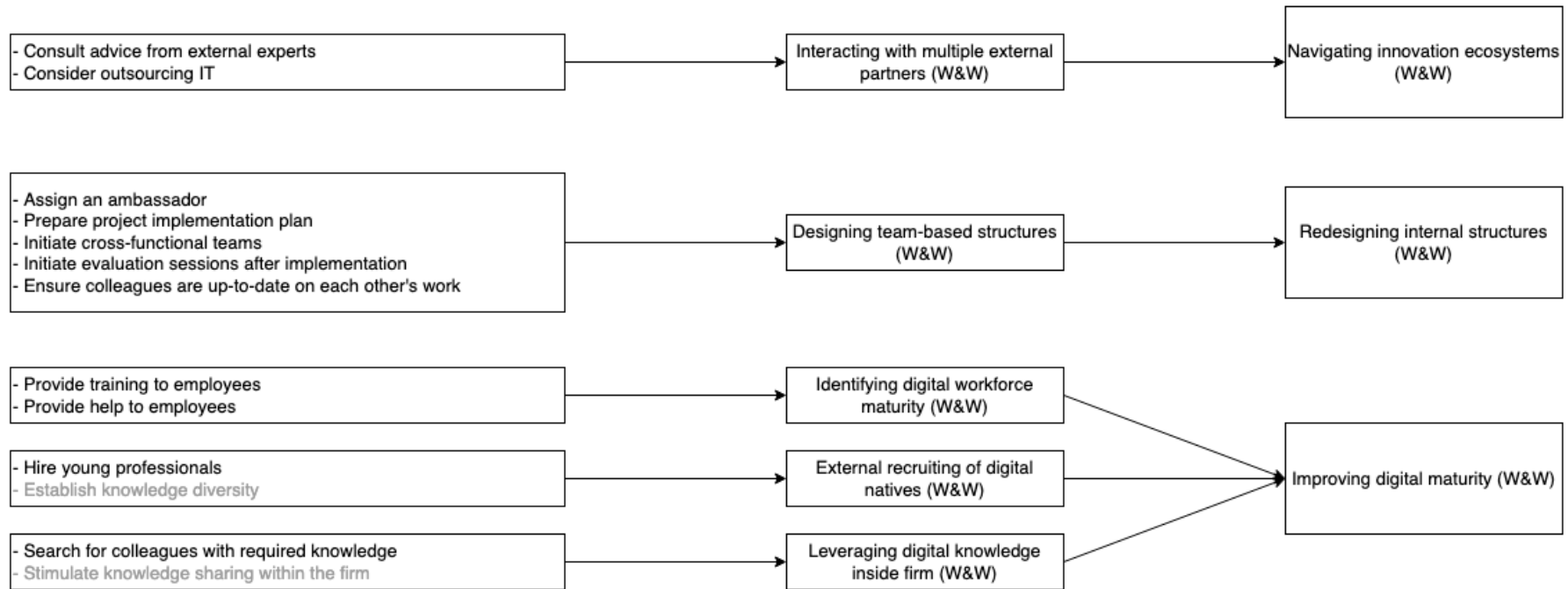
Appendix 4: Factors underpinning Underlying Attributes



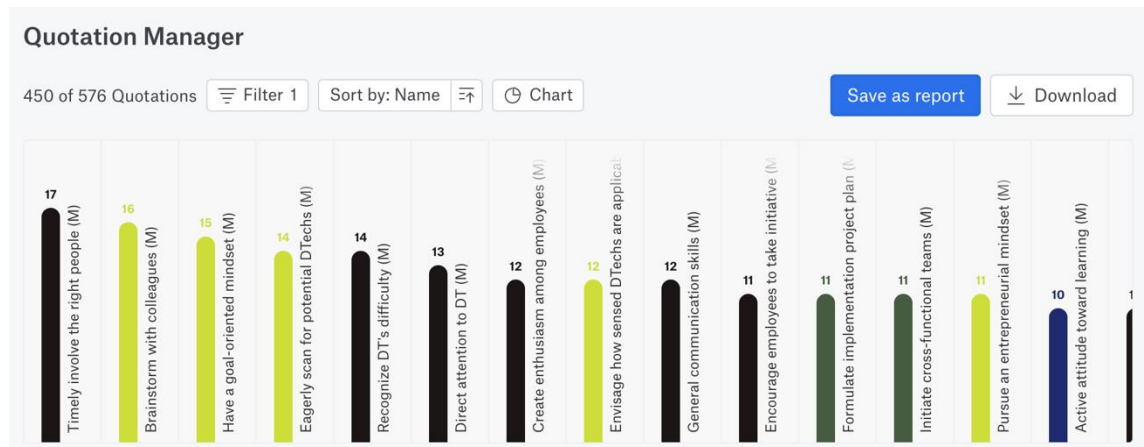
Appendix 5: Preliminary association structure







Appendix 6: ATLAS.ti quotation manager functionality



Appendix 7: ATLAS.ti reports functionality

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	Case company A	Case company B	Case company C
Concentrate on communication (FC)	8	8	8
Consider DT as an imperative (FC)	8	10	18
Ensure the firm collectively wants to work toward DT (FC)	13	13	22
Have a vigilant mindset (FC)	5	6	9
Lead by example (FC)	8	0	5

Appendix 8: Identified facts

	Case company A	Case company B	Case company C
Change resistances (internal barriers, W&W)	4	5	6
Fast decision making (internal enablers, W&W)	1	0	1
High level of hierarchy (internal barriers, W&W)	0	1	2
Importance of knowledge (expert interviews)	2	1	3
Lack of knowledge among employees (expert interviews)	2	3	3
Lack of knowledge of a manager (expert interviews)	0	4	0
No digital mindset among employees (expert interviews)	8	3	3
Too little time for DT (expert interviews)	1	1	0