Digital Service Innovation in the ERP vendor Industry

A case study of a Dutch ERP vendor through the dynamic capabilities perspective

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Abstract

This study is set out to explore how the dynamic capabilities perspective creates value for the strategic management of digital service innovation (DSI) in the ERP vendor industry. A particular interest in this topic was founded through the development of the Software as a Service (SaaS) model. Furthermore, in combination with the ERP vendor industry, it is of interest to see how this important development has affected DSI. A specific interest in dynamic capabilities is chosen due to the fact that companies need to master these in order to survive in today's rapidly changing environment.

This thesis will start analysing the internal and external factors affecting dynamic capabilities of this topic, which will identify how they influence DSI in the ERP vendor industry in particular. Secondly, a developed framework of dynamic service innovation capabilities proposed by den Hertog, van der Aa & de Jong (2010) will be used in order to discover the dynamic capabilities for DSI in the ERP vendor industry. Lastly, a dimension of (digital) service innovation, namely the emerging technology of Machine learning, will be analysed as an innovation, as it is expected that this technology has an effect on the dynamic capabilities of DSI. Machine learning resides in the field of Artificial Intelligence, which has been proven to be tackled differently than other types of innovation.

In order to explore this focus, a case study will be performed with a Dutch ERP vendor, in which a qualitative research method through in-depth interviews will be performed. Through this analysis, the above mentioned sections will be addressed. By applying the dynamic capabilities perspective on this topic, the internal and external factors affecting DSI in the ERP vendor industry are expected to both entail resemblances and differences. Furthermore, an altered new framework strategically managing DSI in the ERP vendor industry is expected. Lastly, a dimension of DSI, Machine learning, will give a demonstration of how dynamic capabilities might be affected. Subsequently, the value of the dynamic capabilities perspective for the strategic management of DSI in the ERP vendor can be determined.

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1 Introduction

As a result of today's increasing globalization, competition is getting more intense and companies need to stay adaptive to unforeseen changes in order to survive in an intensified market. Increasing uncertainties and unpredictability is forcing organizations to act quickly upon their competitive environments (Aburub, 2015). In order to stay adaptive to (unforeseen) changes, the capability of innovating is of key essence, as organizations will fall behind if they do not keep up with fierce competition. However, tackling innovation, while simultaneously efficiently managing everyday business in an efficient way, is a tough task for firms, also referred to as being ambidextrous (March, 1991). The need to develop capabilities that can juggle both of these crucial processes is a demanding and difficult task. Some of the biggest hypes of today, when it comes to transforming your business and adapting to the digitalization wave, include Artificial Intelligence and Blockchain (Panetta, 2017). However, the question remains of how these emerging fields and technologies should be incorporated in organizations, and if they even should in some cases. Innovating is not merely something that should be done just to keep up or blankly following a hype, but should also be strategically considered as why or how to manage it, while keeping the particular business context in mind. Moreover, attempting digital innovation is not identical for every industry, as each industry has its own properties and unique challenges.

In this thesis, the 'Software as a Service' (SaaS) industry, and in particular the Enterprise Resource Planning (ERP) vendor industry in the Netherlands, is chosen as a focus as to how digital service innovation (DSI) should be strategically managed. A particular focus on digital service innovation has been chosen, as software has developed to being offered as a service, and digital service innovation focuses particularly on digital innovation within the service industry, rather than looking merely at "regular" service innovation. Moreover, as strategic management is a rather broad field, the field of dynamic capabilities has been selected in order to address just one aspect of strategic management. The choice of dynamic capabilities is further supported by the fact that they address how firms can strategically deal with changing environments. In this, the internal and external environment affecting the creation of dynamic capabilities is analysed. Furthermore, it is addressed what dynamic capabilities are needed and how these might be affected by hypes like the technology Machine learning, which falls under the discipline of AI. This DSI dimension in particular is addressed, because the SaaS industry, which is based on the relatively new technology of 'cloud computing', is facing the challenge of how to leverage the abundance of data which

they possess. It is not the only industry which is facing this issue, however it is hypothesized that it will affect the dynamic capabilities of DSI in the ERP vendor industry. The thesis will revolve around a case study, in which a Dutch ERP vendor supports the research focus of dynamic capabilities, as it has expressed the need to find out how to strategically tackle DSI and how emerging technologies, like Machine learning, will affect this.

The ultimate goal of this thesis is therefore to find out how dynamic capabilities are of value for the strategic management of DSI, in the ERP vendor industry in particular. In turn, this will lead to an addition of knowledge to the DSI field, which has not been addressed with the strategic angle of dynamic capabilities yet. Moreover the theory behind ambidexterity will support the strategic management of (digital service) innovation.

2 Research domain

This chapter explains the specific research domain in which research will be performed. Digital Service Innovation (DSI) and the (IT) ambidexterity perspective and their overlapping fields of interest will serve as the research domain, as this combination will serve as a suitable course of action to look at strategic management of DSI. Furthermore, it is believed that the combination between these two fields will support how firms tackling DSI are innovative through ambidexterity, which will be explained later in this section. Lastly, this chapter will touch upon AI, and in particular Machine learning, as an innovation, as it is of importance to keep the characteristics of this in mind when attempting to innovate by applying technologies within this domain.

2.1 Digital Service Innovation (DSI)

DSI is a rather broad field and can be seen in many different types of industries, ranging from transport services like airlines and taxis, to infrastructure services like power and communications and even Information Technology (IT) services. In order to narrow down the focus of the thesis, a choice has been made to look at DSI in the Software as a Service (SaaS) industry, more specifically at ERP vendors in the Netherlands. Interesting about this industry is that software was originally provided as a packaged good, however now it has evolved to being sold as a service, in which customers pay based on usage. The following section will therefore explain this industry, how ‘servitization’ has led to it and lastly, what role DSI plays in this. Furthermore, the SaaS industry is based on cloud computing, which will also be further clarified in this section.

2.1.1 Cloud computing

New digital technologies are rapidly transforming the IT industry, which can be seen in many different ways. The emergence of cloud computing serves as an important example, which has transformed a large part of the IT industry. *"Cloud computing refers to both the applications delivered as services over the Internet and the hardware and systems software in the data centres that provide those services",* as defined by Armbrust, et al. (2010, p. 50). These services are often referred to as Software as a Service (SaaS), which will be elaborated further on in this section. Cloud computing makes software as a service even more attractive, and the way IT hardware is designed and purchased is reshaped drastically. One of the huge advantages of cloud computing includes the fact that innovative developers are not tied to large capital outlays in hardware or the human expense to operate them. Other big advantages include the elimination of an up-front commitment by Cloud users and the appearance of infinite computing resources on demand.

A 'cloud' consists of the data centre hardware and software, and entails two type of "clouds", which are referred to as the public and the private cloud. On the one hand, the 'public cloud' entails when the cloud is made available in a pay-as-go-manner to the general public, which is then sold as "utility computing" as a service. On the other hand, the 'private cloud' is not made available to the general public, as the data centre resides inside a firm or organization. Cloud computing in general is therefore the sum of SaaS and utility computing. (Armbrust, et al., 2010)

2.1.2 Software as a Service (Saas)

SaaS is a term which entered the computing world a few years into the millennium, when it was initially used for several firms of service oriented computing, however it is now defined as *"applications and computer-based services delivered and managed from a remote center to multiple customers through the Internet or a virtual private network"* (Lee, Chae, & Cho, 2013, p. 430). The SaaS appearance can be seen as a result of "servitization", which dates back to 1988 when introduced by Vandermerwe and Rada (Atos Consulting, 2011). Servitization *is "the transformation process wherein product companies embrace a service orientation and/or develop more and better services, with the aim to: 1) satisfy customer's needs, 2) enhance the firm's performance and 3) achieve competitive advantage"* (Atos Consulting, 2011, p. 6). One of the key characteristics of servitization is that firms need to understand how the customers make use of a product or service and how this can increase the value proposition of a firm. Ultimately, products and services become more integrated,

sophisticated solutions because of servitization. The notion of servitization is often used when assessing the phenomena of manufacturing companies supplementing their product with services, in order to achieve the three previously mentioned aims. However, servitiziation does not only account for this industry, and it is argued that the IT industry is also going through this development.. The world-wide known company IBM serves as a good example, as it went from being a near failing hardware business to now successfully offering solutions by embracing servitization. When looking at the software industry, in firms like Oracle and SAP, servitization can be seen through the evolution of software ERP packages. Originally, these software packages were sold as a finished product, however it has now evolved into delivering software as a service. Mäkilä, Järvi, Rönkkö, & Nissilä (2010) listed five distinct characteristics that can typically be associated with SaaS. These include:

1. Product is used through a web browser.
2. Product is standardized to a high degree.
3. The software does not need to be installed at the customer's location.
4. It does not require special integration and installation work.
5. The pricing of the product is based on actual usage of the network.

Other software services that fall under cloud computing services include Platform-as-a-service (PaaS) and Infrastructure-as-a-Service (IaaS). Platform-as-a-Service (PaaS) supports software developers through the whole software life-cycle, and Infrastructure-as-a-Service (IaaS) entails a service in which companies do not have to purchase their own servers and network resource as the needed infrastructure is provided.

While SaaS has been around some time now, research in service innovation is attracting attention. Service companies and industries keep on expanding and simultaneously major developments in ICT and digital technologies occur, increasing the interest in digital service innovation (DSI). DSI is also explained as the emerging research which focuses on how digital technologies can enable innovation of service. (Rizk, Bergvall-Kåreborn, & Elragal, 2017) With regards to the case of this thesis, not only the innovation in service innovation is digital, but also the service itself is digital, namely the ERP service provided through the SaaS model. Because of this, the framework of DSI is twisted slightly as the digital aspect of DSI is already residing in the service itself, before initiating DSI. However, this difference will not change the understanding of the framework, as the properties of innovation processes and the infrastructure of DSI will merely already be integrated in the digital service itself. In turn, DSI

occurs on a digital service, instead of a "regular" service. It is argued that new opportunities in innovation in services are caused by the transformative role of ICT and as the role of users as co-creators of value grows. The world is becoming more and more connected and digitalized, combined with the fact that servitization is also taking over traditional goods, making DSI an important topic to perform further research on. Furthermore, service innovation is extending beyond traditional organizational boundaries and into digital ecosystems, affecting the sociotechnical dynamics related to the DSI process. One of the fields of (digital) interest proposed by Rizk, Bergvall-Kåreborn, & Elragal (2017) is how Big Data Analytics (BDA) can enable DSI. BDA is concerned with the analysing of huge amounts of data, which will be shortly touched upon in the next chapter. An illustration of DSI and which three areas, as proposed by Rizk, Bergvall-Kåreborn, & Elragal (2017), influence each other, in turn supporting DSI, can be seen below.

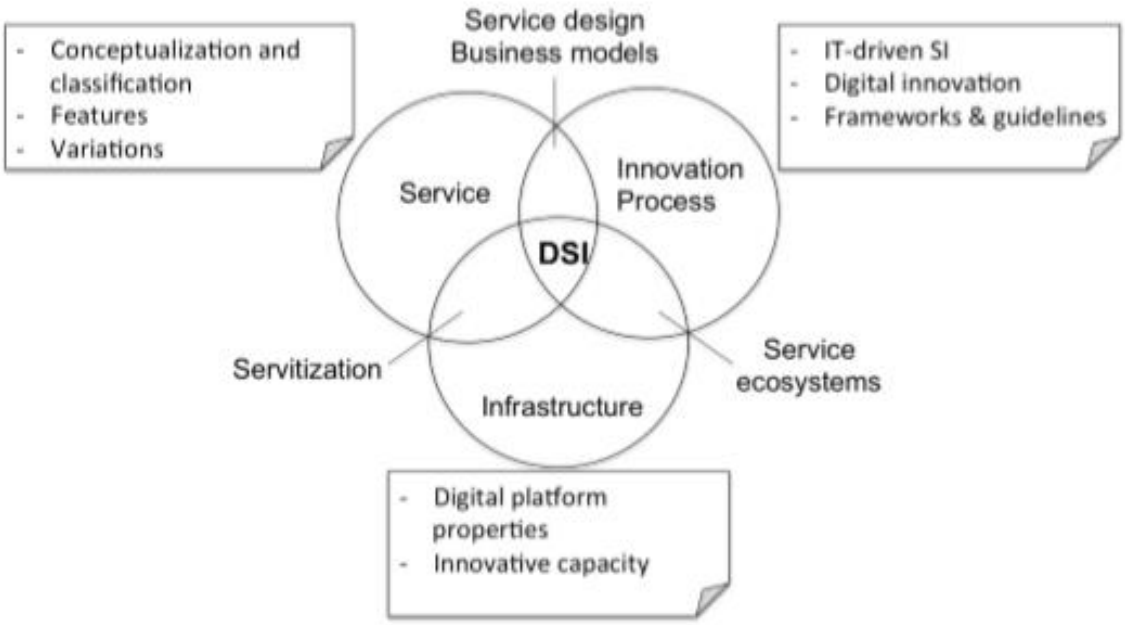


Figure 1. Digital Service Innovation. Adapted from "Digital Service Innovation Enabled by Big Data Analytics - A Review and the Way Forward" by Rizk, A., Bergvall-Kåreborn, B., & Elragal, A. (2017) *Hawaii International Conference on System Sciences*, 1247-1256.

2.1.3 DSI - The Service

As seen in figure 1, the service consists of the conceptualization & classification, the features and the variations. Firstly, **features** include three clusters which are business,

technology and interaction. The *business* cluster includes features such as business objectives, funding and pricing. Business objectives could, for example, be cost reduction, optimization or customer loyalty. Due to the emergence of pay as you go and dynamic pricing, funding and pricing have evolved to now becoming a strong user-driven feature reflecting a cornerstone in the value proposition. SaaS is one of the reasons why this is now feasible. (Williams, Chatterjee, & Rossi, 2008) The *technology* cluster *"encompasses the technological foundations upon which a service is designed, mediated or delivered."* (Rizk, Bergvall-Kåreborn, & Elragal, 2017, p. 1250) The choice of technology ranges from something as specific as a database to a whole service platform. Furthermore, the *interaction* cluster has two representations which include the service interface, in which a user and a digital service interact, and also the social and collaborative service which is created through interaction. An example of this is how social interaction and the data generated are becoming assets for companies like Facebook and Linkedin.

Secondly, **conceptualization** offers a categorization of services, which is proposed by den Hertog's (2000) model of service innovation. He propose service novelty along four features which include: service concept, client interface, service delivery system, and technology. Furthermore, he argues that innovation can occur in relation to any of the four features, and not only when a new concept emerges. Examples of this include a service innovation through a new context or a new technology.

Lastly, service **variations** include product-service systems (PSS) and knowledge-intensive digital services. In this thesis, the focus will be on PSS, also called servitization, because this is the integration of product and service in the ERP vendor industry, as explained earlier. Several technological developments are often the motivation for servitization.

2.1.4 DSI - The Innovation Process

The role of technology in DSI processes is primarily seen as an enabler to the whole service innovation process, which is consistent with the Service-Dominant (SD) logic. This logic stems from the shift from a goods-centric view to the service-centric view in marketing in which *service provisions* have taken the place of *goods* as core concept of exchange (Vargo & Lusch, 2004). In turn, the sharp distinction between goods and services get blurred, which matches the notion of servitization, as mentioned earlier. The SD logic being consistent with technology as enabler becomes apparent as knowledge and skills are thought to be the key resources in exchange, which are enabled by IT. Value is created by acting upon other resources. However, Lusch & Namisan (2015) argue that technology can actually be seen as

both operant and operand resources. Besides the fact that technology can act like an enabler in the service exchange and innovation process, it can also be seen as an actor in service ecosystems, which makes it hard to separate these two roles. Following this, it is of interest to identify how service innovation is realized. Within IT-driven innovation, two distinct phases occur, which include 1) service design, and 2) implementation. One of the challenges that often occur in these phases is the strain between the call for standardization and service innovation. In order to ease this tension, Hanseth and Bygstad (2015) suggest a standardization strategy of "flexible generification", which argues that work processes and actual use determine standards, which are adapted pragmatically. The process steps in this include 1) innovating work processes, 2) development of solutions and 3) standardizing solutions. However, Rizk, Bergvall-Kåreborn, & Elragal (2017) argue that innovating services are more often accomplished in open collaborative (OC) networks, rather than in a linear fashion.

2.1.5 DSI - The infrastructure

Digital infrastructure is described as the pillar of DSI. Within the infrastructure, digital and physical technologies are introduced, which in turn has an effect on the organizational contexts, including human actors and socio-material practices. Within digital infrastructure, Kallinikos, Aaltonen, & Marton, 2013) argue that digital artifacts are editable, interactive, reprogrammable and distributable. Furthermore, they accommodate several subcategories which include platforms, infrastructures and digital products. With regards to the digital platform, it is argued that the evolving architecture is a part of the digital platform's innovation properties. The architecture has evolved from modular architectures with tight coupling, to a more layered modular architecture featuring loosely coupled components. A continuum lies in between these two opposites, in which innovation is promoted, however it also raises issues of integrity and structural flexibility (SF). The SF method is *"a methodology for assessing flexibility in production and service systems in the face of variability"* (Iravani, van Oyen, & Sims, 2005, p. 165). An example of structural flexibility is given by touching upon the thought of introducing employee training in a large U.S. technology company (Iravani, van Oyen, & Sims, 2005). In this, the strategy behind making the right choice that will result in the most benefit to the company is of importance. In other words, is providing good access to training sufficient, in order to yield most benefits, or should the company put effort into purposefully and carefully choosing the training option, in order to create a more flexible system? The SF method argues that system structure has a major impact on

flexibility, and therefore the second option serves as the right way to strategically go about flexibility.

Referring back to the tensions that occur in the continuum between tight and loosely coupled components, the introduction of APIs (Application Programming Interface) serves as a solution to solve these tensions. An API consists of functions which allow for the creation of applications which access the data or features of an operating system or other service. However, this invites distributed and uncoordinated actors to innovate on these digital platforms. A consequence of this is that DSI stimulates generativity of digital platforms. 'Generativity' is defined as *"a technology's capacity to enable the generation of new valuable uses that are easy to distribute and in turn could be sources of further innovation"* (Zittrain, 2008, p. 10).

Having elaborated on DSI and its three areas which together serve as an important aspect to consider when initiating DSI, the question remains of how to strategically manage DSI. While a lot of literature can be found on strategic management in general, and also on strategic management in service innovation, strategic management of DSI appears to be lacking. The conceptual framework of this thesis therefore entails the 'dynamic capabilities' perspective which resides in the strategic management field.

However, before addressing DSI through the dynamic capability perspective, the notion of being ambidextrous as a firm will be explained in the following section. As mentioned earlier, ambidexterity revolves around the ability to find the right balance between incremental and radical innovation in order to successfully innovate, and therefore fits well into the field of DSI. DSI will therefore be further explained in the context of ambidexterity, in which internal processes and organizational structure will be touched upon. In this, the level of ambidexterity determines the success of (digital service) innovation.

2.2 Organizational and IT ambidexterity

While the dynamic capabilities of DSI are of great importance in order to successfully execute DSI, it is also crucial to understand that a great paradox lies in (digital service) innovation itself. While companies are trying to manage for tomorrow, they also need to efficiently keep on managing their business today. In other words, a business should explore with regards to initiating (radical) innovation, while at the same time exploiting (incremental) innovation by managing daily activities in the most efficient way. Even though the combination of exploitation and exploration is crucial in order to enable success, or even survival, it does not come without tensions. Whenever firms can tackle these two activities

simultaneously and give the appropriate level of attention to both, ambidexterity is achieved. March (1991) originally proposed the term organizational ambidexterity and how it could be achieved in the best way. He explains the virtuous cycles of ambidexterity in which three nested paradoxes of innovation become apparent. The paradoxes are founded in the nature of exploitative and exploratory activities, as exploitation seeks to optimize and expand current knowledge to gain efficiency, whereas exploration aims to create new knowledge and foster innovation (Atuahene-Gima, 2005). While exploitation creates tangible and immediate results, exploration creates new and unpredictable results, which in turn means that organizations often tend to favour exploitation of resources and undermine exploration (Aaltonen & Kallinikos, 2012). Because of this, firms often develop a one-sided mindset, as they pursue one of the capabilities and neglect the other. This could explain why some firms are struggling with ambidexterity (Smith & Tushman, 2005). On one hand, if firms lean too much towards exploitation, they miss out on emergent trends and technologies as they focus solely on short-term gains of immediate profits. On the other hand, leaning too much towards exploration will result in firms negating past innovations, in turn failing to capitalize these (Birkinshaw & Gibson, 2004).

Referring back to managing these tensions, the three paradoxes of innovation are labelled as ‘strategic intent’, ‘customer orientation’ and ‘personal drivers’ (Andriopoulos & Lewis, 2009). In this, integration and differentiation tactics are suggested to be vital to managing each paradox. The underlying tensions of these paradoxes work like the Taoist symbol of yin yang, as the more actors move towards one pole, the more pull they feel to the other pole. Within strategic intent, for example, these opposite poles are profit and breakthroughs. Slaatte (1968) states that the typical reaction is to pull to one or the other side, however each pole in isolation is incomplete. In managing paradox, it is important for firms to tap in into its energizing potential, and not trying to reduce or eliminate it. The management tactics of integration and differentiation leverage paradox as they capture both extremes. On the one hand, ‘integration’ focuses on coordination and interdependence between the two extremes, which should help leveraging their synergies (Lewis, 2000). On the other hand, ‘differentiation’ stresses the importance of focusing on either exploitative or explorative qualities. By splitting the paradox, each poles distinct values are accentuated by the actors.

The first paradox of innovation, that of **strategic intent**, see figure 2, is presented as the firm’s reason for being including several contradictions. Being profitable and creative at the same time serves as a good example of the profit-breakthrough tension within this paradox. Secondly, the paradox of **customer orientation** refers to being tightly or loosely coupled to

the client. In this, the tension between current needs and future possibilities is the challenge for firms. For example, tight coupling to the customer *"becomes a blessing and curse, adding insight into the current market, but potentially inhibiting development of new segments"* (Danneels, 2003, p. 560). Lastly, the paradox of **personal drivers** concentrates on the tension between discipline and passion, which touches upon the paradoxical inner drive of employees. As an example, product development faces the challenge of requiring knowledge workers who have high ambitions with regards to design, but who also have the focus on streamlining processes in order to speed development.

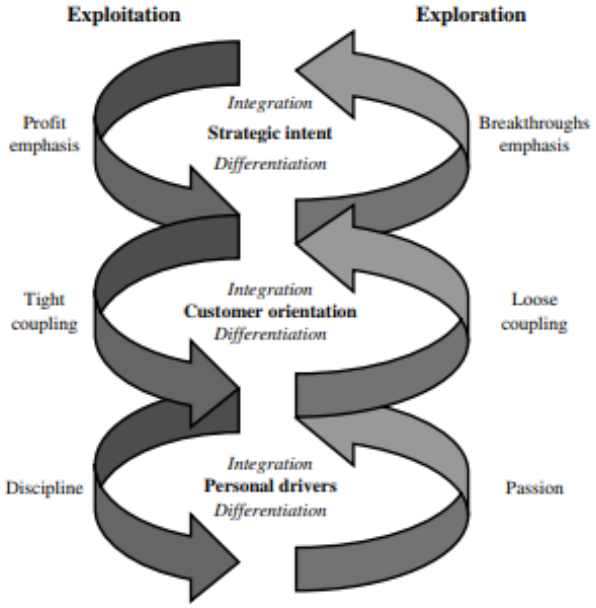


Figure 2. The paradoxes of innovation through the virtuous cycles of ambidexterity. Adopted from "Exploitation-Exploration Tensions and Organizational Ambidexterity: Managing Paradoxes of Innovation" by Andriopoulos, C. & Lewis, M. W. (2009) *Organization Science, vol. 20, no. 4*, 696 – 717.

Because of the focus of this thesis, it is of importance to distinguish between IT ambidexterity and organizational ambidexterity. IT ambidexterity is a particular case of organizational ambidexterity and is defined as *"a firm's ability to concurrently follow exploration and exploitation in their management of IT resources and practice."* (Morabito, 2016, p. 132). In other words, IT ambidexterity contains the same principles as organizational ambidexterity. On the one hand, IT ambidexterity should address IT exploration by having the capacity to experiment technologies with promising commercial potential. On the other hand, IT exploitation should occur by implementing an efficient way of leveraging these

technologies. Gibson & Birkinshaw (2004) argue that top management plays an important role in making an organization context effective and also in developing ambidexterity. However, other researches argue that employees who are in the core of innovation are just as important in this role. Ultimately, it is a complex process in which a firm needs to inform both internal and external stakeholders every step of the way, in order to demonstrate how ambidexterity will be achieved (Morabito, 2016).

To sum up, the level of (IT) ambidexterity influences the success of DSI. As a firm (in the ERP vendor industry) increases its efforts to become more ambidextrous, it must find an appropriate balance between exploitation and exploration, being able to strategically handle new technologies which might appear within DSI. (IT) ambidexterity will therefore serve as a great support for the success of DSI. The other way around, success of DSI, which occurs through the right use of specified dynamic capabilities, also increases the level of ambidexterity as firms form dynamic capabilities for both incremental and radical (digital service) innovation.

Following the explanation of DSI and how being ambidextrous plays an important role, the field of AI and how AI is seen as innovation will be explained in the next section. By incorporating this in the research domain, a particular (hyped) event within DSI is explained, which will in turn serve as the base for analysing how this event may affect dynamic capabilities of DSI. Through this a full picture is drawn of DSI including its overall strategic management.

2.3 Artificial Intelligence (AI) as innovation

As explained earlier, a choice has been made to assess how the field of AI affects DSI. This is of importance, because it is believed that AI might have an influence on dynamic capabilities of DSI in other ways than other digital technologies encountered so far. Therefore, the following section will focus on AI as an innovation and what challenges of managing it. Furthermore, it is to be noted that the technology Machine learning falls under the field AI and is therefore seen as overlapping with the statements on AI as innovation.

AI has now been a buzzword for several years, caused by an enormous growth of data, as digital technologies become increasingly advanced. BDA, as mentioned before, serves as a stepping stone to AI. Data has rapidly become the hard currency of the digital economy and should therefore be managed efficiently. AI is one of the terms which entails technologies to do so. It *"is concerned with developing software as well as machines that have the capability to learn and to simulate humans' intelligence"* (Morabito, 2016, p. 3). These AI technologies

can get insights and discover patterns in big pools of data, which in turn can provide better services for firms' customers.

As demand for better products and services is increasing and customer requirements are constantly changing, organizations are put under pressure to meet these expectations. Rapidly changing market demands are forcing firms to be more flexible, continually redesigning their products and streamlining their services. As a logical consequence, smarter machines and systems have emerged, which can be tied back to AI technologies. A huge trend has emerged in which companies are attempting to employ AI technologies in order to hopefully gain the competitive advantage that helps them survive in their market. However, the emergence of AI has not come without challenges. Research shows that AI will create a large impact on any company in the future (Holtel, 2016). Email and the Internet are two "recent" breakthroughs which have had disruptive consequences, however project management and IT deployment proved to have been sufficient in order to successfully overcome challenges that came with their introduction. With AI this will be different. Certain trends which we see nowadays will have an effect on the success of implementation of AI. The flattening of hierarchies and new forms of collaboration are just a few of many which will affect this. Also, firms often forget or ignore threats that follow with the impact of a new technology. Revolutionary technology cannot simply be substituted by legacy technology without having a psychological or societal impact. A technology based on AI will impact the motivation and attitude of humans to name one of the several psychological/societal consequences of a new technology like AI. "Traditional" IT deployment will not be successful in the implementation of hyper-intelligent machines produced by AI.

Holtel (2016) argues for the notion of a "productivity paradox" whenever AI is tackled with current IT planning and deployment techniques, as AI will then not achieve the productivity gains expected, because companies do not know how to exploit them. In the worst case, companies will not survive the disruptive breakthrough of AI, as they will not be able to tackle the *wicked problem* that comes with it. Wickedness is described as a degree of difficulty, by Holtel (2016). In turn, *"the nature of wicked problems is difficult because conventional procedures cannot handle and resolve the issue"* (Holtel, 2016, p. 172). It has three main attributes which include 1) many causes, 2) tough to describe and 3) does not provide a simple answer. Conventional processes will not only not be able to cope with a wicked problem like AI, they might even worsen the situation by introducing surprising consequences. The opposite of wicked problems, namely *tame problems*, are able to be tackled by conventional standard processes, as these problems may still be hard but can be

handled within a finite period. Often, a problem is somewhere in between the spectrum of wicked and tame, as it can come with many dimensions.

As there is more evidence than ever that data-driven enterprises are the ones to outperform the ones that do not exploit the vast stream of data, Holtel (2016) argues that the ultimate goal is to transform companies to cognitive enterprises. In this, it is important that the organization looks beyond the technology and understands the consequences it will have on expectations and standards of performance.

In order to manage "wicked" problems like AI, it is of importance to understand some key properties of this particular problem. Some of the main characteristics, as proposed by Holtel (2016) include the fact that AI solutions will never be right nor wrong, there is no stopping rule, and every attempt will be novel and unique. These characteristics make managing the wickedness of AI unique in the following ways. First of all, managers need to involve all stakeholders as standard processes will not be efficient, as mentioned before. Through this, they might also be able to unveil some hidden aspects. Secondly, managers should talk about values, as AI might scratch or damage cultural values and destroy existing values. Lastly, it is crucial for companies to apply fast failed attempts, meaning abandoning thinking about all options before choosing one. Through this, constantly adapting and improving makes for progress. *Scenario planning* is a discipline that fits well to understand AI in the business context, as argued by Holtel (2016). By making mistakes consciously, firms learn quickly and walk ahead rapidly.

To conclude, wicked problems like that of AI demand a opportunity-driven approach with fast learning processes that include pilot programs and testing prototypes. Also, the social complexity of a wicked problem requires the creation of *shared understanding and commitment*.

3 Conceptual framework

The following chapter will describe and explain the conceptual framework which is used in this thesis, in order to approach the research question(s) in a structured manner. As the research domain entails DSI and how firms can be innovative by being ambidextrous, a strategic management framework, called the 6-D model is applied, which introduces 'dynamic service innovation capabilities'. This framework is developed by den Hertog, van der Aa, & de Jong (2010) and aims at managing service innovation. This framework is a more general framework, as it focuses on service innovation and not on DSI in particular. However, as

mentioned earlier, this framework can be used to research what kind of (more specific and altered) dynamic capabilities are needed in the ERP vendor industry, when it comes to DSI. The framework will therefore serve as a guideline, but will probably be altered along the way, as altered dynamic capabilities and dimensions are expected for DSI.

The notion of firms needing to be ambidexturious in order to be innovative, as explained in the research domain, serves as a good starting point for analysing how DSI in the ERP vendor industry (in the Netherlands) should be adressed through dynamic capabilities. The reason for this lies in the fact that the theory of (IT) ambidexterity focuses on the pardoxes of innovation and how these should be managed. If mastering these paradoxes correctly, firms should be able to succesfully innovate while simultaneouslly efficiently managing everyday operations. Subsequently, the dynamic capabilities of DSI will serve as a great tool to realize this capability of being innovate. Oppositely, succesfully creating and applying dynamic capabilities succes-fully should also support firms in being more ambidexturous. In order to analyse this, the 6-D strategic management framework has been chosen, which focuses on service innovation and how this should be managed through dynamic capabilities. In other words, it has been taken into account that when initating (digital service) innovation, the level of ambidexterity has to be acknowledged as a cause and effect of the level of success of applying dynamic capabilities in DSI.

In the following section, the term dynamic capabilities and how it is an extension of the resource-based view is explained, followed by how it can create value for a firm and which internal and external factors will influence this. Following this, the 6-D model is explained in which dynamic capabilites are tailored to service innovation.

3.1 Dynamic capabilities

In the strategic management field, the main focus is on how firms can sustain a competitive advantage. Saying this, the resource-based view (RBV) was developed, which believes that a firm can maintain a competitive advantage by possessing resources which are both valuable, rare, imperfectly imitable and imperfectly substitutable, also called the VRIN criteria (Barney, 1991). Even though the RBV focuses on how firms possess heterogenous resources and how this heterogeneity can be sustained over time, the view is rather static as it explains how some firms are able to earn large profits at a certain point in time (Ambrosini & Bowman, 2009). The crucial element that the RBV does not touch upon is the fact that a firm's changing environments should have an influence on these resources. Therefore, an extension of the RBV was introduced, which is called the dynamic capability perspective

(DCP). The DCP contains several similar aspects as it helps understand firm's resources and how they evolve over time, simultaneously sustaining this advantage. However, the DCP is specifically focusing on creating new resources or to renew/alter its resource mix in facing a rapidly changing environment. Furthermore, the DCP view stresses the role of top management and its beliefs about organizational revolution. These beliefs play an important role in developing dynamic capabilities (Rindova & Kotha, 2001).

The DCP was first introduced by Teece and Pisano (1994) who pointed out that it is essential to focus on the changing nature of the external environment and what role strategic management plays in this, which is principally about "*adapting, integrating and reconfiguring internal and external organizational skills, resources and functional competencies toward the changing environment."* (Teece & Pisano, 1994, p. 537). Possessing dynamic capabilities is not enough to support value creation, as stated by Penrose (1959). Instead, the use of the resources, and how much value is created, depends on how the resources are combined within the firm. Furthermore, she argues that managers should have entrepreneurial skills rather than managerial skills. Entrepreneurial skills entail a function of imagination, while managerial skills mainly focus on practical execution, as proposed by Lockett (2005). This could suggest that managers merely know how to run a firm, not being able to change and creating advantage within this.

In order to prevent confusion, it needs to be made clear that the adjective 'dynamic' should not be separated from 'capability'. Supporting this, a dynamic capability is not a capability in the RBV, and it is not a resource as such. *"A dynamic capability is a process that impacts upon resources"*, as stated by Ambrosini & Bowman (2009, p. 32). While capabilites are static and focus on how to compete today, dynamic capabilities focus on the future. Both capabilities and the resource base are stable phenomenons, and 'dynamism' occurs when there is interaction between them, which results in change in the resource base. Moreover, it is important to state that 'dynamic' does not refer to environmental dynamism or the capability itself, but to the change in the resource base, which is also called the renewal of resources (Ambrosini & Bowman, 2009).

Dynamic capabilities entail four main processes, which include *reconfiguration, leveraging, learning* and *creative integration*. Firstly, reconfiguration entails transforming and recombining assets and resources. Secondly, leveraging could, for example, involve extending a resource by applying it into a new domain. Thirdly, learning focuses on performing tasks more effectively and efficiently, as an effect of experimentation. Lastly, creative integration is the ability to integrate assets and resources, thus creating new resources (Ambrosini &

Bowman, 2009). Winter (2003) even argues that there is a third level of capacity, which changes a firm's dynamic capabilities. This level entails the enablers, or also called inhibitors, which impact successful deployment of dynamic capabilities.

Lastly, with regards to methodological issues, Lockett and Thompson (2001) stress that qualitative methods are of more value than quantitative methods when performing empirical work, in order to increase knowledge in the dynamic capabilities field,. They stress that it is necessary to sacrifice some of the generality of quantitative data collection methods, as the qualitative approach can give a more focused attention to detail.

3.1.1 Value Creation

Many scholars make the link between dynamic capabilities and competitive advantage. Cepeda and Vera (2007, p. 427), for example, state that *"if the firm has a dynamic capability, it must perform well, and if the firm is performing well, it should have a dynamic capability'.* However, others like Helfat, et al. (2007) argue against this and state that dynamic capabilities do not necessarily lead to competitive advantage. The reasons for this include that a renewal in the resource base, caused by a dynamic capability, does not necesaarily need to be valuable or it may not even be relevant to the market. Because of the difference in opinions concerning dynamic capabilities and its effects on competitive advantage, four different outcomes can be classified. These include 1) a sustainable competitive advantage, 2) a temporary competitive advantage, 3) competitive advantage, only if the effect on the resource base allows the firm to operate, rather than outperforming other firms, and 4) failure.

Furthermore, it can be argued that dynamic capabilities do not need to be firm specific. The funtionality of them can be duplicated, while the value of competitive advantage lies in the ability to change the resource base. Also, several dynamic capabilities posses common features, making them equifinal, substitutable and fungbile (Eisenhardt & Martin, 2000). The notion of industry dynamic capabilites is further supported by Lampel and Shamsie (2003), who concluded that some dynamic capabilities are similar across firms.

While value creation can occur as a consequence of the deployment of dynamic capabilities, it also comes with certain costs. Firstly, the cost of deploying dynamic capabilities in general, can be expensive. An ad hoc approach could be a good alternative to this, as this is less costly. While dynamic capabilities involve long-term commitment, ad hoc problem solving costs are close to nihil (Winter, 2003). Furthermore, deploying dynamic capabilities requires a lot of time and energy from committed managers. In this, it is of outmost importance that managers perceive the situation in the right way, or else they may

trigger inappropriate dynamic capabilities. This in turn, will increase the cost even more, as the negative consequences of the deployment are added.

3.1.2 External and Internal environment

Dynamic capabilities are shaped by positions and paths. These two terms both enable and constraint dynamic capabilities and focus on both the internal and external environment.

Firstly, 'positions' is twofold as the internal position refers to the firm's assets including financial and reputational assets, while the external position pin points the surrounding markets and institutional environment. It is suggested by Teece, Pisano, & Shuen (1997) that a firm's position has a great influence on its strategic position and could therefore result in a gain in competitive advantage. Secondly, 'paths' focus on a firm's history and the affect it has on the present and future, which also can be both an enabler and constraint to dynamic capabilities. When looking at external factors, factors like uncertainty, complexity, munificence and home country characteristics affect the deployment of dynamic capabilities. With regards to internal factors, managerial style, organizational complementary knowledge and social capital are some of the main factors which have an influence on the deployment of dynamic capabilities. Social capital can be explained as a form of economic and cultural capital which focuses on the networks among people, in which transactions are marked by trust and cooperation. The premise behind this is *"the investment in social relations with expected returns"* (Lin, 1999, p. 30).

To sum up, the value creation process, in which dynamic capabilities reside, has an influence on the outcome, which entails the succeeded or failed competitive advantage. Throughout the process, both the internal and external environment, with its several sub-categories have an effect on this process, as seen in figure 3 below.

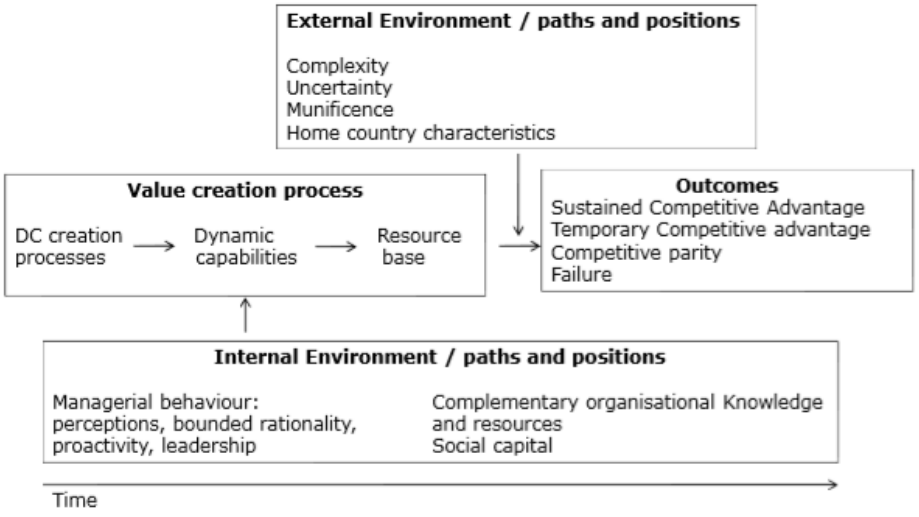


Figure 3. Value creation through dynamic capabilities. Adapted from "What are dynamic capabilities and are they a useful construct in strategic management?" by Ambrosini, V. & Bowman, C. (2009) *International Journal of Management Reviews vol. 11, issue 1*, 29–49

While this section explained dynamic capabilities in general, how value can be created through them and which elements influence them, the following section will focus solely on dynamic capabilities within service innovation, as this ties well to the SaaS industry, in which the (Dutch) ERP vendor industry resides in.

3.2 Dynamic Service Innovation Capabilities

As stated earlier, the 6-dimensional (6-D) framework serves as a framework on how to strategically manage service innovation. The authors of the framework propose that dynamic capability perspective is especially useful for the service industry and its innovation, as the service innovation processes *"is less tangible and more interwoven with capabilities and routines embedded in an organization"* (den Hertog, van der Aa, & de Jong, 2010, p. 491). In the framework, a set of dynamic capabilities are identified, which specifically service organizations can build upon, in turn supporting the creation and realisation of innovations. What is different from this framework than other research performed in this field, is that other papers focus on one certain dynamic capability or resources like managing alliances, knowledge creation or other aspects of innovation.

The six dimensional model, as can be seen in figure 4, covers the possible dimensions for service innovation. Either individually, or most likely in combination, these service dimensions lead to one or more (re)new(ed) service functions that are new to the firm. (den Hertog, van der Aa, & de Jong, 2010) As a consequence of these new service functions, services or goods are changed and these in turn require structurally new technological, human or organizational capabilities in the service organization.

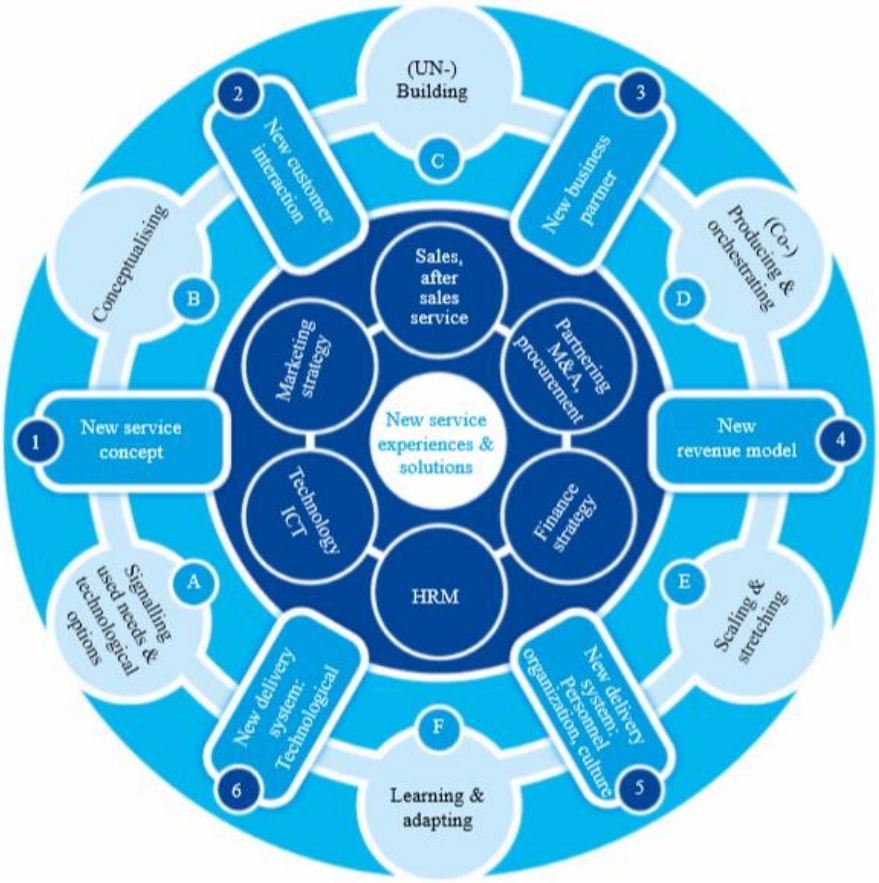


Figure 4. The 6-D framework of Dynamic Service Innovation Capabilities. Adapted from "Capabilities for managing service innovation: towards a conceptual framework" by den Hertog, P., van der Aa, W. & de Jong M. W. (2010) *Journal of Service Management vol. 21, issue 4.* 490-514

Within the model, the functional management domains situated just around the core, illustrate the fact that an innovative firm can realise service innovations by drawing on operational resources and capabilities linked to these departments. Furthermore, the core which entails 'New service experiences & solutions' is seen as the objective of service innovation, which can be a new service, a new service portfolio and/or a new service process, ultimately creating value for the customer. Surrounding the core, the dimensions and dynamic capabilities of service innovation support this ultimate goal. Therefore, the six circles numbered A-F are to be seen as the dynamic capabilities, and the numbers 1-6 illustrate the six dimensions of service innovation. In the following section, each dimension will be shortly explained.

3.2.1 Service Innovation dimensions

The first dimension, that of a *'New service concept'* is where value is created by the service provided, in collaboration with the customer. In order to meet the customer needs, an innovation is created which is a new idea of how to organize a solution which is meeting these needs. An example given in the explanation of the dimensions is from a Dutch supermarket chain Albert Heijn (AH), who created the new service of 'AH-to-go', which are smaller retail stores, open longer than normal times. An example of a new service concept which can be applied by an ERP vendor could, for example, be the new service concept of an Intranet web service that supplements and is integrated with the ERP service offered to the customer.

In the second dimension, which is *'New customer interaction'*, the focus is on the role that customers play in the creation of value. The interaction by the service provider and the customer is the primary source of innovation. In this dimension and in this particular (service innovation) model, the "customer-interface dimension" is dominantly present. With regards to service innovation, the majority of innovations are a variation of "self-service", as for example the introduction of ATMs. With regards to the ERP vendor industry, an example of 'new customer interaction' could be that the ERP service is not only offered through a webservice, but also through a mobile app. In this, the customer is presented with a new interface, increasing the customer experience of the service.

The third dimension, of *'New business partner'*, focuses on new actors which are involved in co-producing a service innovation. In this, value is created as providers, parties in the value chain and actors in the wider network work together to create combinations of service functions. The example of the iPhone in combination with the iStore illustrates how the collaboration within a large community resulted in this successful new service. With regards to innovating an ERP service, a collaboration with, for example, a data analytics specialized firm could result in the new service of offering data analytics of firm processes in the ERP service. Thus the value of using the ERP service goes from being supporting businesses administratively into actually helping them develop.

The fourth dimension, that of *'New revenue models'*, stresses that many new service ideas fail because the distribution of costs and revenues do not match. An example of a new revenue model which had to be applied, is the transition from packaged software sold as a good, to providing SaaS. However, it is of interest to look beyond this, as the application of SaaS is widely adapted today, and could now also benefit of service innovation. A new revenue model for the ERP vendor industry could be to start charging their customers per

minute or transaction instead of per month, as is applicable in the ERP industry at the moment.

The fifth dimension, that of *'New delivery system: personnel, organization, culture'* refers to the organizational structure of the service firm in question. In this, it is important that new services are managed appropriately, which should allow service workers to perform new jobs properly. It is argued that new organizational structures, (inter) personal capabilities and team skills may be required in order to successfully innovate. (den Hertog, van der Aa, & de Jong, 2010) They also stress that a company can differentiate itself from the competition by also focusing on the soft elements of the service delivery system. In this, for example, the motivation of employees and customers with regards to the ERP vendor industry could be increased by creating self-managing teams instead of hierarchical structures. In this, employees are given more freedom and can make quicker decisions, in turn increasing the chance of successful innovation.

The sixth and last dimension, namely *'New service delivery system: technology',* stresses that most service innovations are enabled by ICTs, in which online booking systems and handheld devices are examples from the hospitality industry.. Looking at this from the ERP service perspective, technology is always involved in DSI. The technology of Machine learning applicable for innovation in the software system could enable DSI, in turn creating value for the customer as the system is made less time-consuming. In this, Machine learning will slowly take over human (administrative) processes.

To sum up, a firm can either innovate every single dimension, or it can choose to innovate in a combination of these dimensions. However, *business model* innovation changes every dimension as this is a systems-level innovation. The service innovation dimensions are also of interest for DSI, however only one service innovation dimension will be explored in this research. The interest in the sixth dimensions of *new service delivery system: technology* will be addressed by exploring how the technology of Machine learning affects the dynamic capabilities of DSI. The reasons for this have been explained in the case description and will be further addressed in the third section of the analysis. For further research, it would be interesting to look at all of these service dimensions and if they are the same for DSI. Some examples of DSI are given in the analysis in order to explain certain dynamic capabilities, however no further research is done in the specific service innovation dimensions and how they might differ for DSI.

3.2.2 Six dynamic capabilities

In this section, the 'dynamic service innovation capabilities' are defined, and each of them is further explained. These capabilities are important for firms when they are aiming for service innovation, as it is crucial that they are not solely able to innovate once, but that they are able to introduce and exploit service innovations repeatedly. This means that firms are developing dynamic capabilities which allows them to adopt to changing environments and to obtain a sustainable competitive advantage.

Dynamic capabilities have already been explained into depth in the previous section, however they are taken a step further by adding the lens of service innovation. Teece (2007) proposes three categories of dynamic capabilities, including the capacity to *sense and shape* opportunities and threats, to seize opportunities and dynamic capabilities and to maintain competitiveness through *enhancing, combining, protecting* and, *reconfiguring* the business enterprise's *intangible and tangible assets.* These categories from the DCP are further developed, by analysing them in the service innovation perspective. Saying this, 'dynamic service innovation capabilities' are defined as *"those hard to transfer and imitate service innovation capabilities which organizations possess to develop, (re-) shape, (dis-)integrate and (re-)configure existing and new resources and operational capabilities"* (den Hertog, van der Aa, & de Jong, 2010, p. 498). Furthermore, other factors like firm strategy, market dynamics and firm history have to be aligned with these capabilities in order to create value, as explained earlier. The following six dynamic service innovation capabilities were created, based on existing dynamic capabilities however, now presented with the specific dimensions of service innovation.

In the first dimension, that of **Signalling user needs and technological options** it is stressed that innovations are often an answer to perceived unmet needs of customers, or it is a technological option which is turned into a service proposition. An "intelligence function", which looks and interprets these signals should therefore be in place, in order to successfully leverage these needs and options. For service innovators this is especially important, because they are more dependent on their users as new service propositions are created through co-developing and co-producing. With regard to this thesis and the focus on the ERP vendor industry, it is of interest to look at how this dynamic capability is created with regards to DSI in particular. A slight alteration is expected, because of the solely technological nature of the ERP (vendor) industry. With regards to signalling user needs, it is expected that this will be more complex in the industry in question, because of the wide variety of customers. Furthermore, with regards to technological options in particular, it is expected that this will be

of even greater importance in DSI than in service innovation, because of the wide variety of technological options in the ERP industry. Subsequently, when looking at the technological option of Machine learning, it is of interest to analyse how this technological option affects DSI. As stated in earlier chapters, Machine learning is proven to be of big relevance at the moment, and therefore it is interesting to analyse how it will affect the dynamic capabilities of DSI. Being aware of these latest technology options in a certain industry should be a part of business development function or an ICT department, in which new technological options are discussed and how these should be incorporated in a certain context. Before more focused service conceptualisation can take place, this business unit should be able to manage a variation of information sources, both internal and external, followed by translating these into their customers' unmet service needs and/or other leading problems. While this dynamic service innovation capability pleads for a business development function or ICT department deploying it, another department might be responsible for this in the ERP vendor industry, because of its technological nature. An ICT department in a ERP vendor firm manages other tasks like maintaining the service as such, and is not involved in development.

The second dimension, that of **Conceptualising**, is a dimension in which a clear distinction is made between conceptualising for intangible versus physical goods. First of all, it is hard for a customer to assess beforehand what will be delivered, as they have to experience it before being able to do this. Secondly, the high interaction character is not seen as much in the conceptualizing of physical goods. With regards to this thesis, it is interesting to find out how this is deployed in the ERP vendor industry, as they deal with a product and service that is integrated into one digital solution. The conceptualising dimension will therefore probably be altered slightly, in order to fit the ERP vendor industry. However, other aspects of conceptualising in service innovation, like the ability to come up with a new integrated service configuration, which is experienced as new to the market, is certainly expected to be applicable to the ERP vendor industry. Moreover, the new service offer has to match the firm strategy, target audience, and partner needs, in order to successfully conceptualize service innovation. Just like all other industries, this will be the same for the ERP vendor industry in several ways.

The third dimension, which is the **(un-) Bundling** capability, focuses on the fact that new service innovation is often an existing service in a new context. In other words, most new services are bundled or enriched. (Normann, 2002) Examples given include all-holiday packages, where besides air and accommodation, catering and car rental services are also included. Another example entails integrated consultancies that provide accountancy,

organizational advice and ICT services. With regards to creating (re)new(ed) services in a software service, the (un-)bundling service will be revised and altered. As the focus lays on DSI, and not service innovation in general, this dynamic capability will gain new dimensions. To cater for DSI in the ERP vendor industry, this dynamic service innovation capability is expected to entail a lot more complexity. An ERP system is very broad and consists of many different modules, which all serve as functions to different tasks in a firm. Because of this complexity, (un-) bundling in DSI in the ERP vendor industry will have different properties, when compared to the simpler description in service innovation.

The fourth dimension, which is the **Co-producing and Orchestrating** capability, is one of the key dynamic capabilities with regards to service innovation. Being able to create value across organizational boundaries is of key essence, in order to put a (re)new(ed) service in the market. In this, the service provider co-designs and -produces a service innovation with suppliers and customers. Furthermore, it is also described as the capability to organize and act in open service innovation systems. Co-producing with clients and other stakeholders and orchestrating these temporary partnerships, falls under this important dynamic capability. With regards to the DSI focus, this dynamic service innovation capability is also of key essence with the digital lens, and also in particular in the ERP vendor industry. However, just like with (un-) bundling, co-producing and orchestrating is expected to contain more complexity because of the nature of the ERP vendor industry. Moreover, because of DSI in particular, co-producing and orchestrating will probably also occur in a different manner, because of the technological nature of an ERP system.

The fifth dimension, which is **Scaling and Stretching**, stresses the fact that service innovations are often hard to introduce on large-scale, because of their intangible character and their cultural dependency. However, customers still expect the same service across different channels, as they expect a certain service quality and process with a certain brand. Firstly, scaling is about diffusion. Solely introducing a service innovation once, in one location or part, is something very different than introducing it several times. The ability to do this is a dynamic capability in itself. Secondly, while scaling looks at how a service innovation can be introduced internally, stretching goes beyond the firm and looks at how the new service innovation(s) can be stretched to other related service markets. It is important that the (brand) strategy is always kept in mind and kept consistent, and that it is logical for clients. Winter and Szulanski (2001) argue that scaling, which is also called replication, is not just exploitation, but also touches upon exploration. These terms can also be seen in the theory of (IT) ambidexterity, as explained earlier. Especially in the begin stages of scaling,

exploration happens as a lot of learning, fine-tuning and adaptation of successful service innovation needs to be applied. With regards to DSI in the ERP vendor industry, this dynamic capability is as important as in service innovation. As an ERP vendor has a wide variety of customers it needs to please, it is expected that scaling and stretching requires a lot more consideration. Furthermore, solely implementing an DSI in a certain part of an ERP system will result in not fully exploiting its potential value creation. With regards to stretching, DSI in the ERP vendor industry is expected to be quite similar to the deployment of it in service innovation. ERP vendors also look to stretch DSI into different markets, in turn being able to conquer more markets.

Lastly, the sixth dimension entails **Learning and Adapting**. Within service innovation, this capability entails learning from how the service innovation is managed and subsequently adapting the overall service innovation process. Both failed and successful service innovations should be taken into consideration and the best lessons from these incorporated in the future. Learning and adapting is seen as a dynamic capability both in the original literature of the DCP, as well as in the service innovation literature. This will also be the case for DSI in the ERP vendor industry, just like the dynamic capability of 'learning and adapting' will be applicable for any industry in general. When taking a particular dimension of DSI, the technology of Machine Learning, as an example, it is important to learn and adapt after this new technological option is implemented. By learning how this technology could be adapted in the ERP vendor industry, ERP vendors will be able to use this technology in a more efficient and faster way when they want to implement it in another way in the ERP service the next time. By doing so, value for the customer is created more rapidly, increasing the possibility of the DSI causing an increase in sustainable competitive advantage.

To sum up, it is argued by den Hertog, van der Aa, & de Jong (2010) that service innovators possessing these dynamic capabilities, and being able to use them successfully, will outperform their competitors. This is because they have created specific non-replicable dynamic capabilities, in turn making it difficult for their competitors to simply apply the same service innovation. It is assumed that this is also true for DSI and in particular for the ERP vendor industry. As mentioned, it is argued that some dynamic capabilities developed for the service innovation perspective will be the same. However, some dimensions will need to be altered in order to be of relevance for DSI, and the ERP vendor industry in specific. The possibility of other dynamic (digital) service innovation capabilities emerging for the ERP vendor industry is not excluded.

4 Research Focus

Following the research domain and the conceptual framework, a research focus can be formulated. The combination of these two sections furthermore guide the direction of the main research question and the sub questions. Subsequently, the following main research question is formulated:

How does the dynamic capability perspective create value for the strategic management of digital service innovation (DSI) in the ERP vendor industry?

As explained earlier, the literature available on the strategic management of DSI is scarce. Subsequently, the interest in this from the ERP vendor industry makes it interesting to look at this topic from this particular perspective. Therefore, this chosen research question will guide the analysis of finding out how an aspect of strategic management, namely the dynamic capabilities perspective, can add value and therefore knowledge to the field of DSI in the ERP vendor industry. In this, the field of DSI will gain knowledge on how the inherent properties of dynamic capabilities guide its execution. Several sub questions have also been formulated, which will further help answer the main research question. Moreover, these sub questions all revolve around the dynamic capabilities perspective, covering different aspects of value creation through this perspective.

The first sub question, which entails the factors affecting dynamic capabilities in order to create value, is formulated as the following:

How does the internal and external environment affect the creation of dynamic capabilities for DSI in the ERP vendor industry?

It is hypothesized that the creation of dynamic capabilities and the internal and external factors influencing this will in many ways overlap with DSI in the ERP vendor industry. The model used to analyse this is rather general, which increases the risks of overlapping. However, it is also expected that some additional factors may play an important role, as the focus on the ERP vendor industry is rather specific. Furthermore, it is important to analyse these factors, as value is only created when these internal and external factors are considered carefully when addressing dynamic capabilities.

After addressing how the internal and external environment affects the dynamic capabilities, it is of interest to discover what kind of dynamic capabilities can create value for DSI in the ERP vendor industry in particular. As the literature on this subject is scarce, this second sub question revolves around dynamic service innovation capabilities and how the developed 6-D framework affects DSI in the ERP vendor industry. As stated, the conceptual framework

addresses service innovation, which suits the focus of a SaaS well. However, further research into the digital part of service innovation is of interest. The following sub question is therefore formulated:

How do dynamic service innovation capabilities affect the dynamic capabilities of DSI in the ERP vendor industry?

It is hypothesized that several dynamic service innovation capabilities will also be of value for dynamic capabilities of DSI in the ERP vendor industry. However, it is expected that some dynamic service innovation capabilities need to be altered to fit this particular industry, should be removed or that even some new dynamic capabilities arise that should be created to strategically manage DSI in the ERP vendor industry. The framework of dynamic service innovation capabilities is believed to reach new levels when adapting it to a more specific field.

Lastly, a particular dimension of DSI, namely the technology of Machine learning, derived from AI, will be analysed as this serves as a logical next step in the analysis. Following the analysis of the internal and external environment and the specified dynamic capabilities for DSI in the ERP vendor industry, a dimension of DSI can illustrate how dynamic capabilities might be affected when considering implementing a certain dimension, which should create value for the service. Therefore, the following third and last sub question is formulated:

How are dynamic capabilities of DSI in the ERP vendor industry affected by the technology Machine learning?

This last sub question addresses the fact that there are be many types and levels of DSI and therefore it is expected that these cannot all be strategically managed in the same exact way through the proposed dynamic capabilities for DSI in the ERP vendor industry. Examples of how dynamic capabilities can create value for the strategic management of several events of DSI's are given throughout the analysis. However, it is hypothesized that this will be different for the emerging technology of Machine learning, as explained in the research domain. Machine Learning as an innovation will potentially create new dimensions to dynamic capabilities in DSI. Because of this, it is expected that not only a contribution in DSI can be given by analysing the value of dynamic capabilities in this field, but also how a particular technology option in DSI can have a deviating effect on dynamic capabilities. As explained earlier, AI as innovation can be seen as a wicked problem, which in turn serves as a reason as to how dynamic capabilities of DSI with regards to this field might have to be altered.

Ultimately, the purpose of this study is to demonstrate how dynamic capabilities add value to the strategic management of DSI in the ERP vendor industry. By understanding this, DSI in the ERP vendor industry can be executed with a broader knowledge of its inherent aspects and how these tie in with dynamic capabilities. By creating the appropriate dynamic capabilities and applying them in a suitable way, a firm's (sustainable) competitive advantage should increase, as explained in the conceptual framework. The sub questions proposed in this section will guide this goal, as they start with the focus on the overall value creation with regards to dynamic capabilities, followed by a dive into dynamic capabilities in the (digital) service innovation, eventually leading to how a particular (hyped) technology dimension of DSI is thought to affect the dynamic capabilities of this topic. In order to answer these questions, a case study will be done of a Dutch ERP vendor, which will serve as the method to answer these questions.

5 Case description

In this chapter, the case will be explained and justified. This includes the reasons for why the focus has been laid on the (Dutch) ERP vendor industry and why the ERP vendor in question has been chosen as the case within this industry. Lastly, a dimension of DSI, the emerging technology of Machine Learning, explained by Gartner's Hype cycle will be further explained and why this particular dimension has been chosen to further analyse the value of dynamic capabilities in the strategic management of DSI in the ERP vendor industry.

5.1 Enterprise Resource Planning (ERP)

In order to analyse how DSI should be strategically managed in the ERP vendor industry, a successful and rather large ERP vendor situated in the Netherlands has been selected. The following section will firstly explain the ERP system/vendor industry, which falls under the SaaS industry. The reason for performing research in DSI in this particular industry is further explained. The case will then be described into more detail, explaining what they do, which challenges they have and why this particular case in this industry has been chosen.

While ERP systems used to be sold as software packages, they are now offered on cloud computing under the SaaS model (Seethamraju, 2015). In order to stay adaptive to unforeseen changes, also referred to as agility, ITs/information systems (ISs) can be utilized by all kind of firms, in turn improving business operations (Adrian, Coronado, Sarhadi, & Millar, 2002).

Many firms have invested in large integration ISs, which ERP systems fall under. ERP systems nowadays contain workflows for business process, which are built from best practices concerning of repeatable patterns of business activity. These repeatable patterns are then turned into systematic processes. The ERP system *"gives organizations and companies an incorporated real-time view of its core business processes such as production, planning, purchasing, inventory control, product distribution, and order tracking"* (Bahssas, AlBar, & Hoque, 2015, p. 73). These different business activities are then controlled in different modules within the ERP system including accounting, finance, supply chain, human resources, customer information and several others. ERP is often seen as the backbone of managing business processes, supporting *that "ERP systems have fundamentally reshaped the way business data are collected, stored, disseminated and used through the world"* (Teittinen, Pellinen, & Järvenpää, 2012, p. 278). While standardization of processes comes with great advantages, this same advantage can also serve as an inflexibility. Processes are often hard coded and therefore modifying is minimized in many companies, in order to avoid additional costs. Another important element ERP is data handling. As all important data resides inside the ERP database, standardized processes are done automatically. However, this data is often merely an average, and it does not take into consideration elements from the outside environment that could have an influence on processes within the ERP system (Adam, Keckeis, Kostenzer, & Klepzig, 2013).

ERP systems have undertaken an evolution, since their first appearance in the sixties. Starting with only offering an inventory control system to companies, ERP systems have grown further into implementing Services Oriented Architecture (SOA) as a standard, which is a software architecture allowing different systems to communicate with each other. Entering the 21st century, ERP systems now also incorporate knowledge management, workflows, product management, customer relationship management and many more elaborated functions.

As stated, most ERP systems are now offered under the SaaS model, making them online instead of residing locally and on-premise in firms. With this development, it is therefore of interest to look at DSI in this particular industry. DSI is expected to have reached new heights with regard to the dynamic capabilities in strategic management. Furthermore, the complex nature of an ERP system and the variety of customers it has to please serves as another reason for further analysing how this affects the dynamic capabilities of DSI in this particular industry.

5.2 The Case – AFAS Software

The selected case is the Dutch family company called AFAS Software B.V. (AFAS), which develops an ERP service, called AFAS Profit, as a SaaS solution. AFAS originally stands for 'Applications for Administrative Solutions' and was established back in 1996 by Piet Mars and Ton van der Velde. During its more than 20 years in business, it has grown into four offices, in the Netherlands, Belgium, Curaçao and Aruba, which are two islands situated in the Caribbean. In the Netherlands, AFAS roughly employs 430 employees, however it is expected to increase substantially over the next few years. AFAS is aiming at becoming a market leader when it comes to HR and ERP solutions in the Netherlands. Other main goals include improving sustainability & CSR, continuously improving their operational excellence and working together with and inspiring others (Afas, 2018).

AFAS Profit contains several services, including Financial management, Fiscal Management, Customer Relations Management (CRM), Human Resource Management (HRM) & Payroll, Order management and Project Management. These services are not solely sold to a particular branch or industry or a firm with a particular size. AFAS caters to four different categories of firm size including 1) 1-5 employees, 2) 6-10 employees, 3) 11 to 100 employees and 4) more than 100 employees. Furthermore, its services are altered for the following industries: Accountancy, Construction, Hospitality, Flex, Trade, Manufacturing, Transport, Education, Public sector, Retail and Healthcare. However, in the basis, AFAS delivers a standard software package in which automation serves as the red thread through all functions.

In order to keep up with software developments and other technological developments, AFAS has an unique vision in which they are aiming to 'automate automation'. They are working on a next version of their service, called 'NEXT', in which users, rather than a program, define what the software will need to do. This software will then write its own working application. An entire department has been set up in order to achieve this goal, which ultimately will result in lower costs, more flexibility and platform independence. Software developers will therefore no longer *code* software in the future, but instead businesses are *modelled* in natural language. Subsequently, a platform and device independent application is created by a fully automated generator (Afas, 2018).

As can be sensed, AFAS' core vision revolves around innovation. This serves as one of the main reasons why this case in particular has been chosen for this thesis. Putting innovation as priority number one, makes AFAS a great case in order to analyse how an ERP vendor, in

the Netherlands, can use dynamic capabilities to strategically manage (digital service) innovation and how this is affected when tackling emerging technologies like Machine learning.

5.3 DSI dimension - Machine learning

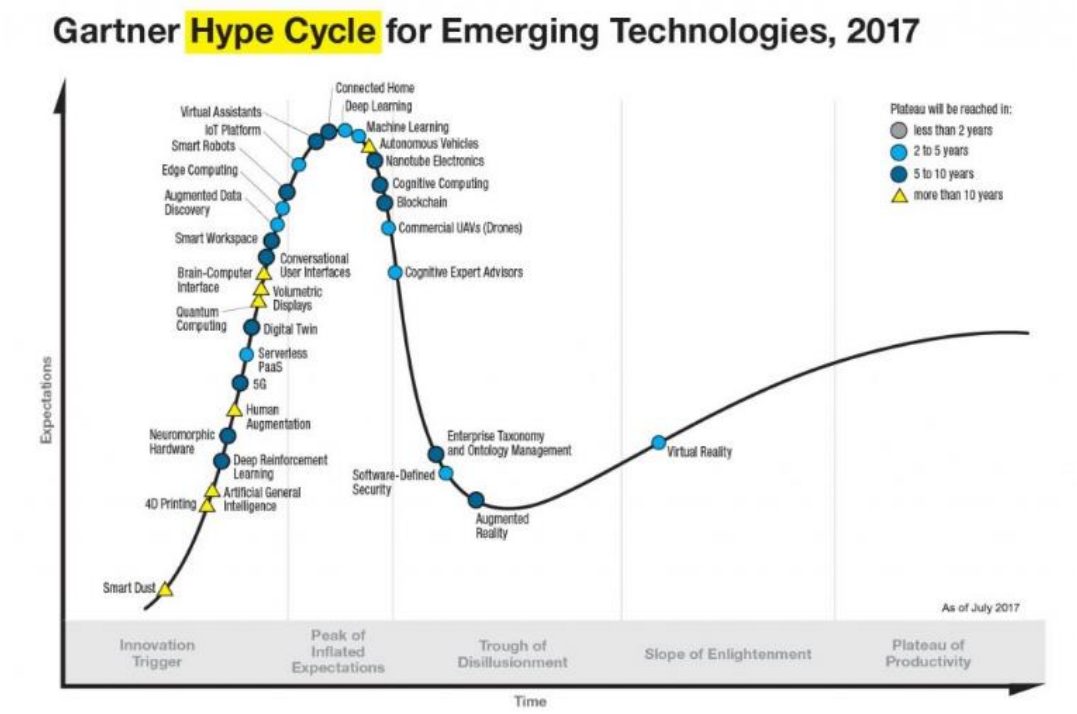
In this section, the technology Machine learning will be further touched upon, and how this emerging technology can be justified when it comes to analysing a dimension of DSI. By analysing this, the view on DSI in the ERP industry can be triggered, as this particular technology is expected to affect its dynamic capabilities. Moreover, Machine learning will be further justified by looking at how other ERP vendors in the Netherlands tackle this emerging technology at the moment.

5.3.1 Emerging technologies

As stated in the introduction, AI is and has been a hype for a while, which can be derived from Gartner's Hype cycle for Emerging Technologies (Panetta, 2017). This cycle focuses on three key trends which include AI everywhere, Transparently immersive experiences and Digital platforms. Technologies like Machine learning and Blockchain have moved significantly along the cycle since it was previously released in 2016. The Hype cycle is developed in order to signal to firms which technology trends create great opportunities as they offer platforms that propel organizations into new business ecosystems. With these technologies, the aim is to become competitive over the next five to ten years (Panetta, 2017). 'AI everywhere' entails a large list of technologies including Machine learning, Deep learning, Smart Robots and many more. Within this mega trend, big leaps are made with regards to sensing, imaging and mapping, however at the same time creating complexity and cost requirements which are presenting challenges. Simultaneously, because of the radically increasing computational power and the endless amounts of data, it is still predicted that AI technologies will be the most disruptive class of technologies in the next 10 years. Within AI, Machine learning is one of the hottest concepts. This technology is expected to have an enormous impact on a variety of firms in a variety of industries. As data will keep on growing fiercely, Machine learning will (still) be able to recognize patterns and create value through this abundance of data, while traditional engineering solutions will slowly fade away in this field.

Being at the peak of inflated expectations at the moment, as seen in figure 5, Machine learning is expected to get to the Plateau of Productivity in 2 to 5 years. In other words,

Machine learning should be taken seriously and taken into thoughtful consideration when it comes to incorporating this emerging technology. In this thesis, it is therefore interesting to see how Machine learning can be analysed as a particular dimension of DSI in a certain industry, namely in the ERP vendor industry in the Netherlands. Furthermore, it is interesting to



touch upon the fact that the combination of Machine learning and ERP systems has already been acknowledged by scholars. Farhat & Owayjan (2017) focus on ERP systems and Neural networks, in which they propose that *"A marriage between these two concepts would yield a system capable of storing and displaying dashboards of data, and simultaneously make computed expectations that can determine the future plans of an enterprise"* (Farhat & Owayjan, 2017, p. 288). While this particularly focuses on Neural Networks, which is just one of the several algorithms within Machine learning, it still argues that Machine learning as a technology is valuable when combined with ERP systems. Furthermore, this stresses how (business) data resides in an ERP system and how can be made use of this in order to support future plans of an enterprise.

Figure 5. Gartner Hype Cycle for Emerging Technologies, 2017. Adapted from Top Trends in the Gartner Hype Cycle for Emerging Technologies, 2017 by Panetta, K. (2017). Retrieved from https://www.gartner.com/smarterwithgartner/top-trends-in-the-gartner-hype-cycle-for-emerging-technologies-2017/

5.3.2 ERP vendors and Machine learning

As the ERP vendor industry is rather large, consisting of many different types of vendors which vary in size of company, size and type of ERP service, presence nationally or internationally and several more dimensions, a selection has been made as to which ERP vendors are comparable in the Dutch ERP vendor industry. These have been measured against AFAS Software, as this is the case company. As no accurate information is available on who the main competitors are of AFAS Software, the information derived in this section is taken from a manager working in Product Management. Based on this, the most comparable and main competitors of AFAS in the Netherlands include the firms Exact, Unit4 and Visma, in the Netherlands (PM 1, 10/04/2018, 25:34).

When observing these ERP vendor's websites and what they are doing in order to stay competitive, it became apparent that these competitors are all incorporating AI and Machine learning in some kind of way. However, this can only be seen in very limited ways. Exact, which is believed to be the number one competitor of AFAS, showcased a whitepaper on their website in which they explain how 'No hands Accounting' can be achieved by Robotic Process Automation (RPA) and AI (Modderkolk, 2018). Moreover, Exact hired a senior Data Scientist in 2017 who solely focuses on incorporating Machine learning and other forms of AI in their Accountancy software. An algorithm was developed which automatically suggests the matching ledger to the incoming bank statements (Exact, 2017). Furthermore, Unit4, also demonstrates that they are aware of AI and are considering it, however they seem to be focusing on other parts of their ERP service at the moment. This includes introducing an AI-empowered "translator" to avoid intercultural miscommunication in between companies, and the introduction of chatbots (Sieber, 2018). Furthermore, Unit4 also promotes on their website that they are working hard on making their business software more and more self-managing. In other words, they are seeing a future in which intelligent automation through self-managing business software can be accomplished through technologies like Machine learning. In turn, employees can focus on what is really important, adding a new intelligent layer to a working day (Dehouck, 2017).

Through these observations, it becomes evident that Machine learning is definitely playing a role in the ERP vendor industry in the Netherlands. However, the question remains how far the technology has developed in the industry, and what the strategic thoughts are, making it possible to draw inferences on the dynamic capabilities of DSI in the ERP vendor industry.

6 Methodology

The methodology section will focus on how the analysis of the thesis is addressed and it will touch upon the methodological considerations that have been taken during the design of the thesis. In order to proceed in a structured manner, the 'Research Process Onion' model is used (Saunders & Thornhill, 2003). The model is divided into five different fields, of which every field stands for a different part of the research process. These include 'Philosophies', 'Approaches', 'Strategies', 'Choices', 'Time horizons' and Techniques & Procedures', as seen in figure 6 below. The following sections will explain what methods are chosen of each field and why.

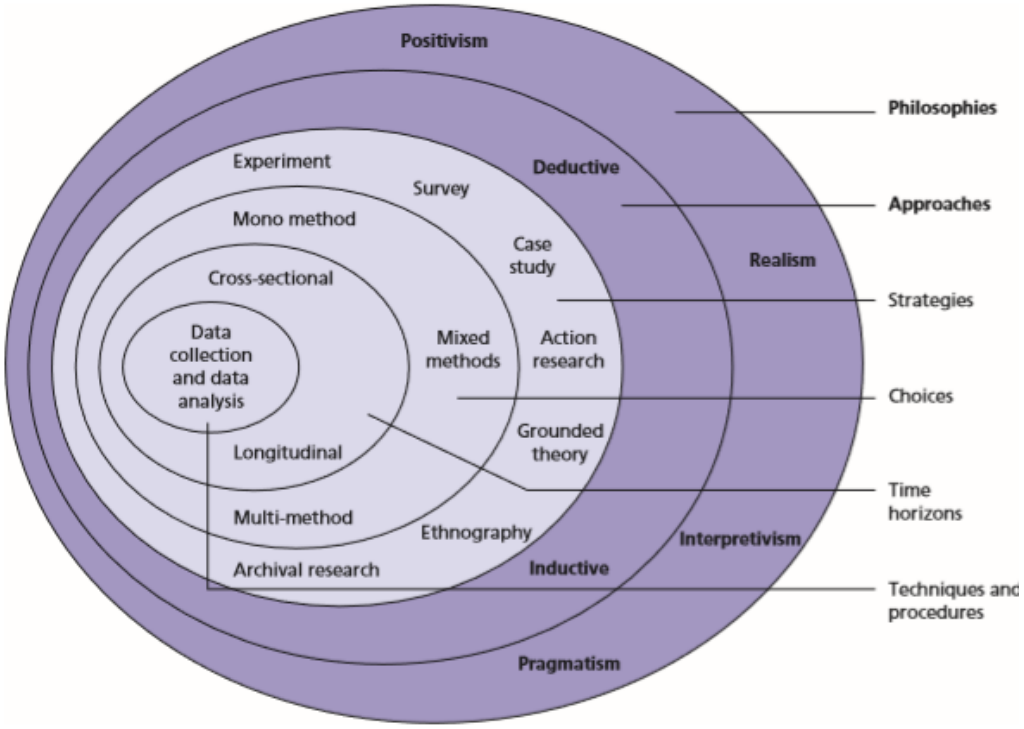


Figure 6. The Research Onion. Adapted from "Research Methods for Business students" by Saunders, M., Lewis, P. & Thornhill, A. (2009), *Springer 5th ed.*

6.1 Philosophies

The research philosophy entails important assumptions on the way you view the world. Saunders & Thornhill (2003) argue that a philosophical commitment should be made prior to starting research, as this choice of research strategy will have a great impact on what we do and how we understand what we are researching. Within Research Philosophy, the four views

of the world include pragmatism, positivism, realism and interpretivism. In this thesis, the viewpoint of **interpretivism** was chosen, as it fits the research focus well. Interpretivism stresses that *"it is necessary for the researcher to understand differences between humans in our role as social actors"* (Saunders & Thornhill, 2003, p. 116). Furthermore, it makes it clear to the researcher that he or she has to understand the difference between performing research among people rather than on computers or other objects. Other characteristics include that we interpret social roles of others with our own set of meanings, and that the challenge of the researcher lays in entering a social world and to understand what is happening from their point of view. Saunders & Thornhill (2003) state that many would argue that interpretivism serves as a good point of view in business and management research as this deals with elements like organizational behaviour. Supporting this is the fact that every firm is unique, making business situations complex. This thesis will only perform qualitative research based on interviews, which also served as a well-grounded reason as to why choosing the interpretivism research philosophy.

6.2 Approaches

Within research approaches two methods exist, which are *deduction* and *induction*. Deduction is the approach in which an own formulated hypothesis is tested by developed theory, followed by designing a research strategy to test this hypothesis. Finally, a conclusion is formulated on basis of the application of theories on the data collected. When performing induction you collect data, which you then analyse in order to develop theory. This approach is more flexible than the deductive approach, as it gives the researcher the ability to change the weight of the research throughout its process, depending on what data has been found (Easterby-Smith, Thorpe, & Lowe, 2002). In this thesis, the choice was made for the **deductive** approach because hypothesises were formed that could be tested by developed theories like the 6-D framework mentioned earlier. This framework and other models and theories served as good tools to analyse organizational behaviour. Furthermore, the research approach also included a few aspects of induction. As no research has been done so far on dynamic capabilities of *digital* service innovation in particular, data from the research was also used to assess how the retrieved data could be applicable for an already developed theory. Through interviews new data was produced, which occasionally diverged from what was expected. New alterations could therefore be made to existing theories, in turn supporting the new research focus.

6.3 Strategies

The research strategy entails the procedure of how to perform research on the phenomenon of interest (Andersen, 2006). Research strategies available include 'Experiment', 'Survey', 'Case study', Grounded Theory', 'Etnography' and 'Actions Research'. These strategies are not mutually exclusive and several combinations are possible. In this thesis, a clear choice was made for the **Case Study**. Case study research *"is the traditional name of a methodology for studying the complexity of the 'real world'"* (Gummesson, 2017, p. 4). However, Gummesson (2017) elevates Case study research as he introduces the expanded version, namely 'Case Theory'. He defines it as the following: *"Case theory is an overriding methodological approach to address both a particular case and to generalize to a broader area"* (Gummesson, 2017, p. 5). In this he uses the terms "particularization "and "generalization". On the one hand, particularization addresses the uniqueness of a case and how the main purpose is to understand this case and come with specific recommendations. Addressing a single case can be seen as applied research, however at the same time it is also basic research, which researchers can use as an opportunity to close access of real-world events. On the other hand, generalization focuses on the idea that a case study is not directly meant to be generalized, however Gummesson (2017) still argues that it can been assessed as offering *substantive theory,* which can be used in cases of the same kind. While arguing this, he also states that substantive theory can evolve into more cases of the same kind, leading to generation, and eventually leading to mid-range theory, ultimately reaching grand-theory. Eventually, theory generation can be achieved, which is about *"incremental improvements of extant theory and the discovery of new theory"* (Gummesson, 2017, p. 6). Yin (2009) supports Gummesson (2017) by stating that case studies are like experiments. The point taken is that case studies are generalizable to theoretical propositions and not to populations or universes. The researcher aims for *analytic* generalization and not for *statistical* generalization. With regards to analytic generalization, the researcher's goal is to expand and generalize theories, while statistical generalization has the goal of enumerating frequencies.

Referring back to Gummesson (2017) particularization and generalization are to be treated together, and not as opposites, as a particular case can have the purpose of remaining a single case. However, other cases can also benefit from the lessons learned in the single case. As mentioned in the research approach, a mix of theory testing (deduction) and a few elements of theory creation (induction) was applied, which fits well to Case theory.

6.4 Choices

As mentioned before, qualitative and quantitative method choices are available in research. Another way of looking at these choices is that the qualitative method focuses on non-numeric (i.e. words) data, while the quantitative method entails numeric (numbers) data. Within choices, three options are available, which include mono-, mixed- and multi- methods (Saunders & Thornhill, 2003). One the one hand, if choosing a mono-method, you choose either the quantitative or the qualitative data collection technique with matching data analysis procedures. On the other hand, the multi-method entails combinations of data collection techniques. In this, the researcher needs to stay within the qualitative or quantitative data collection technique. However several data analysis procedures within this technique may be used. For example, within the qualitative data collection technique, it is possible to combine observations with interviews, which both consist of non-numerical data. A mixed-method is also an option, which mixes qualitative and quantitative data collection techniques. In this thesis, a **mono-method** was chosen as the data from interviews was used for the analysis.

6.5 Time horizons

Within time horizons, the question is asked if the research performed is a snapshot taken at a particular time, or if the research is more "diary" based. When taking a snapshot approach, the study is called cross-sectional, while the diary approach is called longitudinal. Most research is performed in a cross-sectional manner, as research is often time-constrained. This thesis was also performed in a **cross-sectional** manner, as the phenomena of dynamic capabilities was studied over a short period of time. Also, most case studies are viewed in a cross-sectional way as these are often based on interviews conducted over a short period of time.

6.6 Techniques & Procedures

Lastly, techniques and procedures for research have to be selected. Sampling, Secondary data, Observation, Interviews and Questionnaires are some of the options within techniques and procedures. In this thesis, the data collection was obtained through **interviews**.

Firstly, a spectrum of different types of interviews are available, which focuses on the amount of control the researcher has when interviewing. This includes unstructured, semi-structured and structured interviews. In this thesis, a choice was made to perform **semi-structured interviews**. In semi-structured interviews, a guide is used with questions and topics that need to be covered. While the questions are standardized, the researcher has some

flexibility about the order in which the questions are asked. By performing this kind of interviewing, a conversational style is applied to collect detailed information. It is often chosen as it provides the researcher the chance to dive deeply into a subject and really understand the answers provided (Harrell & Bradley, 2009). One researcher, who is also the main researcher of this study executed all interviews. No language barriers were expected, as the researcher speaks Dutch fluently, which matched the mother tongue of the respondents. An interview-guide provided a fixed list of topics and underlying questions, which were based on the underlying topics of the research domain and the conceptual framework of this study (see appendix B). The five overall topics included an overall introduction on the topic of the thesis, the effect of SaaS on the ERP vendor industry, DSI dimensions, DSI processes and Machine learning in DSI. Through these five topics, substantial data was obtained to answer the research question(s) of this thesis. A deliberate choice was made not to state the explicit dimensions of the research domain and conceptual framework to the respondent. Instead, the broader topics within these topics were addressed. Through this, the chance of the respondent being steered in a predefined direction was decreased. Before each topic, a short introduction was given of the topic in order to explain the respondent the topic in more detail. Using a semi-structured interview-guide ensured consistency and uniformity in the data collection among the researcher and interviewees (Gray, 2014).

The interview-guide was written in English and afterwards translated to Dutch, which was considered carefully in order to prevent wrong interpretation. Prior to executing the interviews, a pilot version of the interview guide was tested on a relevant employee who was not part of the target group. This was done in order to create questions that are unambiguous and accurate. Moreover, the pilot version was tested on accurate wording, clear given instructions and formality of questions. After the pilot was tested and the necessary adjustments were made, respondents were contacted. All of the respondents were within the case company, AFAS. Still, respondents received a brief explanation of the study aim and procedure. Before the interview started, respondents were informed about confidentiality and consent was sought. Interviews were audiotaped and conducted by one researcher, who simultaneously took notes for later comparison. The interviews were conducted in Dutch, as most valuable answers would be derived through this, as no language barrier would occur. All of the interviews took place at AFAS and were all transcribed directly after they were conducted. By proceeding in this manner, valuable insights increased, as they were noted down immediately after doing the interviews.

A total of eight interviews were held, which included a variety of employees on management and top-management level. The interviewees included three Product Managers, one responsible for the Financial 'module' of the ERP system, one responsible for the Order- and Project Management 'module', and one responsible for the HR and Payroll 'module'. Furthermore, the interviewees also included two managers from the Architecture and Innovation department, who are both involved with the radical innovation of NEXT, the next step of software development which was described in the case description. Moreover, a manager from Product Development was interviewed. Lastly, the manager of Controlling and the overall manager of the Product Management department were interviewed (see appendix A). All of the interviewees were selected with care, as these were the people who could contribute the most to a strategic management perspective of DSI. Variety in data was accomplished by interviewing (top-) managers with different backgrounds and a developed opinion on the subject of Machine learning. By only interviewing (top-) managers, it was believed that the dynamic capabilities perspective of strategic management could be showcased in the best possible way.

6.7 Data analysis

All interviews were transcribed in verbatim. The collected data, which included the data from the semi-structured interviews, was analysed using a thematic analysis method based on a closed coding sheet. By means of this approach, inferences were made about the data by objectively and systematically categorizing all data based on the key concepts derived from the conceptual framework. Before the interviews were conducted, a coding sheet was made. The coding sheet was specified on the different concepts into topics based on the chosen literature (Gray, 2014). To be able to adjust the coding sheet to all new information obtained from the interviews, the coding sheet was not finalised before finishing transcription of all interviews. During the transcription of the interviews, quotes were first linked to categories , which are topics of the coding sheet. These categories were then divided into subcategories. Themes were identified by sorting and clustering all codes and subsequently linkages between subcategories provided patterns in the data. After this, open coding was used to identify whether any new subcategories were needed to be created, apart from the coding sheet topics. All (sub)categories were used to see differences and similarities between the perception of all participants. This process is referred to as an iterative method. Next, axial coding was used to connect the main categories with the subcategories. Lastly, the (sub)categories were prioritised. Only the most frequently mentioned and most important (sub) categories were

discussed in the analysis. Quotes qualified as meaningful and relevant for the results were translated from Dutch to English.

6.8 Ethical considerations

According to Gray (2014), it is important to not harm those who participate in research. Therefore, prior to data collection, it is important that all participants sign an informed consent. However, in the case of AFAS, this consent was given by the overall manager of Product Management, as he was made responsible to decide on how the retrieved data should be handled by the researcher. It was important to make these arrangements, as informed consent is necessary to ensure anonymity and confidentiality (Gray, 2014). This states that participants are not obliged to answer questions and they have the right to withdraw of the interview at any time. Likewise, it includes permission for possible publication of the data that is collected in this research (Gray, 2014). All audio tapes were securely digitally stored, with access only to the researcher and supervisor of this study. Names of participants were not used in the final analysis.

6.9 Validity and reliability

The conducted interviews were not performed simultaneously, which allowed a constant comparison to identify emerging themes within the research. The potential bias that could arise because of the researcher being the only one to perform the interviews was decreased by discussing contradictionary statements with other employees within relevant departments of AFAS. Moreover, the transcribed interviews were analysed as objectively as possible to ensure validity. After analysing the transcripts, the researcher reviewed whether all quotes of each interviews were accurately categorised according to the coding sheet..

In addition, trustworthiness in qualitative research is an important marker and shows whether research findings are credible, transferable, confirmable and dependable (Shenton, 2004). Concerning the interviews, a general topic guide was created to ensure reliability and consistency (dependability) within the research. Furthermore, accuracy (credibility) of the data increases through paraphrasing during the interviews to check whether the interviewee is understood well.

7 Analysis

The analysis of this thesis presents the data obtained through eight semi-structured with managers across different management functions within the case company, AFAS. As previously explained in the methodological section, the conceptual framework(s) served as the basic guideline and structure for the interviews, which includes the internal and external factors of the value creation of dynamic capabilities and the 6-D model of dynamic service innovation capabilities. The six dynamic service innovation capabilities, namely Signalling user needs & technological options, Conceptualizing, (Un-)bundling, (Co-)producing & orchestrating, Scaling & stretching and Learning & adapting were further touched upon in the interviews. By using these dynamic service innovation capabilities to analyse DSI in the ERP vendor industry, inferences were made on dynamic capabilities of DSI. Furthermore, the technology dimension of DSI, namely Machine learning, was presented to the interviewees and their answers gave indications of its potential effect on dynamic capabilities in DSI. Moreover, the theoretical concept of (IT) ambidexterity functioned as an overall theme throughout the interviews. As described earlier, the execution of a thematic analysis of the collected data allowed to discover new dimensions and or alterations in meanings related to both the internal and external environment, the dynamic capabilities deployed in DSI, and in how an innovation like Machine learning might affect these dynamic capabilities. Through this, altered and additional themes were identified, in turn complementing and refining the mentioned conceptual dimensions. These altered and additional themes will be further discussed in relation to the research domain, which allows deeper insights into how dynamic capabilities are of value for DSI in the ERP vendor industry. These will be presented in the discussion.

7.1 Dynamic capabilities – Internal and External environment

How do internal and external factors affect the value creation of dynamic capabilities for DSI in the ERP industry?

7.1.1 Value creation process

As seen in the conceptual framework, the value creation process includes the dynamic capabilities creation process, which results in dynamic capabilities, that in turn affect the resource base. This rather general model was also touched upon in the interviews, in which the majority of the respondents identified ‘knowledge’ to be the most important resource

when it comes to value creation in dynamic capabilities. Without having the knowledge in-house, the creation and deployment of dynamic capabilities would create no value.

First of all, it was identified that knowledge is of outmost importance in the ERP vendor industry, because of the fact that every single customer has different requirements and wishes with regards to the ERP system. If an ERP vendor would listen to all of them, a clear strategy could never be developed when it comes to further developing the ERP system. As Product Manager 1 stated: *"if we really want to develop something and make a difference, we need to have the knowledge internally*" (PM 1, 10/04/18, 52:13). Furthermore, knowledge from the customer is not always considered as the "right" knowledge, as explained by the manager of Controlling (Manager Controlling, 12/04/18, 38:05). He stated that the customer often has been executing certain processes and tasks in the same manner for a long period of time, wanting an ERP system to facilitate this. However, AFAS uses their in-house knowledge to react on the needs of the customer, creating processes that actually improve the initial processes. An effect of this is the "surprise element" which is mentioned by several respondents as being important in the ERP industry, as these administrative processes are often considered as being very logical and self-evident. This in-house knowledge could surprise the customer, and potentially turn into a competitive advantage.

Secondly, minimizing the dependence on knowledge from partners, serves as another legit reason for focusing on having most knowledge in-house. As stated by Product manager 2: *"we want to do everything in our own way, and keep it like this. By doing this, we have a hold on the whole process from A to Z*" (PM 2, 10/04/18, 44:30).

Other resources like money, in order to facilitate (digital service) innovation were mentioned, however this was considered as a rather straightforward resource that is needed in any industry and in any type of innovation. Evidently, knowledge as a resource is also needed in any industry in order to support (digital service) innovation. However, it was the specified importance of *in-house* knowledge that was rather noticeable as many respondents mentioned it, without being specifically asked about it. However, by stating that this in-house knowledge is of importance for DSI in the ERP vendor industry, does not exclude the fact that it could also be applicable for other industries attempting DSI.

7.1.2 Internal environment

As mentioned in the conceptual framework, internal factors affecting the value creation of dynamic capabilities include Managerial behaviour, Complementary organizational knowledge and Social capital. This section will discuss these factors and what they mean for

dynamic capabilities of DSI in the ERP industry. Furthermore, another additional internal factor was discovered through the interviews, which will be addressed in the discussion.

7.1.2.1 Managerial behaviour

The internal factor of managerial behaviour as such has several sub elements including perception, bounded rationality, proactivity and leadership. The most answers regarding these sub elements focused on proactivity. Several respondents stressed this importance, as the (ERP) environment is changing so quickly, in turn making it very important for the firm to be proactive. As stated by a manager from Product Development: *"Our board does understand very well that what they are yelling about today, maybe takes up to 5 years before it is affective at all customers. They know this very well, however they still need to do it in order to conquer and win the markets"*(PD 1, 11/04/18, 21:52). This statement is further supported by the overall manager of Product Management, who states *"no guts, no glory"* (PM 4, 13/04/18, 13:14). In this he explains that you really have to show that you are just going to do something, even though you are not sure if it is the right thing to do. By doing so, the risk of receiving strong aversion increases, however it still brings AFAS further in the process, and often this is also where innovation occurs.

Furthermore, leadership was a theme which was mentioned often in the interviews. AFAS tries to lead the company by making the employees feel like it is a sort of life necessity to improve how other firms run their businesses (A&I 1, 13/04/18, 12:18). By doing so, it engages its employees in a way which makes them engaged as much as possible, in turn having a positive impact on the dynamic capabilities, ultimately leading to a possible increase in a sustainable competitive advantage.

When it comes to perception, it became apparent that the "smart follower" strategy and the "new business" strategy, are both perceptions of AFAS as a company, which steers them in a certain direction. As manager 2 from Product Management explains*: "Digital (service) innovation is pretty hard to succeed in as you have to do the right things at the right time, but I think AFAS does this pretty well, because of the smart follower strategy"* (PM 2, 10/04/18, 9:55). By smart follower strategy he means that AFAS is not a front runner when it comes to DSI, but a firm that smartly follows innovations from other firms whenever they see the time fit. This perception of AFAS and its environment is believed to successfully facilitate DSI at the right time. Furthermore, by following a "new business" strategy, which means that new business opportunities are prioritised over developing old ones, AFAS perceives its environment by conquering as many industries as possible. This managerial perception has an

effect on the dynamic capabilities of DSI in the way that, through conquering new industries, DSI is stimulated even more. By concentrating mainly on new business, a firm like AFAS is in many ways "forced" to initiate DSI and make use of the right dynamic capabilities at the right time, as they need to win new customers over in order to succeed in these new markets.

Lastly, bounded rationality is an element which is believed to be existing in all firms, as it is never possible for a manager to assess its environment in a fully objective way. Human beings will always be limited with the amount of information they receive, their limited time and by their cognitive limitations. However, as stated before, AFAS tries to overcome this by working with and listening closely to their customers.

7.1.2.2 Social capital

As explained in the conceptual framework, social capital is a form of economic and cultural capital, in which transactions are marked by trust and cooperation. When it comes to AFAS, it became apparent that this social capital is of great importance and has a big influence on the value creation in dynamic capabilities. When addressing the network of AFAS and how it affects dynamic capabilities, 'trust' is the key word that appears most frequently when talking to respondents. As AFAS is an ERP vendor and processor of a lot of (sensitive) information, all stored in databases which AFAS has access to, 'trust' is of outmost importance. Certainly in DSI, as the potential to leverage data is constantly growing, trust is needed in order to be able to initiate DSI. In "using" customers' data, AFAS communicates very clearly to its customers that they are anonymising data, and not using it for any commercial targets. Manager 1 from A&I explains that this is difficult, however trust from the customer can make it easier to justify this (A&I 1, 12/04/17, 53:43). Manager 2 from PM also further links it to 'reputation'. As he states: *"In the past 20 years we have built up a really good reputation, which will in turn increase the level of trust residing at our customers."* (PM 2, 10/04/18, 1:08:00).

7.1.2.3 Complementary organizational knowledge

With regards to complementary organizational knowledge, the majority of respondents state that it influences the success of DSI in the way that this internal factor has a positive influence on dynamic capabilities. The amount of complementary organizational knowledge that a firm possesses will determine how well the dynamic capabilities are made use of when initiating DSI. In the previous section on value creation, the "in-house" knowledge was already mentioned as a resource which AFAS uses when applying dynamic capabilities. However, it is also seen as an internal factor affecting the value creation of dynamic

capabilities. With regards to DSI in the ERP vendor industry, complementary organizational knowledge creates extra value as this internal factor supports the ability to address the complexity of the ERP service and the wide variety of customers, as stated earlier. When possessing complementary organizational knowledge on a certain type of DSI, the chance of using the right dynamic capabilities at the right time will increase the chance of (maintaining) a sustainable competitive advantage.

7.1.3 External environment

Complexity, uncertainty, munificence and home country characteristics, as seen in figure 3m are the external factors which affect the degree of sustainable competitive advantage, after the value creation of dynamic capabilities has occurred, with influence of internal factors.

7.1.3.1 Complexity and Uncertainty

Complexity and uncertainty were most frequently mentioned by respondents when talking about external factors in the ERP vendor industry. Complexity became apparent as not only the ERP system of AFAS is complex in itself, but also the wide variety of customers and therefore industry needs, as explained earlier. *"The ERP industry is tougher than many other industries, because it deals with a lot of different companies",* as stated by a manager from Product Development (PD 1, 11/04/18, 3:55). Not only the requirements and needs of the customers are complex, but also their processes as such. Manager 2 from Product Management compares it with other SaaS solutions like certain apps in which customers work intuitively with the software. He explains that this is never the case with an ERP system, as you often do not know which input will be placed in the system, and which output is going to come from this. This is another point that characterizes the ERP vendor industry (PM 2, 10/04/18, 13:15). In other words, the more complexity, the harder it is to execute DSI, because not one single innovation can be introduced, as can be done in, for example, a mobile app. However, AFAS tries to compensate this by standardizing the solutions as much as possible, differing only per industry and not per every customer.

Secondly, uncertainty also substantially affects the final level of sustainable competitive advantage in the ERP industry. The most noticeable quote regarding the uncertainty of the external environment came from manager 1 from Product Management who stated: *"The only constant thing in this world is change. If you do not change with the change and do no evolve further, and assess how you can do things differently, then you will get a Kodak moment"* (PM 1, 10/04/18, 3:45). With Kodak moment, he refers to the firm Kodak who chose not to

evolve digitally and therefore lost its competitive advantage substantially in the end. Even though this does not only count for the ERP vendor industry, it still illustrates an important strategy as how to deal with uncertainty in the best possible way. Furthermore, he also explained that the introduction and maturing of SaaS resulted in more uncertainty in the ERP vendor industry, in turn making this an even more important factor. With the presence of SaaS, customers can now stop the contract/payment and pay per month if they wish to. This is very different than before SaaS, in which customers were often tied to a heavy contract for 4 or 5 years. Subsequently, it creates more flexibility for the customer, but also more uncertainty for the ERP vendor. However, even though this uncertainty has increased, AFAS choses to tackle this by being confident about their own service and sticking to their own vision. Through this, a natural deselection of customers who do not agree with this is taking place (PM 1, 10/04/18, 25:36).

7.1.3.2 Home characteristics and munificence

The external factor of 'home country characteristics' was mentioned a few times, but was not seen as a noticeable factor. However, some respondents stated that some types of DSI were not possible or were more difficult to succeed in because of a certain element of the Dutch culture. For example, within the Financial management module of an ERP system, a certain way of categorising called 'RGS' in the Netherlands could help the booking of invoices to ledgers, as a standard categorisation would be followed. ERP vendors like AFAS could use this type of categorisation in order to incrementally innovate in financial administrative tasks, making them less time consuming. However, the Dutch government has decided to not make the "RGS" a standard way of categorisation yet, which means that this type of DSI cannot be executed (PD 1, 11/04/18, 9:39).

Lastly, munificence is the external factor which entails the action of being generous. This can be translated to the phenomenon of partners or customers wanting to work together with AFAS, and having the best of interest in each other. Moreover, the granting of success plays a role in this. Several respondents stated that this external factor is important. If munificence is not present, it is hard to successfully apply dynamic capabilities, because they cannot be turned into a competitive advantage without having munificence from its partners and customers.

To sum up, the internal and external factors affecting the value creation process of dynamic capabilities, in turn affecting the level of sustainable competitive advantage, are mostly also of relevance for DSI in the ERP vendor industry. However, this was also expected

due to the rather general character of the model. At the same time, some factors were of more importance to AFAS than expected. Furthermore, certain inferences can be made on DSI and (IT) ambidexterity when it comes to the influence of internal and external factors on the value creation of dynamic capabilities. It is of interest to look at how these factors play a role in the ability to be ambidextrous in DSI in particular in the ERP industry. In other words: How do the internal and external factors influencing dynamic capabilities of DSI in the ERP industry affect the ability to be ambidextrous?

Firstly, the internal factor of managerial behaviour has a strong connection to (IT) ambidexterity in the sense that the ability to be ambidextrous is stated to be rather dependent on the way of managing. As stated in the research domain section, (IT) ambidexterity can be accomplished by finding the right balance between integration and differentiation on the strategic, customer and personal level, finding a balance between exploitation and exploration. Moreover, it is stated that it is of importance that management level has a clear view on this aspect, as they are (mostly) responsible for finding this balance throughout the firm. With regards to DSI in the ERP vendor industry, this managerial factor is extra important when it comes to exploitation versus exploration, which is also known as incremental versus radical innovation. AFAS focuses heavily on making the service incrementally better by making logical administrative processes smarter. In other words, as several managers state, radical innovation is not the main priority. They all state that this is because of the nature of the business, and its variety of customers. Explanations for this balance will be further touched upon in the discussion.

Secondly, social capital also has an inference on (IT) ambidexterity. Without social capital, which includes trust and reputation of AFAS, incremental nor radical DSI could be successfully executed. Without these elements, customers would not trust their business data to AFAS, which in turn would make it tougher for AFAS to initiate DSI. Not only for AFAS, but also for other ERP vendors this is of importance, as this internal factor is important to any digital service wanting to make use of their customers' data. Both incremental and radical DSI can be facilitated.

Lastly, the external factor of complexity and uncertainty makes it hard to be ambidextrous, especially in the ERP vendor industry. Once again, the variety of customers is the reason for this. Due to this both incremental and radical innovation are difficult as so many different customers need to be satisfied. Therefore, incremental innovation is seen as more evident for the ERP vendor industry than radical innovation. As many customers have

not even caught up yet with basic digital trends, certain types of radical innovation would not benefit them in the way an ERP vendor would want it to.

7.2 Dynamic capabilities -Service Innovation

How do dynamic service innovation capabilities affect DSI dynamic capabilities in the ERP vendor industry?

After having analysed the internal and external factors which are of importance for the creation of (DSI) dynamic capabilities in the ERP vendor industry, it is of interest to dive deeper into DSI dynamic capabilities for the ERP vendor industry. As explained in the conceptual framework, the framework used to analyse this is focused on service innovation and not on DSI in particular, and therefore it is of interest to analyse how these dynamic capabilities are applicable for DSI in the ERP vendor industry. In this section, the six dimensions of the 6-D model will therefore be analysed per dynamic capability, and what inferences they have on the dynamic capabilities of DSI and on (IT) ambidexterity.

7.2.1 Signalling user needs and technological options

When questioning respondents about the way of signalling user needs and technological options, several interesting points were obtained that can be linked back to the dynamic capabilities of DSI. Both the complexity of the wide variety of customers with regards to signalling user needs, and also the great(er) importance of technological options, because of DSI and the nature of the ERP industry, were derived from the answers of the interviews. These themes returned in several aspects of this first dynamic capability in DSI.

To begin with, the 6-D model pleads for the fact that a separate department like a business development or ICT department should be responsible for the dynamic capability of signalling user needs and technological options, and in turn being able to translate these to conceptualization. However, when assessing the ERP vendor industry, it became apparent that the Product Management department is the only department that is responsible for this. Furthermore, a manager from PM stressed that the final responsibility lays at Product Management and the board, however he also stressed that innovation can start from any corner of the firm. In this he explains that AFAS wants to involve all its employees in innovation, and therefore all employees are stimulated to share their ideas. This is also noticeable when turning to AFAS' intranet website, where a section is devoted to "1 percent better". Shortly explained, this initiative was introduced in order to give all employees a

chance to improve the firm, even though it is only "1 percent better". Moreover, it illustrates the mindset that anybody can participate in initiating innovation, as PM believes that many of the employees also experience (unanswered) user needs or observe technological options in the ERP market, which could be of relevance for AFAS. Even though this is not particular for DSI, the ideas from other employees of the firm could still turn into DSI. In the end, the board and PM are the ones to take the final decision when it comes to prioritising the different ideas, signals and (technological) options.

When it comes to doing so, AFAS also has different ways of facilitating this in a structured manner. One of these methods is to organize "voice-in sessions", which means that a wide variety of customers are invited to AFAS' office to join in on a session where they can make their voice count and contribute with their opinions on how the software can be improved. Questions asked include: What obstacles do you perceive in your daily work when using the software? Where would you like to see improvement? It is then the task of the Product Managers to listen to this, and create value from all the information that is taken in. Another structured way that AFAS uses to listen to its customers is by organizing 'focus groups', which are smaller groups that are also invited to AFAS. However, these focus groups are asked more in-depth questions by AFAS, instead of the other way around, as with the "voice-in sessions". Through this, AFAS can gather a lot of information, which they in turn can turn into value for their software as well. However, five out of the eight respondents stated that, even though it is very important to listen to the customer, it is also very important to listen to them with a critical view. As Product manager 4 states: "*Customers only voice their problems and not solutions; we need to find the right solutions"* (PM 4, 13/04/18, 17:24). It is important that you listen, but adjust their requests in a way that you make the processes which the customers deals with more logic and smarter. *"If you listen to what the customer wants, you will get unwanted variation"*, as stated by a manager from AI&I (A&I 1, 12/04/18, 2:30).

The way AFAS treats it customers, as stated in the examples in this section, clearly illustrates how they are tightly coupled to their customers, in turn facilitating exploitation on the customer level of ambidexterity. By listening closely to what customers say, and attempting to stay as close as possible to these requirements, the software service is improved incrementally and customers are kept satisfied. When it comes to exploration at this customer level of ambidexterity, AFAS has a rather reserved mindset. Manager 4 of Product mnagement explains this by taking the pension branch as an example. He gives the example of an older lady who has had the job of registering sick absences of employees into an

administrative system, so that she can send it further to the pension institution afterwards, who needs the registration for other purposes. She has been doing this for 20 years and for her, the action of changing this into employees doing this themselves in the system, is already a very big change. For AFAS, it is very normal that everything is done digital and with workflows, however for most of their customers, just like the older lady from this particular company, small steps are big steps. The manager from PM further explains that AFAS as an ERP vendor needs to fully be aware of the fact that most of their customers are just not as far with technology as they are. Therefore, when introducing more radical innovations in the ERP system, he often has heard customers say that the innovation is great, however it is not what they need at the moment (PM 4, 13/04/18, 7:10). When assessing ambidexterity in general, exploitation is more often seen at AFAS, as they need to please the current needs of their customers, who are often more behind on the digital front than AFAS. A manager of PM stresses that not only the digital level of their customers, but also the nature of the business of optimizing administrative software, serves as a reason for this.

Furthermore, several inferences can be made on DSI when analysing this dynamic capability. Firstly, it is important to find the right moment when it comes to DSI. A lot of hypes and technological options are available, however the ability to employ them is challenging. When it comes to AFAS, they follow the "smart follower" strategy, which was explained earlier in the analysis, and which puts them in the position of being more sure about the decision when to implement a particular DSI. By doing this, AFAS strategically handles this challenging aspect of signalling user needs and technological options, taking less risky decisions when it comes to initiating DSI. As manager 1 from PM states: *"Of course there are many hypes like blockchain which we can see has much potential, but first we want to solve the problems which our customers have today. Believe me, whenever a real application of blockchain in the ERP industry has been successful, we will tackle it right away, just not right now"* (PM 1, 10/04/18, 32:42).

The infrastructure of DSI also plays a key role when looking at this dynamic capability. While signalling user needs can be done through face to face contact with the customer, the infrastructure of DSI makes it possible for ERP vendors like AFAS to signal these needs through their data, and not solely through the wishes they express. Through the usage of SaaS at AFAS, the infrastructure can tell them a lot about their customers. As a manager from A&I explains: *"There are things that the customer might not want to tell us or does not know about their own processes. However, their data will tell us that, and this has changed the way of initiating DSI a lot for us"* (A&I 1, 12/04/18, 22:46). This makes it possible for AFAS to

run queries in order to see what customers are exactly doing in the ERP system. Through this, they can get a feeling of what is important. In other words, the data will tell them more than what the customers themselves tell AFAS. Therefore, the initiation, and also the other dynamic capabilities to implement DSI have become a lot more approachable through SaaS and its infrastructure.

Furthermore, signalling user needs and technological options is also often done by looking carefully at competitors, and in particular at start-ups that focus on one thing and specialize only in this. They have no legacy and are not near the number of customers as a bigger ERP vendor like AFAS, making their innovations "less risky". By carefully observing these kind of competitors, AFAS tries to take the best parts and apply it to their own system. As a manager from PM states: *"You do not have to invent everything yourself from scratch every time"* (PM 1, 10/04/18, 29:27).

7.2.2 Conceptualization

The next dynamic service innovation capability is conceptualization, in which it is harder for the customer to assess beforehand what will be delivered, because they have to experience it before being able to understand it. The way that AFAS tries to approach this challenge, is by delivering a (re)new(ed) service concept to the customer, which they call a "90 percent version". By doing so, AFAS gives selected customers the chance to say what can be done better, which AFAS can then in turn improve. The overall manager of PM believes that this is a good way to ensure that the (re)new(ed) service will correspond to the exact needs of the customers (PM 3, 13/04/18, 1:36). In other words, because of the digital aspect of service innovation, it is possible to alter this dynamic capability slightly, in turn making it easier to tackle. The way of conceptualization could not have been done as just described, if the service was not offered through a SaaS model.

Furthermore, conceptualization of intangible goods has a higher interaction character than physical goods. With regards to the ERP industry, in which the product has transformed into a service through servitization, this is noticeable in several ways. As a manager from Product Management states: *"We do it with the customer, not for the customer"* (PM 2, 10/04/18, 4:40). This very clear way of conceptualizing can in turn be linked to the firms strategy, as explained to be important in this dynamic capability. The high interaction character can also be seen through the way AFAS goes into new branches/industries, with the concept of what they call a "launching customer". A good example is of how they are developing a (re)new(ed) service for the flex-market at the moment, which is the industry that

provides the service of sending out employees on flexible, and mostly short-term contracts. A launching customer in this entails that a particular successful, prospect is chosen as a "star" example of the new industry AFAS is entering. This launching customer works closely with AFAS to then together conceptualize how the (re)new(ed) service should take form. A manager from Product Management explains that you need a lot of knowledge of a new branch you are entering in order to fulfil their needs when it comes to a function or more functions in an ERP system. Therefore, a launching customer is one of the best ways for AFAS to get to know a new branch better and fully understand what their needs and requirements are (PM 1, 10/04/18, 50:20). He also explains: *"You can go into new branches and just do what you think is best, but the question then remains if you will deliver something that the customer will really benefit from."* A manager from Controlling further supports him in this and also stresses that it is great that a launching customer is even willing to put so much time and energy into launching a (re)new(ed) service. He explains that they are willing to do this, because of the great result that often comes out of conceptualizing in this manner, which will benefit the customers' way of working substantially. However, as stated earlier in the analysis, AFAS makes sure that they still use their own in-house knowledge and critical view on processes in order to make it function even better than the launching customer could have imagined (Manager Controlling, 12/04/18, 36:38). Lastly, conceptualizing through a launching customer, is a great way of incorporating the target audience in this dynamic capability, as stated as being important in the conceptual framework. The manager of Controlling explains that a balance can be found between pleasing the customers, but also surprising them at the same time. In this, both tight and loose coupling with the customer is accomplished (Manager Controlling, 12/04/18, 38:27).

Moreover, conceptualization in the ERP industry is also characterized by the fact that it needs to fit into the complex infrastructure of an ERP vendor like AFAS. Several respondents argue that conceptualization in DSI is in this way "limited" because not any (re)new(ed) service will fit the existing infrastructure. This existing infrastructure has been built up over many years, which has resulted in a potential issue of legacy. Even though the ERP system is in the cloud, the overall manager of PM argues that more legacy means less innovation. However, he states that this is his opinion and not a fact (PM 3, 13/04/18, 14:37).

Even though the infrastructure limits conceptualization in this way, the innovation process can also happen pretty rapidly as it can merely be tested on the service, if an ERP vendor like AFAS feels like there is a new good idea that should be implemented. As a manager from PM explains: *"If there is a good idea, we just do it. If we then notice it does not*

work like we wanted to, then we just stop. In this manner we proceed on and on" (PM 1, 10/04/18, 4:55). Quick iteration occurs which speeds up DSI. Being able to innovate in this manner serves as a good example of flexible generification. Because of working with an ERP service, work processes and actual usage determine standards, which are then adapted pragmatically, in turn finding the balance between standardization and service innovation. Furthermore, it is interesting to note that conceptualization does not only happen as an effect of signalling customer needs and technological options. DSI is also initiated by merely trusting on the in-house knowledge and instincts at AFAS. As a manager from PM explains, PM does not always need to ask customers what they want, because a lot of the times we already know what they want. This can be linked to the infrastructure which DSI is based on, in which AFAS has an overview of all the actions of the customers.

The conceptualization dynamic capability in DSI in the ERP vendor industry is also characterized by the fact that an ERP system is not just a product that is for sale on a shelf in a store, or as a download. Because of this, AFAS needs to bring together a lot of things when conceptualizing, including different type of technologies, different methods, in turn combining them to ultimately forming a (re)new(ed) service (PM 3, 14/04/18, 22:10). It is the art of not thinking too broad which will make the success of DSI. As a manager from A&I states: *"If you think too big, you will not deliver anything in the end"* (A&I 2, 14/04/18, 0:55). He mostly refers to NEXT, as this radical innovation has been showing signs of not moving in the right direction because of thinking too big. However, the same can be said for incremental innovation in the ERP vendor industry.

7.2.3 (Un-)bundling

Serving as a third dynamic service innovation capability, (un-)bundling focuses on the part that a service is often renewed by (often) merely being put in a new context. As explained in the conceptual framework, it was expected that this dynamic capability would be more complex for DSI than for service innovation, because of the nature of the product and the wide range of customers. This was confirmed in many ways through the interviews, which will be presented in this section.

The most reoccurring theme in the interviews was the fact that this dynamic capability is very important for AFAS. Several respondents explained that the dynamic capability of bundling is done in a unique way by them, in turn creating a competitive advantage according to them. While most of AFAS' direct competitors bundle with other services by merely making connections to their own ERP system, AFAS is very focused on the fact that when

bundling, this should be fully integrated with their ERP system, in turn just having one system and not one system in many different variations. As a manager from Controlling states, Unit4, a competitor of AFAS, already had 154 software packages in 2011, which is the of sequence of take overs of different firms. Unit4 therefore needs to employ a lot of people in order to maintain all these packages. On the other hand, AFAS only has a package per branch it operates in, which were mentioned in the case description. They have a lot less employees, as a lot less maintenance is needed. Through this, AFAS applies bundling by having the vision of standardisation, in which variety is limited as much as possible (Manager Controlling, 12/04/18, 4:10).

Furthermore, "Make, Buy or Connect", which refers to the decision choices of either making something yourself, buying another company or connecting through partnerships, is taken to a new level when analysing (un-)bundling in the ERP vendor industry. Even though AFAS has very clear reasons of why choosing one of these decision choices, some DSI's can only be done by connecting through official (public) partnerships. This is due to the nature of the ERP system, of which the core function entails several administrative processes. However, with administrative processes, public institutions like the (Dutch) Tax & Customs administration and the (Dutch) Chamber of Commerce gets involved, as taxes need to be reported and firms need to register. Therefore, AFAS is actually dependent on bundling with these parties, which has expanded their existing service. Manager 4 from PM explains that initiating DSI makes it harder with these parties that an ERP vendor like AFAS is dependent on, simply because they are the only parties that AFAS can bundle up with when it comes to linking administrative processes to, for example, tax and firm registration. *"We try to innovate with them, but often it is hard, because other parties do not have the same vision as that we do."*, as stated by this manager (PM 4, 13/04/18, 22:07). In other words, some types of DSI in the ERP vendor industry are not very flexible because ERP vendors are dependent on these public parties. While the service ecosystem of the DSI model presented in the research domain pleads for opportunities with other parties like these public parties, these same opportunities can become challenges as DSI is limited by them.

When AFAS is not dependent on a public party, "Make, buy or connect" is followed in which AFAS states to be entirely free of choice. However, they do this with a certain vision. Firstly, it became apparent that AFAS often *makes* new DSI by themselves often, as they prefer developing their service themselves, as explained earlier in the analysis. With (re)new(ed) services that support the core functionalities of the ERP system, AFAS mostly decides to develop it themselves. For example, they developed two web applications 'Outsite'

and 'Insite' which respectively is a website for the customers of AFAS customers, and an intranet for AFAS customers. These new service concepts are built as another layer on the existing infrastructure. A clear decision was made to develop these by themselves, as a manager from A&I explains that you become more independent and a lot more flexible when you develop it yourself in these situations. Furthermore, through this you can make a perfect fit with the infrastructure, instead of trying to make it fit, even though it is actually not suited for it (A&I 2, 13/04/18, 20:40). With this, an inference can be made on the infrastructure again. If bundling with another service which is not suitable for the infrastructure of AFAS, AFAS needs to put a lot of work into making it fit, which can be a disadvantage (PM 2, 10/04/18, 31:42). Another inference which can be made in DSI is on the innovation process. A manager from PM states that AFAS carries a rather big responsibility when it comes to innovating. If something goes wrong, it could have big and potential catastrophic results, as customers like big hospitals could, for example, not be able to pay their employees because of a small mistake in the software. Therefore, in conceptualizing it is very important to be extra precise and careful when initiating DSI (PM 4, 13/04/18, 23:10). Flexible generification, as mentioned earlier, decreases these risks. This method namely aims for as much standardization as possible, while still being able to initiate service innovation. This standardisation part in particular is what minimizes these risks. Another example of *making* is when they developed the function of the digital signature, which can be applied in any module of the ERP system, by giving the customer the option to add it into any workflow. Through this, manual signatures in any administrative process are eliminated, thus supporting the core function (PM 1, 10/04/18, 44:53).

As an opposite, calculation software for the construction industry, is very complex and also very specific just for this branch. Therefore, AFAS chooses to *connect* with partners in DSI's like this, who are specialized in this specific type of software. These partners are called *product* partners as they support the core functions of the ERP system of AFAS. Another product partner is a firm called Company.info, which through an API keeps addresses in the ERP system up to date continuously (PM 1, 10/04/18, 47:40). These DSI's have been possible because of the infrastructure of the ERP system and its innovative capacity through API's. Because of making use of API's, the method of structural flexibility is applied. In other words, the infrastructure of the ERP system allows for the structure of an API, which allows for several external parties to be connected with the ERP system. This flexibility increases the amount of opportunities within the ERP system, which further supports DSI. Another way of *connecting* for AFAS is through certified and non-certified connections. With certified

connections, AFAS chooses only one partner, which a certain DSI is facilitated through. This party and its software needs to be up to date with AFAS' software constantly, as they are dependent on each other. With non-certified connections AFAS gives its customers the possibility to choose from several connections that they can bundle their ERP system to. In these connections AFAS carries less responsibility and the customer is given more freedom of choice. Again, the infrastructure of DSI plays a big role in both of these connections, which is facilitated by the SaaS model. Not every application can run on the AFAS platform, which makes the platform well controlled and fast. When the ERP system only ran on-premise on the customers' server a few years ago, AFAS customers managed these connections by themselves, increasing the chance of the system slowing down as a variety of (non-) fitting applications were connected to the on-premise server.

Finally, AFAS only *buys* firms if they assess the situation not to be suited to either *make* or *connect*. However, this is a challenging thing to do, as AFAS wants the firms and its product to be totally integrated with and embedded in their own ERP system.It is important that a fit can be made with AFAS' ERP infrastructure, and also with AFAS' vision, which is an aspect of the internal factor of managerial behaviour that will be further explained in the discussion.

7.2.4 (Co-)Producing and Orchestrating

As stated in the conceptual framework, this dynamic capability is seen as a key dynamic capability with regards to service innovation. Co-producing with customers and other stakeholders and orchestrating these temporary partnerships falls under this dynamic capability. It was argued that this dynamic capability would be more complex for DSI, which was confirmed through the interviews, and which will be explained in this section. Even though working together with partners and customers has already been slightly touched upon in the other dynamic capabilities, this dynamic capability solely focuses on the dynamic capability of execution of new DSI in the ERP vendor industry.

Firstly, the theme of partners versus customers and co-producing with them occurred as a key theme in most of the interviews. The majority of the respondents stated that co-producing with partners is limited compared to co-producing with customers. This was also noticeable in the other dynamic capabilities explained prior to this one and an inference can again be made on the tight coupling with customers when it comes to innovating. Also, an inference can be made on the profit side of the strategic level of ambidexterity. Because of prioritising the close collaboration with the customer, these exploitation elements of

innovating are addressed, while the exploration side is addressed less. It is argued that by prioritising working together with partners as well, exploration could be addressed more as the focus of the particular needs of the customers would be switched to new (potential) radical innovation ideas of partners. However, as explained, the administrative nature of the ERP service does not lend itself to this.

Furthermore, AFAS does rather not want to let (potential) partners come into their company and simply do whatever they think is best. Often these potential partners do not have the same vision as AFAS, which makes it difficult to co-produce with them. However, luckily there are some partners who fit AFAS and its vision. With these few partners AFAS truly co-produces (PM 4, 13/04/18, 28:55). Not only the vision, but also the complexity and history of the ERP system makes it hard to co-produce with external parties. As the ERP system has been developed for the past 20 years, it is often difficult for external parties to understand the vision and the thought behind the huge system. As a manager from PM explains*: "We could ask for help from a consultancy firm, to whom we would then have to explain everything, but they would never be able to deliver something that is based on the vision of our software*" (PM 2, 10/04/18, 48:05).

Even though it is limited, AFAS still does involve other parties, by, for example, listening to experts on certain areas that could initiate DSI. However, as stated by a manager from PM, these initiatives are always done with the thought of how AFAS can incorporate the experts' ideas in their own organisation and with their own employees (PM 1, 10/04/18, 1:03:03). While co-producing with external parties is limited, co-producing with customers is done a lot more often. As the overall manager from PM states: *"the power of innovating lays in understanding the customer and therefore developing the software together with the customer"* (PM 3, 13/04/18, 1:07). By co-producing more with customers than potential partners, it is also a lot easier to apply further adjustments, after a new DSI has been implemented. Furthermore, he explains that by developing in-house, and closely with the customer, means that DSI can be done a lot faster. He also believes that the development of the ERP system does not lend itself to be co-produced over, for example, Skype as can be seen in many other (more simple) SaaS applications. He explains that, for example, creating an app in India could be beneficiary because content simply needs to be added to the app after production, and nothing more. With DSI in an ERP system this is different, as an ERP vendor has to produce something new all the time. In other words, speed, accuracy and the attention to detail in DSI are all approached in a better manner when producing yourself versus letting external parties be involved (PM 3, /13/04/18, 24:24).

Not only the theme of partners versus customers was considered as important in this (co-)producing and orchestrating. The development of SaaS and its effect on this was also mentioned several times. The speed of producing software has gone up rapidly because of the SaaS model used by (most) ERP vendors today (PM 2, 10/04/18, 30:35). With this increase in speed, an inference can be made on the innovation process of DSI.

Lastly, turning back to the example given of the digital signature, which was mentioned as a DSI in the previous dynamic capability, serves as another good example of developing an DSI internally. A manager from PM supports this by adding the fact that by limiting co-production, additional costs associated to this are also decreased. Another way of limiting co-production, but still getting as much value as possible out of their own employees, is when AFAS often hires interns to whom they present smaller issues within the firms. The same manager explains that in some cases, these projects evolve into small innovations and are directly sent to production (PM 1, 10/04/18, 35:10). By letting these employees go their own way, in turn stimulating innovation, the personal level of ambidexterity is addressed. Thus a focus on passion versus discipline is made, which should support radical innovation.

7.2.5 Scaling and Stretching

This fourth dynamic service innovation capability focuses both on scaling, which entails how a (digital) service can be introduced internally, and on stretching, which entails how (digital) service innovation can be stretched to other related service markets. As mentioned in the conceptual framework, these dynamic service innovation capabilities will also be very applicable for DSI in the ERP vendor industry, which will be explained in this section.

First of all, the advantage of the ERP vendor industry is that its customers have built up affinity and recognizability with the ERP software over the years. In other words, whenever new DSI is initiated, they already know the ERP software and how it has a certain logic behind it. A manager from PM supports this by stating: *"They know us, they know the software, which is a huge advantage for us"* (PM 2, 10/04/18, 16:20). As a consequence, when scaling DSI into other modules of the ERP system, customers do not have to learn the way it works every time, because of the certain logic that is used in the service. Therefore no in-depth explanation has to be given to the customer. However, challenges were also noted when it comes to scaling. A manager from PM explained that scaling is difficult, because AFAS has so many domains in which they want to execute DSI. On the one hand, AFAS needs to be sure that they do not scale the service too much so that it becomes too broad. However, on the other hand, they still need to make sure that they cover all domains of the

ERP service when they execute DSI. *"If you only do one thing really good and perform less on the other domains, then you will lose the game at a certain point"*, as stated by a manager from PM (PM 1, 10/04/18, 15:40). An inference can be made towards the service of DSI, on which the level of scaling in the ERP industry has an impact. When scaling, AFAS also does not need to worry about a decrease of performance of the service. Because of the SaaS model and the infrastructure that the software is built on performance is not an issue as it used to be. DSI can therefore be scaled in a more flexible way (PM 2, 10/04/18, 27:22). An inference can be made on the SF (structural flexibility) method, as the structure of the ERP system is giving AFAS the flexibility to innovate. Furthermore, with regard to scaling, it was stated that exploration, and not only exploitation, also happens in this dynamic capability. As explained before, exploitation focuses on incremental innovation, while exploration entails more radical innovation. Exploration can be seen in the scaling dynamic capability, through the radical DSI that AFAS is initiating at the moment. As explained in the case description, they are changing the underlying method of software development, which will radically change the way software will be developed in the future. Through this DSI, which they have called NEXT, they are trying to make their ERP system a lot more scalable than it is at the moment. At the moment, a software engineer is dependent on the developed infrastructure of the ERP software on which he has to code. Through NEXT, this will be changed into modelling businesses in natural language. A platform and device independent application will be created, which will make the ERP system a lot more easily scalable than what it is today. It is predicted that when NEXT is completed the dynamic capability of scaling will be able to happen in a much more rapid manner.

While scaling is about the organization internally, stretching goes beyond the organizational boundaries. In AFAS' case, this can be applied to the fact that new service markets are approached, like the flex market as mentioned earlier in the analysis. Manager 2 from PM confirms this by stating that it is very important for AFAS to enter new markets. In this, they stretch their ERP system and (slightly) alter it to serve the needs of the new market. He even states that the focus on stretching is often more important than merely optimizing existing processes in already conquered markets (PM 2, 10/04/18, 26:30). With regard to stretching, certain inferences can also be made on the innovation process of DSI. The innovation process becomes a lot more "easily accessible", as explained by a manager from PM. Whenever a smaller DSI needs to be uploaded to the ERP service, this can be done in one time, stretching out to all customers, instead of having to execute this one by one (PM 4, 13/04/18, 14:55).

Furthermore, stretching in the innovation process becomes a lot faster. As soon as one module of the ERP service is introduced in a certain industry with success, other firms in the same industry follow very soon. Again, this refers to flexible generification, as a balance is found between standardization and service innovation, making the innovation process faster.

7.2.6 Learning and adapting

The dynamic service innovation capability of learning and adapting, is evidently very important for any industry. However, through the following examples, the learning and adapting dynamic capability is explained through the particular lens of DSI in the ERP vendor industry.

First of all, it is important to touch upon the public partners that ERP vendors like AFAS *has* to work with, as explained earlier in the (un-)bundling dynamic capability. A manager from PM explains that AFAS learns from every type of DSI that they initiate, however when it comes to these public parties, it is simply very hard to change their way of working because of their position and power. They most important thing that AFAS has learnt from bundling with public institutions is that you learn how to tackle them in the best possible way. Presenting a very clear and sharp idea towards these parties needs to be communicated, so that AFAS can always defend themselves towards their own customers, regardless if a certain DSI succeeded or not (PM 4, 10/04/18, 23:45).

Secondly, if the SaaS model was not used by AFAS, they would to a certain degree have to guess what is best to do. A few years ago, when the software was offered on-premise and therefore was only running offline, an ERP vendor could not really see the problems of the software. Therefore, changes to the software were made on assumptions or simply nothing was done. When changing something in the software, there was always the risk of complaints of the customers. However, now with SaaS, AFAS learns from the data of its customers, and they can observe what DSI is best to initiate. The Service Level Agreement (SLA), in which is stated that AFAS can “use” the customers’ data, makes it possible for AFAS to learn and adapt its ERP system to the actual processes occurring (A&I 1, 12/04/18, 24:35).

Furthermore, the need to adapt constantly is rather high in DSI in the ERP industry, which has an effect on the service. Because of SaaS, AFAS has had to adapt more and show more transparency, as customers are not locked-in for 4-5 years, as stated before. The risk of customers leaving is therefore a lot higher, in turn increasing the importance of being able to adapt quickly. However, also offline interactions in the ERP vendor industry are described to be important when learning (from) and adapting DSI. Through the channel of consultants who

implement and adjust ERP software on site this dynamic capability is applied. A manager from PM explains that when AFAS has enough customers in a certain industry, the consultants go in and see what works and what does not work well with most of the customers. Through this, (digital service) innovation can be initiated, as they learn from what the majority of customers are doing. Therefore, the next customer will take advantage of the learnings of the other customers (PM 1, 10/04/18, 38:10). In turn, the innovation process of DSI is not always online.

Moreover, learning can be coupled to an example which has inferences on the personal level of ambidexterity, in which discipline and passion needs to be balanced in order to be ambidextrous. This can be obtained through integration and differentiation. Manager 1 from A&I strongly believes that by applying differentiation with regards to the job of a Product Manager, both exploitation and exploration can successfully be executed. On the one hand, product managers should solely have the job of exploiting the service as it is now, in which they have to be able to quickly think of suitable solutions and deliver in a rapid manner. As there is no time to try ten different solutions in this position, he believes that other employees should get the task and chance to be creative and think of solutions that are not speaking for themselves. By giving them the chance to try a lot of different things before executing DSI and therefore stimulating quick learning, these employees can focus solely on this, thus achieving radical DSI. For example, this can be seen in the radical DSI of NEXT, in which employees only focus on this particular DSI, and not exploiting the current service of AFAS (A&I 1, 13/04/18, 31:20). In other words, he pleads for differentiation, and not integration, in order to facilitate incremental and radical innovation. It can be argued whether ambidexterity can be achieved if these two strategic approaches are not used simultaneously.

7.3 Dynamic capabilities – Technology dimension

How are dynamic capabilities of DSI in the ERP vendor industry affected by the technology Machine learning?

After having analysed how internal and external factors affect dynamic capabilities, and the dynamic capabilities as such, it is of interest to analyse how a certain dimension of DSI, namely the emerging technology of Machine learning, is affecting dynamic capabilities of DSI in the ERP vendor industry. As explained in the case description, this particular dimension is chosen because of the increasing attention it is getting in the ERP vendor industry and the big consequences it is expected to have. The following section will analyse if

the hypothesis of Machine learning affecting the dynamic capabilities of DSI, can be confirmed or not. First, Machine learning as an innovation will be addressed, in which the views of the respondents on this dimension of DSI will be analysed. Following this, the dynamic capabilities which were analysed in the previous section will be addressed, by comparing the key managing aspects of Machine learning as an innovation with these dynamic capabilities of DSI. By doing so, it can be argued whether the hypothesis can be supported or not.

7.3.1 View on Machine learning

Just like many other companies, AFAS is considering employing Machine learning in some way or form. These considerations were voiced by several respondents however, it was also noticed that some respondents were hesitant about the idea itself and how it should be employed. Firstly, some of the respondents stated that it could be applicable now however, they all see it differently in the ERP service. For example, two of the four managers from PM state that they see the potential of leveraging the huge amount of data that AFAS possesses since several (administrative) processes in the service could be applicable for this. The technology could facilitate learning from these processes, as they are reoccurring to a certain extent (PM 1 & 4, 10/04/18, 1:05:06 & 13/04/18, 36:24). Another manager from PM sees it more concrete, in which he also sees the value of Machine learning, but in work evaporation in particular. He explains that Machine learning could create value, by learning from the processes that customers execute. He believes that Machine learning could indicate which processes can be decreased, in turn causing work evaporation (PM 1, 10/04/18, 1:03:54). Furthermore, the manager from Controlling, sees many potential solutions in Financial management in particular. The main thing he asses to be of value creation at the moment, is the automatically proposing of ledgers, whenever invoices are booked into the system (Manager Controlling, 12/04/18, 50:03). On the other hand, several respondents were more sceptical about Machine Learning. A manager from Product Development can see the potential of Machine Learning and how it can facilitate further automation in the ERP service however, he is sceptical about the usage of data of AFAS customers. He believes that customers will not be comfortable with sharing their data in this manner (PD 1, 11/04/18, 18:43). Furthermore, manager 2 from A&I also has his doubts about applying Machine Learning in the ERP service at the moment. He can see the value, but believes that it is too early for the ERP industry. He states that whenever the radical innovation of NEXT is completed it will be a lot easier to apply Machine learning, because of the increased flexibility

of the software (A&I 2, 13/04/18, 27:42). The overall manager from PM agrees with him and sees a bright future for Machine learning in the ERP industry. However, he sees this happening sooner than this manager from A&I, and is working on using it in order to evolve the ERP service (PM 3, 13/04/18, 38:56). Lastly, the other manager from A&I is the most sceptical about Machine learning and even believes that it does not exist yet, and is solely marketing (A&I 1, 12/04/18, 46:24). In other words, all respondents have different views and opinions about the technology and how, or even if, it should be applied in the ERP service. Therefore, certain inferences can be made on the notion of the 'wicked problem' as described earlier in the research domain. The first one evidently being that the variety of reactions of the respondents supports the fact that Machine learning as an innovation is a wicked problem. Furthermore, if Machine learning was to be implemented in some aspect at AFAS, several elements would be of importance when managing this wicked problem. These key elements of managing a wicked problem were therefore compared to the dynamic capabilities of DSI, being able to derive if the technology of Machine learning has a special effect on the dynamic capabilities of DSI in the ERP vendor industry. By analysing the answers of the respondents with regards to the dynamic capabilities needed when attempting the implementation of Machine learning, several implications could be derived and will be covered in the next section.

7.3.2 Effect of Machine learning on dynamic capabilities of DSI

A key element of managing a wicked problem entails the importance of managers needing to involve all stakeholders. As explained in the research domain, this is needed because a standard process is believed not to be sufficient. When asking respondents about this element, this was confirmed. Several respondents stated that it is important to know the customers' need when it comes to introducing Machine learning. As a manager from PM states: *"Maybe we see a good case for Machine learning, but then we find out that only one percent of the customer is actually making use of this process"* (PM 1, 10/04/18, 1:07:34). However, when addressing Machine learning in the interviews, not many other stakeholders were mentioned, when it comes to tackling this emerging technology. This can be explained due to the fact that AFAS is primarily focused on its customers and developing according to their needs. When comparing this element to the dynamic capabilities of (digital) service innovation in the ERP vendor industry, it became clear that other stakeholders than customers also need to be involved at times, however it is not stressed in particular that *all* stakeholders should be involved.

Secondly, another important element of managing of a wicked problem, is discussing the values as AI, in this case Machine learning, which might damage cultural values and even destroy values. It is argued that the issue of privacy and security, amongst other things, falls under these values. When asking the respondents about potential security and privacy issues regarding the introduction of Machine learning, several respondents confirmed that this could be a sensitive area, as they would have to be informed about the fact that their data would be used extensively in order to be able to make use of Machine learning. However, several respondents explained that this should not be too big of a problem, because customers are already agreeing to the fact that AFAS is using their data at the moment. As explained earlier, this is already stated in the SLA, in which customers are briefed about the fact that their data is used in order to improve the service. The aspect of talking about values concerning a wicked problem can therefore already be seen in the properties of the dynamic capabilities of DSI. Therefore, the introduction of Machine learning as a new technology in the ERP system should make no difference with regards to the privacy and security of the data of the customers. However, this is merely seen from the ERP vendor's point of view. For further research, it would be interesting to get the customers' point of view on this sensitive issue.

The last key element of managing Machine learning as an innovation is being able to apply fast failed attempts in which it is important to abandon thinking about all options before choosing one. When doing so, firms are able to constantly adapt and improve, thus making progress. This was repeatedly confirmed by the majority of respondents if they were to implement Machine learning at AFAS, by stating that this is already done in DSI. Manager 1 from A&I even stated that there is no time to consider ten different options, which means that the first potential solution should be tested quickly, if AFAS wants to be able to keep up in the ERP vendor industry (A&I 1, 12/04/18). Quick iteration is already fully embraced by AFAS at the moment when it comes to DSI, and it is therefore predicted that this will continue if or whenever AFAS decides to implement Machine learning. Furthermore, manager 4 from PM states that he believes that something as abstract as Machine learning should be tackled by taking small steps, one by one. By doing so, potential (failed) attempts can rapidly be adapted and attempted again, supporting quick iteration (PM 4, 13/04/18, 48:23). By testing prototypes and including pilot programs, firms learn quickly and therefore walk ahead rapidly. When comparing this to the dynamic capabilities of DSI, it becomes evident that this key element can be found in several dynamic capabilities of DSI, which indicates that this element of managing Machine learning is not of substantial difference.

After having addressed these three key elements of managing a wicked problem, it has become evident that at least two out of three key elements also appear in the dynamic capabilities of DSI. The first key element, in which it is stressed that all stakeholders should be involved, is not directly addressed in the dynamic capabilities of DSI. It can therefore be argued that this might be an indication of the fact that one or more dynamic capabilities need to be adjusted whenever implementing Machine learning. Nonetheless, the overlapping of the majority of the key elements of managing a wicked problem and the dynamic capabilities have become evident. This suggests that Machine learning can be tackled with the same dynamic capabilities, whenever it will is implemented. It is therefore argued that the hypothesis of Machine learning affecting dynamic capabilities cannot be fully supported. The fact that key elements of managing a wicked problem like Machine learning are also seen in the dynamic capabilities of DSI supports this. However, there might still be other aspects of Machine learning as an innovation which are not in the scope of this thesis and therefore will need to be touched upon in further research.

Furthermore it is of interest to compare a completed DSI within AFAS, with the DSI of Machine learning, which is not implemented yet. By assessing this, the hypothesis for Machine learning affecting dynamic capabilities of DSI can be further disproved. When comparing the DSI of Machine learning with another example of DSI, the digital signature, which was mentioned numerous times by almost all respondent both similarities and differences were discovered. Evidently, the first significant difference is that Machine learning is a tool for (several) DSI(‘s), while the digital signature is a single DSI, which had a rather clear goal from the start. Therefore, manager 1 from PM explains, it is easier to tackle a DSI like the digital signature than attempting to apply a new technology like Machine Learning. “*With the digital signature, we maybe can develop hundred user cases, however with Machine learning this can be thousands and thousands”* (PM 1, 10/04/18, 58:53). Furthermore, with the digital signature, it was rather evident from the start that this function would create value for any customer and the decision to initiate this DSI was more than logical from the start. With Machine learning, this is a different issue, as the emerging technology has not proven itself fully in the ERP vendor branch yet. Not only was this proven through the answers of the respondents, this can also be backed up by the examples of Machine learning at competitors, as stated in the case description. Even though this showcases examples of implementing Machine learning, not one competitor of AFAS has shown an implementation of Machine learning which can be used as a proven case. Machine learning has simply been attempted by some competitors in small areas of their business, but not one

competitor has achieved to implement it on a bigger scale. These differences between the digital signature and Machine learning indicate that complexity and its rather early stage of maturity serve as reasons as to why they should be tackled differently, but this does not necessarily mean that other dynamic capabilities should apply to them. Through this final section of the analysis, it has become evident that the dynamic capabilities are expected not to be of major difference when it comes to dynamic capabilities. It is therefore argued that the dynamic capabilities of Signalling user needs and technological options, Conceptualizing, (Un-)bundling, (Co-)producing and orchestrating, Scaling & stretching, and Learning & adapting are expected to also be of relevance for initiating Machine learning. However, as stated earlier, Machine learning in the ERP industry, will have to become more settled and proven, before these dynamic capabilities will be of value when initiating DSI('s) of Machine learning. Moreover, the creation of a shared understanding and commitment serves as an important element in achieving this more settled and proven concept. Lastly, other dynamic capabilities might arise from this emerging technology however, this cannot be determined in this early stage of maturing yet.

To sum up, it is too uncertain to state with full certainty if Machine learning will affect the dynamic capabilities of DSI, because of its complexity and immaturity in the ERP vendor industry. Even though this section stated some indications of Machine learning not affecting these dynamic capabilities substantially, further research should be done in order to understand the full picture. With regard to the ERP vendor industry, this is expected to take some years, as Machine learning will not mature in the near future.

8 Discussion

This chapter will explain the implications that can be drawn from the analysis of dynamic capabilities for DSI in the ERP vendor industry. By analysing this through the case study of AFAS, several indications in different parts of the analysis were derived. Therefore, the discussion will be divided into sections addressing the sub questions asked throughout the analysis. The internal and external environment, the 6-D model and the dimension of DSI will be discussed. Additionally, (IT) ambidexterity will also be discussed, as this served as an overarching theme throughout the thesis. The following sections address how the answers of these sub questions have supported the main research question, entailing the value of the dynamic capabilities perspective for DSI in the ERP vendor industry. Through this discussion

several conclusions, and therefore addition in knowledge, can be developed in the dynamic capabilities perspective of DSI in the ERP vendor industry.

8.1 Internal and external environment

As indicated in the analysis, most internal and external factors are the same for value creation of dynamic capabilities in DSI, when compared to the more general model used in the analysis. Furthermore, it was noticed that some factors are more important than others for DSI in the ERP vendor industry. However, another important factor was noted through the interviews, when discussing the environment affecting the creation of dynamic capabilities. A topic that was repeatedly mentioned when asking about innovation processes in general was the importance of 'vision'. All respondents mentioned this factor as one of the first things, as being important to steer DSI in the right direction. They believe that the vision of AFAS, which has been formed over 20 years and has stayed pretty stable during this period, is the reason for success. Manager 2 from PM states that an element of this vision is focusing on the ability to be down to earth. *"We just want to build something that our customers really need. And we have not even accomplished that yet. At the moment, we cannot fully satisfy the customer's primary needs"* (PM 2, 10/04/18, 26:15). Wanting to do as much as possible themselves, is another element which is mentioned when the internal factor of vision is described. By doing this, AFAS has control over all the processes. Referring back to the example mentioned earlier in the analysis, concerning the option of hiring a consultant to help with initiatives of DSI, the same manger states that the vision of AFAS could never be transferred to an external party like this, as they would not be able to carry on the vision. Furthermore, manager 2 from A&I stresses that most (digital service) innovation arises from the technology in the firm, while (digital service) innovation arises from the visionaries at AFAS. Here, the CEO and CFO are seen as the visionaries who steer the company. DSI is therefore initiated because they believe in it, rather than it has to be proved through the technology, determining if DSI is of relevance or not (A&I 2, 13/04/18, 27:56). Lastly, standardization, integration and automatization are mentioned as key elements of the vision of AFAS. By having this very strong vision on the software, successful DSI can be accomplished repeatedly because of the positive effect on the dynamic capabilities, as an effect of this long-term and stable vision.

It can be discussed whether 'vision' is too similar to 'leadership' which is an element of managerial behaviour. However, it is argued that vision is an important separate element within managerial behaviour. This (lacking) element of managerial behaviour is not particular

for the ERP vendor industry, as it is a rather general element that could be of importance for any industry. However, it is argued that it should be added to the model based on the answers of the interviews.

8.2 The 6-D model

Several indications have been given throughout the analysis with regards to the 6-D model of dynamic service innovation capabilities. In this section these will be discussed per indication, and what inferences can be drawn on DSI in the ERP vendor industry.

The first important overall indication of the analysis with regards to the 6-D model is that the dynamic service innovation capabilities are very similar to dynamic capabilities needed for DSI in the ERP vendor industry. Even though it was hypothesized that these dynamic capabilities would be similar to a certain extent, they turned out to be more similar than expected. All six dynamic service innovation capabilities are also seen in the dynamic capabilities of DSI however, with more dimensions within the dynamic capabilities because of the digital aspect of service innovation. With this indication two options can be argued. On the one hand, this observation can be due to the fact that the 6-D framework is too general, and therefore also fits DSI and not merely service innovation. On top of that, the focus was narrowed more down due to studying the case of AFAS in the ERP vendor industry, which increases the validity of the argument of the framework being too general. On the other hand, it could also indicate that *digital* service innovation and service innovation are very similar to each other, as the dynamic capabilities needed to execute them are very similar. However, this is not plausible, as dynamic capabilities needed for a digital service innovation have more dimensions and more complexity due to its unique features in service, innovation processes and infrastructure. Therefore, it is argued that the former is a more plausible reason for why dynamic service innovation capabilities are also applicable in dynamic capabilities for DSI. This following section will address dimensions of each dynamic capability and how they are slightly different in order to cater for *digital* service innovation and the ERP vendor industry in particular.

Firstly, the ‘signalling user needs and technological options’ is characterised by having voice-in sessions and focus groups, especially in the ERP vendor industry. However, these options can also be used in other industries. What is unique in the dynamic capabilities of DSI, is the fact that user needs can be signalled through the ERP service itself. AFAS has built up a huge customer base of which they are able to signal user needs by assessing their data. This is seen as a key difference between the possibilities within service innovation and

DSI. Secondly, ‘conceptualizing’ addresses the concept of a “launching customer”, which is used when addressing this dynamic capability in the ERP vendor industry. However, it is again plausible that this way of conceptualising is also used in other industries. What is unique for conceptualizing in DSI, is the fact that the infrastructure of the ERP service makes it possible to, for example, deliver a 90 percent version of a new DSI in order to test it with customers. However at the same time it also limits DSI because the infrastructure cannot handle any type of DSI. It has to fit with the infrastructure of the ERP service. Conceptualizing for DSI is both increasing possibilities, but at the same time limiting them. Thirdly, (un-)bundling is characterized by certain external public parties that an ERP vendor *has* to bundle with, as a consequence of the nature of the administrative processes in the ERP service. Furthermore, when *connecting*, the possibility of using an API to connect with external parties, makes DSI possible in particular, when comparing it to service innovation. Moreover, when *making* a new DSI, the existing ERP infrastructure makes it very easy and fast to execute. Lastly, when *buying* another firm in order to bundle, the complicated infrastructure can limit DSI, as the bundled function has to fit. Fourthly, (co)producing and orchestrating illustrates that customers are most important in co-producing in the ERP vendor industry. However, this could also be applicable for other industries. What is unique for DSI, when comparing it to service innovation, is that the innovation process of DSI makes (co-)producing a lot faster. Fifthly, scaling and stretching in the ERP vendor industry entails being able to scale a new DSI to several elements within the ERP service, while stretching goes beyond the organizational boundaries and focuses on how a DSI can be brought into new markets. Both scaling and stretching has become easier because of the infrastructure of DSI, in turn being able to introduce a new DSI in one time, either scaling it or stretching as much as wanted. However, in the ERP vendor industry it is important to find a balance, in which too broad or too narrow scaling and/or stretching is a risk. Lastly, learning and adapting is important for the ERP vendor industry just like any other industry. However, what makes learning and adapting unique with regards to DSI is the fact that the ERP service has made it possible for an ERP vendor to learn from the customers’ data right away, in turn speeding up the learning dynamic capability. Furthermore, the ‘adapting’ dynamic capability has been put under more pressure, because of the ERP service under SaaS model. As customers can leave whenever they want to, AFAS needs to adapt very rapidly and listen carefully to its customers.

To sum up, all dynamic service innovation capabilities are also seen in dynamic capabilities for DSI however, the mentioned properties within the dynamic capabilities for DSI is what makes them unique when compared to dynamic service innovation capabilities.

8.3 (IT) Ambidexterity

Several inferences were made on (IT) ambidexterity with regards to DSI in the ERP vendor industry throughout the analysis. This part of the research domain will be discussed on its own, because it is an overarching theme of the whole analysis.

It was made clear that AFAS as an ERP vendor puts most focus on incremental innovation because of the nature of the product and the variety and types of customers they have. However, simultaneously they still also focus on radical innovation, as through the development of the new software platform NEXT. It is therefore argued that AFAS tackles both incremental and radical innovation, which increases their ability to be ambidextrous. However, while analysing the answers of the respondents, it became evident that there is a very strict line between the current ERP service development and NEXT. It is therefore argued that the development of the current ERP service can actually be further divided into incremental and radical innovation. Moreover, this can also be done within NEXT, in which there also seems to be a distinction between incremental and radical innovation. In other words, more levels of exploitation and exploration were found, within several sections of AFAS. To further explain this, examples are given within each segment.

Firstly, within the ERP service as it is today, incremental innovations are realized through small updates of the service with, for example, a new way of filtering your data within the service, or a new shortcut which makes a certain process faster for the customer. Even though this does not seem like incremental innovation at a first glance when assessing it through the lens of ambidexterity, it became clear that it is indeed incremental innovation for the customers in the ERP vendor industry. More radical innovations include examples like the digital signature function or the ability to always have up-to-date addresses in the ERP service, through the bundling with another firm. While these would usually be seen as a smaller or incremental innovation, these appear to be more radical for customers of an ERP service, as the majority of customers are not near as digitalized as an ERP vendor like AFAS.

Secondly, within NEXT, incremental and radical innovation was also discovered. Whenever NEXT started six years ago, the focus was almost solely on radical innovation, and the employees in this department were given all the creative space that they needed in order to think as big as possible, believing that this would result in radical innovation with regards to

software development. So far this has been accomplished however, the result so far is different from what was expected when initiated. As manager 2 from A&I stated: *"If you think too big, you will not deliver"* (A&I 2, 13/04/18, 1:03). He also explained that legacy has already been created within NEXT. An effect of this is that not too radical innovations can be realized on the new platform which is being developed, simply because of the complicated infrastructure which has been built over the previous six years. Therefore, incremental innovations within NEXT are increasing, as radical innovations are becoming harder to execute. DSI is slowing down within the radical innovation, which makes it hard to still find the balance between exploitation and exploration.

8.4 Machine learning

As an emerging technology and therefore new potential DSI, Machine learning was assessed by analysing if this technology would have to be tackled different than other DSI's. Even though it was hypothesized that Machine learning would need other dynamic capabilities, it was determined that this was not fully the case. The answers of the respondents suggested that Machine learning could be tackled the same way, however the majority stated that it was too early to apply Machine learning in the ERP service because of its high level of complexity and the present immaturity in the ERP vendor industry. The question remains if Machine learning should just be seen as a technological dimension of DSI, or if it is a phenomenon which will affect all other dynamic capabilities. As described in the case description, AI as an innovation will affect everybody in many kinds of ways. In other words, it can be argued that Machine learning should not be compared to other DSI, like the digital signature or the real-life updating of addresses in the ERP service. This was already mentioned in the analysis, as Machine learning is a tool, rather than a DSI as such. However, it also might have a much bigger impact than thought. It can therefore be discussed if the dynamic capabilities of DSI will indeed change drastically, when Machine learning is applied. As explained, this is hard to determine, as Machine learning is not widely applied in the ERP vendor industry yet. When it will, it will be interesting to perform further research on this matter.

9 Conclusion

This thesis has analysed how the dynamic capabilities perspective (DCP) creates value for digital service innovation (DSI) in the ERP vendor industry. This focus was tested through

a case study of AFAS, an ERP vendor situated in the Netherlands. It was hypothesized that these dynamic capabilities would differ from other kinds of innovation in other industries, because of its digital property and because of the particular ERP vendor industry. However, findings showed that dynamic capabilities for DSI in the ERP vendor industry are less unique than originally thought.

With regard to the first sub question, focusing on the internal and external environment of dynamic capabilities of DSI in the ERP vendor industry, it was concluded that the same general internal and external factors affecting the value creation of dynamic capabilities are of value for DSI in the ERP vendor industry. Some elements like complexity, uncertainty, managerial behaviour and social capital were assessed to be more important than others for DSI in the ERP vendor industry. With regard to complexity the infrastructure of the ERP service and its wide variety of customers played a role. Furthermore, trust within social capital was stated to be important for DSI because data from the customers is used in order to facilitate DSI. Moreover, an extra element of the internal factor of managerial behaviour was noticed, namely that of 'vision', which was argued to be not only an important factor for the ERP vendor industry, but also for other industries. It therefore served as a contribution to the general model.

With regard to the second sub question, which was set out to discover how dynamic service innovation capabilities affect dynamic capabilities for DSI in the ERP vendor industry, mostly similarities were discovered. The dynamic service innovation capabilities, presented through the 6-D model by den Hertog, P., van der Aa, W. & de Jong M. W. (2010), were all applicable for DSI in the ERP vendor industry. However, within these dynamic capabilities, several properties were added in order to cater for DSI in the ERP vendor industry especially. Moreover, it was discussed if this meant that the used framework was either too general or if service innovation in any industry and *digital* service innovation in the EPR vendor industry are a lot more similar than originally thought. It was determined that the latter was not plausible, simply because a digital innovation on digital service has a lot more dimensions and complexity due to its unique features, infrastructure and innovation processes.

The third sub question focused on a particular dimension DSI, namely that of the technology Machine learning. This particular dimension was analysed because it was hypothesized that this emerging technology would demand altered dynamic capabilities in order to be successfully executed. AI as innovation being a "wicked" problem supported this claim, which meant that it could not be tackled as any other innovation. However, the analysis of this technology at AFAS could not fully support this claim at the moment. Instead the

complexity and early stage of maturity of the technology Machine learning were determined to be reasons for why it is challenging to implement a technology like this. It was argued that there is a high chance of the dynamic capabilities for this DSI in the ERP vendor industry being the same as soon as Machine learning has be proven and understood to its full potential. However, this is only true if Machine learning will be seen as any other dimension of DSI, which might not be the case until it has reached a more matured level.

Furthermore, the theory of ambidexterity, focusing on reaching the balance between incremental and radical innovation was addressed throughout the analysis, in order to add an extra dimension to the strategic management of DSI in the ERP vendor industry. The main point taken from this was the fact that incremental innovation has the main focus within the current ERP service. This is mainly due to the type of customers AFAS is dealing with including many companies which are not as digitally developed as AFAS. Simultaneously, radical innovation is still also executed, however this is separated strictly from the ERP service AFAS offers. Due to this, it was discovered that both incremental and radical innovation occur *within* incremental and radical innovation in the ERP vendor AFAS.

To sum up this thesis demonstrated the value of the DCP for DSI in the ERP vendor industry by analysing internal and external factors, the dynamic capabilities themselves and lastly a dimension of DSI which was believed to have an influence on dynamic capabilities of DSI in the ERP vendor industry.

10 Limitations and Further Research

Even though this thesis disclosed relevant findings on how the dynamic capabilities perspective creates value for DSI in the ERP vendor industry, certain limitations were also detected.

First of all, the theoretical lens of dynamic capabilities was discovered to be rather ambiguous to a certain extent. Even though the dynamic capabilities perspective in service innovation was chosen deliberately in order to narrow down the focus within strategic management, the results of the analysis showed that this lens was rather general for the focus of DSI in the ERP vendor industry. The dynamic capabilities of service innovation turned out to be the same for DSI, with the only alterations of more complexity which resulted into more opportunities and challenges regarding the service, the innovation process and the infrastructure. This limitation could therefore be turned into further research, in which the deductive approach is supplemented with more elements of induction, than used in this thesis.

Through a more inductive analysis a more holistic view of dynamic capabilities of DSI in the ERP vendor industry can be obtained. Furthermore, when conducting interviews the researcher always has the chosen framework in the back of his or her mind, automatically steering the answers of the respondents in a certain direction. With observation this limitation can be eradicated. More use of an inductive approach could be obtained through observations by means of meetings, both internally and externally. Internally at AFAS by attending meetings of Product Management, Product Development and Architecture and Innovation, while also attendings meetings externally with their customers or partners when executing DSI. Through observations, the dynamic capabilities for DSI could be refined and developed with more specificity. It would also increase the validity of the results concerning this domain as method triangulation would be achieved. Method triangulation occurs whenever more than one method is used to analyse the data, thus increasing the validity of the research (Shenton, 2004). As the researcher would attend these meetings, without a particular conceptual framework in mind, the chance of observing other additional or altered dynamic capabilities would increase.

The analysis was created merely through the insights of the interviews held at AFAS, which also can be seen as a limitation of this thesis. It would have suited the thesis well if observations would have complemented this. Extra insights and therefore value to the domain of DSI in the ERP vendor would be created, if the researcher could signal dynamic capabilities by attending meetings about initiating new DSI, when a particular DSI has already been chosen, or even further down the road of the implementation. However, this thesis solely included in-depth interviews as these were expected to produce enough relevant information on the chosen topic. Furthermore, the role of the researcher in observations within the case company AFAS would be very challenging as it was noted that most considerations on potential DSI are discussed in informal rather than formal settings. Referring back to the in-depth interviews, which were carefully picked out in collaboration with the overall manager of Product Management, were stated to be the most important employees to interview for this topic. It was trusted that his view would serve as a good starting point for who to interview. In other words, interviewing other employees would probably not have amounted into further insights.

With regard to the method of retrieving data, the data was only derived from one ERP vendor in the Netherlands, due to choice of a case study. Nonetheless, it is important to compare the results of this one case study in the Netherlands with a broader and more international context. Therefore, multiple case studies within the topic of dynamic capabilities

of DSI in the ERP vendor industry, both in the Netherlands and internationally, would create substantial value to this domain. However, it is believed that this one case study, in which all relevant managers concerning DSI were interviewed, still adds valuable knowledge to the focus of this thesis.

Furthermore, the focus of the research was solely on the dynamic capabilities itself and not on the relevance of the service innovation dimensions with regards to DSI in the ERP vendor industry. The only dimension which was discussed was technology through the technology Machine learning. As explained in the theory, this was not in the scope of this study because it did not suit the focus. However, in order to address the 6-D model as a whole, and adjust it to fit DSI overall, these dimensions should be addressed in further research. By doing so, a new adjusted framework for dynamic capabilities in DSI could be proposed, instead of only looking at the dynamic capabilities themselves.

Moreover, the section on the technology of Machine learning, serving as a dimension of DSI, can be elaborated substantially. For this thesis, the section was narrowed down in order to only address the value of the dynamic capability perspective on this particular dimension of DSI in the ERP vendor industry. Even though it was concluded that the same dynamic capabilities will most probably be used whenever this technology is more mature in the ERP vendor industry, this could not be stated with absolute certainty. In order to increase this certainty, further research on dynamic capabilities with this particular technology should be initiated whenever Machine learning becomes more mature and proven in the ERP vendor industry. It can therefore be argued that it was too early to analyse this technology for DSI in the ERP vendor industry. In order to have avoided this limitation, it could potentially have been of more value to look at an event of DSI that had already been executed. Through this, all dynamic capabilities could have been verified. However, this is merely a learning which should be taken into account whenever performing further research on dynamic capabilities in DSI.

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Appendices

A. Interview overview

Anonymised Name	Function	Date	Description of the department
PM 1	Product Manager (Project Management)	10/04/18	The department of PM is responsible for the roadmap of the ERP service that AFAS develops and sells. All the (major) strategic decisions are taken here, in turn being in close colla-boration with the board of AFAS.
PM 2	Product Manager (Financial Management)	10/04/18	The department of PM is responsible for the roadmap of the ERP service that AFAS develops and sells. All the (major) strategic decisions are taken here, in turn being in close colla-boration with the board of AFAS.
PM 3	Manager of Product Management (All modules)	13/04/18	The department of PM is responsible for the roadmap of the ERP service that AFAS develops and sells. All the (major) strategic decisions

			are taken here, in turn being in close collaboration with the board of AFAS.
PM 4	Product Manager (Human Resource Management & Payroll)	13/04/18	The department of PM is responsible for the roadmap of the ERP service that AFAS develops and sells. All the (major) strategic decisions are taken here, in turn being in close collaboration with the board of AFAS. Especially this overall manager has a big take on strategic DSI decisions.
PD 1	Manager Product Development	11/04/18	The department of PD is responsible for the actual development of the ERP service. In collaboration with PM, the service is maintained and further developed. A close collaboration is therefore needed in between PM and PD.
A&I 1	Manager 1 Architecture & Innovation	13/04/18	The department of A&I focuses mainly on the (radical) innovation called NEXT. However, the managers selected to address DSI with both have

			a background as Product Managers.
A&I 2	Manager 2 Architecture & Innovation	12/04/18	The department of A&I focuses mainly on the (radical) innovation called NEXT, which entails developing a new method of software development. The managers selected to address DSI both have a background as Product Managers.
Controlling 1	Manager Controlling	12/04/18	The department of Controlling entails the financial services of AFAS. The chosen manager is involved in several strategic issues concerning the ERP service.

B. Interview topic guide

Introduction

Q1. What is your overall view on digital service innovation? How is it different than solely innovation?

Q2. How does AFAS digitally innovate when comparing it to other ERP vendors in the Netherlands?

Q3. How do you think innovation should be managed, in order to find a balance between everyday business and (digital service) innovation?

The development of Software as a Service (SaaS)

Q1. What overall influence do you think SaaS has had on the ERP vendor industry?

Q2. How do you think the way of innovating has been affected by SaaS?

Q3. How do you think the speed of innovating has been affected by SaaS?

Digital service innovation (DSI) dimensions

Q1. Could you give a recent example of DSI in the ERP service?

Q2. Could you explain how the process of this DSI was?

Q3. Does the process of the example apply to all modules within the ERP service you are offering? If no, how are they different?

Digital service innovation (DSI) processes

Q1. What are important aspects to taken into account when innovating?

Q2. Which organizational aspects are important when innovating?

Q3. How important are partnerships when innovating?

Q4. How important is the customer interaction when innovating?

Q5. How would you describe the balance between innovating with partners and with customers?

Machine learning

Q1. What do you think Machine learning could bring of value to the ERP vendor industry?

Q2. What impact will Machine learning have, both internally and for the customers?

Q3.. How do you think Machine learning should be tackled when comparing it to other DSI's?

Q4. How do you think the implementation of Machine learning affects the issue of data privacy and security, which we see increasing at the moment?