

**MASTER THESIS**

**“The Digital Servitization Framework for the  
Transition to Modular Software as a Standardized  
Product”**

*Author:*  
Evelien Bosboom

*Student number:*  
S2867133

*MSc Business Administration – Digital Business & Analytics*  
Behavioural, Management and Social Sciences, University of Twente  
29-8-2022

*Dr. Robin Effing & Ir. Björn Kijl*

**UNIVERSITEIT TWENTE.**

## ACKNOWLEDGEMENTS

I would like to thank several people who helped and supported me during the process of writing my thesis for finishing my master's in Business Administration with a specialization in Digital Business & Analytics.

First, I would like to thank Job Leemreize for helping me in choosing the topic for this thesis and for his support and trust during the process. It was nice working with him.

Secondly, I would like to thank all the experts who participated in the interviews to share their perspectives and opinions. This was very worthy for the research.

Thirdly, I would like to thank my supervisors from the University of Twente, Robin Effing and Björn Kijl for helping me to complete the master thesis process through their feedback and opinions.

Last but not least, I would like to thank my friends and family for their unlimited support during this process and in general. I couldn't do it without all of them. Big thanks for that.

*Evelien Bosboom*

## **ABSTRACT**

Services such as software, are hard to understand, communicate and differentiate. This is because the service is intangible and not clearly defined which brings challenges for a business and its customers to distinguish between different offerings. A business can overcome this complexity to productize its intangible service to a more clearly defined product outcome. This has already been succeeded by other big companies in the IT industry such as, Microsoft. Productize intangible services, which is about modular services as a standardized product, and in this study specifically software, can help a business to eliminate complex components of their services. This can be reached through Digital Servitization; A transformational process of innovation change in business elements about the way of operating and value creation for the customers. However, little is known about the digital servitization process as it unfolds. What is remain lacking is an overarching framework that helps a business in developing a strategy for the transition to modular software as a standardized product.

This study investigates what business elements are identified in literature and practice, which are mentioned as important for a business when developing a strategy for the transition to modular software as a standardized product. These business elements are categorized into building blocks that can be positioned in the Digital Servitization framework. To find an answer to this study, first, a systematic literature review is carried out that points out the business elements that are mentioned as important by authors to look at, when making the transition. The literature review resulted in several business elements, categorized into four building blocks. Those building blocks were created as the preliminary Digital Servitization framework. The building blocks were used as coordinates for the empirical research. The preliminary Digital Servitization framework has been presented to the experts in the semi-structured interviews to validate the building blocks and to see their own opinions. The outcomes of the interviews, combined with the outcomes from the literature, required numerous adjustments to the preliminary Digital Servitization framework. In the end, seven newly categorized building blocks are created which resulted in the final Digital Servitization framework. The building blocks in the framework, are categorized into: Product, Market, Finance, Customers, Employees, Culture, and Managing Support. This Digital Servitization framework can be used by software vendors as a foundation in developing a strategy for the transition to modular software as a standardized product.

## TABLE OF CONTENTS

<b>ACKNOWLEDGEMENTS</b> .....	<b>1</b>
<b>ABSTRACT</b> .....	<b>2</b>
<b>LIST OF FIGURES</b> .....	<b>5</b>
<b>LIST OF TABLES</b> .....	<b>5</b>
<b>1.0 INTRODUCTION</b> .....	<b>6</b>
1.1 Background of the Problem.....	6
1.2 Conceptual Illustration of the Problem.....	8
1.3 Context and Research Question.....	9
1.4 Purpose of the Study.....	10
1.5 Study Process.....	10
<b>2.0 METHODOLOGY</b> .....	<b>12</b>
2.1 Design of Study .....	12
2.2 Data Collection .....	13
2.2.1 Systematic Literature Review .....	13
2.2.2 Expert Interviews .....	14
2.3 Data Analysis.....	16
2.4 Verification of the Data Analysis .....	16
<b>3.0 LITERATURE REVIEW</b> .....	<b>17</b>
3.1 Key Concepts.....	17
3.1.1 Products, Services, and Software .....	17
3.1.2 Digitalization of Products, Services, and Software.....	18
3.2 Development of Productization and Standardization .....	18
3.2.1 Advantages Productization of Software.....	19
3.3 Productization Process of Services and Software.....	20
3.3.1 Modular Software as a Standardized Product .....	21
3.4 Servitization, Digitization, and Digital Servitization .....	22
3.4.1 Strategic Relevance of Digital Servitization .....	23
3.5 Digital Servitization in the Transition to Modular Software as a Standardized Product	24
3.6 Preliminary Digital Servitization Framework .....	27
<b>4.0 RESULTS</b> .....	<b>30</b>
4.1 Results Expert Interviews.....	30

<b>5.0 ANALYSIS OF THE RESULTS .....</b>	<b>39</b>
5.1 Digital Servitization Framework .....	41
<b>6.0 CONCLUSION.....</b>	<b>42</b>
6.1 Validity and Reliability of the Study .....	43
6.2 Theoretical and Practical Contributions .....	44
6.3 Limitations and Future Study .....	45
<b>References .....</b>	<b>47</b>
<b>Appendix 1: Articles used for Literature Review .....</b>	<b>51</b>
<b>Appendix 2: Expert Interview Questions English and Dutch .....</b>	<b>53</b>
<b>Appendix 3: Description of the Productization Process .....</b>	<b>56</b>
<b>Appendix 4: Description of the Preliminary Digital Servitization Building Blocks .....</b>	<b>57</b>
<b>Appendix 5: Description of the Final Digital Servitization Building Blocks .....</b>	<b>58</b>
<b>Appendix 6: Code Scheme.....</b>	<b>60</b>

## **LIST OF FIGURES**

Figure 1 Global Visual Representation of Problem Background.....	9
Figure 2 Entire Research Process.....	13
Figure 3 IHIP-model (Salminen, 2014).....	18
Figure 4 Conceptual Illustration of the Productization Process (Guvendiren et al., 2014).....	20
Figure 5 Stages of the Productization Process (Guvendiren et al., 2014).....	21
Figure 6 Preliminary Digital Servitization Framework.....	28
Figure 7 The Digital Servitization Framework .....	42

## **LIST OF TABLES**

Table 1 List of Interviewees.....	15
Table 2 Overview of advantages mentioned in literature about service productization in business processes (Harkonen, 2021).....	20
Table 3 Dimensions in the process to the transformation of modular software as a standardized product from a strategic point of view (Guvendiren et al., 2014).....	22
Table 4 Potential identifiers for Digital Servitization framework.....	26
Table 5 Building blocks in preliminary Digital Servitization framework .....	29

## 1.0 INTRODUCTION

### 1.1 Background of the Problem

New business opportunities are created in the digital era, where consumers buy and consume services and products through the digital medium (Shivendu & Zhang, 2019). More service provider companies e.g., Microsoft, had for a long time reported almost 100 percent revenue from products, but today their offering has moved online (Yrjönkoski, 2019). This forms a systemic transformation toward a world where digital services and products are predominantly online and available for all to use (Yrjönkoski, 2019). In contrast to physical products, which are tangible and well defined, services are complex, intangible and, not clearly defined which brings a challenge for customers to distinguish between different offerings online (Wirtz et al., 2021) and thus many services are difficult to understand and communicate, and as a result, difficult to position and differentiate (Wirtz et al., 2021). To overcome these difficulties, a suggestion by Grönroos (2020) is that intangible services should be treated as concrete objects and that they need to be marketed like tangible products. This can be seen as the concept of productization. The productization term can be used in the context where a firm is operating in the service business and wants to modify its intangible service promise toward a more clearly defined product outcome (Simula et al., 2014). Other big IT service providers such as Microsoft and Apple, have gained enormous success with productizing their services such as software (Wali et al., 2018). Software that has been built, stabilized, and resold could lead to significant benefits (Yrjönkoski, 2019). Possibilities of using experienced employees for other tasks, less dependency on individuals, reduced overlapping work, and services becoming more tangible, and concrete are only some of the many more benefits of productization named by Harkonen (2021) and Wirtz et al., (2021). Standardizing services enables a business to stabilize risks which creates more predictable costs and specific features (Soukkala, 2020) which could be seen as main reasons for companies to transition to productized software (Wali et al., 2018). Because of recognizing the advantages, the productization of software is receiving more attention from both academics and practitioners (Wali et al., 2018). According to Elia et al., (2019), productization is growingly prominent in today's market and, therefore, when the concept of productization, services as clearly defined products, is understood correctly, a business can gain advantageous benefits.

Productization is an evolution of service components whereby parts of the services are standardized (Suominen et al., 2009). The service is divided into independent components and this interdependence allows a firm to standardize the components (Ulrich et al., 1994) which can make services more concrete and less complex. This is known as modularity. The modularity of services is a recent phenomenon, but software can be one of the products that can make use of the application of a modular design (Peng & Mu, 2018). A modular design can be seen as a product that is portioned into distinct components that are narrowly specified (Peng & Mu, 2018). Service products that are narrowly specified i.e., have a formalized value proposition, are standardized, modularized and bundled, can be seen as service products that are well defined.

To address the challenges of service complexity regarding communication, positioning and, differentiation that Wirtz et al., (2021) are referring to, servitization scholars have suggested to standardize and modularize services (Eloranta et al., 2021). However, looking at the trends in servitization, digitalization can affect servitization through several digital technologies, like cloud computing (Eloranta et al., 2021). This digital affection is defined by Hsuan et al., (2021) as the concept of ‘‘Digital Servitization’’, which describes the convergence between servitization and digitalization and thereby allows standardization and modularization (Eloranta et al., 2021). Digital Servitization can be seen as a transition process from pure products and add-on services to smart product-service systems, which includes software (Kohtamäki et al., 2020) and can therefore be seen as a driver of business model innovation since it entails changes in the value creation and delivery of processes (Hsuan et al., 2021). The convergence to Digital Servitization is a transformational process of model innovation since it changes the way of operating and value-creating for customers (Frank et al., 2019). Tronvoll et al., (2020), mentioned that many firms are struggling with implementing a digital servitization strategy. This is due to the fast change in creating a strategy. A five-year strategy with a goal at the end works no longer that way because a business has to be very agile and have to be able to switch direction in a short time frame, think about half a year or a year (Tronvoll et al., 2020). Because of this short time frame, companies do not want to make the transition without any guidance because of uncertainties (Wali et al., 2018). But when a business wants to make the software offering more clearly defined and standard, it needs to focus on organizational change such as structure, culture, context, leadership and, human capital (Damanpour, 2017).



Therefore, this study focuses specifically to find business elements that change the organizational aspects when making the transition to modular software as a standardized product.

Several researchers noted that productizing services, which contain software services, since software has similarities to services due to its intangible nature and abstraction required for both software and services (Toivonen, 2018), can have beneficial advantages (see table 2). Digital Servitization can address complex challenges and creates many advantages when choosing modular software as a standardized product. The suggestions to convergence to Digital Servitization where software is standardized in a modular design, could be a reason for a business to unfold in a way to become a more stable and predictable company.

However, little is known about how the nature of the Digital Servitization process may be as it unfolds in standardizing and modularizing services (Chen et al., 2021) and, therefore what is remain lacking is an overarching framework that is applicable across service industries when developing a strategy (Wirtz et al., 2021). Due to the lack of study in this area, which may be perhaps due to the intangible nature of service/software products (Toivonen, 2018), companies do not want to make the transition without any guidance because of uncertainties (Wali et al., 2018).

## **1.2 Conceptual Illustration of the Problem**

The previous paragraph indicates the background of the problem that is recognized. To give a visual representation of how the concepts are all connected, a conceptual model is created for more clarity. As can be read in the previous paragraph, services/software can bring complexity due to their intangibility. The solution to overcome the complexity and to make the software more refined is, according to authors in literature, to productize the software. The change to this can be made through digital servitization which enables the business, in the end, to modular software as a standardized product. Modular software as a standardized product, can be characterized as; One product for many customers for a specific market, structured releases, completely configurable software and, the aim of selling licenses (van de Weerd & Brinkkemper, 2013). In digital servitization, the business changes from customer-specific solutions, project-based to more standardized modules of software, product based (Yrjönkoski, 2019). A project-based business that wants to overcome the complexity of software, wants to

grow, and wants to benefit from the advantages of productization, can become, through digital servitization a product-based business, whereby the software is delivered in a similar form to every customer (Yrjönkoski, 2019). This is about the concept of modular software as a standardized product. An overview of the visual representation of the concepts written above can be seen in figure 1.

<p style="text-align: center;"><b>Software and Service Complexity for Customers &amp; Business</b></p>	<p style="text-align: center;"><b>Productization</b></p>	<p style="text-align: center;"><b>Digital Servitization</b></p>	<p style="text-align: center;"><b>Modular Software as a Standardized Product</b></p>
--	--	---	--

**Figure 1 Global Visual Representation of Problem Background**

**1.3 Context and Research Question**

Several researchers identified that the productization of services can have beneficial advantages, and modular software as a standardized product by Digital Servitization can address complex challenges such as clarity in communicating, positioning, and differentiation of the software. There are many advantages and suggestions of productization (see table 2), and software in a standardized modular design makes the convergence of Digital Servitization an attractive consideration for software vendors to unfold the transition where software is modularized as a standardized product.

However, little is known, and little research is carried out about the nature of a Digital Servitization process as it unfolds (Chen et al., 2021) when modular software as a standardized product. Therefore, many companies do not want to make this transition because of a lack of guidance and uncertainties (Wali et al., 2018). The lack of this guidance can remain fuzzy and varying offerings can result in an even inefficient operation (Wirtz et al., 2021). This is a notable gap, considering the attention that this transformation to modular software as a standardized product has received in academia and given its prevalence in practice (Chen et al., 2021).

Therefore, the goal of this study is to provide a framework that comprises building blocks that points out for a business where to be aware of when developing a strategy for the transition to modular software as a standardized product.

Existence literature about productizing services is not focussed on one specific industry but Toivonen (2018), Elia et al., (2019), and Wirtz et al., (2021) all mentioned that the research

of productization on software services, which has similarities to services (Toivonen, 2018), is limited, this study will specifically focus on the software vendors. This leads to the following research question:

*“What building blocks comprise the Digital Servitization framework that offers software vendors a foundation in developing a strategy for the transition to modular software as a standardized product?”*

#### **1.4 Purpose of the Study**

Although productizing services can have beneficial advantages and modular software as a standardized product by Digital Servitization can address complex challenges of services, according to Chen et al., (2021), little is known about the nature of the digital servitization process as it unfolds in standardizing and modularizing services. Therefore, this study has several purposes.

First, this study extends the discussion on the already existing literature on the concepts of productization, modularization, and digital servitization. The concepts are explained by several articles which are selected through a systematic literature review. Secondly, this study aims to create the Digital Servitization framework which comprises several business elements categorized as building blocks, that offers software vendors a foundation in developing a strategy for the transition to modular software as a standardized product.

The theoretical contribution of this study is to have a more concise discussion on the concepts of productization, modularization, and digital servitization. Thereby, the business elements that are found in this study are, instead of being scattered over different articles, summarized and merged into one clear review. The practical contribution of this study is to provide management positions in software vendors a framework that comprises building blocks that will present an organized overview of what business elements to pay attention to in developing a strategy for the transition to modular software as a standardized product.

#### **1.5 Study Process**

This study contains two parts. The first part is about the literature review which can be found in chapter 3 that presents an overview of the already existing academic literature. The literature review starts with general concepts which are important for this study and proceeds during the

chapter to literature that identifies business elements that are mentioned as important for the transition to modular software as a standardized product. Those elements are categorized as potential building blocks for the preliminary Digital Servitization framework, which can be used as guidance for empirical research. The research design of this study is qualitative in nature and data is collected through systematic literature review and semi-structured expert interviews. Expert interviews are carried out to get a better and more comprehensive understanding of their opinions about the potential building blocks which could be in the Digital Servitization framework. A detailed description of the entire process can be found in chapter 2, the methodology.

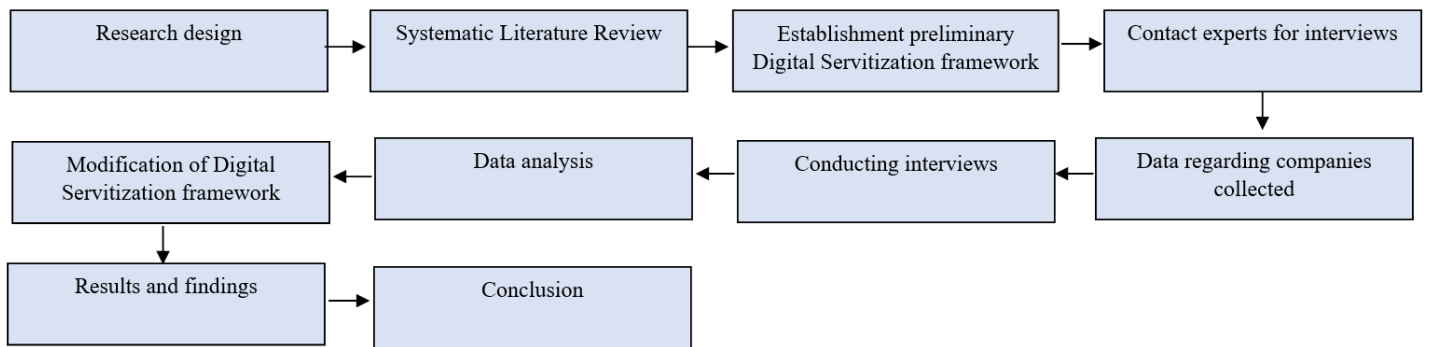
## **2.0 METHODOLOGY**

The methodological aspects and choices of this study are presented in the following paragraphs. This chapter aims to explain and outline the methods and data that are used in this study that help to identify the building blocks of the Digital Servitization framework. In the following paragraphs, there will be explained and justified about what the chosen research design is for this study and which methods and techniques were used to get the (empirical) data.

### **2.1 Design of Study**

The design of this study makes use of a qualitative research approach. Using the qualitative method for this study is suitable since all the information that is needed to answer the research question, is located in qualitative forms, such as theoretical literature and interviews. Qualitative research makes it possible for the researcher to search for a deeper understanding of a social problem and therefore, this provides rich insights and contextual explanations (Lanka et al., 2021). Since this study aims to come up with building blocks that can be within the Digital Servitization framework, interpretations of people in the field are needed. Therefore, the use of a qualitative method for this study enables the researcher to study this in the natural setting attempting to make sense of and interpret the terms of meaning people bring to them (Aspers & Corte, 2019). Little research is carried out about the nature of the Digital Servitization process as it unfolds but using a qualitative research method can enrich the literature by a combination of theoretical literature and practical interpretations from the expert interviews, about the potential building blocks for the Digital Servitization framework, since such a framework is still lacking.

Companies do not want to make the transition to modular software as a standardized product since there is a lack of guidance which brings in uncertainties for such a business. Therefore, using a qualitative method enables the researcher to first find more information in a qualitatively form about the topic in general and subsequently to find out more about the potential building blocks that can be within the Digital Servitization framework (Aspers & Corte, 2019). An overview of the entire research process can be found in figure 2. Different methods can be used in a qualitative research approach, the next paragraph will explain more about this.



**Figure 2 Entire Research Process**

## 2.2 Data Collection

There are multiple qualitative methods for collecting empirical data. For this study, a systematic literature review has been carried out to identify the concepts and to find potential building blocks for the framework. To get a deeper understanding and to validate the founded literature in practice, the main source of information was collected through semi-structured interviews with experts working in big companies in the IT market. Both methods will be explained in the following paragraphs.

### 2.2.1 Systematic Literature Review

This study starts with a literature review identifying the important topics. The aim is to dimensionalize and categorize existing knowledge of the concepts of productization, modularization, and Digital Servitization, to find opinions and justifications about potential building blocks which could be within the framework. This is carried out according to a structured literature review. Several relevant articles which identified the concepts of products and services, productization and standardization, modular software design, and digital servitization, were analysed. Conducting a systematic literature review enables to map and assess the already existing literature to develop the knowledge of existence further (Wilma & Schrotenboer, 2019). The search of articles has taken place via the database of Google Scholar and the majority of the articles were selected through the year 2018-2022 to get an as recent as possible view of the topic, only a few are older. An overview of the selected articles for this study, can be found in appendix 1. In those articles, several elements were found and mentioned by several authors which are mentioned as important in the transition to modular software as a standardized product. An overview of this can be found in chapter 3, paragraph 3.5, table 4. Those elements resulted in the establishment of the theoretical preliminary Digital Servitization

framework. Those elements from the preliminary framework were included and validated in the interviews to see if there can be found differences and similarities between the mentions of the experts and authors in the literature.

### **2.2.2 Expert Interviews**

Expert interviews were carried out to identify personal meanings, in combination with literature, about the potential building blocks which could be within the framework. Therefore, the main source of information in this study was collected through semi-structured expert interviews, which creates a way of understanding people's perceptions (Mahat-Shamir et al., 2021). Lanka et al., (2021) mentioned that interviews are a suitable method for capturing the experiences of participants and are a valuable way to find out what is understood or how some concepts are interpreted (2021), which is needed for this study.

Several structures can be used when carrying out interviews. Ranging from structured, semi-structured, and unstructured. However, looking at the objective of this study, which is to see the different perspectives of expert's opinions about the building blocks, the semi-structured interview method is the most commonly used technique to go in-depth (Mahat-Shamir et al., 2021). The semi-structured interview outcomes can elicit themes that might be very valuable since semi-structured interviews have a characteristic that turns questions about a specific topic into storytelling invitations (Mahat-Shamir et al., 2021). It gives the researcher the possibility to have personal contact and engender personal and detailed information (Story & Tait, 2019).

The interviews are held with experts operating in the industry of IT/ICT/software, to find out what their opinion is about the potential building blocks of the Digital Servitization framework. The experts have been working in the industry for several years and at big-sized companies who have experienced and/or are experiencing and/or seeing the movement of this transition where the focus lies on software services to/and products, operating in the IT/software/cloud industry. The individual perspectives of the experts about what business elements are needed to look at as a business when making the transition to modular software as a standardized product are asked. The interview starts with their own opinions to avoid steering the experts in a certain direction that might control their mindset. Therefore, the preliminary Digital Servitization framework was not shown until later in the interview.

The sample of the interviewees is selected based on willingness, experience, and good knowledge of the topic, but to have a wider orientation on the perspectives of the experts, the

interviews were carried out in although, the same industry, different companies. An overview of the interviewees who participated in this study can be found below in table 1.

#	Interviewee	Job function & Company	Date of Interview	Location of Interview
1		General manager,  <b>Total Specific Solutions</b>		
2		Technical Sales Manager Data & Artificial Intelligence,  <b>IBM</b>		
3		Director Product Development,  <b>AFAS software</b>		
4		Head of Division and Embedded & Systems,  <b>Capgemini</b>		
5		Digital Transformation Specialist,  <b>KPMG</b>		
6		Director Infrastructure,  <b>DELL Technologies</b>		

**Table 1 List of Interviewees**

The results of the interviews will be analysed and compared to each other to see if the founded business elements in the literature can be validated by the experts and to find additional opinions and justifications. Subsequently, the business elements are created and categorized into building blocks that can be within the Digital Servitization framework. The business elements that have a chance of being taken as a building block for the framework, should have at least 3 mentions by different experts and/or authors. According to the results of the expert interviews, the preliminary Digital Servitization framework, see figure 6 in chapter 3 paragraph 3.6, will be adjusted, if needed. After the possible adjustments of the preliminary framework,



the final Digital Servitization framework appears that comprise building blocks that can be used by software vendors as a foundation in developing a strategy for the transition to modular software as a standardized product.

Before carrying out the interviews, there has been a list created with interview questions to give the researcher (interviewer) a semi-structure to stick to during the interview. The list of the interview questions, in Dutch and English, can be found in appendix 2. The researcher (interviewer) introduced herself to the participants and explained the goal of the study. However, the participants were already informed about the topic of the study before the interviews were carried out, via email.

### **2.3 Data Analysis**

A crucial step in qualitative research is the interpretation of the data collection to do this in a way as accurate as possible (Wali et al., 2018). The qualitative data collected through the interviews were transcribed after the interviews were carried out. Then, the interview transcripts were analysed according to inductive coding. It starts with open coding, then axial coding, and last selective coding. This method can be used to find out if there are similarities and differences in the several interviews. The interviews were recorded to prevent any losses which make the transcription process easier for the researcher.

### **2.4 Verification of the Data Analysis**

A very important step in analysing the data is verification. Methods used for the research of this study can be questioned regarding their trustworthiness, which is about validity & reliability (Wali et al., 2018). However, trustworthiness should be considered during the entire process of the study. Therefore, a researcher, have to be objective when analysing the data so that the researcher's perceptions do not influence the results of the data (Wali et al., 2018). This means that the researcher is not sharing any of her own opinions during the interviews and makes sure that the questions are specific, objective, relevant, and unambiguous (Story & Tait, 2019). This will increase the reliability of the study since it enables the items to measure what they are designed to measure (Story & Tait, 2019).

### **3.0 LITERATURE REVIEW**

To have a clearer understanding of several concepts that are used in this study, this chapter will elaborate on these concepts related to existing academic literature. It represents a review of several academic literatures by explaining the important concepts for this study and a State-of-Art overview. An overview of the literature used for writing this chapter can be found in appendix 1. First, a review of general important concepts is elaborated which is followed by more in-depth explanations and described processes. Later, a preliminary Digital Servitization framework is created with the included building blocks consisting of business elements, that were mentioned as important in literature.

#### **3.1 Key Concepts**

Several concepts are used in this study and therefore, it is critical to understand what is meant by these concepts so that there will be a clear and universal understanding of this. In the paragraphs below, the context of the different concepts is explained.

##### **3.1.1 Products, Services, and Software**

Products and services are structurally different but their commonality both present a market offering (Wirtz et al., 2021). According to Al-Gunaid (2019), a product is something that can be seen as a developed, produced, delivered, marketed, and consumed good that can be offered to a market in the industry, for consumption that satisfies the needs or wants of customers. Products contain characteristics that differ from services. Products can be seen as physical and tangible products (Wirtz et al., 2021) whereas services can be seen as a kind of performance that is experienced rather than owned like physical products (Wirtz et al., 2021). Services are essentially intangible and therefore they will never result in the ownership of anything (Al-Gunaid, 2019). However, products can be intangible such as software or an application, and thus services can also be seen as a part of a product that includes a combination (Al-Gunaid, 2019).

Toivonen et al., (2018) describes that software has similarities to services due to its intangible nature and abstraction that is required for both software and services. However, as mentioned before, services can be seen as a part of a product, and therefore software offerings like computer programs, procedures, documentation, and data delivery, although the intangibility, can be defined as a software product (Adusei et al., 2021).

### 3.1.2 Digitalization of Products, Services, and Software

In the digital era, more products, services, and software are offered online through a digital medium such as the internet. The digitalization of products, services, and software can be seen as virtual objects which bring value to someone that is delivered over the internet (Øverby & Audestad, 2021), for example, Microsoft Word, music on Spotify, and apps on an iPhone. The digitalization of products, services, and software can come with several benefits like reducing unemployment but also greater transparency and efficiency (Greeven et al., 2017). Digitalization creates the possibilities to be replicated without any costs, for example, software, whereby the availability is not reduced by consumption and usage (Øverby & Audestad, 2021). Therefore, the difference between the digitalization of products, services, and software from physical products lies in the presence of the physical domain. The IHIP model shows how the critical characteristics of digital services are different in contrast to goods (Salminen, 2014). Digital services can be seen as offerings that are a combination of several characteristics that have been attributed to either goods or services (Salminen, 2014).

Service characteristic	Applies to digital services
Intangibility	Yes
Heterogeneity	No
Inseparability	No
Perishability	No

Figure 3 IHIP-model (Salminen, 2014)

### 3.2 Development of Productization and Standardization

The need to understand services and thus software, as products are because most services are hard to understand, communicate, differentiate, position, and sell due to their intangibility (Wirtz, 2020). A business that is operating in the service industry wants to modify its intangible service promise toward a more clearly defined product outcome (Simula et al., 2014), identifies the concept of productization. Big companies like Google, Apple, Microsoft, Facebook, and Amazon, also called the ‘‘Frightful Five’’, show how the impact of new and innovative digital business adoption creates an impact on society and the economy in terms of rapid growth, scaled-up revenues, and continually division into new areas (Gebauer et al., 2021). These big successes were made possible since they productized their services and thus their software (Wali et al., 2018). Productization helps in eliminating complex components of services which makes the content and scope of services and software more understandable and concrete, and this makes it easier to sell (Wali et al., 2018). Therefore, the productization of services helps to

create a concrete virtual product. However, the productization of services also means that a business should use strategies that address the challenges that come with the intangibility nature of services and software (Wirtz, 2020). Because products are much more understandable than services and the buyer becomes more aware of what he is buying (Wali et al., 2018).

When productizing services, standardization of the service modules is likely to be important since it can enhance the efficiency of the development (Gremyr et al., 2019). Standardization creates the ability to have the coherence between each module maximized to improve its performance (Gremyr et al., 2019). As mentioned before, enormous success has been gained by the productization of services and software, however, without standardization, meaningful boundaries cannot be defined between the modules and therefore standardization is crucial for productization (Gremyr et al., 2019).

### **3.2.1 Advantages Productization of Software**

As mentioned before, there are several advantages identified in the productization of services, and more attention is given to this by academics but also practitioners. Harkonen (2021) describes that the productization of services creates a structured understanding and clarifies the commercial and technical service offering, where the main advantage for software vendors is the improved manageability of services. However, there are also advantages for customers such as potential improvements in service quality, a decrease in prices, and minimum time needed to spend on buying services (Harkonen, 2021).

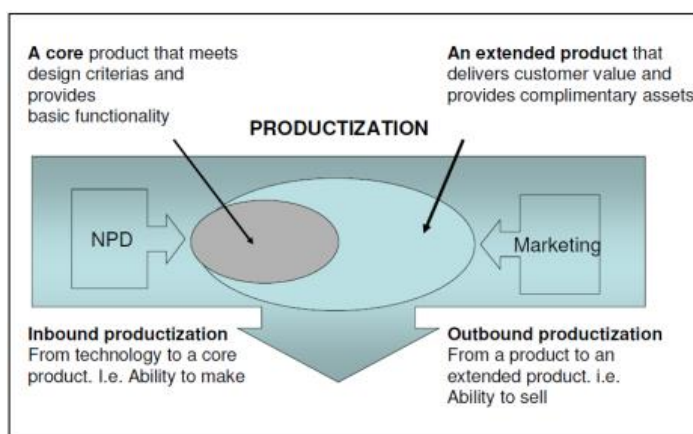
The advantages mentioned in the literature can be found in table 2. Additionally, next to the advantages, the number of mentions by several authors is given, which shows the importance of such a relevant topic as service productization in business processes.

Advantages of Productization			
Facilitate understanding internal/external <sup>8</sup>	Routines <sup>1</sup>	Reduced dependency on individuals <sup>1</sup>	Effectiveness <sup>9</sup>
Shared understanding <sup>3</sup>	Quality <sup>2</sup>	Systematisation <sup>12</sup>	Profitability <sup>3</sup>
Employees understanding their role <sup>1</sup>	Efficiency <sup>9</sup>	Comprehensibility <sup>1</sup>	Formalisation <sup>11</sup>
More concrete pricing <sup>1</sup>	Price <sup>1</sup>	Information sharing <sup>2</sup>	Time <sup>1</sup>
Creation of service platforms <sup>1</sup>	Pricing logic <sup>1</sup>	Tangibilisation <sup>2</sup>	Improved focus <sup>1</sup>
Concretisation <sup>2</sup>	Cost savings <sup>2</sup>	Transferability <sup>1</sup>	Identifying core benefit <sup>1</sup>
Standardization of some service elements <sup>4</sup>	Cost structure <sup>1</sup>	Improved manageability <sup>4</sup>	Structural understanding <sup>7</sup>
Addressing service portfolio <sup>4</sup>	Common language <sup>2</sup>	Marketing and selling <sup>2</sup>	Linking to data and IT <sup>3</sup>

**Table 2 Overview of advantages mentioned in literature about service productization in business processes (Harkonen, 2021)**

### 3.3 Productization Process of Services and Software

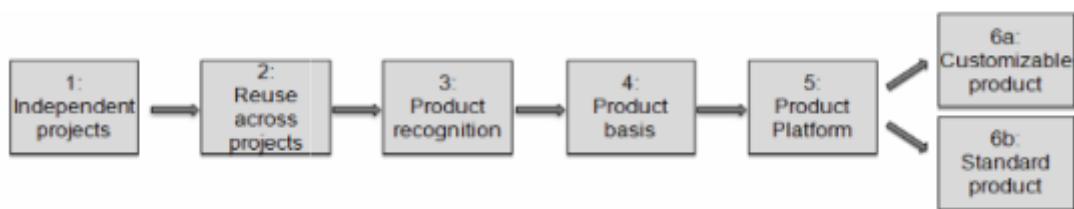
Productization of services and software and thus treating the intangible software as concrete objects and market them like observable, tangible products, can overcome the complexity that comes with services (Grönroos, 2020). Productization in the context of software is about the purpose to transform intangible software into a more product-like and well-defined set of deliverable offerings (Guvendiren et al., 2014). The conceptual illustration of the productization process that is made by Guvendiren et al., (2014) can be seen in figure 4.



**Figure 4 Conceptual Illustration of the Productization Process (Guvendiren et al., 2014)**

Productization in today's market is massive growth and is getting more prominent (Elia et al., 2019). Productized software that is built, stabilized, and resold, could lead to significant benefits for companies operating in the service industry (Yrjönkoski, 2019). It will allow a business to stabilize risks and thus create more predictable costs and specific features (Soukkala, 2020). Standardizing software through the concept of productization, creates more predictability and therefore stabilizing costs results in more efficient and effective work, which can all be the main reasons for a business to make the transition to productized software (Wali et al., 2018). Creating more stable costs is about the increased profitability that is linked to systematization and thereby pricing becomes more concrete, transparent, and cost-saving (Harkonen, 2021).

The process of productization can be described according to Guvendiren (2014) through several stages, ranging from the perspective of the customer-specific development to the product software business perspective. A detailed description of the steps of the productization process can be found in appendix 3, however, the following stages are identified and explained according to Guvendiren et al., (2014):



**Figure 5 Stages of the Productization Process (Guvendiren et al., 2014)**

### **3.3.1 Modular Software as a Standardized Product**

Standardizing parts of a service can be seen as the evaluation of productization whereby the service is divided into independent components (Suominen et al., 2009). It is its interdependency of the components of the services which enables standardization to make services more concrete and less complex (Ulrich et al., 1994). This interdependency is also known as modularity, which is a very recent phenomenon (Peng & Mu, 2018). More studies have emphasized the role of modularity in managing tensions between the components considering the increase in interdependence (Kohtamäki et al., 2021). The software which is divided into independent components can be seen as a modular design whereby the components are proportioned into distinct, narrowly, well-defined, and specified products (Peng & Mu, 2018). The modularity of software makes complexity manageable and gives the firm the ability

to manipulate and change the interconnected components (Hsuan et al., 2021). Changes in one component do not lead to changes in other components, however, it is allowed to have the components mixed and matched with each other which makes it also easier for companies to make quicker and easier changes in the components such as upgrades (Hsuan et al., 2021).

Making the components of software standardized such as generic and mass services/software, enables a prominent level of replicability since it would be easy to copy, minimizing low added value which is about the freedom of customers to customize the nature of the software (Jovanovic et al., 2019). Gremyr et al., (2019) point out that service modularity is similar to mass customization which improves the efficiency of the standardization of business offerings and thereby enables customization to a certain level. When there is the case of non-modular services, all solutions would be fully standardized or fully customized for each customer without any allowance to combine the service modules (Gremyr et al., 2019).

Dimensions that are identified as the process of modular software as a standardized product, which is relevant for the transformation process can be found in table 3.

<b>Dimensions</b>	<b>Delivering standardized software</b>
Business focus	Gaining market share
Requirements gathering	Gathered from whole market
Requirement's selection	Optimal selected subset of requirements
Marketing goals	Product, price, place, promotion (4P's), branding and differentiation
Software development philosophy	SCRUM agile development
Lifecycle	Several releases based on market requirements
Development teams	Product-focused, self-managed, involved in the entire development cycle
Stakeholder involvement	High internal, low external

**Table 3 Dimensions in the process of the transformation of modular software as a standardized product from a strategic point of view (Guvendiren et al., 2014)**

### **3.4 Servitization, Digitization, and Digital Servitization**

Servitization scholars have suggested to standardize and modularize services (Eloranta et al., 2021) to enhance the value propositions of service providers in general but also to reduce unclarity and ambiguity (Wirtz et al., 2021). This can overcome the complex challenges of communication, positioning, and differentiation of services which partly comes due to their intangible nature (Wirtz et al., 2021).

Servitization entails a transformation journey, which is rooted in the value-generating mechanisms whereby the adoption or increase in digital products by an organization enables

new ways of value creation (Gebauer et al., 2021). Servitization enables standardization and is about paying for the service, rather than buying the equipment itself (Wirtz et al., 2021). The Servitization process can be seen as the transition, where a company moves from providing pure stand-alone products and services to maintenance contracts and operational services (Kohtamäki et al., 2020), from a traditional business model where people are sold by hours, to providing maintenance contracts such as licenses and subscriptions and standard operational services (Guvendiren et al., 2014). This transformational process can bring strategic and competitive benefits when adopting this form of model innovation, which is possible for software (Frank et al., 2019). Therefore, the way of operating and creating value for customers changes for a business in a way to more refined solutions (Tronvoll et al., 2020).

The Servitization process is affected by digitalization (Eloranta et al., 2021) such as IoT in terms of monitoring, control, and optimization of remote locations (Kohtamäki et al., 2021). The combination of Servitization with Digitalization evolves the concept of Digital Servitization. Companies can start offering services without investing in digitalization or invest in digitalization without having a focus on services, but digitalization and servitization can be strongly interconnected with each other (Favoretto et al., 2022) and the convergence between the two can create a way to standardized and modularized software. Subsequently, Kohtamäki et al., (2020b), mentioned that servitization without digitalization can result and lead the business to negative returns and therefore the convergence of the two can reduce operating costs, for example by incorporating digital components and make them intelligent and connected (Favoretto et al., 2022). Favoretto et al., (2022) have described how digitalization affected traditional servitization and how this changes servitization. Nine dimensions were discovered based on content analysis, which was about: motivations; strategy; service offerings; structure; culture; resources and capabilities; processes; performance; and servitization ecosystems. Considering the many dimensions, Digitalization is working supportive of servitization.

### **3.4.1 Strategic Relevance of Digital Servitization**

The concept of Digital Servitization is emerging among researchers but also among companies in practice. Digital servitization and thereby the productization of services can provide a business with beneficial advantages which can address and overcome challenges and complexity of services (Wirtz et al., 2021) since services are hard to understand. Companies can gain long-term competitive advantage opportunities with digital servitization and therefore,



it can be an attractive consideration for a business to make this transition. However, it may also change firm processes and customer relationships (Kowalkowski et al., 2022). Digital servitization may influence the overall strategy of a company, for example, the strategy focus which is about differentiation, and the type of service strategy which is about the shape of the service strategy (Favoretto et al., 2022). However, the change of business model to digital servitization is a complex process where the environment, strategy of the business, and the structure of the environment are in interplay (Kohtamäki et al., 2021). The use of the digital servitization strategy is to create, deliver, and appropriate customer value, and thus strategies like these are used to create offerings for the customers with low-cost, differentiated and, hybrid value promises (Kohtamäki et al., 2021). The type of strategy depends on the type of service that is offered, thus having different software requires also other strategic approaches. Guvendiren et al., (2014) mentioned two types of software where customized software, which focused on a specific customer, is following a customer-oriented approach and standard software, which is focused on a specific problem, is following a market-oriented approach. Therefore, the shift toward tangible services comes with some challenges in the design phase and the delivering phase of a modular and scalable offering (Mustonen et al., 2019) because moving from the traditional business model where projects and people are sold by hours makes it hard to invest in longer-running market-driven products (Guvendiren et al., 2014). Reconsidering the strategy of a business and starting for instance selling licenses and subscriptions can create a more stable cash flow (Guvendiren et al., 2014).

### **3.5 Digital Servitization in the Transition to Modular Software as a Standardized Product**

According to Favoretto et al., (2022), Digital Servitization drives a business to generate more financial benefits, but also strategic and marketing benefits. Using the information and communication technologies (ICT) to understand customers' needs to improve the offerings of the business (Tronvoll et al., 2020). Digital servitization stimulates the offerings to be smarter and digitalized (Tronvoll et al., 2020). The convergence of the two can create new opportunities which are seen by practitioners as attractive and therefore, software vendors need to focus on organizational change and business model innovation to reach this convergence (Favoretto et al., 2022). Competitive advantage can be reached when the capabilities, which can be seen as specific competencies, are continuously adjusted in the strategies following the environment (Coreynen et al., 2020). Companies that are in active environments which are characterized by

rapid and impactful technological change are more oriented toward digital servitization, such as software vendors and other IT providers (Coreynen et al., 2020).

The type of strategy depends on the type of service that is offered and the type of industry. Digital servitization requires some changes in the working environment where the development of new specific competencies come along (Cimini et al., 2021). To successfully deal with the phenomenon of digital servitization, it is important to identify the core elements that are crucial to implementing by a business in this transition (Cimini et al., 2021). There are several business elements identified for the process of modular software as a standardized product, as can be seen in table 4. However, when looking at this transition, several elements are categorized as building blocks that can be settled in a framework. This results in the establishment of the preliminary Digital Servitization framework (See figure 6). The usefulness of a strategy partly depends on the business capabilities which are needed since these are useful means for implementation and since they enable a business to achieve its goals (Kreye & Jensen, 2014)

As can be seen in table 4, which is shown below, different authors mentioned different elements in literature that are seen as essential in the transition, which are categorized into 4 building blocks. These building blocks are settled in a preliminary framework. The preliminary Digital Servitization framework, which can be seen in figure 6, shows what elements are mentioned in literature as important, to look at for a business when developing a strategy for the transition where software is modularized as a standardized product.

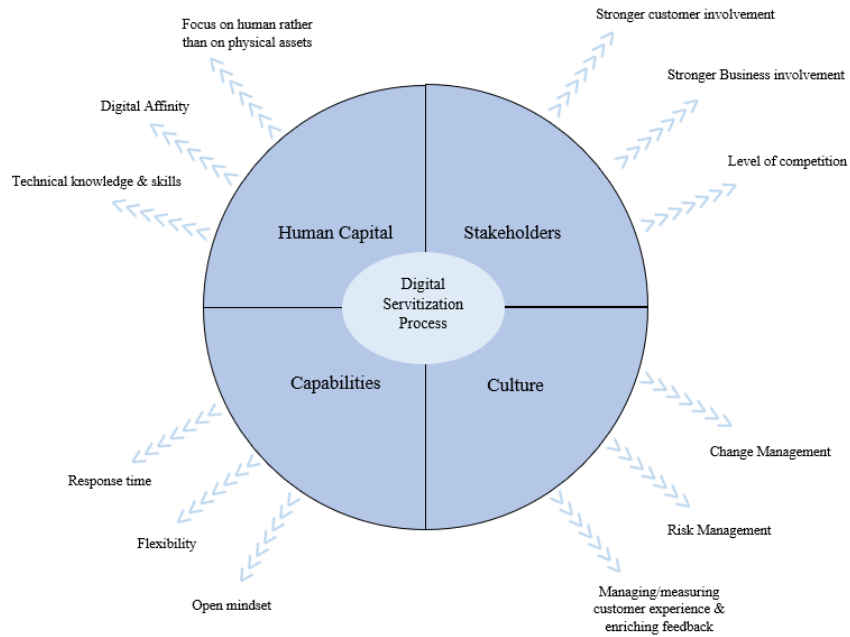
**Business elements mentioned in the literature**

<b>Authors</b>	Bustinza et al., (2018)	Cimini et al., (2021)	Favoretto et al., (2022)	Gebauer et al., (2017)	Harkonen et al., (2017)	Kohtamäki (2021)	Kreye & Jensen (2014)	Kryvinska & Bickel (2020)	Marcon et al. (2022)	Münch (2022)	Sklyar (2021)	Tronvoll et al., (2020)
<b>Business elements</b>												
<b>Capabilities</b>												
Response time	X		X				X	X				
Flexibility	X	X				X		X		X	X	
Open Mindset		X				X			X	X		X
<b>Culture</b>												
Change management	X		X			X	X		X	X		
Risk management	X			X	X					X		
Managing and measuring customer experience & enriching customer feedback			X				X		X	X	X	
<b>Stakeholders</b>												
Level of competition					X	X	X		X		X	
Stronger customer involvement			X	X	X		X	X	X	X	X	
Stronger business involvement			X	X				X	X	X	X	X
<b>Human Capital</b>												
Technical knowledge and personal skills		X				X	X	X			X	X
Focus on human capital rather than on physical assets		X	X						X			X
Digital affinity		X	X			X						X

**Table 4 Potential identifiers for the Digital Servitization framework**

### **3.6 Preliminary Digital Servitization Framework**

Different elements in the building blocks are presented which are mentioned in the literature by several authors. All the elements are categorized based on the interpretations by the researcher. However, the elements found in the literature can be seen as identifiers for the digital servitization process in the transition to modular software as a standardized product. As can be read earlier in this chapter, the productization of software can have beneficial advantages and therefore digital servitization can address complex challenges, stabilize risks, and therefore create more predictable costs and specific features for software vendors (Wirtz et al., 2021). These advantages can be seen as motivation drivers for the need toward this transition through digital servitization. The preliminary framework comprises building blocks that give an overview of the digital servitization process and what to address as a business when developing a strategy toward the transition of modular software as a standardized product. Looking at the elements found in theory, they are categorized into specific building blocks according to the interpretation of the researcher, the coherence between the elements, and the common mentioned elements. All the building blocks together in the Digital Servitization framework, are supportive of the process. All the building blocks in the framework contain at least two deeper elements rooted in the blocks. The elements are visible in the framework, behind the building blocks. The framework is in the first case temporary because there may be some adjustments made to the framework awaiting the results of the expert interviews. The chosen elements which are created in building blocks, had multiple mentions in literature by several authors. In figure 6, the visual representation of the preliminary Digital Servitization framework can be found.



**Figure 6 Preliminary Digital Servitization Framework**

All the building blocks together represent the digital servitization process to modular software as a standardized product. The included building blocks in the framework can serve as a foundation for developing a strategy toward the transition of modular software as a standardized product. The arrows in the framework pointing toward the elements, indicates the measured importance of the elements in the building blocks. Little is found in the literature about the priority per element, however, it might be that there is a priority ranking in elements, but this is also in anticipation of the results of the expert interviews.

### **Digital Servitization Process**

The building blocks which are visible in the framework, are, related to the literature, needed in the digital servitization process to modular software as a standardized product which can create new opportunities in the central process of software vendors. The building blocks for now according to literature are:

<p><b>Human Capital</b> – People with specific skills must be hired, and therefore this is brought under the building block of human capital which contains the elements of: Technical knowledge and skills, digital affinity, and having a focus on human capital rather than on physical assets.</p>	<p><b>Stakeholders</b> – Elements that are within the building block of stakeholders, are: Level of competition, and stronger business involvement, stronger customer involvement connected to the internal environment by means of influencers.</p>
<p><b>Capabilities</b> - Looking at the internal capabilities, the abilities to be capable which are needed for the transition toward modular software as a standardized product, are: Response time, flexibility, and an open mindset.</p>	<p><b>Culture</b> - Looking at the change toward modular software as a standardized product, culture has the following elements: Change management, risk management, managing, measuring customer experience, and enriching the customer feedback. The management of culture in this sense can be seen as a process of scaling the work culture in an organization.</p>

**Table 5 Building blocks in preliminary Digital Servitization framework**

A detailed description of all the here above-mentioned elements which are included in the building blocks can be found in appendix 3.

## 4.0 RESULTS

This chapter presents the findings derived according to the study design which is described in chapter 2. The purpose of the expert interviews was to validate the founded elements in the literature and to find additional opinions and justifications. This chapter presents the main findings of the semi-structured expert interviews, which are supported by quotes from the experts.

The semi-structured interviews with the experts were carried out in the period between the 24th of June till the 8th of July. Most of the interviews were carried out via Microsoft Teams because of time-consuming issues, however, two of the six interviews were on location. The experts were informed about the topic of the study in advance and have been able to look beforehand at the questions before the interview was executed. A more detailed description of the experts their functions, and the time and locations of the interviews, can be found in table 1.

### 4.1 Results Expert Interviews

Next to the theoretical findings which were discovered in the literature review, expert interviews were carried out to validate the business elements and to have a more concise understanding of their opinion of the building blocks with elements that could be included in the Digital Servitization framework. The main findings of the interviews are presented hereunder and divided according to; Relevance of the topic, individual opinions, opinions about the building blocks which were found in literature, and lacking building blocks.

#### *Opinion of experts about modular software as a standardized product*

Before diving into the content of the business elements mentioned, the development of the transition to modular software as a standardized product is recognized by the experts. On the question, if the experts could explain if they recognized the development of this transition to modular software as a standardized product, multiple experts indicated that they recognise this. One of the experts said that the change is seen at the *“Hyper Scalers which containerize the software where that discrete piece of software will be maintained separately so you can add new features more easily based on changes in the market”* and since there is *“a scarcity of people in the market, this transition can make it is easier to manage everything with fewer people”* (Dell Technologies). Another expert is recognizing the development of this transition

*‘for sure, especially if you look at the functionalities of products since this is more determined by software, which can change the whole organization’* (Capgemini).

In addition, eliminating the complexity of components of the software enables a business to *‘Sell more advanced modules to the customers because you get the time to make sure that the software never stands still since your employees have time to do other things’* (Capgemini). Looking at companies in the industry, the most successful ones have around *‘75 till 80 percent of their revenue coming from recurring revenue which allows you to continue to invest’* (TSS). Thereby, *‘You know beforehand what to expect’* (AFAS) which makes a business more predictable.

The experts acknowledge the need for SMEs to get more research on this topic since they also see the beneficial opportunities a business can get when making the transition to modular software as a standardized product. On the question of what the experts think of why a business wants to make this transition, various answers were given. The most frequently mentioned reasons are related according to people and finance. The business model now is where people are sold by hours, but it is increasingly harder to find people in this industry which is also recognized by the experts. Experts on behalf of AFAS, Capgemini, KPMG, and Dell Technologies all mentioned that it is hard to find people in this industry and therefore making the transition as a business to modular software as a standardized product, can be a solution for the scarcity of people. Looking at reasons according to finance, an expert mentioned that this transition enables a business to get *‘a more predictable revenue stream which gives a steady turnover and subsequently less risk because it’s got covered the costs with its monthly or yearly income’* (TSS). Having fewer people does not make it possible to have many custom-made projects and therefore standardizing offerings can boost the scalability because *‘A business only makes something once and after that it’s just copying it to the businesses who have the same problem’* (TSS) and making the offer *‘more general and standard, makes it more refined and understandable for customers’* (IBM), which allow companies to look for a business with the same problem and *‘Roll it out in those businesses, which gives a business very quickly new customers, that results in the end in; mass is cash’*(AFAS).



### ***Results of opinions of experts about business elements in general***

The transition of a business to modular software as a standardized product can bring in some changes in the way of operating which can result in organizational changes. To the question of what the opinions of the experts are about what elements are needed to look at when a business wants to make such a transition, multiple answers were given. To structure the answers which were given, the interviews were compared with each other, and this resulted in a random creation of the following categories of business elements: Finance, product, market, customer, and employees.

***Finance*** – Multiple experts mentioned finance as an essential element to look at when a business wants to make such a transition to modular software as a standardized product. Customers are needed for a business to survive, which means that it needs to have a product where customers want to pay for. Therefore, the experts mentioned that *‘It is needed to look at the Value-Based Pricing, how is the ratio of the price of the product compared to the value it has for the customer’* (TSS). This is supported by another expert who says to *‘Watch out for relating the price of the product to the value rather than cost’* (Capgemini). Another financial aspect is about the investments a business needs to do. This has to do with another way of making money. *‘A business has to rethink its business models and think about licenses and maintenance models’* (Dell Technologies) and if a business experience troubles in this transition with customers about the changing business model, an expert is saying about this that *‘Give a discount on consultation but not on the maintenance because that is where a business its new income comes from, that will come back for another five or ten years because that is the revenue line the business is steering on’* (TSS). Investments for the software are needed, KPMG believes saying that *‘A business needs more investments in the beginning but less in the end, if it roll the product out with minimal specificities per customer, the costs will be low’* and Capgemini adds to this that *‘A business needs to continually invest in its product to prevent that it becomes an ‘end of life’ product’*.

Unless investments, the experts in the field also mention that investments can be seen as an unfavourable factor for SMEs in this transition. This is related according to an expert since *‘SMEs don’t have the full knowledge and network they can fall back on like a big company’* (KPMG). It might be harder for start-ups to meet the investments because it needs to *‘Continually innovate’* (TSS) and therefore *‘Investments are needed in standardizing*

*software but that might be hard for start-ups because they are way smaller and don't have that much money''* (Cappemini). In addition, the experts mentioned to be aware that next to pre-finances such as investments, you need to have a buffer because *''The salaries of the business its employees still have to be paid out, so a business needs to have enough resources to pre-finance this''* (AFAS). Another expert reinforces this by saying that it can be possible that it takes a while before you make money; *''It can take a lot of time before a business can make money out of this because the product needs to meet many customers with satisfaction''* (IBM).

**Product** – A business who wants to make the transition to modular software as a standardized product, needs to know exactly what product it is selling and to whom; *''The vision of the company in combination with the product should be correct otherwise people will miss it and this can result in a loss of customers''* (AFAS). Therefore, a business needs to rethink the product it offers. It is not only about the product anymore, but it is more because; *''Software is quite boring in its basis, so your visions around the product are essential to attract new customers''* (AFAS), and in addition, it is needed to think about the essence of the product that is offered to the customers; *''Is it only a ''nice to have'' product or it is really a necessary solution for the customers?''* (TSS). This brings in a change in the organization because the way of operating will be different; *''Businesses will transform much more commercially and focuses on more visibility and attractiveness operations''* (IBM) which explains that nowadays it is not only the product that is sold. This is substantiated by another expert who is of opinion that *''If a business can have a solution product for the customer and it can put that solution at many other customer businesses, you can start running mass''* (AFAS).

**Market** – There are many other companies in the market and therefore an analysis of the market for a business its product and transformations can be helpful in this transition. The experts on behalf of TSS, IBM, and AFAS all mentioned that a business needs to look at its market share if there is a space in the market for the way the business becomes in operations and the product thereby offered. This will give insights into the market and also about the competitors. An expert of IBM says; *''A business wants to be more attractive and nicer than its competitor, so it is needed to have a more interesting offer, even if it is almost the same offer as its competitor.'''* This clarifies the importance of the vision that comes with the product, and that the product is not just a product. An analysis of the market can also give more insights for a business about the specializations in the market, which can have the advantage to specialize

in a market; *‘It is possible to stay generic as a business but when it chooses to specialize, it can become a very strong business which enables to really speak in the language with people that is close to the business’* (Capgemini). The expert of AFAS adds to this that *‘Focussing first on a specific branch in the market and if the business has really good knowledge later on of that branch and it becomes a success, only then look for new markets which the business can enter with little adjustments’*. It would also be possible to stay generic and decide to operate more globally instead of specializing, however, this is really up to the company. It is needed to analyse the market and the business world a business wants to enter because it cannot win without analysis. An expert of TSS is saying on this; *‘Competition of the Global Players is hard, and therefore a business needs to have a strategy on how to handle, manage and respond to that’*

**Customers** – The relationships with the customers might change when a business wants to make this transition because modular software as a standardized product is about the long-term focus. An expert of KPMG mentions that; *‘A good relationship with a business its customer is crucial, but you only get a good relationship when you spent much time onto it’*. This means that a business should make enough time for their customers whereby another expert is saying; *‘A business should have in any case a customer support point, or at least for customers a first contact point’* (TSS). Having such a point allows a business to spend more time in the customer to achieve a long-term relationship. Having such a department in the business also enables to focus specifically on customer-related cases such as decisions on whether to work with customers who want a specific solution and how satisfied the business can make them with delivering a standardized product. Therefore, a business needs to keep looking and measuring the satisfaction level of the customers, which can be realized for instance, according to the experts, by the customer support point. In addition, an expert mentioned also to have a contact point because; *‘The continually contact and the whole managing and making clear agreements with customers is super important’* (Capgemini), which emphasizes the essence of customer support. Although customers will pay the business a subscription every year or month where a business does not, except in the beginning, have to do much for, a customer support point also enables a business to what the expert of TSS is saying; *‘A business needs to look for that Wide in the Mote strategy, customers pay monthly but what can you as a business do more for the customers so that they will not leave in any case’* which emphasize also the need of the satisfaction of the customers.

Measuring and managing customers satisfaction is important, however, the experts in practice mention by experiences that it is sometimes hard to have the customer fully satisfied because; *‘Modular software as a standardized product, can never reach a 100% satisfaction level of a business its customer because of the standardization which means that the customers have to adopt the business solution and is maybe satisfied for 80%’* (TSS). In addition, a business has to think about the flexibility of the company because the expert of Dell Technologies is mentioning that the disadvantage is locked in customers’ needs; *‘If the business is too rigid and the market change, are you as a business still able to get adopted to that new reality and still satisfy the customers you have?’*. These are important aspects to think about how to manage and respond on this to the customers of a business; *‘Nothing is as changeable as a customer’* (Capgemini).

**Employees** – Not only is it important to keep customers happy and satisfied but also the employees are mentioned as crucial. An expert of TSS mentioned that; *‘The satisfaction of employees is at least as important as the satisfaction of customers; they are going to have very deep knowledge of customer processes which makes it important to continually invest in the talents within a business’*. Another expert complements this by saying; *‘Employees are the most essential element in a business, a business should always put her employees on number one and not its customer’* (AFAS). Delivering a standardized product also changes the way the employees work in the business; *‘It is possible for employees to do other work and activities in the company and to continue their own development, just by delivering standardized products’* (Capgemini). According to the experts, having more time for employees to work on their development, can increase satisfaction. A business product is important but the employees in the company have to be able to sell the product in the right way to the right customer. An expert of KPMG appointed that; *‘Employees must dispose of some kind of sales qualities so they can actively look at the processes of the customers and recommend them in the right way’*, however, looking at startup companies who not all have in the first place people with lots of experience, the expert of Capgemini point out that; *‘As a business, it does not only need money for financial investments but it also needs money for its employees to invest in their training, workshops, and studies’*. This emphasizes the essence of investing in employees, which is mentioned by several experts, so that they can build more skills and knowledge, not only about the product but also about dealing with customer-related aspects. It is experienced by the

experts that is it hard to find people in this industry which can make the essence to invest in employees, extra valuable.

***Results of opinions of experts about business elements which were found in the literature***

Showing the experts, the preliminary Digital Servitization framework did not evoke any surprising comments in the first sense. It all seems ‘*Logical*’ (KPMG; Dell Technologies). Looking more closely at the elements in the building blocks results in the following answers:

***Stakeholders*** – Stakeholders are according to the experts an essential element where to look at in developing a strategy. Multiple stakeholder groups are mentioned by several experts in the interviews. Especially customers and competitors were mentioned in all the interviews. As a business; ‘*Focus on customers because you want to keep them for 10 years or so, if a business loses them, it loses them for 10 years to the competitor*’ (TSS). Stronger customer involvement is, therefore, necessary because a business is getting deeper in the processes of its customers but before this, it needs to know its customer and that is according to the expert of Dell Technologies; ‘*Extremely important*’. Both are related to each other, looking at the competition, which is needed because a business should do something that is not easy to copy by competitors, however, the offer also has to be more interesting and attractive to buy for customers instead of buying at the competitors and therefore; ‘*A business has to fit enough customers with its product but it also has to be nicer than the competition*’ (IBM).

***Culture*** – The culture of the organization will change when making the transition to modular software as a standardized product which has to do with change management and a business has to think about its Unique Selling Points because it’s; ‘*Totally different compared to service providers, just think about the long-term focus instead of selling every hour of your consultancy*’ (TSS). Every layer in the organization can experience a change and therefore risk management is frequently mentioned by the experts and especially in terms of responsibility, internal and external, and financial risks related to investments and buffers. However according to the expert of IBM; ‘*The risks are greater when a business does not have a standardized product because the only risk in standardizing is about the time of implementation and not like does it fit or not, because a business knows this beforehand from the customer*’. But looking at the frequency of risk and change management, which is named by the experts, seems to be important. The expert of KPMG is seeing this change as an opportunity to enhance more social

standards in the culture and more inclusivity and diversity since; *‘The Tech World is now 70% males and 30% females, so try to find a balance as a business in this because it is scientifically proven that a balance can enhance the business activities which might distinguish you from the rest of the market’*. Managing this risk and change management is also included to measure the customer experience and enriching feedback since this is about the internal and external perspectives.

**Capabilities** – Open mindset, flexibility, and response time are mentioned in the expert interviews but were more related to other elements found in the literature. It depends on the type of business the company is in, and what it’s wanting to be as a business. The expert of TSS mentioned that; *‘Response time is for sure necessary, especially when the business is in the primary processes of the customer’* this relates that it depends on the market where a business is in, because not every company needs 24/7 ability for response and the expert of Capgemini support this by; *‘The response time partly depended on the market where a business is in, for a hospital it is more important than for a bakery and it depends on the appointments that are made between the parties’*. Flexibility is needed to look at but more in a way of how flexible the business is going to work, think about the Agile and Scrum working culture. *‘How flexible are you going to be that make send to take the burden off the customer’* (IBM), emphasizes the necessity to look at the core value of the company.

**Human Capital** – Multiple experts have emphasized the necessary need to look at human capital elements in the transition to modular software as a standardized product. Experts even mentioned; *‘All you are as a business is the knowledge of the employees’* (TSS) and; *‘Employees are the most important business element’* (AFAS) and; *‘Employees are very valuable people and without them, a business cannot do a thing’* (Capgemini) and; *‘Humans are a strength of a business, not a resource’* (KPMG) which all highlights the importance of human capital. It is a needed to have people who have digital affinity and technical skills, and knowledge, however, it is still needed to invest in your employees in terms of development. *‘A business has to make sure that its employees are satisfied, that there are good working conditions for them and that they can develop themselves’* (TSS). Such skills and knowledge are important because they must be able to stabilize the old software but also adopt the new digital innovations for customers, so they need to understand the processes of the customers which makes it so important.

### ***Results of opinions of experts about lacking business elements***

There is not a very big difference between the own opinions of the experts about the building blocks of business elements in general and the founded elements in literature. However, there were several elements named in the interviews that were not in the preliminary Digital Servitization framework. The similarities and differences between the elements and the adjustments made to the preliminary Digital Servitization framework will be explained in the next chapter.

The results of the expert interviews in this study show the individual opinions of the experts about potential business elements that can be categorized as building blocks for the Digital Servitization framework. The results from the expert interviews noticed that next to the founded elements in the literature, more elements are needed to be aware of when developing a strategy for the transition to modular software as a standardized product. Such elements are; Products, finance, market, and employees. Other elements that were found in the literature, were emphasized and validated by the experts such as; Human capital, culture, and stakeholders.

## 5.0 ANALYSIS OF THE RESULTS

Analysing the results of the data which was gathered in the literature and given by the expert interviews, a few similarities and differences were recognized. This resulted in a new combination of business elements and newly categorized building blocks. These building blocks together created the Digital Servitization framework, which finalizes the study.

### *Similarities*

What is noticed first, is that there is no business element more important than another. There was nothing identified in the literature about a certain priority of the business elements nor in practice. This is supported by the opinions of the experts in the interviews that one element cannot live without the other. All the business elements mentioned in the literature and in practice, are a coherent whole. This made it necessary to modify the preliminary Digital Servitization framework. What stands out in the analysis, is that both business elements; customers and employees are very important in the transition to modular software as a standardized product. Customers were acknowledged in the literature by several authors; Favoretto *et al.*, (2022); Gebauer *et al.*, (2017); Harkonen *et al.*, (2017); Kreye & Jensen (2014); Kryvinska & Bickel (2020); Marcon *et al.*, (2022); Münch *et al.*, (2022); Sklyar (2021); Tronvoll *et al.*, (2020), but it became even more emphasized after the analysis of the interviews how important customers are in terms of relations and support. Employees were also mentioned in the literature; Cimini *et al.*, (2021); Favoretto *et al.*, (2022); Marcon *et al.*, (2022); Tronvoll *et al.*, (2020), but less exaggerated than emerged in the interviews. According to the interviews, the employees are the most essential element of making this transition, you need them to be satisfied, developed, and skilled. Next to this, the competitors were also frequently mentioned in both the literature; Harkonen *et al.*, (2017); Kohtamäki (2021); Kreye & Jensen (2014); Marcon *et al.*, (2022); Sklyar (2021), and in practice. It is important to know in what market the business is, what other companies there are, and if there is even space for such a business. Therefore, analyse the market as a whole. The culture of the business was mentioned in literature; Bustinza *et al.*, (2018); Favoretto *et al.*, (2022); Gebauer *et al.*, (2017); Harkonen *et al.*, (2017); Kreye & Jensen (2014); Kryvinska & Bickel (2020); Marcon *et al.*, (2022); Münch *et al.*, (2022); Sklyar (2021); Tronvoll *et al.*, (2020), but even more in practice. A business needs to change its focus toward long-term relationships because it wants customers for more than 10 year. This asks for a new way of operating and communicating with customers and



employees. These similarities which are acknowledged in literature and in practice will come back as building blocks in the finalization of the Digital Servitization framework.

### *Differences*

The biggest difference identified between the literature and practice is certainly the financial element. Finance has been little mentioned in the literature by authors; *Harkonen et al., (2017)*; *Bustina et al., (2018)*. It was said by several authors that there could come financial advantageous benefits when having modular software as a standardized product through digital servitization, however, no specific financial aspects were mentioned. It was mentioned in the literature that changing from a business model where people are sold by hours, as in consultancy, to selling licenses and subscriptions could create a more stable cash flow because of the maintenance contracts (Guvendiren et al., 2014). However, after analysing the interviews with the experts, it became clear that the transition to modular software as a standardized product can indeed bring in financial benefits for the business, but on the other hand it can also bring in challenges, especially for start-ups. The most challenging financial aspects mentioned in practice are the investments and the buffer a business needs in the years it cannot yet cover its costs with only the maintenance contracts. The experts mentioned that it can take quite a while before a business starts to make money with this model. But the salaries of the employees still need to be paid so it needs to have a buffer in any kind of way, to overcome this period. It has been shown by the expert interviews how important the financial element is, and therefore this will be included in the framework as a new building block. Another element that was seen as a difference between the literature and practice, was the product itself. Because a business will be starting to deliver standardization does not mean that the product will sell itself. It is needed, according to the expert interviews, to do more than just deliver the product or the solution. It is about the vision around the product where a business can distinguish itself, within the market. In addition, a business has to think about how much the product will cover the process of the customer. This is also related to the agreements on response time and flexibility of the business which should be included in the contracts.

To conclude, initially there were find several business elements in the literature which are important when developing a strategy for making the transition to modular software as a standardized product. Those elements were categorized and included in building blocks as can be seen in the preliminary Digital Servitization Framework (figure 6). However, after

conducting and analysing the interviews, which resulted in some differences and similarities of the mentioned business elements in literature and practice, a combination of the elements resulted in newly created categories. These categories were created according to the interpretations of the researcher. This results in adjustments to the building blocks of the preliminary Digital Servitization framework which will be explained in the next paragraph. The form of the framework is changed as well for more clearness.

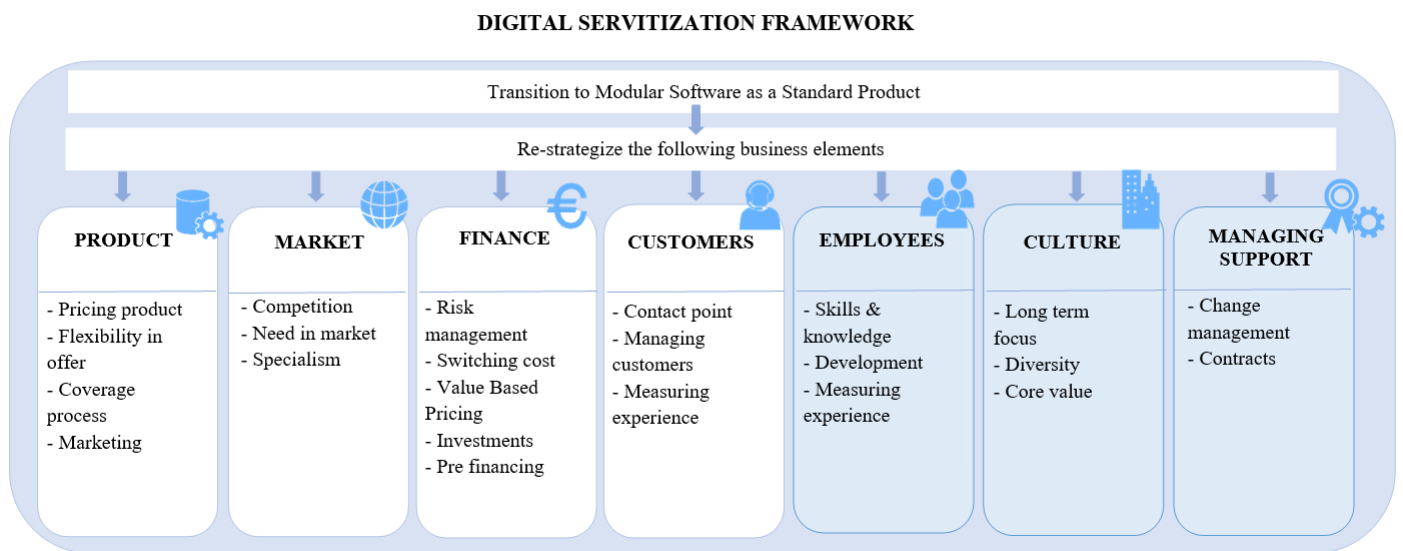
### **5.1 Digital Servitization Framework**

The results of this study which are presented in the previous paragraphs have resulted in adjustments to in the paragraph 3.6, figure 6 presented, preliminary Digital Servitization framework. Adjustments were needed according to the results of the interviews compared with the founded academic literature. The new building blocks in the adjusted framework are a combination of the individual opinions of the experts identifying what business elements are needed to look at for making this transition in general, and the individual opinions about the elements which were found as necessary in the literature. The business elements are categorized into seven different building blocks that a business can use as foundation in developing a strategy for the transition to modular software as a standardized product. As mentioned before, there is no evidence found that one element is more important than another, therefore, the chosen classification of the building blocks is based on the interpretation of the researcher. The classification is divided from external (left white building blocks) to internal (right blue building blocks). This is based on the interpretation of the researcher that first; analysis of the external environment is needed before a strategy can be successfully executed in the internal environment of an organization.

According to a combination of the literature, practice, and the interpretations of the researcher, the final Digital Servitization framework is presented in the next chapter, figure 7. The Digital Servitization framework comprises the building blocks; Product, Market, Finance, Customers, Employees, Culture, and Managing Support. A more detailed description of the building blocks can be found in appendix 5.

## 6.0 CONCLUSION

To conclude, this study has aimed to answer the research question: *“What building blocks comprise the Digital Servitization Framework that offers software vendors a foundation in developing a strategy for the transition to modular software as a standardized product?”*



**Figure 7 The Digital Servitization Framework**

It can be concluded that a business that wants to change its intangible service offer like software, toward a clearly defined product outcome, requires some organizational change since this can bring beneficial advantages. A business that wants to sell its software as a modular standardized product, can struggle with organizational change. Suggestions are made in theory by Servitization scholars to make the transition to modular software as a standardized product through Digital Servitization, which is about a transformational process of innovation change of business elements in the way of operating and value creation for the customers.

The systematic literature review of this study resulted in several business elements that are categorized into four preliminary building blocks that could be seen as necessary to look at as a business for developing a strategy in the transition to modular software as a standardized product. These were included in the preliminary Digital Servitization framework. The building blocks were divided into: Human Capital, Stakeholders, Culture, and Capabilities. These preliminary building blocks formed the basis of the structure of the interviews.

The semi-structured interviews with experts in the field of IT, resulted in even more business elements which were categorized into five building blocks. In general, it can be

concluded that there were no considerable variances in opinions about the necessary business elements drawn in literature by authors and opinions given in the expert interviews. However, there were a few differences identified between the elements and there were several, according to the experts, lacking elements that should be included in the framework. The similarities between the business elements which were identified in the literature and mentioned in practice were about the customers and employees. Next to this, culture and market elements were likewise mentioned in both analysis. The biggest difference between the literature and practice identified was the financial element. Finance is according to the experts in the field a very important element and is therefore created as a new building block for the final Digital Servitization framework. Comparing the data gained from the interviews and the literature, numerous adjustments to the Digital Servitization framework were needed because of the new combination of building blocks.

This new combination of building blocks resulted in the final Digital Servitization framework, which is also the answer to the main question of this study and therefore; the elements that are included in the Digital Servitization framework that offer software vendors a foundation in developing a strategy for the transition to modular software as a standardized product, are: Product, Market, Finance, Customers, Employees, Culture and Managing Support.

## **6.1 Validity and Reliability of the Study**

### *Validity*

It is essential to evaluate the quality of the study, especially if the findings might be utilized in practice (Noble & Smith, 2015). It is a challenge to show the quality and trustworthiness of the study and therefore it is needed to evaluate and continue the research process. Openness and transparency are very important in this evaluation (Al-Gunaid, 2019). According to the results, it can be said that the research is valid enough within the framework of this study. There were not plenty of articles in the literature, but most articles were very recent which makes them more valuable for this study. The thorough systematic literature review resulted in several business elements which could be used as coordinates for the semi-structured interviews.

Six expert interviews were carried out with experts who are already for many years in the field of IT and therefore also all recognized the development of this topic. These semi-structured interviews were recorded which allows future researchers to a repeated revisiting of the data to check other emerging themes (Noble & Smith, 2015). The interview questions were sent before conducting the interviews to the interviewees via email who agreed on

understanding the topic and validated the elements that were included in the preliminary Digital Servitization framework. The interviews were carried out at six different companies to get a high internal validity. However, it could be increased by adding even more companies or more people in the same companies to validate the shared understanding. Six different companies of varied sizes support the applicability of the results for other IT companies in the industry. The validity of the interviews could also be improved by sending the analysis of the results to the interviewed experts, and how they agree on the results. However, this was not possible due to time limitations.

### *Reliability*

The semi-structured interview questions used for this study followed a fixed list of interview questions where all the topics were discussed, in every interview. This increases the reliability of this study. All the interviews have been transcribed and coded in Word, as can be seen in appendix 6. However, it is possible to reproduce the results of the coding with Atlas.ti to increase the reliability of the results. In addition, the Digital Servitization framework in this study has not yet been applied by a business in practice and therefore, nothing can be said about the reliability of the framework.

## **6.2 Theoretical and Practical Contributions**

### *Theoretical*

This study contributes to the already existing literature by providing a complete, coherent, and deeper understanding of the concepts of productization, modularization, and Digital Servitization. Identifying potential business elements that together can be seen as the building blocks, enable the extension of the academic literature by providing insights about business elements that will change and which are important to look at for a business when developing a strategy to modular software as a standardized product. This knowledge can be seen as new literature on the elements and building blocks, that subsequently can be used as coordinates for empirical (future) research. In the end, it provides the literature with a theoretical framework that comprises building blocks that a business can use as a foundation in developing a strategy for the transition to modular software as a standardized product.

This Digital Servitization framework contributes to knowledge by delineating the construct (Jaakkola, 2020) of usable building blocks in a strategy to modular software as a standardized product.

### *Practical*

The practical contribution of this study is to provide managerial positions in software vendors with a clear overview of the Digital Servitization framework. This framework comprises building blocks that can be used as a foundation in developing a strategy for the transition to modular software as a standardized product. The deeper theoretical understanding of the concepts of productization, modularization, and Digital Servitization, clearly shows the need for more research on this topic and thus the literature used in this study provides recent knowledge and discussions about this topic to inform companies who are interested in this topic. Obtaining a universal understanding of these concepts is important to benefit in the end, from the advantages that comes with modular software as a standardized product.

Therefore, software vendors who are willing to make the transition to modular software as a standardized product, are provided with the Digital Servitization framework that comprises building blocks that can be used as a foundation in developing the strategy for such a transition. The Digital Servitization framework supports a business to think in a certain direction when it wants to make such a transition to modular software as a standardized product. But also, when a business wants more information about the potential changes in business elements for the organization.

### **6.3 Limitations and Future Study**

The reader should bear in mind that this study is based on specific articles in literature and interpretations from experts who are already working for a longer period of time in the industry. The following limitations can be defined for this study:

The first limitation of this study is the founded articles in the literature. There has not much research been carried out on this topic and therefore it was sometimes quite hard to get a clear and complete view of the topic. Thereby, only one database was used for searching for relevant articles which could be a limitation to the founded articles.

The second limitation of this study is the number and selection of expert interviews. Six expert interviews were carried out and all the experts from different companies had good knowledge about the topic and their different interpretations gave a clear view of which business elements are important to be aware of for a business, the selection of the experts could give some selection bias. It would be more valuable to have even more experts interviewed from more different companies such as Microsoft, who already made this transition. In addition,

it would also be valuable to have more experts interviewed by the same company to see if there is a match of similarity in the answers given.

The above-written limitations are the results of the recommendations for future studies. The first recommendation for a future study would be to pick one of the building blocks in the Digital Servitization framework and to do deeper research on this. It would be interesting to see if there could be more or other dimensions of elements added to the framework, or to see if there are other classifications regarding the internal and external building blocks. Additionally, focussing on one building block enables a deeper understanding, instead of globally, of the elements in the building blocks. Another recommendation would be to do this study over through a quantitative design. This enables the researcher to see many more perspectives of a larger number of people about the business elements where to look at and could be a valuable supplement to this study, which also increases its validity. The overall recommendation would be to spend more time on the general concepts of service productization since not much research has been carried out on this topic. In addition, it could be interesting to study the degree of the essence of the digital servitization in this transition, since this is more like a grey area in literature because no one knows yet exactly what the best way is to make this transition.

## References

- Adusei, A. G., Härkönen, J., & Mustonen, E. (2021). Productization and Product Structure: Extending The Perspective to Software Business. *International Journal of Business and Administrative Studies*, 7(2). <https://doi.org/10.20469/ijbas.7.10004-2>
- Al-Gunaid, M. (2019). *Productization of Construction Consultancy Services Productization of Construction Consultancy Services*.
- Aspers, P., & Corte, U. (2019). What is Qualitative in Qualitative Research. *Qualitative Sociology*, 42(2), 139–160. <https://doi.org/10.1007/s11133-019-9413-7>
- Aziz Yusof, A., & Ali, J. (2000). *Managing culture in organization*.
- Chen, Y., Visnjic, I., Parida, V., & Zhang, Z. (2021). On the road to digital servitization – The (dis)continuous interplay between business model and digital technology. *International Journal of Operations and Production Management*, 41(5), 694–722. <https://doi.org/10.1108/IJOPM-08-2020-0544>
- Coreynen, W., Matthyssens, P., Vanderstraeten, J., & van Witteloostuijn, A. (2020). *Unravelling the internal and external drivers of digital servitization: A dynamic capabilities and contingency perspective on firm strategy*.
- Damanpour, F. (2017). Organizational Innovation. In *Oxford Research Encyclopedia of Business and Management*. Oxford University Press. <https://doi.org/10.1093/acrefore/9780190224851.013.19>
- Elia V, Gnoni MG, & Tornese F. (2019). *Exploring the benefits of productization in public services utilities*.
- Eloranta, V., Ardolino, M., & Saccani, N. (2021). A complexity management approach to servitization: the role of digital platforms. *International Journal of Operations and Production Management*, 41(5), 622–644. <https://doi.org/10.1108/IJOPM-08-2020-0582>
- Favoretto, C., Mendes, G. H. S., Oliveira, M. G., Cauchick-Miguel, P. A., & Coreynen, W. (2022). From servitization to digital servitization: How digitalization transforms companies' transition toward services. *Industrial Marketing Management*, 102, 104–121. <https://doi.org/10.1016/J.INDMARMAN.2022.01.003>
- Frank, A. G., Mendes, G. H. S., Ayala, N. F., & Ghezzi, A. (2019). Servitization and Industry 4.0 convergence in the digital transformation of product firms: A business model innovation perspective. *Technological Forecasting and Social Change*, 141, 341–351. <https://doi.org/10.1016/J.TECHFORE.2019.01.014>
- Gebauer, H., Paiola, M., Saccani, N., & Rapaccini, M. (2021). Digital servitization: Crossing the perspectives of digitization and servitization. *Industrial Marketing Management*, 93, 382–388. <https://doi.org/10.1016/J.INDMARMAN.2020.05.011>
- Greeven, C. S., Williams, S. P., Majanoja, A.-M., Linko, L., Leppänen, V., Kobus, J., Westner, M., Strahringer, S., Parviainen, P., Tihinen, M., Kääriäinen, J., & Teppola, S. (2017).



*Tackling the digitalization challenge: how to benefit from digitalization in practice.*  
www.sciencesphere.org/ijispm

- Gremyr, I., Valtakoski, A., & Witell, L. (2019). Two routes of service modularization: advancing standardization and customization. *Journal of Services Marketing*, 33(1), 73–87. <https://doi.org/10.1108/JSM-10-2018-0285>
- Grönroos, C. (2020). Viewpoint: service marketing research priorities. *Journal of Services Marketing*, 34(3), 291–298. <https://doi.org/10.1108/JSM-08-2019-0306>
- Guvendiren, K., Brinkkemper, S., & Jansen, S. (2014). Productization of an IT Service Firm. In *LNBIP* (Vol. 182).
- Harkonen, J. (2021). Exploring the benefits of service productisation: support for business processes. *Business Process Management Journal*, 27(8), 85–105. <https://doi.org/10.1108/BPMJ-01-2021-0056>
- Hsuan, J., Jovanovic, M., & Clemente, D. H. (2021). Exploring digital servitization trajectories within product–service–software space. *International Journal of Operations and Production Management*, 41(5), 598–621. <https://doi.org/10.1108/IJOPM-08-2020-0525>
- Jaakkola, E. (2020). Designing conceptual articles: four approaches. *AMS Review*, 10(1–2), 18–26. <https://doi.org/10.1007/s13162-020-00161-0>
- Jovanovic, M., Raja, J. Z., Visnjic, I., & Wiengarten, F. (2019). Paths to service capability development for servitization: Examining an internal service ecosystem. *Journal of Business Research*, 104, 472–485. <https://doi.org/10.1016/j.jbusres.2019.05.015>
- Kohtamäki, M., Parida, V., Patel, C. P., & Gebauer, H. (2020a). *the relationship between digitalization and servitization*.
- Kohtamäki, M., Parida, V., Patel, P. C., & Gebauer, H. (2020b). The relationship between digitalization and servitization: The role of servitization in capturing the financial potential of digitalization. *Technological Forecasting and Social Change*, 151, 119804. <https://doi.org/10.1016/J.TECHFORE.2019.119804>
- Kohtamäki, M., Rabetino, R., Einola, S., Parida, V., & Patel, P. (2021). Unfolding the digital servitization path from products to product-service-software systems: Practicing change through intentional narratives. *Journal of Business Research*, 137, 379–392. <https://doi.org/10.1016/j.jbusres.2021.08.027>
- Kowalkowski, C., Sklyar, A., Tronvoll, B., & Sörhammar, D. (2022). *Digital servitization: How data-driven services drive transformation*. <https://hdl.handle.net/10125/79487>
- Kreye, M. ;, & Jensen, P. L. (2014). *Key variables of organisation design in servitization*. APA.
- Lanka, E., Lanka, S., Rostron, A., & Singh, P. (2021). Why We Need Qualitative Research in Management Studies. *Revista de Administração Contemporânea*, 25(2). <https://doi.org/10.1590/1982-7849rac2021200297.en>
- Mahat-Shamir, M., Neimeyer, R. A., & Pitcho-Prelorentzos, S. (2021). Designing in-depth semi-structured interviews for revealing meaning reconstruction after loss. *Death Studies*, 45(2), 83–90. <https://doi.org/10.1080/07481187.2019.1617388>

- Mustonen, E., Harkonen, J., & Haapasalo, H. (2019). *From Product to Service Business: Productization of Product-Oriented, Use-Oriented, and Result-Oriented Business*. IEEE.
- Noble, H., & Smith, J. (2015). Issues of validity and reliability in qualitative research. In *Evidence-Based Nursing* (Vol. 18, Issue 2, pp. 34–35). BMJ Publishing Group. <https://doi.org/10.1136/eb-2015-102054>
- Øverby, H., & Audestad, J. A. (2021). *Classroom Companion: Business Introduction to Digital Economics*. <http://www.springer.com/series/16374>
- Peng, G., & Mu, J. (2018). *International Journal of Production Research Do modular products lead to modular organisations? Evidence from open source software development Do modular products lead to modular organisations? Evidence from open source software development*. <https://doi.org/10.1080/00207543.2018.1492753>
- Salminen, J. (2014). *Digital services: How are they different?* <https://www.researchgate.net/publication/314134187>
- Shivendu, S., & Zhang, R. (2019). *The Impact of Digitization on Content Markets: Prices, Profit, and Social Welfare*.
- Simula, H., Lehtimäki, T., & Salo, J. (2014). *Re-thinking the product: from innovative technology to productized offering Cleantech Solutions-Co-creating Environmental Solutions with Lead Customers View project Re-thinking the product-from innovative technology to productized offering*. <https://www.researchgate.net/publication/228344311>
- Soukkala, L. (2020). *Service Productization-Business Plan for a Graphic Design Service*.
- Story, D. A., & Tait, A. R. (2019). *Survey Research*.
- Suominen, A., Kantola, J., & Tuominen, A. (2009). *Reviewing and Defining Productization Evolute approach View project Patent knowledge analysis View project Reviewing and Defining Productization*. <https://www.researchgate.net/publication/236326445>
- Toivonen, U. (2018). *OULU BUSINESS SCHOOL PRODUCT PORTFOLIO MANAGEMENT IN THE CONTEXT OF LARGE SOFTWARE SYSTEMS*.
- Tronvoll, B., Sklyar, A., Sörhammar, D., & Kowalkowski, C. (2020). Transformational shifts through digital servitization. *Industrial Marketing Management*, 89, 293–305. <https://doi.org/10.1016/J.INDMARMAN.2020.02.005>
- Ulrich, K., Ellison, D., Gillett, F., Pine, J., Stoll, R., & Tatikonda, M. (1994). FUNDAMENTALS OF PRODUCT MODULARITY. In *ASME DE* (Vol. 39).
- van de Weerd, I., & Brinkkemper, S. (2013). *Productization: The process of transforming from customer-specific software development to product software development The Software Product Management Workbench View project Architecture Enterprise View project*. [www.cs.uu.nl](http://www.cs.uu.nl)
- Wali, A., Author Wali, D., & Akpınar, S. (2018). *Productization of customer specific software in an IT company School of business Master's Degree Programme in International Business Management Productization of customer specific software in an IT company*

*Degree programme Master's Degree Programme in International Business Management  
Chief Digitalization and Information Officer in Case company.*

Wilma, D., & Schrotenboer, D. (2019). *12 th IBA Bachelor Thesis Conference.*

Wirtz, J. (2020). Viewpoint: Service products, development of service knowledge and our community's target audience. *Journal of Services Marketing*, 35(3), 265–270. <https://doi.org/10.1108/JSM-03-2020-0086>

Wirtz, J., Fritze, M. P., Jaakkola, E., Gelbrich, K., & Hartley, N. (2021). Service products and productization. *Journal of Business Research*, 137, 411–421. <https://doi.org/10.1016/j.jbusres.2021.08.033>

Yrjönkoski, K. (2019). *Software Business: A Short History and Trends for the Future* . <http://ceur-ws.org>,

## Appendix 1: Articles used for Literature Review

Topic	Authors
<b>(Digital) Products, services, software, productization, standardization</b>	<ol style="list-style-type: none"> <li>1. (Wirtz et al., 2021) Service products and productization</li> <li>2. (Al-Gunaid, 2019) Productization of consultancy services</li> <li>3. (Toivonen, 2018) Product portfolio management</li> <li>4. (Adusei et al., 2021) Productization and product structure</li> <li>5. (Øverby &amp; Audestad, 2021) Business introduction to digital economics</li> <li>6. (Greeven et al., 2017) Tackling the digitalization challenge</li> <li>7. (Simula et al., 2014) Re-thinking the product</li> <li>8. (Gebauer, 2021) Crossing perspectives of digitization and servitization</li> <li>9. (Gremyr, 2019) Advancing standardization and customization</li> <li>10. (Grönroos, 2020) Service marketing research priorities</li> <li>11. (Elia et al., 2019) Exploring benefits of productization</li> <li>12. (Soukkala, 2020) Service productization business</li> <li>13. (Salminen, 2014) Digital services: How are they different?</li> </ol>
<b>Servitization, digitalization, Digital Servitization</b>	<ol style="list-style-type: none"> <li>14. (Gebauer, 2021) Crossing perspectives of digitization and servitization</li> <li>15. (Kohtamäki, 2019) Digital Servitization models in ecosystems</li> <li>16. (Paschou, 2020) Digital Servitization in Manufacturing</li> <li>17. (Coreyen, 2020) Drivers of Digital Servitization</li> <li>18. (Kohtamäki, 2020) Exploring servitization</li> <li>19. (Lexutt, 2020) Different roads to servitization success</li> <li>20. (Hsuan, 2021) Exploring Digital Servitization trajectories</li> <li>21. (Toth, 2022) Tensions in Digital Servitization</li> <li>22. (Eloranta et al., 2021) Complexity management approach to servitization</li> <li>23. (Kohtamäki, 2020) Relationship between digitalization and servitization</li> <li>24. (Favoretto, 2022) From servitization to Digital Servitization</li> <li>25. (Kharlamov &amp; Parry, 2021) Impact of servitization and digitization on profitability of the firm</li> <li>26. (Sklyar, 2021) Digital Servitization, organizing the firm</li> </ol>
<b>Software standardization, modular software design</b>	<ol style="list-style-type: none"> <li>27. (Gremyr, 2019) Two routes of service modularization</li> <li>28. (Velásquez Villagrán, 2019) Standardization: A key factor of industry 4.0</li> <li>29. (Adusei, 2021) Productization and Product Structure: Extending the perspective to Software Business</li> <li>30. (Ulrich, 1994) Fundamentals of product modularity</li> <li>31. (Guvendiren, 2014) Productization of an IT firm</li> </ol>

	<p>32. (Balint, 2017) Value of packaged software customization</p> <p>33. (Harkonen, 2021) Exploring benefits of service productization</p>
<b>Strategy, transition, transformation</b>	<p>34. (Tronvoll, 2020) Transformational shift through Digital Servitization</p> <p>35. (Kowalkowski, 2022) Digital Servitization: Data driven services drives transformation</p> <p>36. (Favoretto, 2022) How digitalization transforms company transition toward services</p> <p>37. (Struyf, 2021) Toward a multilevel perspective on Digital Servitization</p> <p>38. (Mustonen, 2019) From Product to Service Business</p> <p>39. (Soukkala, 2020) Business plan for Service Productization</p> <p>40. (Kim, 2021) Digital transformation types for product service systems</p> <p>41. (Kohtamäki, 2021) Unfolding the Digital Servitization path</p> <p>42. (Guvendiren, 2014) Productization of an IT service firm</p> <p>43. (Coreynen, 2020) Internal and external drivers of Digital Servitization</p> <p>44. (Cimini, 2021) Digital Servitization competence development</p> <p>45. (Kreye &amp; Jensen, 2014) Key variables of organisation design</p> <p>46. (Münch, 2022) Capabilities of Digital Servitization</p> <p>47. (Bustinza, 2018) Organizational change framework</p> <p>48. (Marcon et al., 2022) Capabilities supporting Digital Servitization</p> <p>49. (Kryvinska &amp; Bickel, 2020) IT enterprises servitization</p>

## Appendix 2: Expert Interview Questions English and Dutch

### ENGLISH

#### 1. General information

- What is your function within the company?
- What is the size of your company, as in how many employees?
- For how many years are you active in the IT/ICT/software industry?

*(explanation from researcher about the development of this transition toward productization of software).*

#### 2. Experts' opinion about productization of software

- Can you explain if you recognize the development of this transition toward the productization of software?
- Can you think of any examples of successes/failures?
- What is your opinion about why software vendors aim to make this transition?
- What are in your opinion the business elements/units where to look at when a business wants to make this transition?
- Can you explain what you think are the advantages/disadvantages of these elements?

*(explanation from researcher about Servitization scholars who suggests in literature to making this transition through Digital Servitization)*

*(researcher shows preliminary framework to interviewee)*

#### 3. Digital Servitization Framework

- What is your opinion about a Digital Servitization framework as guidance in developing a strategy to this transition?
- Can you explain how you perceive the following elements as necessary for a business who wants to make the transition to software as a standardized product...?

##### I. Culture

- Change management
- Risk management
- Managing customer experience and enhance customer feedback

##### II. Human Capital

- Technical knowledge and skills
- Digital affinity
- Focus on human rather than on physical assets

##### III. Capabilities

- Response time
- Flexibility
- Open mindset

##### IV. Stakeholders

- Level of competition
- A stronger business involvement
- A stronger customer involvement

#### **4. Lacking elements/units**

- Now, after having knowledge of the Digital Servitization framework, do you think any adjustments are needed to the elements/units?
- Can you explain if the framework is complete?

DUTCH

#### **1. Algemene informatie**

- Wat is uw functie binnen het bedrijf?
- Wat is de omvang van uw bedrijf, met hoeveel werknemers?
- Hoeveel jaar bent u actief in de IT/ICT/software industrie?

*(Uitleg van de onderzoeker over de ontwikkeling van deze overgang naar productisering van software).*

#### **2. De mening van deskundigen over het productiseren van software**

- Kunt u uitleggen of u de ontwikkeling van deze transitie naar het productiseren van software herkent?
- Kunt u voorbeelden bedenken van successen/ mislukkingen?
- Waarom denkt u dat bedrijven deze transitie willen maken?
- Wat zijn volgens u de bedrijfsselementen/eenheden waarnaar gekeken moet worden als een bedrijf deze transitie wil maken?
- Kunt u uitleggen wat volgens u de voor-/nadelen van de door uw genoemde elementen zijn?

*(Uitleg van onderzoeker over Servitization geleerden die in de literatuur suggereren om deze transitie te maken via Digital Servitization)*

*(Onderzoeker toont voorlopig kader aan ondervraagde)*

#### **3. Digitaal Servitization Framework**

- Wat is uw mening over een Digital Servitization framework als leidraad bij het ontwikkelen van een strategie naar deze transitie?
- Kunt u uitleggen hoe u de volgende elementen als noodzakelijk ziet voor een bedrijf dat de overgang wil maken naar software als een gestandaardiseerd product...?

##### **I. Cultuur**

- Veranderingsmanagement
- Risicobeheer
- Beheer van klantenervaring en verbetering van klantenfeedback

##### **II. (Menselijk) kapitaal**

- Technische kennis en vaardigheden
- Digitale affiniteit
- Focus op menselijke in plaats van op fysieke activa

### **III. Capaciteiten**

- Responstijd
- Flexibiliteit
- Open instelling

### **IV. Stakeholders**

- Niveau van concurrentie
- Een sterkere betrokkenheid van het bedrijfsleven
- Een sterkere betrokkenheid van de klant

#### **4. Ontbrekende elementen/eenheden**

- Nu, na kennis te hebben genomen van het Digital Servitization framework, denkt u dat er aanpassingen nodig zijn aan de elementen/eenheden?
- Kunt u uitleggen of het framework compleet is



### Appendix 3: Description of the Productization Process

1. **Independent projects** are about a description of the situation within the organization which provides solutions per customer on project basis and contains barely any standard features or functions. The projects in this stage vary from each other in budgets, technology and functionality.
2. **Reuse across projects** is about the ability to reuse the already existing components and functionalities across project. The main advantage of this stage is that it increases the overall quality software and thereby also increases the reliability since they have been tested for several times in previous projects. However, standardization is still limited in this stage and custom features are still greater here.
3. **Product recognition** is about the description of the situation within the organization where similarities of customers' wishes are identified which can lead to a potential identification of a certain product scope. Compared to the second stage, here the standardized parts are larger than the customized parts due to the way of reusing the existing functionalities, components and features. A Business can use the product recognition stage of the process also to make decisions on how to identify more on a product to become a market-driven business.
4. **Product basis** is about identifying the market requirements to determine the features and content of future releases. When a business takes the decision in stage three to identify more on a product, means the start of developing a long-term plan for the product as a set of features that can be efficiently customized, developed and produced.
5. **Standardized product platform**, the product where has been made the decision on to identify deeper and the long-term plan for this which was described in the previous two stages, has now been brought to the market through the product platform. The definition of this stage is as follows: *“increasing the set of features that form a common structure and introduce releases, from which still a stream of derivative products can be efficiently customized, developed and produced”* (p.p. 6).
6. **Customizable product – standardized product** can be chosen between the customizable product or standardized product. Customized is offered to specific customers and hereby the level of variability determines the applicability in the market and on the other hand, the standardized product is about the software as a one-size-fits-all solution.

## **Appendix 4: Description of the Preliminary Digital Servitization Building Blocks**

**1. CULTURE** – The process of scaling the work culture in an organization.

- Change management: Creating a horizontal organization structure to be able to respond quick to changes and pressures from the environment.
- Risk management: Change in structures can redistribute the risk in new partnerships and customer risks in terms of utilization and failures.
- Managing, measuring customer experience, and enriching customer feedback: Delivering of digital solutions like modularized software as standard product change the process of customer interaction and touch points thus managing and measuring can be crucial.

**2. CAPABILITIES** – The power of ability to do something.

- Response time: Ability to respond in a timely manner where speed is critical of agility and needed for change management in continually changing environments.
- Flexibility: Being flexible during changes to sustain value which can is related with response time since this is then needed.
- Open mindset: Prevent the lack of service-oriented mindset by achieving internal support to create commitment that a new business mode is not something negative but something different which opens new ways.

**3. HUMAN CAPITAL** – Value of a worker's experience and skills.

- Technical knowledge and skills: Can be perceived by others as a threat but technical knowledge and skills are needed to recombine data where to create competitive advantage with.
- Digital affinity: Internal orientation to data and relevant digital technologies.
- Focus on human capital rather than on physical assets: To start with the success on selling the physical assets/ modularized software, human capital is important for this so focus on human capital rather on physical assets in first phase.

**4. STAKEHOLDERS** – Parties that affect or can be affected by business.

- Level of competition: Competition for the same customer relationships.
- Stronger business involvement: Create more collaborative relational and network contacts with other companies to overcome barriers such as absence of trust and to prevent those companies' become competitors.
- Stronger customer involvement: Standardization changes and increases the importance of customers. Thus focus on the relational capital, more interactions between customers and providers are needed.

## **Appendix 5: Description of the Final Digital Servitization Building Blocks**

### **1. MARKET**

- Competition: Competition with other companies who strive for the same product and customer relationships.
- Need in market: Is there need in the market for your product in terms of, is it just a nice to have or is it really a solution.
- Specialism: Decide on whether focusing on a specific market. Look what specific markets there are.

### **2. FINANCE**

- Risk management: Finance related risks such as is there enough investment money, is there a buffer to overcome the period before you can cover the costs with recurring revenue.
- Switching cost: The costs for the customers when its wants to switch to another business. It is recommended to be high.
- Value Based Pricing: Decide on the ratio of the price of the product to the value it has for the customer.
- Investments: Expenditure of a business into several elements such as, processes, automation and people.
- Pre financing: Is there enough buffer to pay the salaries of people in the business.

### **3. CUSTOMERS**

- Contact point: Customer relationships will change so have a central point in the business that customers can contact.
- Managing customers: Monitor the customer and spend more time with the customer to achieve long-term relationships. See what you can do more for the customer so they will not leave in any case.
- Measuring experience: It is wanted to achieve long term relationships and therefore important to measure the experience of customers how satisfied they are.

### **4. CULTURE**

- Long term focus: Emphasize and value more on endurance, dedication and adaptability.
- Diversity: See the change as a chance to add more diversity in the business which can be the strength.
- Core Value: Decide who the business wants to be. The highest priority in the business that represents the organization.

### **5. MANAGING SUPPORT**

- Change management: Creating a horizontal organization structure to be able to respond quick to changes and pressures from the environment.

- Contracts: Making clear agreements with your customers about the moments of contact, in terms of responsibility.

## **6. EMPLOYEES**

- Skills & Knowledge: Recombine (technical), (sales) skills and knowledge where to create competitive advantage with.
- Development: Keep investing in employee's workshops, trainings and studies so they stay up to date from the market, have a better understanding about how to manage processes and customers and contributes to satisfaction.
- Measuring experience: Keep measuring the experience of your employees because they are the ones that have deep knowledge of the processes, and a business is what its employees are and therefore measure the satisfaction.

## **7. PRODUCT**

- Pricing product: What more will there be added to the product. Decide whether customers just pay for the product and that is it or does the business wants to give an extra.
- Flexibility in offer: Decide on how flexible the product will be if you still want to manage customers with specific solutions, or will it only be standard.
- Coverage process: Decide whether the product will cover the entire primary processes of a customer or is it just a small piece of the process.
- Marketing: The vision around the product should be correct and attractive.

## Appendix 6: Code Scheme

### Summary of the coding scheme

Question	Open coding	Axial coding	Selective coding
<b>Section 1</b>	1. Executive title in operation and activities in function	Job function in company	Position in Company
	2. People working in the company	Number of employees	Total company size
	3. Experience in field of IT	Number of years working in industry	Operating in ICT industry
<b>Section 2</b>	1. Recognition of transition	Development of transition to standardizing software	Popularity of the topic
	2. Stories of successes identified in practice by experts  Stories of challenges identified in practice by experts	Successes in transition to productization of software  Challenges in transition to productization of software	Perceived opportunities and challenges in transition
	3. Opinions of experts about opportunities and difficulties in way of operating	Needs and wants from a business to make the transition to software as standardized product	Motives to make the transition to productization of software
	4. Identifiers that are related to finance  Identifiers that are related to the product  Identifiers that are related to the market  Identifiers that are related to the customer  Identifiers that are related to the employees  Clarification of experts about the way of operating the business	Business elements where to look at when making this transition	Analysis of experts about business elements
	5. Favorable interests for making the transition  Unfavorable interests for making the transition	Opportunities  Threats	Analysis of advantages and disadvantages related to the transition

<b>Section 3</b>	<ol style="list-style-type: none"> <li>1. Opinion of experts about framework use in the transition</li> <li>2. Opinion of experts about stakeholder elements found in literature</li> </ol> <p>Opinion of experts about culture elements found in literature</p> <p>Opinion of experts about capabilities elements found in literature</p> <p>Opinion of experts about Human Capital elements found in literature</p>	<p>Essence of framework in the transition</p> <p>Stakeholder related elements</p> <p>Culture related elements</p> <p>Capabilities related elements</p> <p>Human Capital related elements</p>	<p>Framework for developing a strategy</p> <p>Pre found business elements in literature for digital Servitization framework</p>
<b>Section 4</b>	<ol style="list-style-type: none"> <li>1. Opinion of experts about adjustments to elements after seeing the framework</li> <li>2. Opinion of experts about elements to make framework complete</li> </ol>	<p>Readjustments of the existing elements in framework</p> <p>Accurateness of elements</p>	<p>Adjustments to the framework</p> <p>Analysis of framework completeness</p>