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A Conceptual Cooperative Model Designed for Business Processes, Digitalisation and Innovation

A model to develop and improve by visualising and prioritising opportunities of digitalisation with an external innovation partner

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ABSTRACT

Key words: Digitalisation, Innovation, Process Management

Digital transformations are changing society and they force industries to respond to demands more frequently. Managers are aware of new technical demands, which increase the pressure of meeting those demands. To meet technical demands, radical innovations are one way to stay competitive. However, it is more complex to make them a part of the business.

This research is based on a M.Sc. thesis project conducted at Propia AB, which is a process management consultancy firm in Norrköping, Sweden. The goal of the study was to develop a well-defined framework for small and medium enterprises to use for digital transformation of business processes that provide structure to understand the possibilities of digitalisation and how/which business processes should be prioritised. The framework should also create prerequisites for an external innovation partner to develop digital solutions for business processes.

The study was performed together with a case company and with an innovation partner. The research had an abductive approach where both deduction and induction where used to study the empirical findings and formulate new theories in relation to recognized theories. Qualitative methods have been used in the empirical study due to their flexibility and the fact that the focus of the information gathering was to create a context.

The analysis indicated that a certain level of process maturity could be related to a certain innovation level and a certain level of digital change. According to a process maturity model, an adaptable process could respond to changes in customer demands better, which can be related to changes in the business domain and the society. The research resulted in a Conceptual Cooperative Model based on the three domains of frameworks. The model has been validated using design reviews with the case company, consultancy firm and together with an innovation partner. The model will be a practical template for SMEs to follow when digitalising business processes in order to fulfil future customer expectations and needs.

SAMMANFATTNING

Digitala transformationer förändrar samhället och påtvingar organisationer att agera mot förändringar i efterfrågan i en snabbare takt. Företagsledare är väl medvetna om dessa förändringar, vilket också ökar förväntningarna på att möta dessa krav. För att behålla och öka konkurrenskraften och för att möta framtida tekniska krav, radikala innovationer är ett sätt att möta dessa nya tekniska krav. Även med en ökad medvetenhet av konsekvenser av digitala transformationer, så kan det vara problematiskt att integrera radikala innovationer och göra det till en grundläggande del av organisationen.

Denna masteruppsats är baserad på uppdrag av Propia AB. Propia AB är ett konsultbolag beläget i Norrköping, Sverige som arbetar med processutveckling. Målet med denna studie var att utveckla en väldefinierad samverkansmodell för små och medelstora företag som ska användas vid en digital transformation av affärsprocesser som ska bidra med ett strukturerat arbetssätt för att förstå digitala möjligheter samt hur och vilka affärsprocesser som ska prioriteras. Denna samverkansmodell ska också ge förutsättningar för en extern innovationspartner att utveckla digitala lösningar för affärsprocesser.

Denna studie var genomförd enligt en abduktiv ansats som är en kombination av en deduktiv och induktiv ansats tillsammans med ett fallstudieföretag. I den empiriska studien har kvalitativa metoder används främst för en ökad flexibilitet och för att skapa ett sammanhang på det sättet insamling av information görs.

Det framkom genom analysen att en relation mellan en given nivå av processmognad, en viss innovations nivå och en viss nivå av digital förändring kunde observeras. Enligt processmognadstrappan, en nivå motsvarande en anpassad nivå skulle kunna reagera till förändringar i efterfrågan på ett bättre sätt, vilket skulle kunna relateras till förändringar inom organisationen och samhället. Denna masteruppsats resulterade i en konceptuell samverkansmodell baserad på tre huvudområden av digitalisering, affärsprocesser och innovation. Modellen har utvecklats genom att visuellt presentera den konceptuella samverkansmodellen för fallstudieföretaget, konsultbolaget samt tillsammans med en extern innovationspartner. Modellen ska vara ett praktiskt tillvägagångssätt för små och medelstora företag att följa vid en digital transformation av affärsprocesser för att kunna uppfylla framtida kunders förväntningar och behov.

PREFACE

This report summarises five years of studies where the two last year of master studies have been conducted at Linköping University resulting in this master thesis. It has been a great experience of conducting this master thesis involving new unexplored research concerning digitalisation for both authors. The last two years have included challenging tasks, personal development and new friendships.

The road to the goal has not been straightforward, but a contribution of turns, up-hills and down- hills on the road, which had led to many insights and a lot of learnings on the way. This master thesis could not be done without certain individuals who have supported us during this time, and for that, we would like to give those individuals all our gratitude.

From the very first meeting with Propia, they have helped us to keep focus with their extraordinary strategical knowledge and expertise within process management. All consultants have shown candidness and willingness to help. This has been greatly appreciated. We have felt welcome from the very beginning to the very end of this project and we have had a lot of fun during the last semester.

A sincerely great thanks to our supervisor at Propia, Johan Hall for his consequent support and advice. You have given us a great responsibility and the opportunity for us to develop the Conceptual Cooperative Model. We are very grateful for your time to answer our questions and your cooperation.

To our participating case company, Lejonfastigheter AB. We will like to thank you for your time and for your participation and involvement. You have been very accommodating and you have been a strong contributor to this research. Additionally, a great thanks to the Innovation partner who has participated and shared knowledge within the research area of digitalisation. It has been a great opportunity for us to further understand the scope of digitalisation.

To Peter Cronemyr, the supervisor from Linköping University at the Department of Quality and Management for his supervision in this master thesis. Your interest and your great knowledge have provided us insights and academic guidance to keep our work going forward. You have been very valuable for us in this master thesis.

Finally, we would like to thank our examiner Mattias Elg and our opponents Maria Eriksson and Amanda Forsén for you constructive opinions and for your thoughtful recommendations. With your opinions and recommendations, it has been possible to raise the quality of the report.

With that said, now we entering a new time of other kinds of challenges as engineers and we are looking forward to it. We wish you a great reading and we hope you will enjoy it!

Daniel Sehlin & Maja Truedsson

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1 INTRODUCTION

The opening chapter of this master thesis is intended to give an explanation and understanding of the background of the research area, followed by a problem description. The purpose of a Conceptual Cooperative Model and research questions, as well as delimitations, are presented at the end of this chapter.

1.1 BACKGROUND

Digital transformations are changing society and they force industries to respond to demand more frequently (Henriette, et al., 2015). Leaders and managers are challenged to continuously adapt to technical changes (Manso, 2017; Solis, 2014). Managers need to answer both to rapid fluctuations and adapt to meet market demand in order to stay competitive (Porter, 1996). Managers are aware of new technical demands, which increase the pressure of meeting those demands (Manso, 2017). Solis (2017) defines digital transformation as *"the realignment of, or new investment in, technology, business models, and processes to drive new value for customers and employees and more effectively compete in an ever-changing digital economy".* Stolterman and Fors (2004, p. 698-690) explain that *"the digital transformation can be understood as the changes that the digital technology causes or influences in all aspects of human life. The digital transformation leads in that sense to a world where everything is connected, almost in a way that is common in many spiritual understandings of our reality".* Organisations have a difficult time to evolve at the same speed as technology and society. Solis (2014) calls this era *Digital Darwinism*. Kääriäinen, et al. (2017), refer to digitalisation as a fundamental change in society. Digitalisation can be defined as the ability to develop and change existing products or services to digital offerings. The usage and adaption of new digital technology by an organisation, industry or country can also be defined as digitalisation. Kääriäinen, et al. (2017) separate digitalisation from *digitising*. Digitising means and can be identified as the transformation of analogue data into digital data.

To meet technical demands, radical innovations are one way to stay competitive. Innovations are welcome and they are easy to appreciate. Hence, it is more complex to make them a part of the business. One challenge lies in motivating managers to be more innovative. Innovation also includes new ways of thinking and new approaches that never been tested, which can increase the risk of failing (Manso, 2017).

In some cases, many companies have gained advantages due to their technological innovations (Morabito, 2013). Radical innovations are often beneficial for businesses, by making the business better or placing the business in another competitive position. Hence, Bossen and Ingemansson (2016) describe the challenges for many companies of handling new complex areas of technologies. New competencies are required which, in some cases, cannot be collected internally. Thus, it is essential to have access to systems and specific required knowledge. Markovitch and Willmott (2014) also urge that knowledge and expertise in some circumstances should be collected externally.

To remain competitive in an era of high complexity, companies should co-operating with others to expand their boundaries in order to create value. Utilizing new creations of value for customers,

companies should focus on core business processes and their main competencies and at the same time commit to the entire business processes, including the whole supply chain (Ciasullo, et al., 2017). The changed environment within organisations, due to digital innovations, has led to new products and services and have created new involvements of different actors with different capabilities and goals (Nambisan, et al., 2017).

1.2 PROBLEM DESCRIPTION

There is an opening for enterprises to integrate digital solutions into core processes and business models, due to the expansion and accessibility of technology. Many large companies have had the opportunity to analyse open innovation within their business processes. However, few studies of open innovation have been done in small and medium enterprises (SMEs) (Van de Vrande, et al., 2009). Even with present technical solutions and innovations, companies fail to connect their core processes to new digital business processes. (Radar Ecosystem Specialists, 2017). Innovative ideas and digitalisation have become a strategic tool to continuously develop in a world where the speed of technology increases. Still, it can be difficult to connect innovation and digitalisation progress with core business processes (Nilsson, 2015).

Process management methodologies has contributed to decreased variations and has improved manufacturing efficiency and has influenced other parts of organisations, for example, processes regarding technical development and innovation. Furthermore, the spread of process management to other processes, such as processes concerning variation creation activities, affects dynamic capabilities of organisations. Thus, it has been limited research regarding how these practises of process management affect technological adaption and innovation. Empirical studies shows that process management has increased performance for example within the automobile industry, but the opposite situation has occurred within the computer industry (Benner & Tushman, 2003). Henderson, et al. (1998) stated that businesses' effort of providing immediate customer service to any price could influence process structures that was well rooted in the organisation by creating impediments.

Continuously, there is a conflict between innovation activities and routines. Routines in daily operations can be related to inflexibility with focus on stability and result in organisational inertness. This is to be compared to innovation, where dynamicity, creativity and flexibility are central (Nilsson, 2015). Innovation research focuses on the daily operations routines of companies with attention to increasing efficiency in existing processes, and therefore, obstacles for new innovations and the understanding of them are not fully explored within organisational routines (Dougherty, 1992; Tushman & O'Reilly III, 1996).

A collaboration between structural processes and creative innovations is a challenge. Thus, there is an urgency of making this collaboration work, especially for SMEs where all necessary knowledge cannot be collected internally. There is an opportunity for SMEs to cooperate externally, but there is limited research of how such cooperation to develop technical innovations can be defined.

1.3 PURPOSE & RESEARCH QUESTIONS

With mission from Propia, the goal of this study is to develop a well-defined framework for small and medium enterprises to use for digitalisation transformation of business processes. Propia is a consultancy firm located in Norrköping and Stockholm. With a team of currently 16 consultants, they are specialists in process management, change management and business development. (Propia AB, 2017) The purpose is to develop a framework that provides structure for businesses to better understand the range of digital possibilities and which business processes should be prioritised to better benefit from the potential of digitalisation. This framework should also create prerequisites for an external innovation partner to develop digital solutions for business processes. Figure 1 shows the authors' thoughts on the framework. Digitalisation is the main topic of the model, innovation is the external innovation partner and the business processes are the parts the authors' want to improve.

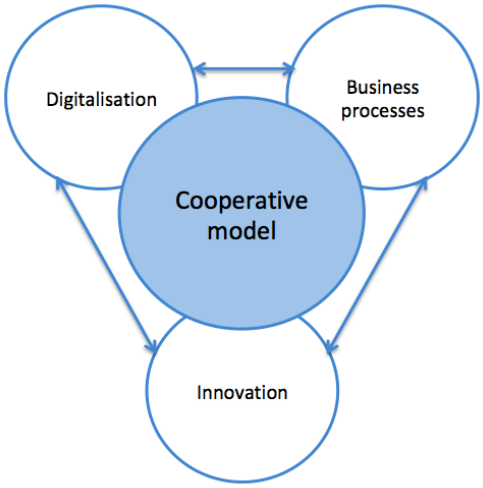

Figure 1: Cooperative model

To create a framework, the following research questions are used for guidance:

RQ 1: *How could opportunities for digitalisation be identified and exploited internally?*

RQ 2: *How could these digital opportunities contribute to improvement and development of business processes?*

RQ 3: *How could the digital opportunities be prioritised and developed with an external innovation partner?*

1.4 DELIMITATIONS

The focus of the thesis is to develop a Conceptual Cooperative Model together with a case company and with the expertise of an external innovation partner. This model will only include the already mentioned areas of digitalisation, innovation and business processes. Moreover, the area of digitalisation is considered to be broad. Therefore, the area of digitalisation has been limited to challenges but also prerequisites regarding digital transformation. Also, the model will be developed with the information from one Swedish SMEs as a case company. The implementation of a finished Conceptual Cooperative Model will not be included in this thesis.

2 METHODOLOGY

This chapter describes the research methods that were relevant to this study and how the authors have proceeded to create a basis for a Conceptual Cooperative Model. This study utilises an abductive approach and qualitative data collection. The motive of the research method and qualitative methods will be further explained in this chapter.

2.1 RESEARCH METHOD

The area of established Conceptual Cooperative Model within the three main areas of digitalisation, innovation and business processes is unexplored in a relation to one another. Therefore, this study has been done according to an abductive approach. In comparison with deduction and induction, an abductive approach gives ample room for exploration and creativity. Abduction is a procedure of both deduction and induction (Davidson & Patel, 2011). Backman (2016) describes deduction emphasis as hypothesis and question formulations together with definite theories. Researchers working with a deductive approach follow already established theories and make conclusions based on proven empirics (Davidson & Patel, 2011). On the other hand, an inductive approach is used as an exploratory method, where theories are not the elementary basis. Researchers study the empirical findings and information to formulate new theories. Which means that empirical findings are put in relation to the recognised theory. In many cases, scientific research has a qualitative and generation-of-hypothesis methodology, an inductive approach (Davidson & Patel, 2011).

2.2 RESEARCH DESIGN

The goal of this study was to identify and link the gap between business process, digitalisation and innovation. A specific procedure had to be performed to be able to reach the goal and answer the research questions. The chosen procedure is shown in Figure 2. The following sections will describe the steps of the research design in detail.

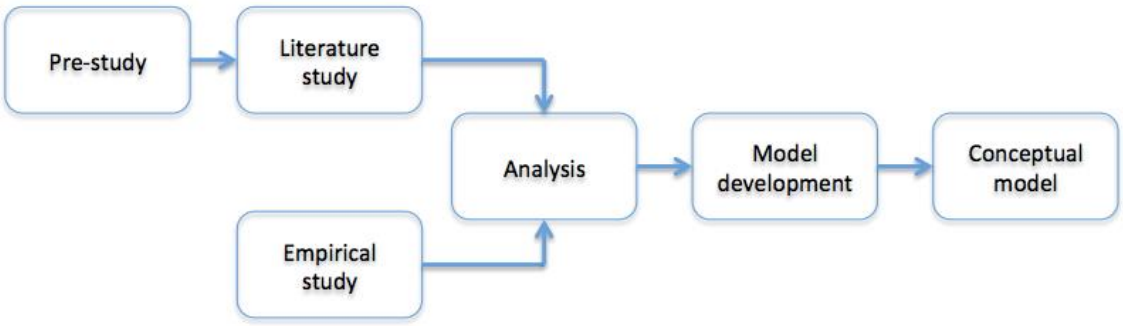

Figure 2: Research design of the thesis

2.2.1 PRE-STUDY

First, a pre-study was done to understand the scope of the research topic by collecting information regarding the three central areas of this thesis: digitalisation, business process and innovation (see Figure 1). Collection of information was done by a short research online and at the university library to get a perspicuous understanding of the three main topics. Henceforth, business processes will be expressed as process management. Furthermore, in response to the mission from the employer Propia, guidelines of a future Conceptual Cooperative Model were established. The mission was identified and stated according to the guidelines for the Conceptual Cooperative Model. Existing information from the remit, in terms of purpose and goal of this study, was used as a foundation for the guidelines. These guidelines were the basis for understanding the necessary and required performance of a Conceptual Cooperative Model. The Conceptual Cooperative Model should:

- Create prerequisites for digital solutions
- Indicate which business process should be prioritised according to digital opportunities
- Constitute a tool for creating a roadmap toward a digital transformation

2.2.2 LITERATURE STUDY

When the pre-study was finished, the researchers started with a literature study. The literature study went deeper within the research areas and explored what has been done before into the chosen topics and how these insights can be related to one another. Also, the literature study was the foundation for exploring how digital opportunities can be identified by understanding what kind of digital solutions there are and challenges connected to digitalisation. By studying the area of digitalisation and the challenges of a digital transformation, it is possible to understand how and to which extent digital opportunities can contribute to process management. With this literature study, the authors can answer the first and the second research questions.

Research engines such as Google Scholar and Scopus have been the primary sources when finding relevant literature. The literature study has focused on chosen areas within process management, innovation and digitalisation. Those areas and related keywords were used to search for relevant articles and books. Approximately around 30 articles including reports and master theses have been studied in this research to formulate a common ground for the three main areas in this research, due to the limited number of articles regarding the research scope. Many articles within the separately three main areas were found but in a combination to one another were different. The selection of relevant articles was done by firstly read the abstract of every article. If the abstract was considered interesting and relevant according to the three main areas, the article was further investigated. If the abstract did not fulfil the requirements, the article was rejected. Because of the lack of sources in a combination between one another, the focus of each area have been sources to receive a main understanding of the topics. Furthermore, the focus of digitalisation has been associated to challenges and strategies with digitalisation, the focus for process management has been related to definitions of process management and how it works and the focus of innovation has been in a close connection to digitalisation and how to preferable work with innovation. Examples of keywords are listed below.

- Process Management
- Business Process Management
- Business Process Improvements
- Process Development
- Digitalisation
- Digital Technologies
- Digital Strategy
- Digital Transformation
- Innovation Management
- Innovation Strategy
- Innovation System
- Open Innovation
- Innovation Process
- Business Relationship
- Quality Management
- Process- and Prioritisation Model

A strategic choice for the literature study was to explore previous work in the chosen topics in order to search for tools and methods that the authors could use for this study. The most used sources that have been used are peer-reviewed articles and books. Peer-reviewed articles have been audited by other authors with the same expertise as the original author (Jerkert, 2018). By using peer-reviewed articles, the information can be observed as more trustworthy (Alexanderson, 2016; Thurén, 2013). Moreover, when using independent sources, the reliability of the information would be more trustworthy if the different sources are resulting in the same thing (Alexanderson, 2016).

In this study, the authors have tried to use the most recent sources in chosen topics. The newest sources are more relevant and include up to date information (Ejvegård, 2009).

2.2.3 EMPIRICAL STUDY

The authors of this thesis choose to work with qualitative methods in the empirical study due to their flexibility and the fact that the focus of the information gathering was to create a context. Examples of qualitative methods are interviews, observations and documents studies (Denscombe, 2007). Due to qualitative methods flexibility, compared to quantitative methods, they are considered to be easier to adjust and information can be gathered without time limit (Eliasson, 2013). Together with the literature study, the empirical study was done to answer research questions two and three. The empirical study was analysed on the basis of the literature study in order to generate a start of a Conceptual Cooperative Model.

Other methods that could have been used are quantitative methods. Quantitative methods are applied when analysing data statistically. The result of quantitative methods can be measured with statistical tools (Davidson & Patel, 2011). One reason quantitative methods were not performed in this study was

due to the limited numbers of participants. The authors could not ensure that the analysis of a quantitative method would be accurate. Instead, qualitative methods were a more suitable choice. When the selection of having qualitative methods was established as a foundation for collecting data, the qualitative methods were investigated further.

2.2.4 DATA COLLECTION TECHNIQUES

The authors of this study have used both primary and secondary data. Primary data is data that the researchers have collected themselves through observations, measures, interviews or surveys (Eriksson & Wiedersheim-Paul, 2014). In this case, the researchers have chosen to gather primary data through observations and interviews. Secondary data is indirect data that has already been gathered. It could be data from registers, databases, archives and documents (Eriksson & Wiedersheim-Paul, 2014). Secondary data sources that the authors have used are past documents, peer-reviewed articles and books.

As mentioned previously, there are different data collection techniques used in qualitative methods. The focus of this study has been to collect information primarily through interviews and documents conducted at the chosen case company, Lejonfastigheter AB. To gather enough information and at the same time make the information trustworthy, several interviews have been constructed. The interviews were performed in a semi-structured way. Semi- or half structured interviews mean that the interviewers have prepared some questions in advance, but have left time and settings for follow-up questions during the interview (Eliasson, 2013). The reason why semi-structured interviews have been used was to encourage an open discussion, due to the exploratory approach of this study.

By performing structured interviews, the interviewer has prepared questions for the whole interview and limited the interview to those questions. This method is mostly used in quantitative methods. Unstructured interviews, on the other hand, means that the interviewer only has one or two bigger questions that require lots of time for answering and afterwards plenty of follow-up questions (Eliasson, 2013). Interview guides for this research can be found in Appendix 2, Appendix 3 and in Appendix 4. The interview guide helped the authors to find how Lejonfastigheter AB works within the three main areas of this thesis. Every interview had a specific focus on either digitalisation, innovation or processes.

There are some strengths and weaknesses of each technique: interviews, observations and document collection in terms of annual reports, financial reports and past documents. Those strengths and weaknesses are visualised in Table 1. Since interviews are the main focus of this study, strengths and weaknesses are presented further. The interviewers should consider that the interviewed person might leave aspects out when answering the questions and sometimes the answer might not be the whole truth. The response might be favouring the person or the person's businesses. If the questions are not well prepared, the respondent might misunderstand the questions and therefore give a weak answer. Also, if the questions regard the past, the respondent might not remember the past correctly (Yin, 2009). The summary of strengths and weaknesses are used as guidelines in this thesis.

Table 1: Authors' own table of (Yin, 2009, p. 102)

Source of Evidence	**Strengths**	**Weaknesses**
Documentation	Stable - can be reviewed repeatedly	Retrievability - can be difficult to find
	Unobtrusive - not created as a result of the case study	Biased selectivity, if collection is incomplete
	Exact - contains exact names, references, and details of an event	Reporting bias - reflects (unknown) bias of author
	Broad coverage - long span of time, many events, and many settings	Access - may be deliberately withheld
Interviews	Targeted - focuses directly on case study topics	Bias due to poorly articulated questions
	Insightful - provides perceived causal	Respond bias
	Interferences and explanations	Inaccuracies due to poor recall
		Reflexivity – interviewee gives what interviewer wants to hear
Observations	Covers events in real time	Time-consuming
	Contextual - covers context of "case"	Selectivity - broad coverage difficult without a team of observers
	Insight into interpersonal behaviour and motives	
		Reflexivity - event may proceed differently because it is being observed
		Cost - hours needed by human observers
		Bias due to participant observer's manipulation of events

In parallel with the literature study, empirical data was collected through interviews and examination of past documents. This was done in order to relate empirical findings with chosen theories and to understand how the chosen case company interprets and works with digitalisation, process management and innovation. Both authors were present during all interviews. One author was responsible for taking notes. The other author was responsible for listening and keeping the interview focused and concentrated on topic. Also, this author was in charge of testing recording devices and the

actual recording of the interviews. Five interviews were recorded. The option of recording was explicitly mentioned and only executed if the respondent or respondents allowed it. Before each interview, the respondent or respondents received information about the purpose of the interview and the interview questions. For all interviews, the respondent or respondents received information about the purpose and the interview questions at least four hours in advance. This was done in order to prepare the respondent or respondents for the interview and to decrease misunderstanding during the interviews. In order to decrease misunderstandings before the interviews, the interview questions were once more communicated and discussed. This was done to control if the interview questions were understood correctly. Misunderstandings were sorted out before the interview started. It could be misunderstandings in form of that the respondent did not understand the questions.

With the mission from Propia, discussions were held by different consultants in order to discuss opinions about the Conceptual Cooperative Model continuously and to make sure that important aspects were included and raised when developing a Conceptual Cooperative Model. A discussion seminar regarding findings of theories was held on 17th of March 2018 and several consultants from the company were present. See Table 2 for a chronological summary of the accomplished information methods, collected through interviews and during the discussion seminar.

Table 2: Summary of empirical information collections

	Date	Time	Present	Purpose	Recorded
Interview 1	06/02/18	2 h	Consultant, Head of Development, IT Manager	Introduction	No
Interview 2	12/02/18	1,5 h	Business Developer, IT Coordinator	Digitalisation and innovation	Yes
Interview 3	12/02/18	1 h	IT Manager	Digitalisation, innovation and processes	Yes
Interview 4	14/02/18	1 h	Head of Development	Digitalisation, innovation and processes	Yes
Interview 5	15/02/18	1,5 h	Technical Specialist, Strategist, Controller	Digitalisation	Yes
Interview 6	16/02/18	1 h	Consultant	Processes	No
Interview 7	05/03/18	1 h	Business Developer	Processes	Yes
Discussion seminar	17/03/18	1 h	Consultants	Open discussion regarding all three main areas	No
Interview 8	27/03/18	1 h	External Innovation Partner	Innovation	No
Interview 9	04/04/18	1 h	Consultant	Processes	No
Interview 10	12/04/18	1,5 h	Consultant	Processes	No

2.2.5 ANALYSIS OF FINDINGS

The analysis of the empirical findings was first summarised on the collected notes and thereafter transcriptions were carefully performed. Keywords from the interviews regarding the three main areas of digitalisation, innovation and process management were collected. This was done in order to structure the interviews and sort the answers according to the accurate main area. Answers regarding other areas without relevance to the topic were not taken into consideration when analysing the empirical findings. When the summary of the empirical findings was done, an analysis was performed by comparing the empirical findings to the written theory. New theories were added and complimented when finding interesting empirical findings that had not been deliberated during the literature study. The output of the analysis of findings resulted in important factors and sequential steps that were included in the cooperative Conceptual Cooperative Model.

2.2.6 MODEL DEVELOPMENT

To ensure that the Conceptual Cooperative Model met the goals of the mission and the requirements, the steps according to a system development process have been used as a guideline to develop the Conceptual Cooperative Model. The system development process is called the “V-model” due to its shape, see Figure 3. The model describes how systems requirements are disintegrated and built together toward a detailed design and toward a Conceptual Cooperative Model starting in the left corner of the model. The Conceptual Cooperative Model is tested to make sure customer demands are met and unnecessary features are eliminated (Backlund, 2000). In the middle of the V-model are feedback arrows: *test*, *verification* and *validation*. These make the sequential process able to use iteration loops in different levels of integration. Still, managers from project management may express some resistance against these loops. Project managers may consider the iteration loops as something negative because stepping backwards is not preferable in projects. Stepping forward in a project also means finishing and closing the previous step (Cronemyr, 2000).

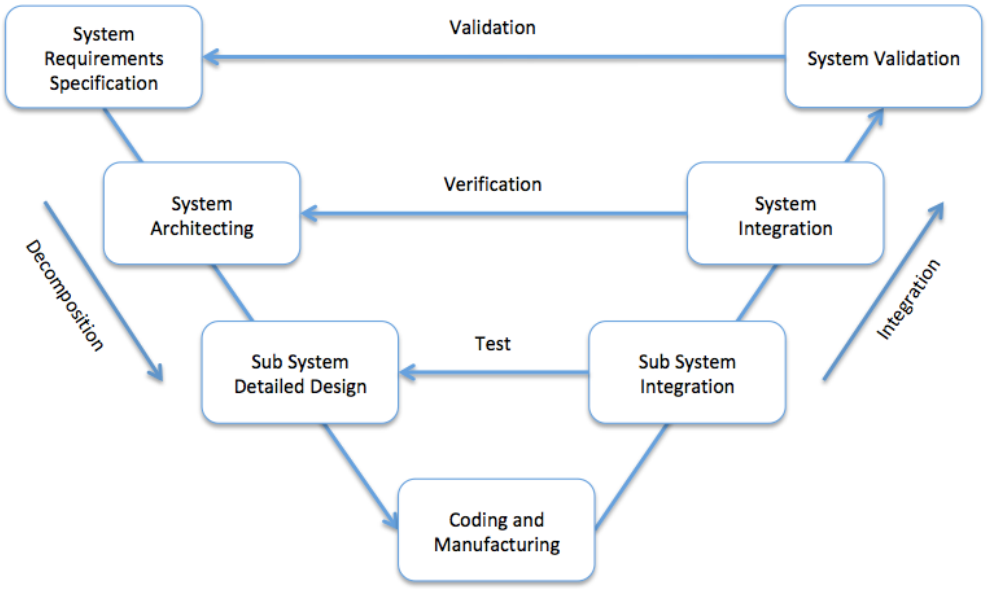

Figure 3: System developement process based on MIL-STD-498 (Cronemyr, 2000)

In order to achieve the verification in the iteration loop in the development process, the result should meet the systems architecture. Verification should answer the question: *"Did we build the system right?"*. Furthermore, this is also done to verify that implementation has been made correctly. Validation means that the whole system should meet the customer needs, to secure the system is correct. Validation regards the question: *"Did we build the right system?"*. (Backlund, 2000)

The authors finished the first four steps in the V-model. Firstly, the authors did the pre-study to get an overview of the topics, but also identified and specified the requirement specification for the developed model. The existing information, in terms of purpose and description of this master thesis, from the employer Propia, were used as a foundation for the requirement specification. Furthermore, some requirements were to create prerequisites for an external innovation partner to give suggestions of digital solutions. Also to indicate which processes were best to start with, to priority the business processes.

In the second step of the V-model, the authors did the literature study to find relevant theories within the main topics. The empirical study was accomplished with interviews together with the case company. In this study, previous models within digital transformation, product development processes and a previous conceptual model regarding welfare technologies were used as inspiration and a basis for developing a Conceptual Cooperative Model. These existing models helped the authors find the main areas when creating the core process for the Conceptual Cooperative Model.

The third step of the V-model can be connected to more detailed and understandable connections between the findings. This is the analysis of this thesis where the authors did a brainstorming session and discussed how theories, empirical findings and relevant models could be connected to each other in order to create a possible Conceptual Cooperative Model design with relevant steps for reaching the requirement specifications.

The V-model was not fully followed by performing every step. The fourth step had the purpose of developing the Conceptual Cooperative Model. This step was performed back and forth. In the end of the fourth step and a slightly beginning of the fifth step of the V-model, the authors completed four design reviews together with Propia, the case company and the innovation partner with the reason to evaluate the Conceptual Cooperative Model. A detailed description of the design reviews are presented in the next following section.

2.2.7 CONCEPTUAL COOPERATIVE MODEL

The result of the analysis of theoretical and empirical findings was generated in a Conceptual Cooperative Model. The Conceptual Cooperative Model is shown and explained in chapter 6. The Conceptual Cooperative Model was further developed by a four step evaluation process together with involved consultants, Lejonfastigheter AB and the innovation partner. The purpose of the evaluation was to estimate if the Conceptual Cooperative Model met the settled requirements. Therefore, potential problems and opportunities regarding the Conceptual Cooperative Model could be determined. The four step evaluation process, also called Design Reviews, is presented in Table 3.

Table 3: Design reviews

Design Review	Date	Time	Present
1	25/04/18	1 h	Consultant
2	03/05/18	1,5 h	Head of Development, IT Manager
3	08/05/18	1,5 h	Consultants
4	15/05/18	1,5 h	Innovation partner

The Conceptual Cooperative Model was presented and explained in detail in every evaluation occasion. Similar to the performed interviews, the design reviews were completed accordingly to a structured approach. One of the authors was responsible for taking notes and the other author observed and kept the presentation focused. Firstly, the Conceptual Cooperative Model was presented to the CEO of the consulting company. The second design review were held at Lejonfastigheter AB's head office together with the Head of Development and the IT Manager. The third design review was held with two consultants from the consulting company. Lastly, the Conceptual Cooperative Model was presented to the innovation partner equivalently as the previous design reviews. Additionally, after each design

review, spontaneous thoughts and feedback were gathered and discussed between the authors. Feedback only related to improvements of the Conceptual Cooperative Model according to the authors was taken in consideration. Together with collected feedback, the Conceptual Cooperative Model was developed continuously after every design review.

2.3 RESEARCH VALIDITY, RELIABILITY AND OBJECTIVITY

Validity, reliability and objectivity are three aspects that consider studies trustworthiness. Validity can be described as the extent authors really measure what intends to be measured. Reliability means the degree of trustworthiness in the measurement instrument, i.e. to what extent the value becomes the same when the experiment is repeated. Validity and reliability are related to each other since validity assumes reliability. This means that the measured information should be reliable to be valid. If the information is not reliable, it cannot be valid (Bryman & Bell, 2015).

Objectivity means that it is the extent to which values affect the study (Björklund & Paulsson, 2012). Objectivity, according to Eriksson and Wiedersheim-Paul (2014), includes candidness where the authors' opinions are non-existing. Objectivity can be increased through clarification and motivation of the different choices in the study, which gives the readers opportunity to analyse the result by themselves. The authors should include all data from different perspectives and the writers should avoid giving signals about their own thoughts regarding the source (Björklund & Paulsson, 2012). When sources were used in the literature study, the writers of the study had to reproduce the content as objective as possible with correct data. The authors have been objective in terms of being candid by not expressing any personal opinions when collecting empirical data.

According to Eriksson and Wiedersheim-Paul (2014), validity should be divided into internal and external validity. External validity regards how the result of the research can be generalised and applied outside the research scope. Andersen (1994) describes external validity as the compliance between research results and reality. Internal validity regards the correspondence between the content of a nominal and an operational level (Andersen, 1994).

Since this master thesis only studies one case company, it is necessary to be able to receive data from Propia and the Innovation partner as well. The purpose of this was to receive other opinions in order to make the research more generalised. The result of this study could therefore, be used in other companies within other areas. The purpose of the cooperative model was to be able to use it for more than one company. This makes the generalised perspective even more important to achieve.

However, in an interview aspect, validation could be increased with e.g. increased precision of the target group, as well as a better formulation of clear and finished questions. Increasing precision of target group can be performed by a well-performed selection of participants. The selected chosen participants could generate significantly accurate information, while the reliability could increase with e.g. control questions in an interview. Both validation and reliability can also be increased with the help of *triangulation*.

Triangulation includes more than one method or source of data while studying one social phenomenon (Bryman & Bell, 2015; Björklund & Paulsson, 2012). According to Björklund and Paulsson (2012), there are four different types of triangulation: *method triangulation*, *data triangulation*, *theoretical triangulation* and *evaluation triangulation*. Method triangulation means that different research methods are being used in a study. Data triangulation means that different data sources are being used when gathering information, such as different books, articles and respondents. Thirdly, theoretical triangulation uses different theories for the same data. Lastly, evaluation triangulation stands for the idea that different persons evaluate the material (Björklund & Paulsson, 2012).

The authors have used different kinds of triangulation. To achieve the result of this report, the authors have used both a literature study and empirical findings, which are two different methods. Also, the authors have used different books, articles and respondents during the interviews. Moreover, since there are two authors of this master´s thesis, the materials have been controlled from two perspectives in the evaluation part. It can be beneficial by having two different perspectives. However, those perspectives might be similar since the authors have a similar academic background.

2.4 ETHICS

In research, there are certain demands on the outcome of the work but also demands regarding the integrity of the researchers. Researchers should have a proper ethical approach to their research. (Swedish Research Council, 2017)

In the Swedish Research Council's report (2017), a summary of general rules are presented in order to get an overview of research ethics:

1) *You shall tell the truth about your research.*
2) *You shall consciously review and report the basic premises of your studies.*
3) *You shall openly account for your methods and results.*
4) *You shall openly account for your commercial interests and other associations.*
5) *You shall not make unauthorised use of the research results of others.*
6) *You shall keep your research organized, for example through documentation and filing.*
7) *You shall strive to conduct your research without doing harm to people, animals or the environment.*
8) *You shall be fair in your judgement of others' research.*

(Citations from the Swedish Research Council, 2017)

This collection of criteria can be compared to stricter guidelines that researchers should follow throughout the research. These guidelines describe how researchers should act when collecting information and approval before the research, how risks are avoided, how questions are formulated during research and how publishing and storage of materials are done after the research is finished. (Swedish Research Council, 2017)

As mentioned above, before every interview and collection of information, every respondent received the interview questions in advance by mail. Before starting each interview, information about the purpose of the interview was given and a presentation of the interviewers was held. All interviews started with questions concerning approval of recording, transcription and anonymity. The researchers did not execute recording or published names or title of the respondent or company if it was not permitted. Before publishing empirical findings, information from the interviews was corrected and adjusted by the person who gave the information. This was done in order to ensure that information had been perceived correctly and allowed the respondents to review the researchers' collection of information. Some of the research areas are outside the scope of the authors' expertise, which can increase the risk of misunderstandings. Therefore, consistent preparation before every collection of information was essential for decreasing risks of misunderstandings and false interpretations. The sources in the literature study have been respected as their work and the authors of this thesis have referred to the sources when they are used.

3 THEORETICAL FRAMEWORK

The theoretical framework is divided in three sections according to the main areas that are included in the Conceptual Cooperative Model, digitalisation, innovation and process management. To understand digital fundamentals and challenges towards a digital transformation, the first section in this chapter will provide an insight in this area. Innovation has a broad definition and can be interpret differently depending on company and branch. Therefore, the term innovation will be further explained and how new opportunities can be found by being creative and by collaborate with others. One of the main areas is related to business processes and how they can transform. Thus, theories regarding process management and how processes can be continuously improved are included in the theoretical framework. Therefore, the theoretical framework is the moderate basis to answer the first research question and parts of the second research question in this thesis. The chapter will end with methods of quality management and tools that concern this study and the Conceptual Cooperative Model.

3.1 TOWARD INDUSTRY 4.0

Over the last century, the industrial environment has changed. This had led to four industrial revolutions. The first revolution started in the late 18th century and involved the development of machine tools and steam power, where technological innovations empowered productivity (Bortolini, et al., 2017). Koren (2010) refer this first revolution as the "craft production" era. The second revolution took place between late 19th to mid 20th century and the power of electricity was installed in manufacturing processes and was known as the era of mass production (Bortolini, et al., 2017; Koren, 2010). Moreover, the introduction of electricity and mass production led to the expansion of Information Technology (IT) and automation, which were central parts of the third revolution. This revolution is called "mass customization" (Koren, 2010), where customer demands are met with a greater product variety and quantity with competitive costs (Bortolini, et al., 2017). To summarise, the first three revolutions generated mechanisation, electricity and IT to the industry (Qin, et al., 2016). Today, we are facing the fourth revolution, also known as Industry 4.0. Industry 4.0 implicates an entire transformation of industrial production, including the development of internet, information and communication systems (Bortolini, et al., 2017; Atzori, et al., 2010). The revolutionary changes in manufacturing processes involve the development of digitalisation. Digitalisation is a name for technologies such as Internet of Things (IoT), big data, real-time optimisation and cloud computing (Bortolini, et al., 2017). The interest of Internet of Things is high and companies have started to work with IoT- products and services (Wortmann & Flüchter, 2015).

3.2 DIGITALISATION

The new area of Industry 4.0 and digitalisation has changed the way we usually operate and has created new technologies and innovations to meet present and future demands (Kääriäinen, et al., 2017). The industrial-age products, including key functions, are now digitised and connected due to broadband communication, smaller hardware, powerful microprocessors and reliable memory (Yoo, et al., 2010).

The speed of digitalisation changes our daily life in many aspects. Digitalisation can open for complete automatisation and efficiency. Systems are built up and developed by digitalisation. Even cognitive systems are becoming digital. Automatisation, one area within digitalisation, has created and led to new areas of services, products and business models (Linnhoff-Popien, et al., 2017).

3.2.1 DIGITAL TECHNOLOGIES

Bossen and Ingemansson (2016) discuss digital technologies in the Swedish manufacturing industry**.** Operations can be complex in many businesses and digital solutions are adapted depending on the industry. Furthermore, Bossen and Ingemansson (2016) explain areas of digitalisation and solutions for specific areas. The specific areas are *data*, *automation*, *digital interface* and *connectivity*. Hence, the solutions can be grouped by common fundamental digital technologies. These areas and solutions are presented in Table 4.

Table 4: Areas of digitalisation, interpretation of (Bossen & Ingemansson, 2016)

Digitalisation			
Data	**Automation**	**Digital interface**	**Connectivity**
Simulation and modelling System of systems Big data analysis	Additive manufacturing Smart electronic systems	Social networks Machine-Human Visualisation	Cyber security Wireless communication
Digital solutions			
Predictable maintenance Smart products Decisions programs Self- diagnostic Adaptive steering	Recognition equipment Autonomous systems Collaborating robots Combination of machines Flexible production systems	Fourth party logistics Customized manufacturing E- commerce Adaption of communication Performance-based contracts	Integration of robots Remote-controlled maintenance Enhanced reality Digital services Monitoring processes Integration of factories

3.2.2 CHALLENGES OF DIGITALISATION

Consumers have during a longer time, used digital solutions in their daily life, including the Internet and social media in mobile phones. Manufacturing is following in the same footsteps. Digital solutions include e-services, Application Programming Interface (APIs) and applications, which are essential focus areas for several Swedish enterprises, also called “front-end” solutions. A total of 73% of Swedish businesses consider that digitalisation is about “front-end” solutions. Short profits can be gained with “front-end” solutions and they are considered to be a good start toward a digital organisational change. Still, it is not done including a long-term organisational strategy in the rest of the organisation. Digitalisation is not only these “front-end” solutions, and companies’ interpretation of digitalisation results in missing out other opportunities. With a narrow focus related to “front-end” solutions, opportunities for digital transforming business processes are not fully explored. (Radar Ecosystem Specialists, 2017)

Digitalisation can increase competitiveness and create innovative sources of income due to an increased efficiency of core processes. The progress of digitalisation looks different depending on company and branch (Radar Ecosystem Specialists, 2017). Even with the acknowledgement of the speed of technology and the beneficial outcomes, companies are facing challenges in terms of understanding the potential contribution of digitalisation (Kääriäinen, et al., 2017). As mentioned, Swedish enterprises are facing challenges due to the revolution of digitalisation and compete within areas of innovation, both for competence and resources (Radar Ecosystem Specialists, 2017). At the same time, traditional business models are confronted by international competitors (Radar Ecosystem Specialists, 2017; Teknikföretagen, 2013). The willingness to become more innovative and stay competitive is required to meet the future demands of digitalisation. Otherwise, there is a risk for enterprises to lose market shares in the world of digitalisation (Radar Ecosystem Specialists, 2017; Gassman, et al., 2013).

Increasingly in digital settings, the role of digitalisation and its connections needs to be reconceptualised to better propose to the business strategy. As mentioned earlier, the evolution of digitalisation changes rapidly. Therefore, there is an urgency of rethinking regarding IT infrastructures and the business processes around them. (Bharadwaj, et al., 2013)

Introducing digital strategies or solutions is equal to comprehensive changes for many enterprises (Jacobi & Brenner, 2017; Solis, 2017). The changes include reflections on structural and cultural aspects. Even with reflections on different changes, yet a specific requirement for digital change has not been fully described. The pressure from digitalisation forces companies to modify cultures and strategies. Digitalisation makes businesses act rapidly in a short time frame where there is a need for modifying entire strategies and cultures. One start point toward a digital change starts with top management and digital leadership (Jacobi & Brenner, 2017). Kane, et al., (2015) also argue that digital leaders compared to other leaders need a defined digital strategy. The digital strategy is a key ingredient by combining culture and leadership toward a digital transformation. Key success factors for digital transformation is summarised in Figure 4. A digital vision starts with the top management. Moreover, the knowledge needs to be provided before altering corporate processes and structures.

Figure 4: Key success factors for digital transformation according to (Jacobi & Brenner, 2017)

3.2.3 DIGITAL TRANSFORMATION STRATEGIES

The digital business transformation includes barriers between businesses, people and structures and need to be broken down. Broken barriers can result in new ways of doing business. The application of technology can digitise businesses by creating new business models, processes and systems which can generate different kinds of profits. Hence, a digital transformation is still developing and organisations have not fully reached the end of digital maturity (Schwertner, 2017). In regards to the digital transformation, Jacobi and Brenner (2017) point out the importance of having digital strategies. Digital transformation can be complex and management engagement is essential. Schwertner (2017) argues that digital transformation is viewed differently depending on business, and therefore, it is difficult to make a general strategy for everyone. He continues to point out that businesses must perceive possibilities in integrating strategy, culture and leadership of a digital transformation. The goal of a digital transformation strategy is to formulate a concept where integrations of coordination and implementation of digital transformations are done (Matt, et al., 2015). Schwertner (2017) states that transforming businesses, improving decision making, improving innovation, increasing efficiency and increasing customer satisfaction are future goals for a digital strategy. Matt, et al., (2015) explain that a digital strategy can be based on four aspects. These four aspects are the *use of technologies*, *changes in value creation*, *structural changes* and *finance*. The use of technologies is related to companies' ability and attitude toward new technologies. For example, "new technologies" can be used from a strategic point of view to become a market leader. Also, from an operative point of view, "new technologies" can improve business operations. "Changes in value creation" are associated with how the established business value chain is affected by digital transformation strategies. When new possible value chains are created, operations need "structural changes" to be able to have a sufficient

basis. The three mentioned aspects can be done and transformed with support from “financial aspects” (Matt, et al., 2015). Schwertner (2017) agrees that financial resources support the implementation of digital business transformation together with a clear strategy and prioritisations.

The financial aspects can be both a driver for the transformation, but also an aspect that inhibits. The four dimensions to formulate a digital transformation strategy are visualised in Figure 5.

Moreover, the definition and implementation of a transformation strategy need to be clear and the responsibilities around it as well, due to the complexity of digital transformation. Therefore, engagement and expertise with digital transformation strategy are essential. Hence, such transformation leads to digital and structural changes that influence the whole business. (Matt, et al., 2015).

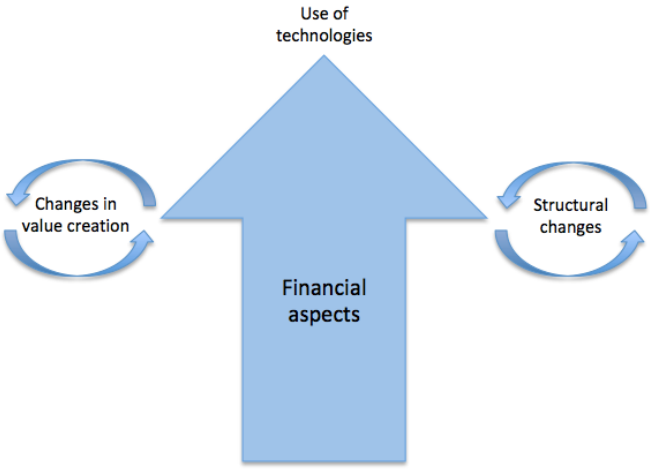

Figure 5: Digital transformation framework showing the four aspects as a basis of a digital strategy with the financial aspect as a driver (Matt, et al., 2015).

Thus, even with guidelines for the formulation of digital strategies and key successful aspects of digital transformation, there is still a missing connection in how to make digital transformation work in practise. Even with the knowledge of beneficial features of digitalisation, many companies fail due to obstacles appearing when applying a digital transformation (Kääriäinen, et al., 2017; Schwertner, 2017). Obstacles are not the only technology itself, but issues such as the human factor, organisational cultures, resistance to change, lack of knowledge, lack of resources, motivation and risk-taking (Schwertner, 2017).

Digital transformation is a change that affects organisational levels in different ways. Kääriäinen, et al., (2017) have defined different levels including the digital change, see Table 5.

Table 5: Levels of digital transformation (Kääriäinen, et al., 2017)

Levels	Digital changes
Process	Adopting new digital tools and streamlining processes by reducing manual steps
Organisation	Offering new services and discarding obsolete practises and offering existing services in new ways
Business domain	Changing roles and value chains in ecosystems
Society level	Changing society structures (type of work, means of influencing decision making)

3.2.4 TACKLING DIGITAL CHANGE

There are several companies that provide other businesses with expertise and knowledge toward a digital transformation. Digitalisation of business processes is not an entirely new phenomenon. Still, it can be difficult for SMEs to know where to start when digital knowledge is absent internally. To better meet challenges due to the speed of technology and digitalisation, Kääriäinen, et al., (2017) have developed a conceptual framework to better benefit from digitalisation in *practise*. This framework was based on empirical data collection from case studies from several companies during a period of two years. Their framework is supposed to be a support tool for digital transformation. It is divided into four sequential steps:

1. *Positioning a company in digitalisation*
2. *Review current state*
3. *Roadmap for digitalisation*
4. *Implementation with technical support*

The framework focuses on digital transformation in companies and follows a plan-do-study-act principle that is commonly known for improvements. These principles are more explained in chapter 3.7.1. The first step of the framework, *positioning a company in digitalisation*, is divided into four sub-steps:

- *Digitalisation impacts*
- *Digitalisation drivers*
- *Digitalisation scenarios*
- *Digitalisation goals*

The impacts of digitalisation and a goal for digitalisation need to be identified together with digital drivers and digitalisation scenarios. Firstly, the impacts are identified by analysing current and upcoming market trends in terms of digitalisation and how these digital opportunities affecting the business. For example, the increased use of mobile devices. Digitalisation can affect the entire business including internal operations and internal functioning. It can also create new value chains and bring new business opportunities by changing traditional operations by creating new digital solutions. To better understand how these trends influence the business, a SWOT-analysis (strength, weakness, opportunities and threats) is an applicable tool to use. A description of a SWOT-analysis is found in 3.7.2. The result from the trend analysis results in the identification of digitalisation drivers. Drivers are considered to be factors changing the market, for example, customer demand fluctuations and new products or services available on the market. When the drivers are clear, future scenarios are visualised for the company's future to identify the sequential importance of drivers and how they influence impacts of company's digitalisation progress. The impacts of digitalisation can be viewed from three different extents, *Internal efficiency*, *External opportunities* and *Disruptive change*. Internal efficiency regards re-planning internal processes and improves daily work by digital tools. It can provide consistency and better quality by removing manual steps. Digitalisation can also improve data gathering and how the data is visualised. In manufacturing operations, digital transformation in terms of automation can increase employee satisfaction to some extent and replace human labour. By finding new opportunities for new services or new customers in the same market are related to external opportunities. Disruptive changes are influences that could change the business entirely. For example, it can be opportunities caused by digitalisation that could change companies´ current business to become obsolete. Then, future scenarios are evaluated based on costs, benefits, and risk of implementing future scenarios or not implementing the scenarios. Based on the first three steps, a goal or a goalsetting is developed toward the process of a digital transformation. The goal can differ depending on impacts, drivers and how the scenarios are evaluated. (Kääriäinen, et al., 2017)

The second step evaluates the current state in relation to a future state and impacts, to identify the gap between them. When the impacts are analysed and identified, the current situation is analysed with a connection to the settled goal. Depending on impacts and goal, different approaches need to be taken. Examples of questions related to digital impacts can be found in the Appendix 1. A detailed description of the current state with relation to the digital goal is the result of step two. (Kääriäinen, et al., 2017)

The goal of the third step is to close the gap and identify actions to reach the future state. In this step, a detailed plan is created, a roadmap to reach the goal in an optimal way. Four sub-steps can be done in the third step: *identify the gap*, *planning the essential actions to close the gap*, *analysing prioritisation* and *feasibility of actions and create the digital roadmap*. These actions are related to a specific impact. Identified actions are analysed and prioritised involving feasibility analysis, cost-benefit analysis, risk analysis and analysis of constrains. Related costs for a digital transformation can include the cost of technology, training and support for employees and the cost of maintenance. As mentioned

in chapter 3.2.2, digital transformation can be equal to organisational change. Therefore, cost including the organisational change needs to be taken into consideration. If considering internal efficiency, actions of new technologies can optimise current processes and re-define processes by digital opportunities. The way of working is not only optimised by digitising, but also functionalities should be clear. Digital opportunities can, therefore, be used optimally. To better understand which process would benefit from a digital transformation to improve the business, Key Performance Indicators (KPI:s) need to be re-evaluated to meet the digital goal. (Kääriäinen, et al., 2017)

"KPIs are compilations of data measures used to assess the performance of a construction operation" (Cox, et al., 2003, p. 142).

The outcome of the third step is prioritisation of actions, arranged in a roadmap, defining the order, importance and responsibilities for the actions.

The last step is an implementation step where actions are validated. It can be of importance to implement a proof of concepts to increase validity to see if new digital tools are sufficient. Actions can be further corrective if the goal is not entirely fulfilled. Moreover, the framework is summarised in Figure 6.

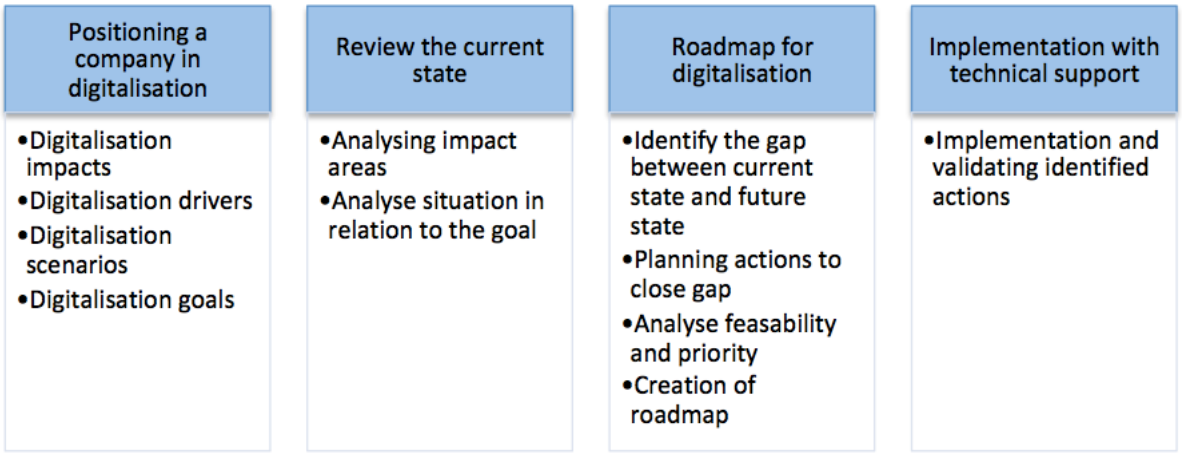

Figure 6: Framework for tackling digital change. Interpretation of framework by (Kääriäinen, et al., 2017)

This framework describes an approach to benefit from digitalisation in practise. Still, the framework can be considered to be too general and does not include prioritisation of processes. It is mentioned in their Conceptual Cooperative Model, that an analysis should be done to consider which processes has the highest potential of digitalisation. How this analysis and the prioritisation are done is not fully explained. Also, it is not stated how companies can work with external expertise to better benefit of digital opportunities. Simply, it is said that technical support is present in the last step.

3.3 INNOVATION

Innovation is more than about creating new products. Innovation includes understanding of the customer demands and how to deliver those demands in new ways and in new collaborations with other business (Keeley, 2013). Innovation is also associated to "newness" (Varis & Littunen, 2010) and can be considered be equal to new ways of doing business, new services and systems (Keeley, 2013). Gupta, et al., (2007) define innovation as a development or production of a new idea. Even with the association with something new or inventions, there is no simple way to clearly define the term innovation, due to shape or degree. Innovation can also be distinguished between product innovations, process innovation, organisational innovation and market innovation (Varis & Littunen, 2010). It can also generate new engagement and interactions between customers and organisations. New innovations can create feasible and practical tools or contributions (Gupta, et al., 2007). Hence, the challenges are to transform innovations opportunities that can generate organisational growth (Keeley, 2013; Francis & Bessant, 2005). Internal resource constrains such as time, money, skills and knowledge need to meet external challenges (Francis & Bessant, 2005). The traditional management measurement and steering need to be re-shaped or better adapted to future challenges of new innovations (Nilsson, 2015). Moreover, open innovation has become a popular new way to interpret the content of innovation.

3.3.1 OPEN INNOVATION

Open innovation is a term developed in the early 21st century and has several meanings. Chesbrough (2006), the father of the term open innovation, describe open innovation from his point of view as follows:

> "*The open innovation paradigm can be understood as the antithesis of the traditional vertical integration model in which internal innovation activities lead to internally developed products and services that are then distributed by the firm*. *Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation"*. (Chesbrough, 2006, p. 20)

Open innovation drives companies toward a new area where companies should and can use external knowledge but also internal ideas. The combination of external and internal expertise and ideas result in platforms and architectures initiated by open innovation. Business models that use those platforms and architectures can create value and at the same time define internal mechanisms for that value. There is two different open innovation, inside- out and outside-in innovation. Inside-out perspective allows unused ideas to be applied to others in their business models. Outside-in is a popular perspective, both in academic research and in industry practices, where open innovation processes are opened for external contributions and involvements. (Chesbrough, 2006)

3.3.2 MANAGING YOUR INNOVATION PORTFOLIO

As already mentioned, managers are struggling with global competitive pressure and the rapid pace of structural changes. Moreover, the ability to be innovative is considered to be essential to stay profitable. Still, chief executives need to act and have a difficult time to handle internal initiatives and how to prioritise these initiatives. There is limited knowledge of how to manage innovation strategically. For those companies who have succeeded with their innovation portfolio, have a clear innovation ambition and have categorise and found the balance between core, adjacent and transformational innovations. Also, the various categorised innovations have been manage accordingly with tools and capabilities. (Nagji & Tuff, 2012)

How businesses invest in initiatives are different within a broad range of risk and reward. Therefore, it is of importance to allocate optimal resources for different innovative ideas to produce the highest return and at the same time handle possible risks. Nagji and Tuff (2012) have developed an Innovation Ambition Matrix. The Innovation Ambition Matrix is a further development of a classic diagram created by mathematician H. Igor Ansoff. The Matrix are divided by *how to win* on the x-axis and *where to play* on the y-axis, see Figure 7 for an overview of the Innovation Ambition Matrix.

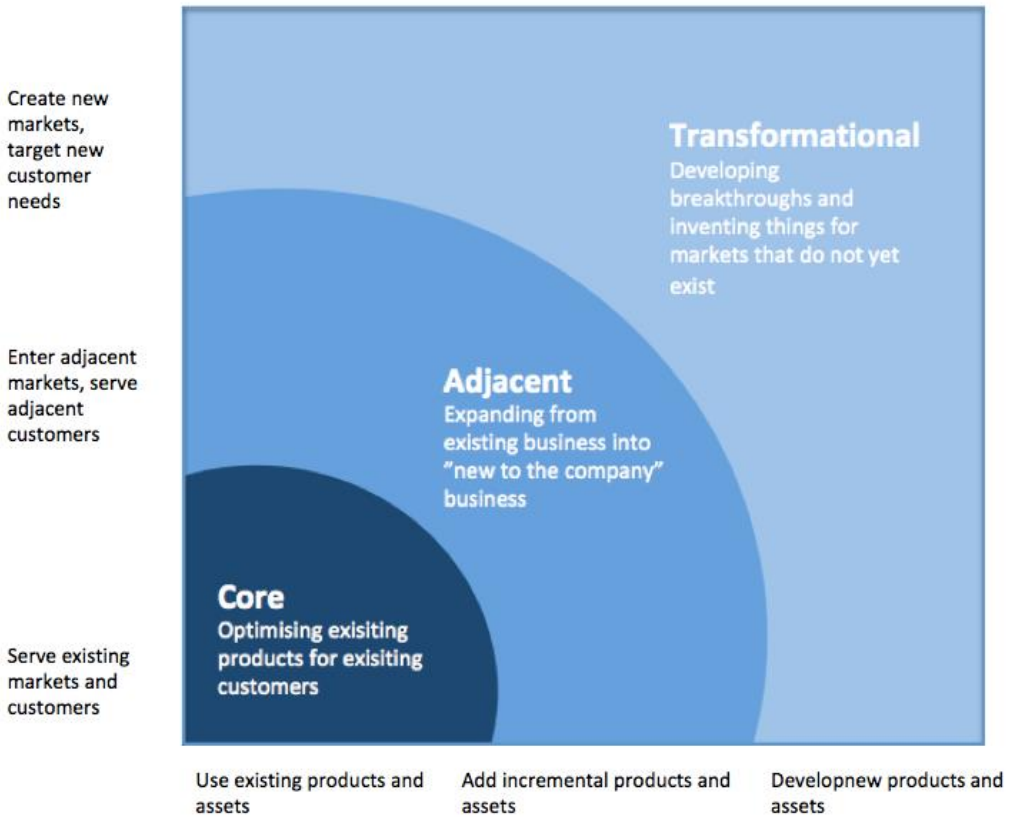

Figure 7: The Innovation Ambition Matrix (Nagji & Tuff, 2012)

In the lower left corner relates to initiatives improving core offerings of products and incremental ways into new markets. Examples of core offerings are other ways to package products or service convenience. The placement of adjacent innovations in the middle is associated to companies offerings take a turn into a new space. Adjacent innovations can be a combination of both improving core offerings and transformational initiatives. Therefore, transformational innovations are placed in the right upper corner. Innovations regarding breakthroughs of completely new products or new markets are transformational. The launch of iTunes or Starbucks in-store experience are examples of successful breakthroughs. (Nagji & Tuff, 2012)

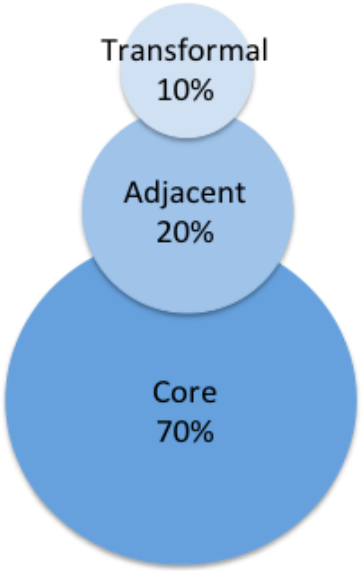

Figure 8: Allocation of resources of innovation activities (Nagji & Tuff, 2012)

How to allocate the resources within the different range of innovation are varied depending on how to increase share price performance. The majority of companies who have succeeded with allocation of resources, have allocate their resources accordingly; Resources associated to innovation activities were allocated to 70% to core offerings, 20% to adjacent initiatives and 10% to transformational innovations, see Figure 8. Thus, this is not an optimal allocation for every business, but it is considered to be a good starting point to continue a discussion. (Nagji & Tuff, 2012)

3.4 BUSINESS RELATIONSHIP AND PARTNERSHIP

Due to open innovations reshaping the relation between companies, business relationships have gone through a transformation and rules are changing in the competitive environment (Kleinaltenkamp, et al., 2016). To gain new competitive advantages, a creation of business relations is common (Mohr & Spekman, 1994). Technical innovations are one trigger of this significant change in the marketplace. Technical innovations affect manufacturing processes, application processes and make businesses

collaborate in a different manner (Kleinaltenkamp, et al., 2016). Cooperative relationships between firms are an important aspect to take in consideration when gaining external knowledge outside the business. There are several factors that influence marketing and management in business relationships, such as commitment and trust (Friman, et al., 2002; Morgan & Hunt, 1994; Mohr & Spekman, 1994), relation termination costs and benefits, communication between businesses, shared values and opportunistic behaviour (Morgan & Hunt, 1994). Ganesan (1994) agree that trust is an essential factor in a long-term business relationship together with mutual dependence. Mentioned aspects are connected in a model called a Key Mediating Variable (KMV) model to provide a holistic view of factors that influence long-term collaborations. The KMV model is shown in Figure 9.

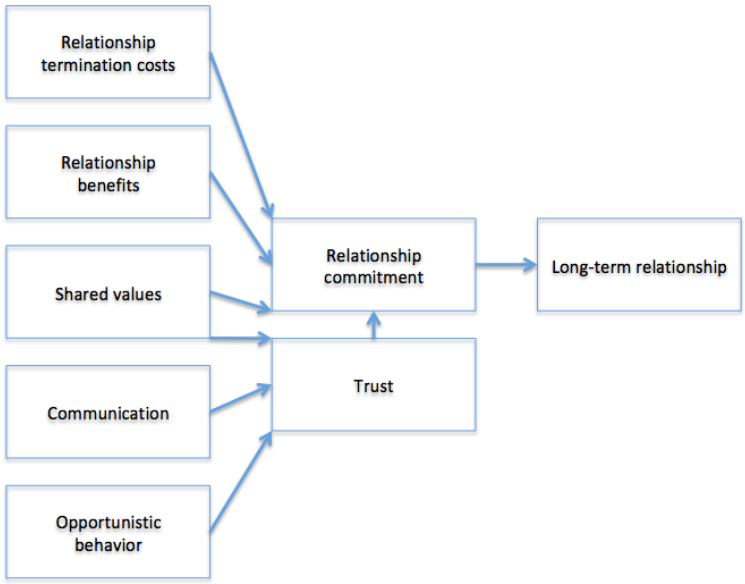

Figure 9: KMV model of relationship marketing, cited in Friman, et al. (2002)

3.4.1 TECHNOLOGY DEVELOPMENT IN THE 'TECHNOLOGY STREAM'

Creative work including technical innovations, need to be taken care of and implemented in core business processes. Clausing (1994) has described and explained a course of actions for a dedicated technology development to collect optimal technical concepts from a creative internal environment. This course of actions is first and foremost developed within product development. The reasons of having a dedicated technology development process to gain advantages from a technology stream according to Clausing (1994) are "*to enable time for creativity*, *to provide a creative environment* and *to develop (robust) technologies that can be used in several products"* (Clausing, 1994, p. 317). One of several advantages of having a clear technology development, is that it can reduce uncertainties in terms of scheduling in product programs, such as invention uncertainty and robustness uncertainty in the process of developing new products. New innovations and technology developments can be time consuming. In contrast, product development programs with chosen concepts take less time, usually

a few months. One critical factor for success is, therefore, a clear product development schedule with minor uncertainty. (Clausing, 1994)

Necessary time for new innovations and ideas are essential. Also, it can be beneficial for companies to provide an environment dedicated to creativity. To have in mind, engineers working with technology development differs from product engineers. Product engineers highlight great range of available knowledge ready to be installed. Engineers within technology development believe in creativity followed by robustness development. Organisations working towards technology development an environment that support creative work so creativeness can flourish without major obstacles. (Clausing, 1994)

A technology development process is described in a sequence of several steps:

- *Technology strategy*
- *Creative work*
- *Robustness development*
- *Selection and transfer* (Clausing, 1994, p. 321)

The first step involving technology strategy is a guideline for the creative work and include technologies that are most needed in a development of new products. The second step, creative work is an important step where new ideas are generated and room for inventions are made. This step can be divided into three sub-steps: *Definition of needs, Invention* and *Concept selection*. After creativeness and new concepts are generated, the concepts need to be optimized and robust. By optimizing robustness in concepts, concepts can be used in several products and production preparation are more efficient by not having to rework the design. The best concepts with the desired robustness are then selected and transferred to the concept phase and a start of a new product can begin. The technology development process for product development is shown in Figure 10.

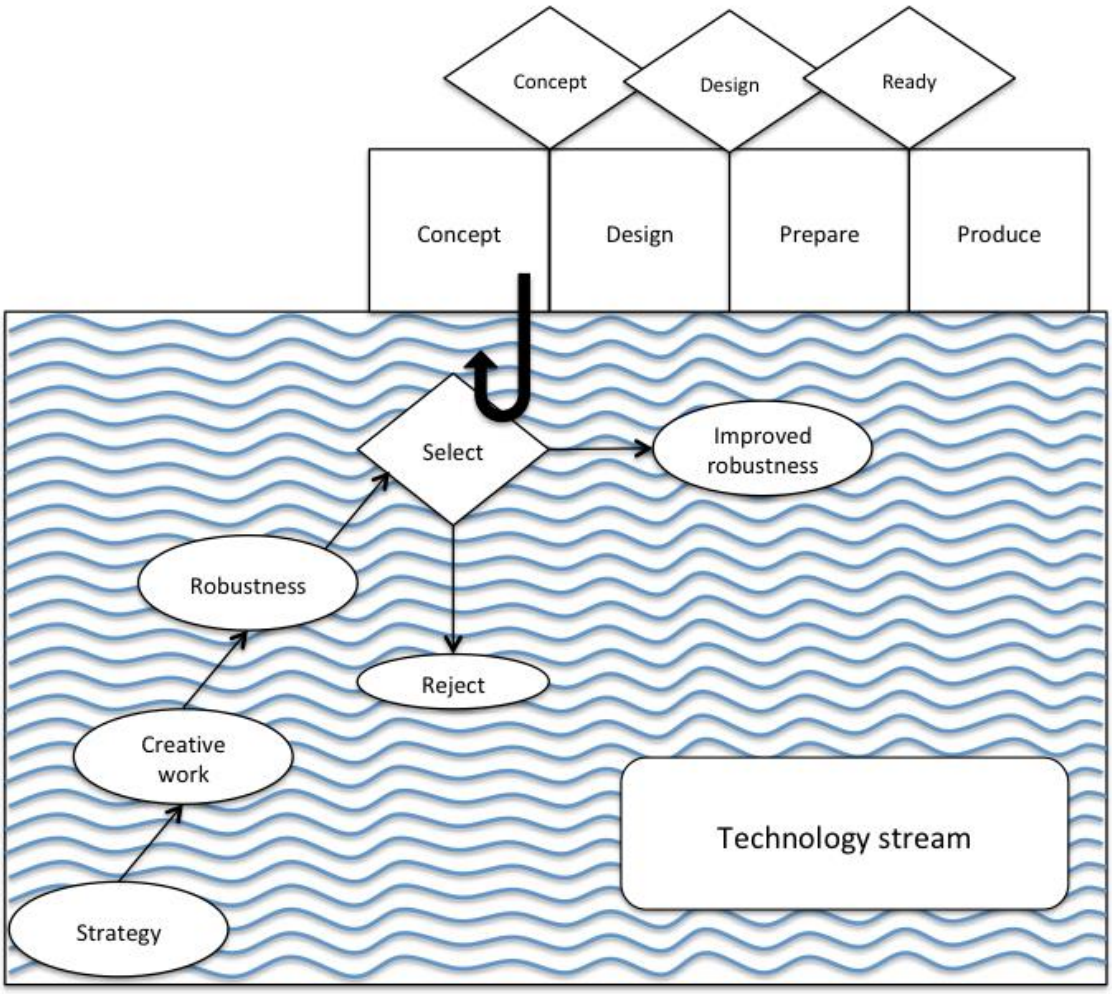

Figure 10: Technology development in the "Technology stream" according to (Clausing, 1994), cited in (Cronemyr, 2000)

The step between strategy and creative work in the schedule of developing robust technological solutions, can be considered to be quite broad and weak. Therefore, Cronemyr (2000) has further evaluated this step with a more structured way with a framework to reach the creative work. The creative work is done by technical specialists who work accordingly to a strategy. A sub-process to the technology stream has been developed and is explained in the next following section.

3.4.2 TECHNOLOGY DEVELOPMENT AT ABB STAL – PHANTOM TURBINE DEVELOPMENT

1998, ABB STAL did a future improvement of their technology development process. This improvement was a concept of the Phantom Turbine as a roadmap for product development. The Phantom Turbine does not exist, it is an ideal model to develop new products with common goals presented to unify the research and design (R&D) department. The Phantom Turbine development focus was to share the goal and focus on the customers. The initial purpose with the Phantom Turbine was divided into different aspects. For a long-term competence development, resources and money had to be allocated. It was necessary to have a relation to a 'real' product to make an understanding for the top management. Processes and technologies had to be ready when they were needed. The correct competencies had to be available at the right time to make the product development process more efficient. A well-defined goal had to be focused for the technical specialists and the researchers. Within the Phantom Turbine development, the main goal was to make it possible to produce the Phantom Turbine at the right time in the future. Even if the Phantom Turbine would never be produced, it would still meet future customer needs. (Cronemyr, 2000) Also, this was a structure roadmap to meet future customer and organisational demands with the possibility for technical specialists and developers to be creative in their own environment. The concept will be further explained.

Phantom Turbine specifications are inputs to the process 'Technology Development'. The development process 'Develop Products' is showed in Figure 11. A future fictive turbine was stated with these specifications, such as performance, cost and emissions. These values are compared to the performance of a turbine that the organisation was producing than by using technology roadmaps. This is the first step in Figure 12. The performance roadmap showed the gap and the direction to decrease the gap between the turbines. The next step constituted the Phantom Turbine roadmap by identifying the components and sub-systems that is necessary to achieve the performance of the Phantom Turbine. Key technologies and core competencies had to be identified to be able to develop the new components from the 'Phantom performance'. The outcome of the 'Technology Development' process is technology development specifications. These specifications are delivered and used by technical specialists and 'researchers' in development projects. (Cronemyr, 2000)

This type of projects develops technologies, core competencies and requirements for the improved development processes to develop the Phantom Turbine. To follow up and measure the expected technology improvements, the roadmaps are updated every year in the 'Develop Product Portfolio' while the technology development projects usually reaching over a longer period of time in the process 'Technology Development'. (Cronemyr, 2000)

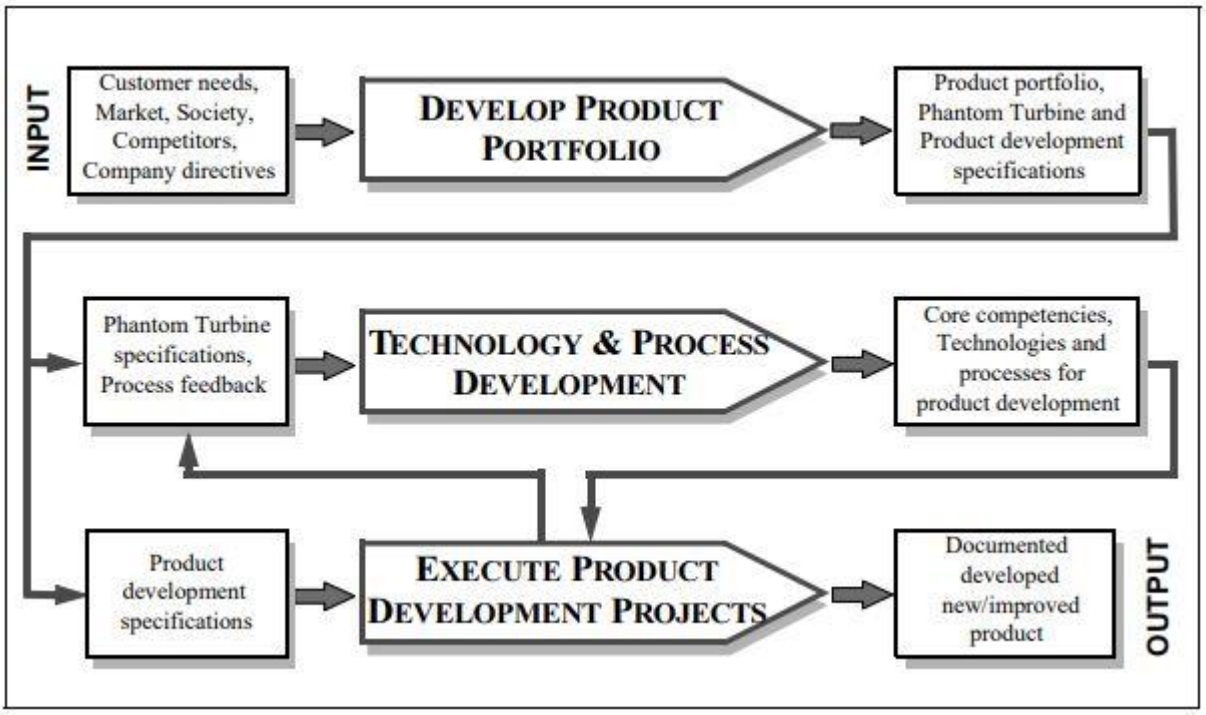

Figure 11: 'Develop Products' process (Cronemyr, 2000)

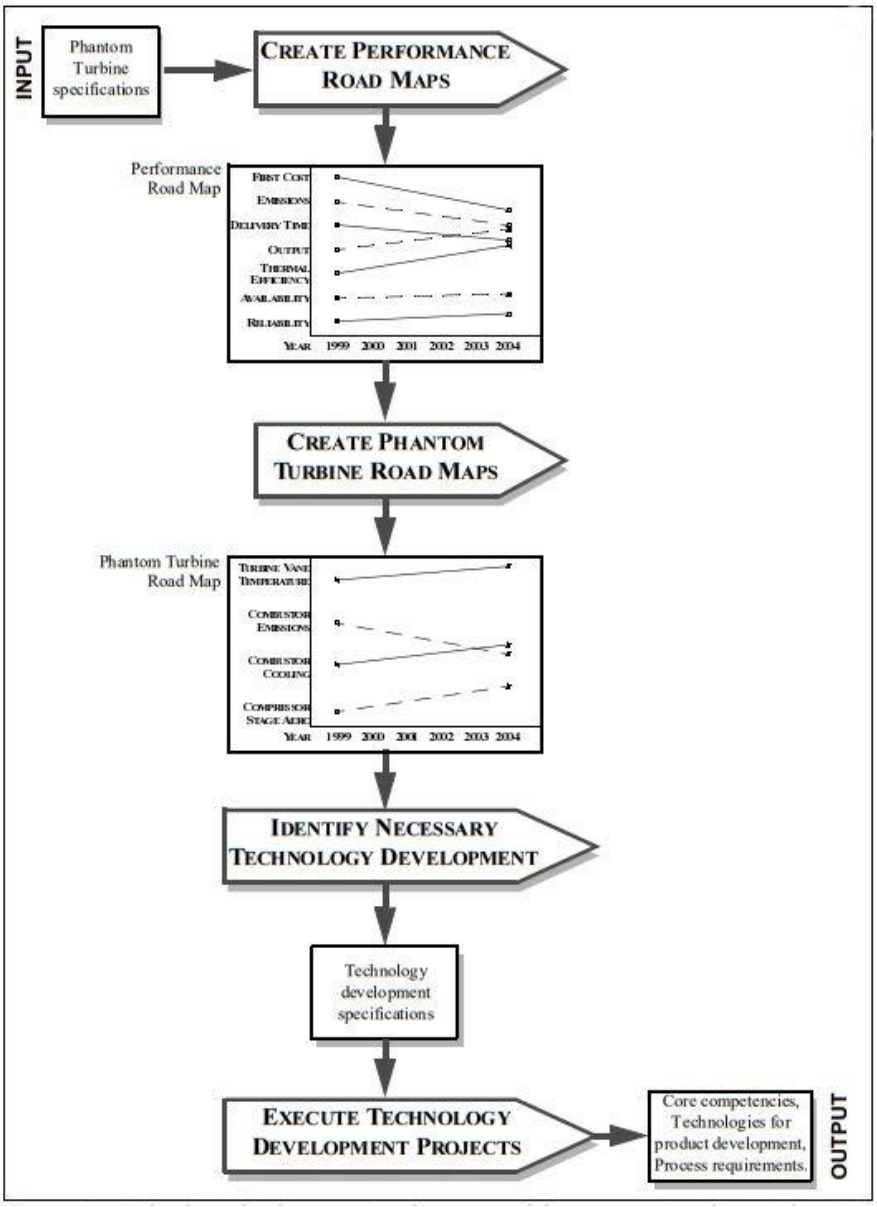

Figure 12: Technology development roadmap (a sub-process of the process 'Develop Products') (Cronemyr, 2000)

3.5 PROCESS MANAGEMENT

Process Management is a popular concept and has been used for several years. What is the purpose or meaning of process management? Rentzhog (1998) explain that process management focus on the process of the product or service. The attention lies in the activities in the process and the process is the common ground for a good product or service. Melan (1995, p.2) describes process management as *"a bounded set of repeatable work activities that transform material and information into an output".*

Create value and integrate value-added activities in organisations are central actions in process management. Process management has gained popularity in many businesses such as service companies and within the public sector (Hellström, 2006). Value is what is considered to be important for the customer (Clausing, 1994). A process is, according to Rentzhog (1998) as well as to Bergman and Klefsjö (2012), a chain of activities that repeats and create value for a customer.

A company can be described as a network of processes. The processes can be divided into different type of processes, *main processes*, *support processes*, and *management processes*. See Figure 13. The main processes purpose is to fulfil the external customers' requirements and to breed the company's products. Furthermore, product development processes should create value to future customers, while production and distribution processes should create value to current customers. Each company should identify one to maximum three main processes. Support processes purpose is to support the main processes with resources. Those processes have internal customers' as focus, such as recruitment processes, maintaining processes, and different types of administration processes. Management processes purpose is to decide about goals and strategies of the organisation. At the same time, the management processes should support improvements for the other processes. The purpose with each process is to satisfy customers' with the minimum amount of resources as possible. Different kind of resources is required in processes, resources as information, energy and working hours. (Bergman & Klefsjö, 2012)

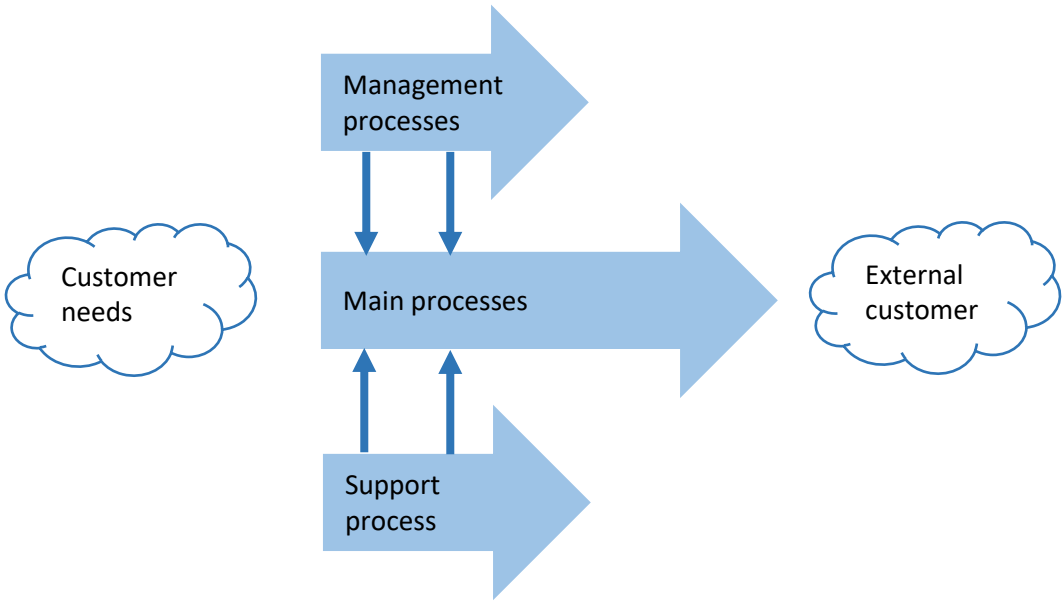

Figure 13: Different types of processes. Authors' interpretation of (Bergman & Klefsjö, 2012)

Processes can be divided into sub-processes, which depends on the amount of people in the process. Either it is called individual processes, functional processes or core processes. Individual processes are produced by an individual. Functional processes are connected to business activities with a connection to a certain department, function or unit. Core processes goes through the whole organisation and not

only one function or one department. In general, should those processes result in incomes to the organisation. (Bergman & Klefsjö, 2012)

According to theory, there are two different ways to work, function-oriented or process-oriented. Function-orientated organisations are the traditional way to work, while nowadays, many organisations are either changing or have already changed to a process layout in the organisation. A function-oriented organisation means that the problem is solved but the solution still exists thanks to the tradition and our habits. Function-orientated organisations can be described as there are almost no communication at all between different departments. In some organisations, it is almost as there is a wall between the departments, which can lead to dissatisfied customers. To create new solutions and change from traditions, it requires courage, power and creativity. (Ljungberg & Larsson, 2012)

Process management has been successfully implemented in many manufacturing companies, but there are still room for improving other types of processes. To continuously improve processes, there are different kinds of procedures. Benchmarking is one of them. Benchmarking seeks for improvements by observing other processes and compare them, such as internal-, external-, functional and general comparison. See Table 6. The purpose is to gain understanding and utilise from the comparison of observed processes. (Bergman & Klefsjö, 2012)

Table 6: Different types of *Process Comparison* or also called *Benchmarking*. (Bergman & Klefsjö, 2012)

Process Comparison	Description
Internal	Process comparison with the same process at another place, another department or corporation within the corporate group
External	Process comparison with the same process at a competitor
Functional	Process comparison with an excellent company working in the same or similar area
General	Process comparison with the best-known company no matter area of business

It is important to understand the process before start working with continuous improvements. To understand the suppliers' and customers' needs, it is necessary to have a collaboration with them. That is because it is easier to understand how the result of the organisation affect the different partners instead of just a question which make it easier for misunderstandings. (Bergman & Klefsjö, 2012) According to Rentzhog (1998) the most important part in Figure 14 is the customer. The customers make it possible for the process to exist and should therefore be able to affect the process result and

content. Continuous feedback is necessary to receive correct information both from the supplier and customer, the reason of that is to be able to develop the process and continuous improve it.

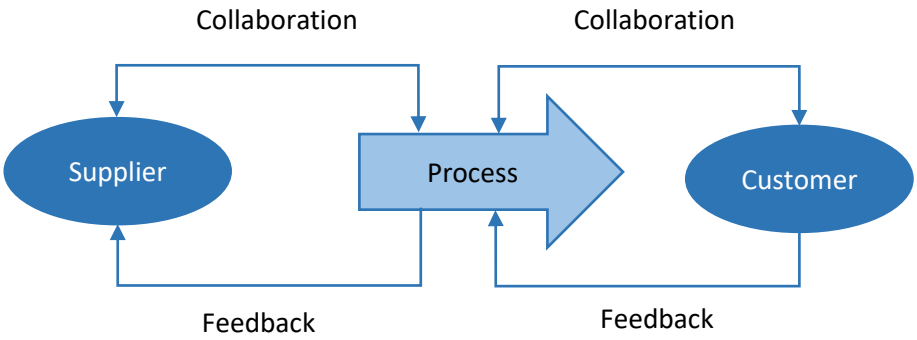

Figure 14: Customer and supplier model (Rentzhog, 1998)

To continuous improve a process, it contributes to a better quality, efficiency and adjustment ability. Improved process quality means to get the ability to satisfy the customers' needs and expectations. Efficiency means how well the processes uses the resources of the organisation to produce the result. Adjustment ability measure the opportunities to adapt in a surrounding of changeable conditions. An important step today, is to simplify the complex systems from a quality and productivity aspect. Examples of being more efficient in the process can be to reduce unnecessary waiting times, to find the bottlenecks, and to reduce variation. (Bergman & Klefsjö, 2012) If variation exists in the process, the outcome will have variations as well (Rentzhog, 1998).

"The best way to improve performance results of a business outcome is to improve the process that produced it!" (Watson, 2007, p. 14) Therefore, focus on improvements and steering should be first and foremost positioned in the chain of activities in the process (Rentzhog, 1998).

According to Ljungberg and Larsson (2012), process mapping are used to convey the purpose, structure and appearance of the process in form of designed maps. Process maps are helpful while explaining how the organisations different departments are connected to each other and how they collaborate to create value for the customer. When an organisation makes this process maps, the problems and misunderstandings are being removed. Mapping is necessary in the beginning of the work with processes, since they contribute with the whole picture of processes. Two important aspects of process mapping are to understand the process and to develop the process, to show what is supposed to do and not how. A proposal procedure way to create a process is:

1. Define the purpose with the process and the start and finish point.
2. Brainstorm all the possible activities for the process and put them on Post-it-tags.
3. Arrange the order of the activities.
4. Merge and add activities.
5. Define objects in and objects out to each activity.

6. Make sure that the activities are linked together via the objects.
7. Control that the activities are on a common and detail level and have suitable names.
8. Rectify until a satisfied description of the process has been obtained. (Ljungberg & Larsson, 2012)

According to Cronemyr (2016), there is a process map called “doing things right process”, which means to start the process mapping from the end where the customer is. Then, an assumption is made that the step before is correct and completed on time. The purpose of that is to take care of problems before they arise. (Cronemyr, 2016)

To create an efficient process map, it is beneficial to use a structured method to make fewer mistakes. Mistakes such as, too many activities are created and not reflected enough, getting too deep in details in a too early stage, taking too long time to get started, hamper creativity and productivity while trying to create the “perfect map” at once, does not differ current and future state, different detail level in the description of different part of the process. (Ljungberg & Larsson, 2012)

The inclusion of routines in process management and related activities can influence organisation’s technical innovations. Established routines and coordination between activities can have a positive influence on responsiveness in a stable environment but have a negative effect on resistance to change where the environment change more frequent. Variations in organisations can be created by technological innovations and make organisations more adaptive to external changes. (Benner & Tushman, 2002)

3.5.1 PROCESS MATURITY

In some cases, according to Beer and Nohria (2000), change initiatives of restructuring, downsizing or new technologies fail up to 70% of the times. The same authors state the reason of those failures is due to managers’ urgency to change the organisation. As already mentioned, digital strategies and digital solution can be equal to change for many businesses. To better meet change initiatives and improve insight into process management, (Cronemyr & Danielsson, 2013) have developed a diagnostic process maturity model based on previous maturity models to better improve process management. There are several maturity models of process states and organisations, but there is limited information how to go from one state of level to another. Therefore, a diagnostic tool that practical describes how to go from one maturity level to another developed by (Cronemyr & Danielsson, 2013), will be described in this report. It is a diagnostic tool developed together with several companies to assess their current level of process maturity and together with an academic cooperation. The purpose of the maturity model is to help organisations reduce the risk of failing when implementation new change initiatives.

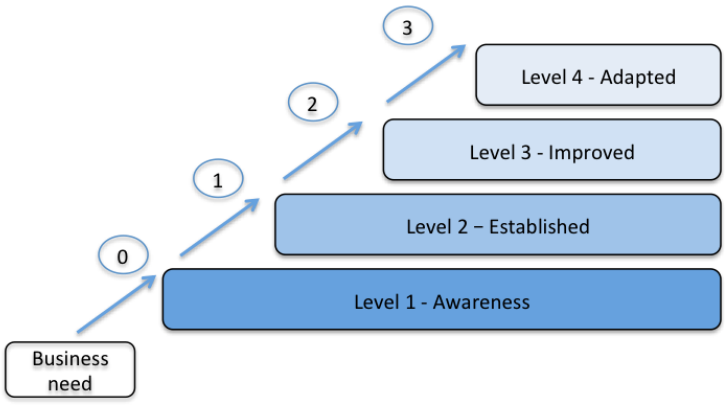

Figure 15: The process maturity level (Cronemyr & Danielsson, 2013)

The model consists of one level of business need, which is a pre-level step and four maturity levels, see Figure 15. The pre-level step is not a part of the other levels, because it is not a foundation of the other levels. Organisations positioned at this step have an absence of processes, no process awareness at a top management level and the organisation is functionally oriented. Therefore, necessaries to establish processes cannot be performed. (Cronemyr & Danielsson, 2013)

The first level of maturity is the level of awareness. Process management and the usefulness of it are existence at a top management level. This awareness is essential to establish processes. At this level, some influence of process management can be found. (Cronemyr & Danielsson, 2013)

In the next level, processes are established in the organisation. The processes are put in practise and documented containing necessary constituents. At this level, it is necessary to have some demands delivered from the process and attention from the management for the process to be sustainable. (Cronemyr & Danielsson, 2013)

Level three, the improved level, process data is the focus. To improve the processes, the process need to be fully established. Improvements are better implemented with a stable basis. The foundation of improvements should be based on facts, where structured methods and customer focused measurements are considered to be necessary. Controls for the processes should also be added and established when measuring results. (Cronemyr & Danielsson, 2013)

The top level of process maturity is the adapted level. At this level, the processes need to be more proactive and flexible together with a closer collaboration with the customer. Reaction to changes in the process are detected earlier when implementing statistical process control. Processes at this level are more able to adjust to changes of customer demands. For this level, there is a need for everyone working with and in the processes to have a fundamental understanding and commitment for the process. (Cronemyr & Danielsson, 2013)

To be able to use this tool in practise in a more detailed way, eight categories were derived from basic process theory and process management models. The eight categories are:

- Management of the organisation
- Way of working
- Layout of the process
- Documentation
- Management of the process
- Users of the process
- Measurements
- Improvements (Cronemyr & Danielsson, 2013)

A summarised figure is shown in Figure 16.

Figure 16: Detailed maturity model, cited in (Cronemyr & Danielsson, 2013) based on (Bergholtz & Danielsson, 2012)

3.6 QUALITY MANAGEMENT

Quality Management has the focus on the customer, the same aspect as in process management. Quality dimensions are also an integrated activity within a business and have gained importance from a strategic point of view. A central view of quality is the focus on the customer. Quality of a product or service are determined and valued by the customer. (Bergman & Klefsjö, 2012)

There are different concepts within Quality Management. The most used global concept is *Total Quality Management (TQM)*. It is similar to the Swedish version, *Offensive Quality Development*, which

is based on the *Quality Cornerstone Model*, see Figure 17. Offensive Quality Development means to actively prevent, change and improve and not to control and repeat. The model includes *Top Management Commitment, Focus on customers, Focus on processes, Base decision on facts, Improve continuously, and Let everybody be committed.* Top Management Commitment means that the top management should be engage and show interest to be able to achieve results within quality. The central focus of the model is to focus on the customers. The reason of that is the importance of working with value aspects regarding quality. The customers should be satisfied with the quality and the quality aspects differ if it is a product or a service. Quality aspects of a product can be *reliable, performance, maintainability, environmentally friendly, appearance, free from defects, security, and sustainability*. While quality aspects of a service can be *reliability, credibility, availability, communication capability, service minded, politeness, empathy, and surroundings*. The upper left corner in Figure 17, focus on the processes, should satisfy the customers with the result and use as fewer resources as possible. Base decision on facts, means that the organisation should get enough knowledge by analysing data and differ irrelevant and correct information. Improve continuously, the requirement of the customers continuously increases and also the technology and new forms of businesses. Therefore, companies always need to continuously improve their products/services and their organisations, to be competitive on the market and satisfy the customers. Communication, delegation, and education are important words that have to be fulfilled if everybody would be able to be committed. (Bergman & Klefsjö, 2012)

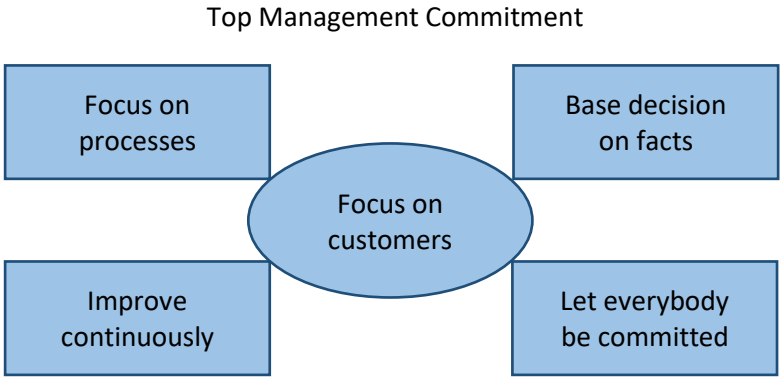

Figure 17: Quality Cornerstone Model (Bergman & Klefsjö, 2012)

3.7 QUALITATIVE TOOLS

In this section, qualitative methods and tools are presented. The tools are recommended to include in the Conceptual Cooperative Model. The qualitative tools are explained and visualised in this section.

3.7.1 PDSA

Demings (1993) has invented a tool called PDSA-cycle, which is used to improve processes. See Figure 18. The goal of the first step is to *Plan* a test or a change of improvements. In this step, there are many organisations trying to shorten this step to start working to achieve results instead of planning so everything will be correct. That can give effects later on, if the organisation has missed any aspects of the work. Those effects could lead to rework, loss of costs and time, or even effects as an accident or broken products. Step 2 is *Do*, to carry the test or change on a smaller scale in the beginning before doing it in the whole process/organisation and collect the result. *Study* is the third step, which means to review the results of what went well and what went wrong with the change. Also, what have we learned during the process? What will we bring with us for the next improvement? The last step in the circle is to *Act*, adopt the change into the process or reject it. It is always possible to start-over the process again if that is necessary. (Demings, 1993)

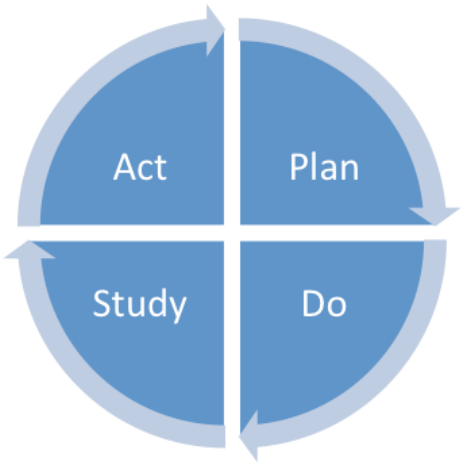

Figure 18: PDSA (Bergman & Klefsjö, 2012)

3.7.2 SWOT

SWOT analysis is a tool for brainstorming and planning that helps organisations to evaluate a project or an idea in a business (Harmon, 2015). SWOT can be used to identify and assess the internal strengths and weaknesses in an organisation but also to identify and assess the external opportunities and threats (Harmon, 2015). The purpose of a SWOT analysis is to intend strategic insight (Valentin, 2015) and to provide businesses with ideas for improvements, but also to determine the performance in a new business (Harmon, 2015). Harmon (2015) claims that internal factors could influence the business

in form of reputations. It is possible to change these internal factors even though it takes time and effort, while external factors are usually difficult to change, such as competitors. It is important to understand that SWOT analysis is one tool that can be used to solve some problems, but not all, and therefore other tools could be more relevant depending on the situation (Harmon, 2015).

Common areas for using SWOT analysis is to organising information, identifying problems, determining solutions, and recommending opportunities. The tool could help businesses to eliminate and reduce the internal weaknesses, while at the same time, focus on the internal strengths. A team of different backgrounds, managers and non-managers, should be involved when creating a SWOT analysis. The reason of that is to generate as many ideas as possible. However, SWOT analysis should be used both in existing businesses and in new businesses. In existing businesses, the tool should be used with the purpose to analyse if the company needs to change anything to stay competitive. While in new businesses, the analysis should be a part of the planning and development phases in the organisation. (Harmon, 2015)

Furthermore, the SWOT analysis different parts are compared. The internal parameters (strengths and weaknesses), then the external parameters (opportunities and threats) are identified and compared against each other. When the employees have highlighted the internally issues, the leaders have to prioritise the problems and thereafter decide if they are worth fixing. However, examples of internal factors according to Harmon (2015) could be: *current processes*, *finance*, *resources* etc. While examples of external factors could be: *demographics, economic and market trends* etc.

3.7.3 BRAINSTORMING

Another method to find solutions to specific problems is *brainstorming*. Brainstorming can be done when it is necessary to generate new ideas or new requirements. In product development processes, brainstorming is often used in an early or middle stage. Still, brainstorming can be used whenever there is a need for new ideas or solutions. There are several strengths of brainstorming. In some cases, spontaneous ideas and quick ideas can be provided only by brainstorming. There is no need for a lot of materials, it can be a democratic way of creating ideas and there is a social interaction when working in teams or groups when generating solutions. Still, there is other aspects to take in consideration when having a brainstorming. It can inhibit individual recognition for good ideas if some participants are more dominant, different experience and status of the participants can reduce the effectiveness and it can be difficult to sort out and choose the ideas. (Wilson, 2013)

3.7.4 SMART- GOAL

To continuously work toward a vision, development of short- and long-term goals is necessary to understand the basis of critical success factors. A goal should be reachable within a specific time-frame and everyone involved in the goal should have a clear understanding of its meaning. To have someone responsible for the goals is also of importance by allocating resources more efficient to successfully

reach a desired level. A goal should be *Specific, Measurable, Acceptable, Relevant* with *a Time-frame*, also known as a SMART goal. (Bergman & Klefsjö, 2012)

- *Specific* – Should give the goal a direction. Useful words can be decrease, increase and improve. Words such as satisfy, utilise or cherish.
- *Measurable* – Which possible measurements and units should be used to measure progress, for example money, time or entities.
- *Acceptable* – The people involved in the goal, should accept the goal as well.
- *Relevant* – The target of the goal should be realistic with realistic prerequisites.
- *Time-frame* – Time for finish should be done with the people involved with the goal. (Bergman & Klefsjö, 2012)

3.7.5 ROOT CAUSE ANALYSIS

Acknowledged problems often have causes that need to be identified (Olhager, 2013; Andersen & Fagerhaug, 2006). By identifying the root causes of the problems, problems can be avoided and prevent that they will occur again in the future (Olhager, 2013). By identifying a cause or causes to a problem and eliminate those causes, may occur easy. Still, it is simple to misjudge how much time and effort it takes to find the right cause of a problem. If the root causes are identified, it is important to eliminate them. Also, one root cause can be the reason of several problems. Otherwise, if the root cause cannot be found, there is no proper solution to be developed (Andersen & Fagerhaug, 2006). There are several approaches of problem solving and processes to find the root causes. Andersen and Fagerhaug, (2006) describe their point of view of problem solving, emphasizing on root causes analysis. The process is described in seven steps, starting with *problem understanding,* followed by *problem cause brainstorming, problem cause data collection, problem cause data analysis, root cause identification, problem elimination* and *solution implementation.* There is many other problem solving methods, for example Deming's PDSA- cycle. See section 3.7.1.

3.7.6 ROOT CAUSE DIAGRAM

To connect the problems to different root causes, a root cause diagram can be used. This tool is also known as fishbone diagram or Ishikawa diagram. The name fishbone comes from the shape of the structure and how the problem is visualized. A specific problem is connected to different root cause areas, also known as the 6M's, *Material, Man, Milieu, Measurements, Methods* and *Machine* (Olhager, 2013). Bergman and Klefsjö (2012) have also added *Management* as one more cause area, see Figure 19. By doing so, the problem is broken down systematically in and the root causes are connected to the right areas (Olhager, 2013).

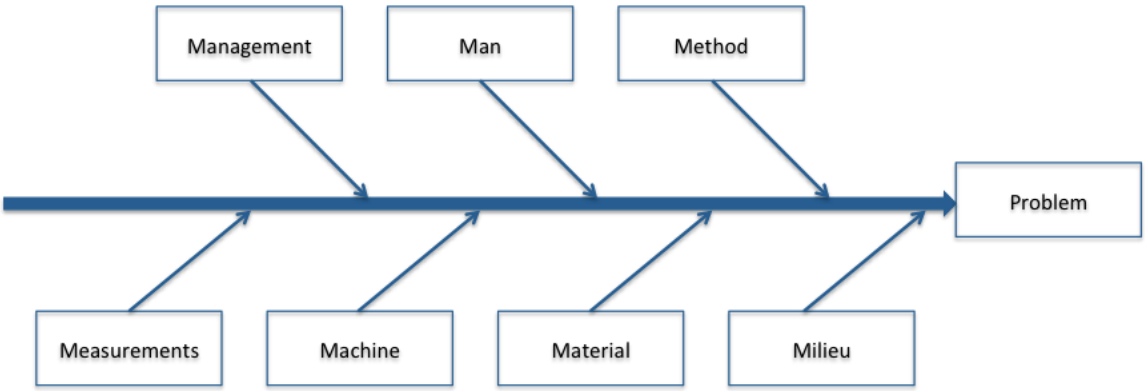

Figure 19: 7M-diagram (Bergman & Klefsjö, 2012)

The problem can be broken down by using the 5 why:s. This is a concept to make a detailed evaluation of a problem before solving it. Every possible improvement needs to be associated to a real problem. By saying the question "Why?" five times, a root causes can be identified. By using this concept of 5 why:s, a root causes can be detected and can be find in a completely different area. (Olhager, 2013)

3.7.7 QUALITY FUNCTION DEPLOYMENT (QFD)

To go from customer requirements and translate it to practical specifications in internal processes are the basic methodology in Quality Function Deployment (Olhager, 2013; Clausing, 1994). This methodology is used mostly in product development and is a systematic process where functions and attributes for products are specified with desired targets. Product requirements and specifications are conveyed to the production chain, from the start of product development to production including all departments are involved in an early stage. Therefore, time and money can be saved by the early stage involvement of customer product demands with different departments within production development. The House of Quality is a central part of QFD and is considered to be an effective tool in product planning. The house of quality helps to systematically maintain information related to customer, product and construction techniques (Olhager, 2013). To do so, Clausing (1994) divide schematic the House of Quality in 8 different "rooms", where the rooms goes from customer desires and needs in room 1, toward the definition of corporate expectations of the new product in room 8.

Olhager (2013) describe the development of the House of Quality similar to Clausing, but in following seven steps: *Customer requirements, prioritization of customer requirements, customer comparison with products from competitors, compilation of technical solutions, connection between customer requirements and technical solutions, technical comparison with competitors* and *connection between different technical solutions*. Therefore, the starting point is the voice of the customer where there is a need of a cross-functional cooperation to better understand the customer to connect the important product functions throughout the whole organisation. (Olhager, 2013)

QFD is chosen to be used in this study because the authors have experience of the tool and believe that it is suitable to use in the Conceptual Cooperative Model.

3.7.8 PRIORITISATION MATRIX

Selection of optimal solution or solutions can be done according to a solution selection matrix, also known as a Prioritisation matrix. It is a structured technique where a combination between a list of possible solutions and weighted criteria is made. This matrix shows both advantages and disadvantages of different solutions according to the weighted criteria. This is often done in teams where different opinions are valuable to the result of the matrix. First, a selection of solutions is made excluding unacceptable solutions that the organisation will not accept. Make sure that the criteria with weighting scores are accurate and well-formulated including a cost/benefit assessment. Moreover, the team make scores for every solution in relation to the criteria followed by a calculating the final scores and overall rankings. The overall ranking shows the result of which solution is optimal. The result and the preferred solution should be verified by the team. See Table 7 for an example of a Prioritisation Matrix. The *Weighting* is calculated according to a multi-voting system. (Brook, 2014)

Table 7: Example of a Prioritisation Matrix (Brook, 2014)

Criteria	Can be implemented quickly	Will solve the problem fully	Costs less than 100K Euros	Won't impact the customer	No regulatory risks	**Final weighted score**	**Overall ranking**
Weighting	0.09	0.48	0.13	0.21	0.09		
Solution A	8	4	8	7	1	5.24	4th
Solution B	8	7	9	6	5	6.96	1st
Solution C	4	9	4	3	7	6.46	2nd
Solution D	4	5	3	10	4	5.61	3rd

3.7.9 PUGH MATRIX

One method for selecting a solution and further develop a possible synergy with other solutions, a Pugh matrix is a practical tool to use. Generating of different solutions are compared and are put in relation to announced criteria. Several identified solutions can be mixed due to positive synergies to better meet the criteria. The first step toward a complete Pugh matrix is to select possible solutions, the assessment criteria and weighting. Weighting is done by prioritising which criteria is consider to be the most important and rank them after that. Next step is to select which solution should be the standard solution. The standard solution is used for comparison when evaluating the other solutions. This comparison with a standard solution, is the third step. The other solutions are compared by making a comment if the solution will meet the criteria better, the same or worse than the standard

solution. When the comparison is made, the fourth step includes the calculation of the weighted sums (positive and negative) for every solution. When the strongest solution is set, evaluate if there is a possible way to combine the best aspects of different solutions. If new solutions are created, it can be necessary to make the Pugh matrix once more. (Brook, 2014) An example of a Pugh Matrix is shown in Table 8.

Table 8: Example of Pugh Matrix (Modern analyst, 2015)

Criteria	Optimal importance weighting	Current solution	Alt #1	Alt #2
Effectiveness	5	0	1	1
Availability of resources	3	0	0	1
Support from business	2	0	0	1
Long term benefit	2	0	1	0
Time to implement	4	0	-1	0
Ease to implement	1	0	0	0
Cost of implement	5	0	-1	-1
	Totals	0	-2	5

3.7.10 FAILURE MODE AND EFFECT ANALYSIS (FMEA)

FMEA stands for 'Failure Mode and Effects Analysis' and it is mainly a tool for risk analysis. The tool is used to prevent accidents before they happen, safety precautions and when the failure rate for a process is so low that the change to learn from past failures is very low. FMEA can be used both for products and processes. In a product FMEA, the function, the design and each component of a product is analysed in a potential failure aspect. In a process FMEA, the key outputs and each step in the process are analysed in the aspect of potential failure. (Brook, 2014)

Firstly, when using FMEA, the steps in the process or the components of the product are identified. The different failure modes that may occur must be listed for each step in the process (or for each component), and the severity (SEV) is rated. Furthermore, consider the different potential reasons that may cause the failure and repeat it for each failure mode and thereafter rate the occurrence (OCC). Moreover, the controls that are in place to prevent it happen, must be considered for each potential cause. Also, the controls should detect the failure if the cause does occur. Afterwards, the rating of the chance of detection of the cause (DET) is made. SEV, OCC and DET need to be multiplied with each other to generate a Risk Priority Number (RPN). This means that a calculation for each potential failure is made (SEV*OCC*DET). Finally, act on the results by allocating actions for the RPNs, start to tackle the one with the highest RPN and consider a deadline for reviewing progress. Consistency is essential when rating each parameter on a scale between 1 and 10. Several tables with some variation exist to help define the different ratings. It can be good to customise the template to the organisation's environment. A team should be assembled across the process while working with the FMEA, such as an operator, a manager and a designer. It is easy for FMEAs to expand fast and become big, since

several failure modes, potential causes and relevant controls could be part of each process steps. Therefore, a plan has to be followed to be able to complete the FMEA in time. (Brook, 2014)

3.7.11 ANALYTICS FOR MANAGEMENT (AFM)

Analytics for Management model was developed by (Chowdhury & Sandén, 2015) through theoretical studies which resulted in a conceptual model. Analytics for Management is a decision making tool where right KPIs are visualised and measured correctly. The model is divided in three main processes with including sub-steps. An input to the model is a formulated strategy which describe how value is created for stakeholders and customers.

The goal of the first phase in the main process is divided in three sub-steps involving decomposition of business strategy and to generate goals in subsequent order; Compilation of strategic goals, formulation and compilation of Key Success Factors and compilation of tactical goals. The second step is divided in three sub-steps; Generation of KPIs, mapping of KPIs and selection of KPIs. KPIs are thereafter selected and analysed for measurement. The third phase of the model involves measurement of the selected KPIs and a compilation of data collection. The last phase starts with preparation of measurements followed by the actual measurement and ends with a compilation of data collection. The compilation of data is visualised by scorecards and balanced score cards.

It important to involve persons on different levels of the organisation in the model, due to necessity of involving different types of knowledge in the different steps. Therefore, the authors of Analytics for Management have visualised which level of the organisation is involved in every phase and in every sub-step. A further detailed explanation of the three phases in the main process will not be included in this report.

3.7.12 WELFARE TECHNOLOGIES IN RELATION TO EFFECTIVENESS AND STRATEGIC PLANNING BY APPLYING AFM

There are several different digital solutions on the market. Still, it can be difficult to choose the most optimal one. A conceptual model regarding how to choose right technologies, in this case, 'welfare technologies in relation to effectiveness and strategic planning' (Eriksson & Johansson, 2017) have been an inspiration to this report. The model regarding choosing the right welfare technologies is a tool to link strategic goals, key performance indicators and welfare technologies. It gives a decision basis concerning a selection of welfare technologies. The model is divided and performed in three sequential phases; Strategy disintegration, welfare technologies and their connection to KPIs, and the last phase aims to meet customer needs and cost with chosen welfare technologies. The first step, Strategy disintegration, is divided into three sub-steps including a compilation of strategic goals based on five perspectives; customer, finance, collaborator, process and development, a compilation of KPIs and measurements. The goals should be related to the strategic planning made by top management and be connected to the right perspective. It is important that goals in different perspectives do not have a conflict. Hence, there is a need for redesigning the goal in conflict. With the settled goals, critical success factors are formulated and are formulated based on internal strengths,

internal weaknesses and external opportunities and threats. This can be done by a SWOT-analysis or a TOWS-analysis. The TOWS-analysis has been used in their report. Tactical goals are then generated by the critical success factors. The second sub-step involves generating KPIs in relation to the tactical goals. The chosen KPIs are then grouped by Key Performance Outcomes (KPO) and Key Performance Drivers (KPD). The third sub-step includes how to measure the chosen KPI by data collections of KPOs and KPDs.

The second step of the model is related to choose welfare technologies. This can be done in two different ways depending on the situation. Alternative 1 has its basis to improve a certain KPI that can be improved by a specific welfare technology. Moreover, in Alternative 2, it can be beneficial to evaluate welfare technologies first. Then, the evaluated welfare technology is connected to a specific possible KPI in an identified process. How the welfare technology affect the process is then identified, to later, determine how the chosen welfare technology effects KPIs through processes. The determination is done by the top management.

The first two steps in the model have connected strategies and goals with welfare technologies and the last step involve other aspects to take in consideration. In this case, other aspects are customer demands and cost-analysis. By implementing certain welfare technologies, the implementation should consider the customers' needs and how they can make optimal use of the technology. Otherwise, it is a risk of not reach a desired effect of the implementation. Also, a cost- analysis is done, to alternately, compare different welfare solutions. This cost-analysis should be a supplement to better informed decision making. A prerequisite for this conceptual model regarding how to choose right welfare technologies, was the usage of Analytics for Management developed by Chowdhury & Sandén (2015).

4 EMPIRICAL FINDINGS

Chapter 4 presents and includes information from the different interviews. All interviews have been held in Swedish and therefore are quotes translated until English. This chapter is a contribution to develop the Conceptual Cooperative Model, and therefore, provide a basis to answer the second and the third research question. Empirical findings from Propia is first presented in order to show an overview of the thoughts from the employer. Empirical findings from Propia exist due to the reason of making the Conceptual Cooperative Model generalisable. Secondly, empirical findings from Lejonfastigheter AB are presented and how the work according to the three main topics, digitalisation, innovation and process management. Finally, the results of the interviews with the external innovation partner contribute to the answer of the third research question.

4.1 PROPIA

During a discussion seminar held the 17th of March, theories regarding digital transformation were presented and discussed. During the discussion, it emerged that KPIs should be included in the Conceptual Cooperative Model. It would be preferable to monitor and follow-up the KPI to observe if changes emerge by an implementation of digital solutions. How to include KPIs in the Conceptual Cooperative Model exactly, was left to determine with this study.

Information regarding process management and process maturity was discussed with multiple consultants at Propia. There were different opinions during the discussion. Consultants thought that process maturity were necessary for a digital transformation, while others thought that a digital transformation would be possible without considering process maturity.

4.2 THE CASE COMPANY - LEJONFASTIGHETER AB

Lejonfastigheter AB is a public utility within the real estate market that conducts, builds and maintains public buildings such as schools, libraries and sports arenas. They have a responsibility and a mission from the municipality. It is a small company with around 70 employees. All interviews were held at their head office.

4.2.1 DIGITALISATION

According to Lejonfastigheter AB, 20% of their buildings, foremost bigger buildings are connected to servers and systems. Minor buildings are not connected to the same extent due to greater costs of connecting minor buildings. Still, new constructions and new buildings are connected to a greater extent. Digitalisation in buildings is related to ventilation, heat and cold calibrations, maintenance and digital systems in terms of installation of sensors in these buildings. The sensors collect data and store them in a system where administrators can get visual diagrams and real-time data. The starting point of connecting buildings was to detect errors before the customer did. Recently, due to stricter energy efficiency and stricter energy goals, digital solutions are more related to these energy goals within

constructions. Still, it can be difficult to analyse how much energy has been saved due to an implementation of a digital solution.

Within their processes, several systems are used. Recently, a digital platform has been implemented in the organisation where they work with digitising on a daily basis. It was stated that they separate digitalising from digitising.

"What we do currently is related to digitising. We improve our business processes to make them more efficient and more reliable".

IT Coordinator

Different systems are used in their business processes to collect and secure information and data. One challenge for the company is to make all employees use the existing systems that are integrated into the processes. Everyone does not optimally use the systems. Another challenge is to find the right competencies and to have a modern leadership to motivate and to make the progress move forward. Therefore, the company see the opportunity to work with an external partner that can deliver new innovative ideas.

"There are several great suppliers connected to us that just wait to show their great ideas. And at the same time, I need a stable environment of what I already got".

IT Manager

During the second half of 2017, a digital strategy has been developed with an initiative from the development manager and the IT manager. The strategy is not communicated and not established yet and there is a need for elaborating the strategy into text. It is not fully determined if the strategy will be separated from the business plan, but there are an awareness and discussions regarding if the digital strategy should be integrated into the overall business strategy or not. The strategy is not fully integrated at the top management level.

4.2.2 INNOVATION

During 2017, together with process development, there has been a start of structure the work of concept improvements. Before that, a general business improvement was done to improve the systems to meet customer demands more efficiently. The PDSA- cycle is a common tool to continuously work with improvements and change within the business. When identifying improvements and necessary change with a bigger scope that requires more resources and are related to a higher level of business development, a business development portfolio is used. This portfolio identifies what the business should deliver in relation to goals and business development according to a structured work procedure.

"There is an interface between improvements, innovation and development with different conceptions. From my point of view, innovation is about thinking outside the box and at the same time, find the shortcut without losing quality".

IT Manager

Innovation for Lejonfastigheter AB is related to improvements and thinking outside their way of working. For example, how they can think more innovative to meet business needs. Also, there is a responsibility for the dialogue with customers and suppliers. Innovation regarding changing the whole business has not been the primary focus.

There is a present need of working with innovation and innovation systems. An innovation system for Lejonfastigheter AB is associated with adaptable "arenas" to handle improvements with different prerequisites. These arenas are connected to create an interaction when improving the business mission. By developing their internal ability and capability to be innovative, can lead to finding new solutions to meet desired goals and results, and at the same time, meet different opportunities and challenges. Also, with increased ability to be more innovative, they can be an attractive workplace with dedicated co-workers.

During one interview, it was explained that innovation can be divided into three different steps according to Figure 20 where the bottom of the figure stands for enhancements to core offerings and represents 70% of innovation initiatives, the middle by 20% and the top stands for 10%. In the bottom and the basis of the picture, improvements related to process improvements can be found where process teams are a contribution to enhancements to core offerings. The middle section of the picture is related to pursuit of adjacent opportunities where separate resources in terms of project leaders etc. are needed and perhaps a separate budget. The top of the picture presents the perspective of ventures into transformational territory. Currently, Lejonfastigheter AB works first and foremost in the bottom and in the middle of the picture but intents to work with an innovation team to work toward the 10% top.

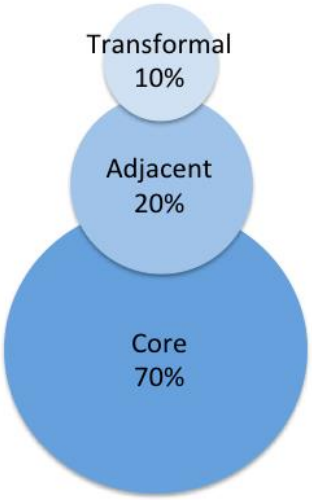

Figure 20: Allocation of resources on different types of innovation (Nagji & Tuff, 2012)

Recently, an innovation incubator also called the "innovation lab" was started. The purpose of the innovation incubator is to make space for innovative initiatives and other suggestions of future improvements. Anyone within the company is welcome to participate in cases in the innovation lab. Cases and ideas in the innovation incubator have until now been related to a safer environment, attractive environments and a concept called green foods. The ideas are generated from someone within the company where they raise an interesting topic with a certain need. Ideas from the innovation lab have generated a concept regarding a day filled with activities connected to a specific environment within the municipality.

4.2.3 PROCESS MANAGEMENT

Lejonfastigheter AB has worked with their processes during several years. A collaboration was made with an external partner one and a half year ago to develop their processes further. It is a procedure to create an entirety by building up the processes including information systems and where the same concepts are used. 15 processes are visualized, three management processes, five core processes and seven support processes. All processes are not fully completed and structured. Two processes are determined and two are under construction. Every process has a process owner, a process team and a process leader. Processes are built and visualised by workshops including a brainstorming session where the process team is created with a designated process owner and a process leader. Requirements and important activities to deliver the compulsory output for the processes are settled together with which information is needed to deliver the required output. Process development is led similarly to projects. Tests are performed to make sure the system and the process deliver the settled requirements.

"When documenting a process, the challenge is not to make it complex, it is to make it simple".

Business Developer

Prioritisation of which processes to first identify and develop was done in collaboration with an external partner. The prioritisation of processes was done according to a certain KPI that needed improvement. By analysing the business plan and goals of the company and how the organisation plans accordingly, suggestions and ideas from the external partner was communicated to Lejonfastigheter AB. Lejonfastigheter AB also did an analysis of their own of the suggestions and a reappraisal was done. A project group from Lejonfastigheter AB made a prioritisation. From the beginning, the external partner prioritised six processes. Hence, Lejonfastigheter AB stated that there were not enough resources to start with the mentioned six processes. Therefore, four processes where first prioritised. The top management made the final word about which processes should be prioritised.

The processes are continuously improved by suggestions from the people within the processes. The suggestions of improvement related to a certain problem are described and documented in an "improvement box" in the digital platform. When improvements are done in the digital platform, the suggestions are sent to the process owner and he or she is responsible for evaluating suggestions of improvements. It is stated that there is a need for a system to take care of suggestions from the processes. The current solution by communicating suggestions by the digital platform is considered to be a temporary solution, which will be continuously improved. When effective processes are visualised and developed, they can be developed further when the whole picture of processes is done. At that state, digital opportunities can be considered as a vitality to continuously improve processes.

"Currently, we do not have a mutual picture of what we do and what we deliver in the different processes. It is not until we have the whole picture that we can find even smarter solutions for the company at a comprehensive level".

Business Developer

A pre-study of process maturity at Lejonfastigheter AB was done autumn 2017. The result of that pre-study indicated that Lejonfastigheter AB was at an awareness level. Hence, it was argued that this level does not necessarily need to be accurate, due to case company´s continuous improvements of their processes.

4.3 INNOVATION PARTNER

The innovation partner is a company that works with companies to make those companies business organised to meet the connected world. They deliver suitable solutions with technical expertise to power innovations. They are a strategic advisor partner and work with innovation, the creation of innovations, testing and management of digital solutions. Their fields of specialisation are within digitalisation, Internet of Things (IoT), Cloud Services and Secure Connectivity.

There is a great focus of digitalisation, IoT, artificial intelligence, global sustainability, robotics/automation, electrification, autonomous, circular economy, connectivity, product to service and 3D printing that drives the market today. Technology is becoming cheaper and it drives companies

to be a digital leader or a digital prey. Companies going from delivering a product to deliver a service. For example, instead of delivering engines for aircraft, fly hours are delivered. Product to service.

There are several challenges related to digitalisation according to the innovation partner. International competitors in Asia are going to challenge the Western world. In some firms, the right competence can be difficult to find internally. Furthermore, there are cultural aspects to take in consideration and can be a challenge in the digital world. Digitalisation is considered to be a high priority for many companies.

When the innovation partner working with business transformation, there is a certain procedure that is performed. Firstly, an understanding of the customer and customers´ needs and problems are identified. This is done by inspiration workshops. In some cases, several workshops are performed if it is required. Continuously, understanding of new business models and wanted operating models are done. Innovative ideas and suggestions are presented to their customers together with proof of concepts. This procedure has different time horizons depending on the maturity of the customer and problem areas. One tool they use to help their customers is the business model canvas. They strive to be near the customer during collaborative projects by having frequent follow-ups.

5 ANALYSIS

In this chapter, the three main theoretical areas of digitalisation, innovation and process management are analysed with additional information from Lejonfastigheter AB. This was done in order to find connections and missing links between the theoretical framework and the empirical study. The result of the analysis generated in a Conceptual Cooperative Model.

5.1 DIGITALISATION

As written in the problem description, it can be a challenge for SMEs to connect digital opportunities and innovation with core business processes. This agrees with the challenges of Lejonfastigheter AB. Lejonfastigheter AB is a small enterprise with limited resources and digital competence, and therefore, the need of external expertise to start digitalising their business processes can be observed. According to theory, obstacles to towards a digital transformation could be related to the human perspective of resistance to change, organisational cultures, lack of knowledge, lack of resources, lack of motivation and lack of risk-taking. Similarities to mentioned obstacles have also been stated during the interviews. Several employees understand the situation of moving towards a digital transformation and are motivated to meet the digital challenges, while other employees do not have equal engagement. Several respondents mentioned that one of the major challenges was the human standpoint. There is a certain resistance to change and employees work continuously as they have always done. This can be related to Solis (2014) statement of the importance of working with change management. Respondents agree that there is a lack of resources and knowledge within the organisation related to the area of digitalisation. There is also a further challenge to make all employees utilise the existing systems that are integrated into the processes. The full potential of functions of the systems is not used optimally. It could be numerous of reasons why employees do not utilise the full potential of the systems. It might be due to not receiving the knowledge of the whole system. Another reason could be related to limited understanding of the systems, where new systems are integrated continuously.

From a digital perspective, Lejonfastigheter AB is using different information systems where information is collected from connected sensors in their buildings. Recently, a digital platform have been developed and realised. In chapter 3.2.1 in Table 4, main digitalisation areas are presented. Those four areas are: *data*, *automation*, *digital interface* and *connectivity*. Present digital solutions used could be related to digital areas in terms of data and connectivity since the data area includes system of systems and big data analysis, while connectivity includes digital services. It could be difficult to transfer the areas of digitalisation accordingly to Lejonfastigheter AB. The difficulty could be related to how Table 3 is founded. The four areas of digitalisation, according to Table 4, are based on manufacturing industries and could therefore, differ in service businesses. Still, manufacturing companies can be considered to have embraced digitalisation in a greater extent, for example in the area of robotics and additive manufacturing.

Lejonfastigheter AB is mostly working with digitising by transforming analogue data to digital data. This can be related to an early stage of embracing digital opportunities. When digitalising their processes and the organisation, the digital solutions can consider the quality assurance of the information in the systems. Moreover, the digital solutions of sensors etc. related to their buildings, are used to meet

stricter energy goals and to satisfy users of the buildings. These digital solutions with the purpose to meet users of the buildings, could be understood as front-end solutions. Therefore, opportunities regarding an end to end solutions are not fully explored.

The pressure from the market in terms of digitalisation forces companies to modify cultures and strategies. Top management engagement and digital leadership with a digital strategy are considered to be an essential basis toward a digital transformation. Top management has to introduce a digital vision and define a digital strategy which is combined with the organisational culture and leadership to become successful with digital transformations. A digital strategy and a digital vision are not established or discussed with the top management at Lejonfastigheter AB. However, there is an engagement from few ambitious employees towards a digital strategy, which indicates that Lejonfastigheter AB has internal digital leadership to some extent. As the theory is recurrently stating, it is of importance to have a digital strategy and a digital vision. The authors argue that a digital strategy and a digital vision are prerequisites when start working with digitalisation. According to the authors' perception, by starting with a digital strategy and vision, digital opportunities can be better understood and integrated. The change can be involved more rapidly when more employees and managers are involved and becoming drivers for a digital transformation to happen. Once again, digital transformation can be complex and management engagement is essential. It can be difficult to have a general strategy for all types of businesses. Consequently, a company needs to formulate a digital strategy that suits their company and their goals. There are some key success factors for digital transformation according to Figure 4. It would be optimal if Lejonfastigheter AB would strive to fulfil all those aspects. Hence, it might not be a requirement to achieve all of them before start working with digital transformations.

It will probably not be possible to introduce a more risk-taking perspective to the culture since Lejonfastigheter AB is a municipal real estate company where they can be limited to some extent. Still, risk-taking is a broad word and could be interpreted in different ways. To build a strong partnership is something that is very important on this topic as well. For a company that does not work with digitalisation as the main field, might not have the necessary knowledge internally to succeed with digitalisation. With that aspect, a collaboration with experts in the area is necessary and therefore, a strong partnership would be ideal.

With digital transformation, the management has challenges with digital changes in different levels. As can be observed in Table 5, there are four types of levels regarding digital changes, *process*, *organisation*, *business domain* and *society level*. It is interpreted that Lejonfastigheter AB work with the two first mentioned levels, but in different stages. Since they are working with continuously improvements and digitising in general but mostly in their processes, they are working in the first level. Lejonfastigheter AB might not have a foremost focus of reducing manual steps so far, but they are trying to adopt new digital tools and streamlining processes. At an organisational level, Lejonfastigheter AB is striving for digitalised smart buildings and an even better customer service. This means that they are heading in the direction of offering existing services in a new way but still has some aspects to improve, such as discarding obsolete practises. Regarding business domain and society level, Lejonfastigheter AB might not be positioned in the last two levels in a greater extents, due to how they currently work towards a digital transformation. The company has a mission from the municipality by following instructions and rules. Political forces are not included in the frame of

references when talking about digital transformation, which is an essential part for Lejonfastigheter AB. Political forces can hinder smaller companies to be proactive when it comes to innovations and different business relationships. Moreover, the first three levels can be connected to Lejonfastigheter AB's way of working with innovation, which will be explained further in the in 5.2.

5.2 INNOVATION

Lejonfastigheter AB works with innovations according to a specific approach, see Figure 20, where they focus on enhancements to core offerings and pursuit of adjacent opportunities. Based on the interviews, innovations were viewed differently. This correlates with theory, where there the definitions of innovation is broad and there is different types of innovations, for example product innovation, process innovation or organisational innovations. Therefore, the definition of innovation can be difficult to determine. The definition could differ depending on branch or company. Innovation for one company does not necessary mean innovation to another business. Furthermore, innovations in this thesis can be related to digital innovations, where an innovation partner is the source of expertise of digital innovations, also called digital solutions in this case. When discussing innovation during the interviews, innovation for Lejonfastigheter AB was to improve what exists in the processes. For Lejonfastigheter AB, it is more about what is new to them, they do not need to be revolutionary and invent something totally new. Lejonfastigheter AB are working with the middle level of the innovation approach, pursuit of adjacent opportunities, to develop the business in a bigger scope. It can be related to when starting a larger project including more resources in terms of money, working force, time and competence. Whiles the top level in the figure, ventures into transformational territory, is something Lejonfastigheter AB are not primary working with today. This could be analysed by and compared to the different levels of digital changes, according to (Kääriäinen, et al., 2017) in Table 5.

Digital transformation in different levels, can be related and connected on how innovative initiatives are interpret at Lejonfastigheter AB. To have in mind, the different levels of digital changes are related to digital transformation and the innovation approach are related to innovations. To further conclude and analyse this aspect, Lejonfastigheter AB can be positioned in a process level where the bottom of the innovation approach can be in line with that level. The comparison between levels of digital change and the innovation approach is visualised in Figure 21.

The innovation approach can also be related to Kääriäinen, et al. (2017) explanation of how impacts of digitalisation can be viewed. The impacts of digitalisation are viewed from three different extents, internal efficiency, external opportunities and disruptive change. Enhancements to core offerings can be related to internal efficiency, external opportunities can be related to pursuit of adjacent opportunities where opportunities are collected externally to broad offerings for existing customers. This is followed by the disruptive change that can be related to ventures into transformational territory where proactive ideas are present. This relation is also shown in Figure 21.

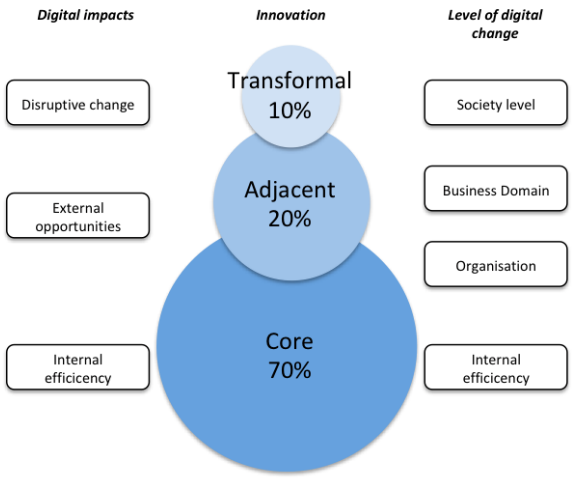

Figure 21: Comparison between digital impacts (Kääriäinen, et al., 2017), innovation (Nagji & Tuff, 2012) and level of digital change (Kääriäinen, et al., 2017)

By collaborating with other business to meet digital challenges is necessary according to Lejonfastigheter AB. They are not the experts when it comes to digitalisation, which can imply the urgency of external expertise when it cannot be collected internally. In this specific case, Lejonfastigheter AB is municipally owned. That can affect which kind of business relations are appropriate or not. Still, their initiative with the innovation lab indicates that the company want to take care of internal forces and ideas which can be considered to be a good alternative to motivate co-workers to be creative and think outside the company box or individual box. It also indicates that the company meet future challenges in an innovative way. Hence, this innovation lab is a relatively new initiative and is still in progress. Currently, ideas are generated by someone raising a subject or a problem area. This can be related to Clausing (1994), see Figure 10. Hence, technology development in the "technology stream" is based on a certain strategy. This is not the case at Lejonfastigheter AB, were they do not fully base their ideas on a certain strategy, but the creative work is placed early in the process. Ideas from the innovation lab can better be taken care of if the subject or a problem area are connected to a certain strategy with a clear purpose, similar to Cronemyr´s (2000) model where there is a structured course of actions to create technology development specifications. To have in mind, the purpose of the innovation lab was not to create solutions from a strategic point of view. It was done to expand creativity to motivate employees to do something else besides their daily work. This innovation lab could be analysed as an open innovation according to an inside-out approach. Lejonfastigheter AB is not considered to work with an outside-in approach in the innovation lab at the moment. A reason for this can be related to the purpose of the innovation lab, but also due to the early stage of the start-up of the innovation lab.

5.3 PROCESS MANAGEMENT

Lejonfastigheter AB divide their processes accordingly to chosen theories. The name of the process can be slightly different, but it is not relevant and does not change the way of formulating processes. The difference is the number of processes. It is stated in the theory that one to three main processes are preferred. Lejonfastigheter AB has five main processes which are called core processes. Still, it can be argued that a certain amount of processes can differ depending on business to business. Even if the theory recommends one to three main processes, some businesses preferably need more processes for create value to the customer properly.

Even if Lejonfastigheter AB has worked with their processes during several years, all processes are not fully visualised and followed. The development of their processes is continuously moving. With not fully visualised processes, there can be a risk of not following the conceivable processes. Therefore, different problems are solved by departments, similar to a function-oriented organisation.

Established processes can be a key to work with continuous improvements of the business processes, which was also stated in the interviews. By having a settled way of working, suggestions of improvements can easier be taken care of. In several interviews, process maturity was discussed when discussing the digital transformation of processes. Most of the interviews stated that it can be required to have a certain maturity of processes to better meet digital opportunities. Still, a minor majority thought that processes can be digitalised without a certain maturity. Digital transformation is a major change for many businesses, which was mentioned by Lejonfastigheter AB as well. In small and medium enterprises, it can be preferable to have a level of awareness to better meet and handle digital opportunities. As mentioned by Beer and Nohria (2000), 70% of change initiatives fail. Change initiatives can also be related to digital change. Therefore, it is considered that small and medium enterprises can integrate digital solution more efficient if some of their business processes have a higher level of maturity according to the process maturity model by Cronemyr and Danielsson (2013). Then, digital integrated solutions can be compared to a current state, if the state of processes is considered to be stable.

Moreover, levels of digital changes according to Table 5, can also be compared to the process maturity model. If the process maturity and level of digital changes are put in relation to two axes, Lejonfastigheter AB is positioned in the lower left corner. According to the empirical findings, the process maturity is at an early stage and therefore, digital changes or innovations are related to enhancements to core offerings. Moreover, enhancements to core offerings are naturally located at a process level regarding internal efficiency. By having the allocation of resources on different types of innovation, see Figure 20 the authors indicate that with a high maturity of processes, higher steps can be made in the figure but also in levels of digital change. According to the maturity model, a process of an adapted level can respond to changes in customer demands better, which can be related to changes in the business domain and the society. Still, this does not necessarily mean that ventures into transformational territory cannot be implemented if processes have a lower maturity level. It is just indicated that digital opportunities located in a higher level of digital change, can be met more efficient if the processes have a higher degree of maturity. The relation between process maturity, levels of digital change together with the three areas regarding innovations, is visualised in Figure 22.

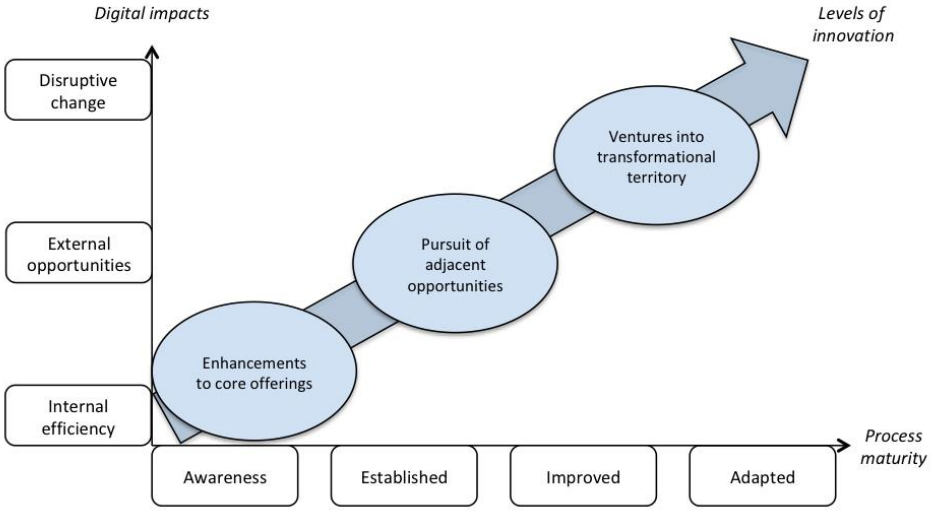

Figure 22: A possible relation between process maturity, digital impacts together with the levels of innovation

With comprehensions gathered by this chapter, it was possible to observe how Lejonfastigheter AB operates in the three main areas and how that could be related to chosen theories. Lejonfastigheter AB is continuously improving their business processes, but has not visualised them all. Therefore, it could be challenging to find optimal digital solutions internally if the business processes are not fully established. Nevertheless, digital solutions could be integrated in the business process, but there is a risk of making reactive decisions and missing out the opportunity to integrate the same digital solutions in other business processes, if that is the case. Their effort regarding the innovation lab is considered to be a great approach for collecting internal unexplored ideas and for employees to work with something different besides their daily work. The innovation lab could also be a platform to invite external innovation partners to participate with contribution of their knowledge and ideas. Therefore and positively, knowledge from different point of views could led to new innovative ideas that would contribute to business processes. There are several digital solutions currently used at Lejonfastigheter AB, but there is a present effort of digitising their business processes. This was analysed to be related to a basis towards a digital transformation. The basis stage of digitalisation was also related to an early stage of process maturity according to the authors, which was not a fully reassuring discovery but an interesting one.

6 DEVELOPMENT OF CONCEPTUAL COOPERATIVE MODEL

With insights based on the analysis between the theoretical framework and the empirical findings together with the authors own reflections and exploration, a Conceptual Cooperative Model was developed. This chapter intends to explain the development of sequent steps of the Conceptual Cooperative Model. This Conceptual Cooperative model provides structure and understanding of digital opportunities and is used at a digital transformation of business processes. Also, where to start a digital transformation is done by an evaluation of prioritisation of processes. Lastly, the Conceptual Cooperative Model provides prerequisites for an external innovation partner to develop accurate digital solutions.

6.1 PROGRESS OF CONCEPTUAL COOPERATIVE MODEL

By the information gathered from chapter 5, it was possible to observe how Lejonfastigheter AB work according to the three main areas and how opportunities and challenges towards a digital transformation are interpreted. It is estimated according to the theoretical framework, that there is a certain necessity of recommended prerequisites to enhance digital opportunities towards a digital transformation. This necessity of recommended prerequisites has been taken in consideration when developing a Conceptual Cooperative Model. Perceived prerequisites are as follows: *digital strategy*, *digital vision*, *management engagement* and an *organizational culture* that is open for new ideas and innovations. To develop a digital strategy and a digital vision have not been investigated in this research. It can be argued that Conceptual Cooperative Model should support strategies towards a digital transformation. As already mentioned, digitalisation continuously changing the society and how we usually operate and therefore, aspects of digitalisation should be included in the strategic planning. Management engagement is essential and is associated to all types of change initiatives, not only digital initiatives. Hence, it is reflected to be optimal if these preconditions are established before starting a digital transformation to better succeed in the long-term. Due to the scope of this research and the aim of a cooperative model to support SMEs, the innovation partner is involved in the beginning of the process to the end of the process. By including external digital knowledge from an innovation partner in an early stage, is essential in this case. Early involvement of expertise from an innovation partner, could increase the internal understanding of digital opportunities and future digital challenges. Still, the scope and the responsibility of the innovation partner differs in the different step of the Conceptual Cooperative Model. This also applies for the case company and the consultancy firm were involvement of parties are different in every step. In Figure 23, an overview of the Conceptual Cooperative Model is presented. The Conceptual Cooperative Model is divided in four phases as follows, including sub-steps in every phase: *Positioning*, *Prioritising*, *Digital roadmap* and *Implementation*. To notice, previous mentioned prerequisites are not included in the Conceptual Cooperative Model. Following chapter are intended to explain every phase in detail.

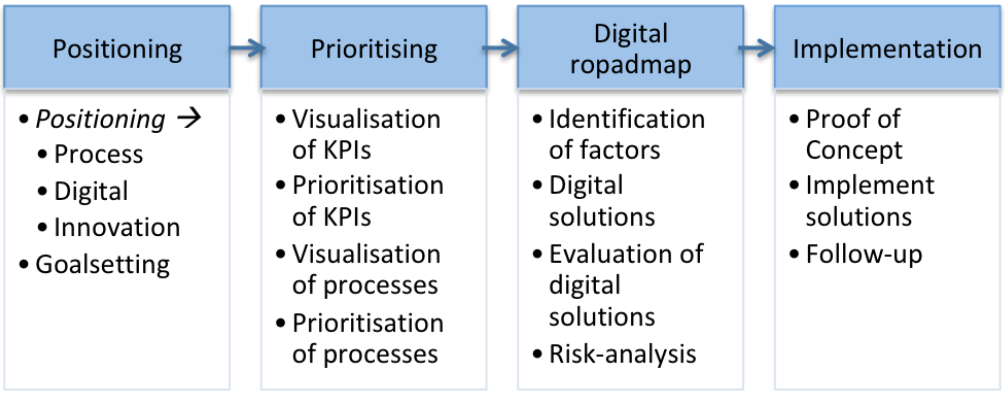

Figure 23: Conceptual Cooperative Model

6.2 POSITIONING

The Conceptual Cooperative Model was first formulated based on Kääriäinen, et al. (2017) model for digital transformation. Their model describes as a practical approach towards a digital transformation, which the researchers of this study consider to be useful and adequate in this case. To meet process structure and at the same time provide an opportunity for creativity from innovation, Cronemyr's (2000) model technology development roadmap was used as an inspiration to create a structured path to discover and choose optimal digital solutions where creativity is adequate. Thereafter, in addition to the empirical findings, the Conceptual Cooperative Model was supplemented and further developed. Kääriäinen, et al., (2017) model involves four sequential steps, *Positioning*, *Current state*, *Roadmap for digitalisation* and *Implementation with technical support,* see Figure 6**Fel! Hittar inte referenskälla.**. The positioning step in Kääriäinen, et al., (2017) model, is comparable to the first step in this research Conceptual Cooperative Model. The purpose of the first step includes an indication of a current state with a first corporate gathering with all parties involved. Hence, in this Conceptual Cooperative Model, the first step includes how a case company is positioned according to the three main areas in this research. Digital drivers and digital impacts explained in Kääriäinen, et al., (2017) are replaced to some extent. The innovation partner is the expert of digital opportunities with comparative knowledge, and therefore, has another insight and knowledge about digital drivers. Digital impacts are replaced by observing how Lejonfastigheter AB works with innovation, according to enhancement to core offerings, pursuit of adjacent opportunities and ventures into transformational territory. In Kääriäinen, et al., (2017) model, a risk analysis is done in the positioning step. Due to a collaboration between all parties involved throughout the whole Conceptual Cooperative Model, it is evaluated that a risk analysis in an equivalent extent is not done in this step in the Conceptual Cooperative Model. Firstly, the Conceptual Cooperative Model is developed by first prioritising KPIs and business processes were a risk analysis is not performed in the same extent, similar to Kääriäinen, et al., (2017). In the Conceptual Cooperative Model, a risk analysis is performed and needed to evaluate possible digital solutions before the implementation.

A risk analysis is performed when implementing possible digital solutions in a future step. Defined positions based on the three main areas can be supplemented with a SWOT analysis. A SWOT analysis

is performed to recognise internal and external strengths and weaknesses according to the three main areas. At the end of the *Positioning* step, a cooperative goal is settled based on the positioning formulations. This is done to visualise a future state based on the positioning linked to the three main areas of this research. Goal settings can be performed differently. In this research, a goal can be defined by using the terminology of a SMART goal. That means that the goal should be specific, measurable, acceptable, relevant and with a time-frame.

By positioning a company according to the main areas of this research can be related similarly to a current state. Therefore, a current state in this research is considered to be done approximately already in the first step. Conclusively, a clear positioning according to the three main areas and a settled goal are the outputs of the Positioning step in the Conceptual Cooperative Model.

6.3 PRIORITISATION

In the following step, the *Prioritisation* step, a first prioritisation is performed. This is done to reassure that a digital transformation starts accordingly to the strategic goals. Strategic targets and goals are dismantling to KPIs and prioritisation of KPI are included in this step. The prioritisation step in this research was primarily based on the empirical findings from the consultancy firm. Moreover, due to a prerequisite of a digital strategy, KPIs are included to link a strategy to internal process changes. KPIs is also mentioned and evaluated in Kääriäinen, et al., (2017). Therefore, the authors made the decision to prioritise according to certain KPIs. Moreover, the start in this step from a strategic point of view, KPIs are therefore visualised. Starting prioritising according to the importance of certain KPIs, an evaluation is performed. For example, if a certain KPI or KPIs need improvements or if there is a certain KPI or KPIs that need to be improved in order to reach the settled goal. Subsequently, selected KPI or KPIs are connected to relative internal processes. This can be performed by using the methodology of Analytics for Management. One other reason to include the connection of KPIs was to evaluate a possible implementation by study how the certain KPI or KPIs were affected by a possible implementation. When the connection between KPIs and processes is visualised, process maturity is taken into consideration. Moreover, it is considered that it is important with process perspectives when implementing digital solutions, due to an implementation may be related to change initiatives. Consequently, process maturity, in this case, is a necessary priority to take in consideration. It is indicated by the analysis, by having a certain level of process maturity, different digital solutions related to different innovation levels can possibly be better-taken care of. Also, it is important to understand the process of improving it. Therefore, prioritisation of processes according to process maturity is included in the Conceptual Cooperative Model and in this step. The output of this step results in a starting point for a digital transformation according to a prioritised process based on certain KPIs and according to process maturity.

6.4 DIGITAL ROADMAP

When KPIs are connected to related processes and a prioritisation of processes according to a process maturity is done, step three includes the path towards potential digital solutions, the *Digital roadmap*. The purpose of this step is to find optimal digital solutions to a prioritised process. This step can be done in two different ways according to two different starting points, see Figure 24. These two alternatives are influenced by a previous master thesis, see 3.7.12.

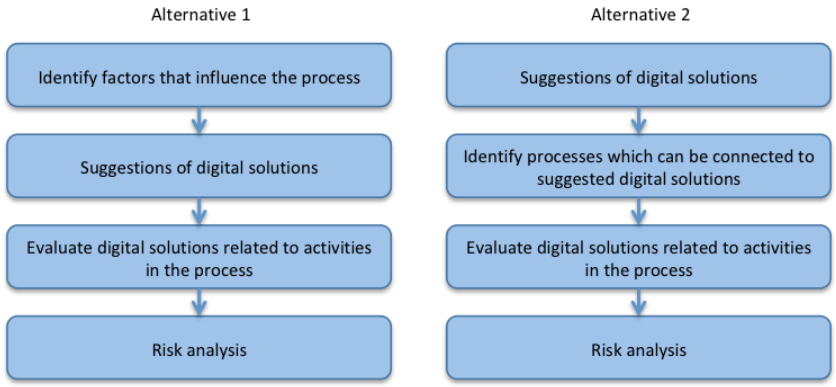

Figure 24: Two alternatives of Digital Roadmap, inspired by Eriksson & Johansson (2017)

In the studied previous master thesis regarding welfare technologies, the different approaches in the two alternatives are based on KPIs. In this case, the two alternatives are based on a perspective of processes. When having a prioritised process based on the previous step, alternative one should be selected. Firstly, elements or factors which have an influence on the process should be identified. An identification of factors can be done by several techniques and tools. Examples of tools are root cause diagram, brainstorming etc. Furthermore, the purpose of an identification of factors is to indicate which type of areas can be related to opportunities or problems in the process. Henceforth, when factors are identified and possible problem areas are visualised and communicated, it will thereby be easier for an innovation partner to give suggestions for digital solutions to improve the process.

In alternative two, suggestions for digital solutions are placed first. As stated in chapter 1, organisations have a difficult time to evolve at the same speed as technology and society. Technology is market-driven and the market supplies digital solutions continuously. Therefore, other available digital solutions may be essential to collect externally. In this step, this perspective has been taken into consideration. When external possible digital solutions are identified, these solutions should be placed in relation to internal processes. This is done to detect if suggestions of digital solutions are appropriate and suitable internally. Therefore, the two first stages in both alternatives are different depending on situation and perspective. Alternative one can be related to an internal-external approach and alternative two can be observed as an external-internal approach.

The last two stages in alternative one and alternative two are identical and are performed accordingly. To make sure if the digital solutions are optimal solutions for prioritised or selected processes, an evaluation is performed. This can be executed by different tools, for example, a Quality Function Deployment (QFD), a prioritisation matrix or a Pugh matrix. When a digital solution or digital solutions

are selected, a risk analysis is performed. This can be done according to a process Failure Mode Effect Analysis (FMEA) to detect possible risks of implementing digital solutions. When possible risks are detected, proactive precautions can be formulated to better meet future possible risks.

6.5 IMPLEMENTATION

The last step in the Conceptual Cooperative Model involves the implementation of selected digital solution or solutions. To establish digital solutions, a proof of concepts can be performed. If the proof of concepts is successful, the digital solution would be implemented and integrated fully. To monitor the implementation, KPIs related to the process are observed and measured. In this research, there is a delimitation of this step and will not be further developed.

6.6 EVALUATION OF MODEL

To evaluate the Conceptual Cooperative Model, four design reviews were performed. The authors received different feedback from each design review and afterwards, the authors evaluated relevant feedback to complete the Conceptual Cooperative Model. After each design review, the authors updated the Conceptual Cooperative Model until the next design review. A summary of suggestions and changes from the design reviews are shown in Appendix 5.

6.6.1 DESIGN REVIEW ONE

The first design review together with the CEO of the consultancy firm resulted in discussions regarding the third and fourth phase, digital roadmap and the implementation phase. In the digital roadmap, opinions regarding required knowledge in different areas as well as the importance of knowledge within digital solutions were discussed. Also, the model should visualise to which extent parties have to be involved in each phase, considering different branch and knowledge. The first step in the digital roadmap regarding identification of factors got questioned. It was not stated and it was not fully clear what kind of factors were mentioned. When discussing the implementation phase, a known term as proof of concept should be used. That could make the involved parties more convinced and it is a well-known term. How to label the second step and the third step in the implementation phase were questioned as well. Suggestions were presented regarding how formulate *implement the solution*s and *follow-up*. Instead of "implement the solutions", *creation of solutions* was a better alternative according to the CEO. Furthermore, "follow-up" was reformulated to *verifying.* Also, the headline of the fourth phase was discussed and a suggestion of changing the headline was reviewed. Moreover, instead of only referring to implementation, establishment was added.

The authors ended up with the changes in terms of visualising the involvement and responsible areas for parties and reformulate headlines and clarification of sentences. The authors agreed that presented suggestions and discussions were suitable to develop the model even further.

6.6.2 DESIGN REVIEW TWO

The second design review was presented to Lejonfastigheter AB together with the Head of development and the IT manager. During this meeting, questions and constructive opinions concerning the whole model were discussed. Firstly, Lejonfastigheter AB had opinions regarding the second step in the positioning phase, which considered the positioning of digitalisation. They discussed that this step was difficult to understand and wondered which tools could be used to accomplish this step. Furthermore, Lejonfastigheter AB did not fully agree that the process maturity had a major influence regarding the innovation aspect according toFigure 22. Instead, they argued that the tendency to change or receptiveness of processes is more important towards a more innovative organisation and towards a digital transformation. Lejonfastigheter AB also discussed the absence of including market trends and market research in the positioning phase, in order to be able to collect inspired ideas from others and learn from others. Lejonfastigheter AB also recommended using the tool, strategic roadmap, for the goal settings.

Further on, in the prioritisation phase, Lejonfastigheter AB had several inputs. They stated a possible risk of a too long lead time of this step. In order to improve one overall KPI, it might be necessary to improve more than one process, since it might be more than one process that can be related to the chosen KPI. Another aspect that they were clear about was the value of the solution has to be considered, the effort contra the benefit. When following the Conceptual Cooperative Model, Lejonfastigheter AB wants to make sure that the model will contribute to choose the optimal project, which includes processes and digital solutions. They want to be able to work agile towards a digital transformation. With that perspective, they think that it is necessary to work with a cyclic model to support an agile approach. It was argued that the different phases in the model do not necessary have to be linear. It could be necessary to go back and forth between the phases. A suggestion was stated to do a prioritisation that results numerous digital roadmaps. They also suggest that it should be possible to measure and follow-up an implementation of a digital solution to observe the impact. Consequently, it is important to follow-up continuity in order to make sure that the company are heading in the correct direction. Regarding measuring KPIs was also discussed. It was argued that it could be other types of possible measurements to observe. Other types of measurements has not been further discussed, but KPIs were further considered to be included in the Conceptual Cooperative Model. They also wondered if the model was too simplified together with long lead-times in the different phases.

This Conceptual Cooperative Model should not contribute to more meetings, if the parties make sure that they have a common goal from the beginning and a good communication during the project. Lejonfastigheter AB also asked if it was possible to include any tools for measuring innovation in the model.

The authors discussed the feedback from Lejonfastigheter AB and considered what was reasonable to include in the Conceptual Cooperative Model. The authors added a market research to the positioning step regarding digitalisation. The authors also chose to add questions that should be answered in each phase, with the purpose of clarification and understanding. To achieve a common goal setting, the

strategic roadmap was included in the first phase. Since it was ambiguousness regarding the prioritisation phase, an additional picture was added to the model to simplify the authors' views. It was also several questions regarding the digital roadmap. Therefore, the authors chose to visualise the steps differently.

6.6.3 DESIGN REVIEW THREE

Design review three were done together with two consultants from the consultancy firm. Opinions and feedback through the whole model led to a valuable discussion with new ideas. The discussion started in regard to the prerequisites for the model. It would be necessary to have process management as a prerequisite for the model. Furthermore, discussions concerning if all the other parameters would be necessary, such as digital strategy and digital vision. According to the two consultants, it might be more important to think general within digital aspects. Another suggestion was the attitude towards digital transformation, when implementing digital aspect into the company's culture. This was followed by a question regarding digital transformation in general, if there were any scales of digital transformation and in that case, if the authors had considered it. This was discussed, but no scale of digital transformation were found.

From the overall perspective of the Conceptual Cooperative Model, the consultants mentioned that it would be appropriate if the purpose of each phase were listed in a clear way. They thought that all needed information did existed, but it to be further improved by better visualisation. Figure 22 was also a recurrent subject of discussion. The consultants pointed out the way it was visualised and also that it might not be necessary to include the figure in the model. A general feedback through the whole model was that it could be visualised better, with clearer points and without free interpretations. The information did exist, but how to present the information could be improved. According to the consultants, the positioning phase was confusing and after some discussion, a suggestion to rename it to current state was mentioned. In the prioritisation phase, synergies with a system were discussed, if a digital solution could be used in multiple processes. Furthermore, it should be a loop between prioritisation phase and digital roadmap phase. From the digital roadmap, they were positive towards the two alternative steps depending on the situation. They thought that alternative one would be done first and thereafter the second alternative. The reason of that was to investigate if the chosen digital solution could be used in another process as well. However, to make the model even more clear and visualised better, suggestions of implementing the questions how, what and why should be added in each step in the model.

From this discussion, the authors chose to add recommended prerequisites instead of only state prerequisites. The reason for that is a further clarification of essential prerequisites to better succeed with the Conceptual Cooperative Model and to meet a digital transformation. The authors also chose to include process management in the recommended prerequisites. The reason of that was due to previous discussions associated to observed tendencies from both the theory and the empirical findings. Other parameters in the recommended prerequisites was merged, for example digital strategy and digital vision. The overall model became visualised in another way due to clarification by including visualised purposes of each step. The authors visualised the whole model differently and

renamed the first phase into current state. The reason of that was because the authors agreed with the consultants of a confusing heading and the name did not fully presented the content.

6.6.4 DESIGN REVIEW FOUR

The last design review was presented to the innovation partner. Similar to previous design reviews, opinions and feedback were received in form of an open discussion. In this case, the focus where set on the last two phases of the model since it considered the involvement of the innovation partner in those steps the most. Discussions regarding the preconditions into the model were that a digital strategy does not always exist in every organisation. In that case, according to the innovation partner, the first step is to create a digital strategy. The innovation partner pointed out that managers' engagement is not the only aspect that is necessary to be successful with a digital transformation. The co-workers have to be engaged and motivated as well. The people who are involved in the processes have to be receptive to an innovative idea if a company should continuously improve. Furthermore, feedback regarding clarification of the Conceptual Cooperative Model was once again discussed. The innovation partner had difficulties of understanding every step.

A digital solution could often affect multiple problems. Therefore, interaction workshops between the case company and the innovation partner would be necessary. This interaction could improve the solutions even further with knowledge from the business process and the expertise of digital innovative solutions from the innovation partner. Therefore, it is essential with a great cooperation between them to make sure that the digital solutions will become suitable to the case company. In the current state of the model, it could be preferable to have an inspiration workshop to show opportunities for the case company at an early stage. If not having an inspiration workshop, it might be enough with a competitor analysis. A combination of people with different expertise is necessary for a project to make sure all perspectives are covered.

After this design review, the authors performed various changes to the model. Changes such as adding an inspiration workshop into the current state since it seemed like a preferred suggestion. In that sense, organisations could possibly better understand the scope of digitalisation. Furthermore, the interaction between the case company and the innovation partner were also included in the model. The reason of that was due to the innovation partners' judgement of the importance of having knowledge from both internal processes and since they have experience with it. Finally, a further improvement of the design of the model was adjusted mostly in form of visualisation changes.

7 RESULT – CONCEPTUAL COOPERATIVE MODEL

In this section, the result of the final Conceptual Cooperative Model will be presented. The visual Conceptual Cooperative Model can be found in Appendix 6.

Before using this Conceptual Cooperative Model, numerous preconditions are recommended in order to become successful with both the digital transformation as well as with the work of this Conceptual Cooperative Model. Recommended prerequisites to become successful with a digital transformation are as follows; a digital strategy associated to a digital vision, top management commitment, leadership that encourage digitalisation and openness for innovative solutions and changes within the company culture. Additionally, a recommended prerequisite specifically for this Conceptual Cooperative Model is process management. One of the main areas of this model is related to improving business processes. Therefore, to continuously increase the efficiency of processes, there is a need to understand the process. Due to that statement, process management is a prerequisite of the Conceptual Cooperative model.

The Conceptual Cooperative Model is a structured approach towards a digital transformation of business processes in a collaboration with different parties. The final Conceptual Cooperative Model is visualised in Figure 25. Before entering the first phase of the model, a strategy need to be established. To develop a strategy has not been included in this master thesis. In Figure 25, an overview of the main phases of the model is shown. Each phase is visualised including what should be performed and the reason why it should be done as well as the output of the phase. The Conceptual Cooperative model is divided into four main phases; *Current State, Prioritisation, Digital Roadmap and Establishment & Implementation.*

The first phase of the model concerns a current state of the three main areas of this study, digitalisation, innovation and process management. Also, a future state of the organisations' targets within these areas is visualised. The purpose of that is to visualise and understand the gap between the current state and a future state. When the first phase is completed, it should be clear where the company are and what they want to reach. The second phase involves a prioritisation of KPIs and a prioritisation of processes to reach a desirable future state. KPIs and business processes should be visualised and prioritised, with the purpose to understand which business process is most receptive to digitalise. This phase generates a visualised starting point towards a digital transformation. The third phase in the model is related to the digital roadmap. The digital roadmap involves the development of a framework to identify potential digital solutions, with the purpose to provide prerequisites to create innovative digital solutions for a process as well as creating synergies for the remaining business processes. The output of the third phase is a prioritised and evaluated digital solution. The purpose of the last step in the model, the establishment and implementation, is to implement the optimal digital solution towards an integrated digital solution. The step is not worked through fully since the authors chosen to delimitate from this step. For further notice in Figure 26, there is a cyclic approach between the second phase and the third phase. The reason of that is due possible necessity of going back and forth between those phases.

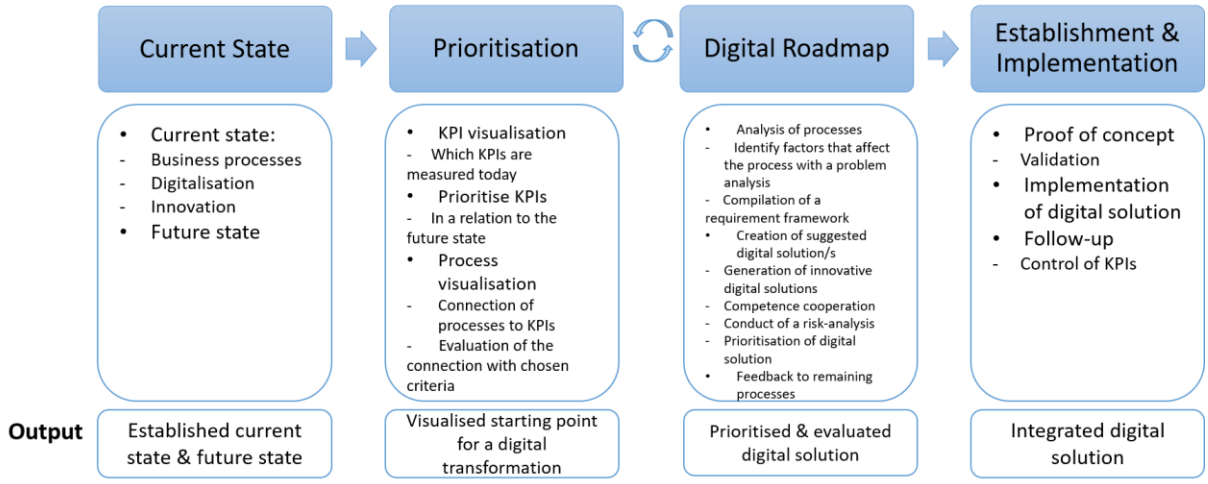

Figure 25: Final Conceptual Cooperative Model

7.1 CURRENT STATE

As previous mentioned, the purpose of the Current state is to receive an understanding of how the case company are positioned in each area, digitalisation, innovation and business processes. Firstly, in a collaboration with the case company and the consultancy firm, a detailed research of the situation of the processes are done at the case company. The case company has the knowledge of their business processes and the consultancy firm has the knowledge of the process maturity model, which is a tool that is suitable to get the understanding of the maturity of the processes. The process maturity model visualises to which extend each process is mature. By the existing stages of process maturity, each business process is located according to *awareness*, *established, improved* or *adapted.*

The second step in the current state is to observe of how organisations work accordingly to the digital aspect and to which extent the case company work with digital solutions. Thereafter, an inspiration workshop is performed, preferable with the innovation partner as the responsible part of the inspiration workshops. The reason of that is to show organisations what kind of digital solutions are available on the market and to start the brainstorming of what could be used in their organisation. A market research can either be used as a complementation or as a replacement for the inspiration workshop.

A current state of the innovation perspective is also performed. To do a current state of the innovation, the involved parties should analyse to which extent the relevant organisation works with innovation today and how receptive the organisation is for innovative initiatives. In this step, it could be important to observe how innovation is identified, due to the numerous definitions of innovation. To categories how organisations work with innovation, innovation can be sorted to *enhancement to core offerings*, *pursuit of adjacent opportunities* and *ventures into transformational territory*.

Additionally, these steps in the current state can be done by a SWOT-analysis. A SWOT-analysis is a suitable tool to visualise internal strengths and weaknesses together with external treats and

opportunities. When these three steps are done, a common view of the future state within the three main areas has to be determined. This can be could be performed by the methodology of a SMART-goal. That means that the goal should be specific, measurable, acceptable, relevant and with a time-frame. With both a visualised current state and a future state, the gap between those states could be identified and visualised. The output of the first phase is a clear current state and a clear goal of the project.

7.2 PRIORITISATION

The prioritisation step is important because of most of the times it is not possible to work with multiple projects at the same time. It could be due to limited resources, such as money and workforce. In that case, a prioritisation of where to start to digitalise is necessary. Firstly, the case company explain and visualise which KPIs are measured and used. Thereafter, a prioritisation of which KPI are the most important and which KPIs can be related to the future state. When the KPIs are prioritised, the processes should be visualised and connected to the KPIs. The connection between KPIs and business processes could be done together with the methodology of AFM (Analytics for Management). An evaluation of the connection between the KPIs and business processes should be performed together with chosen criteria. This can be visualised by performing a Quality Function Deployment (QFD) or more known as a House of Quality. These criteria are related to process maturity, tendency to change and independence of processes. More criteria could be added. Those criteria are valued differently depending on importance. In this study, a high importance of process maturity is preferable. Thereafter, tendency to change is prioritised second and the independence of processes is prioritised third. Independence of business processes means to which grade the process is connected to other business processes. The output of this step is a visualised starting point for a digital transformation.

7.3 DIGITAL ROADMAP

After the defined starting-point of which process should be prioritised, the digital roadmap visualises the path towards a chosen digital solution. The first step in the digital roadmap is to identify which factors have influence in the prioritised business process and what triggers the factors. Factors, in this case, could be KPIs, Key Performance Drivers (KPDs), communication systems and other factors. Thereafter, the step includes identification of different opportunities or problems that are related to the factors. This step could be performed with tools such as brainstorming and root cause diagram. These opportunities/problems result in a framework, which is delivered to an innovation partner. The framework is a result of a structured path towards a creative environment with certain guidelines to develop optimal digital solutions for the business process. Therefore, the purpose of the second step of the digital roadmap was to generate innovative digital solutions. It is essential of an interaction between the case company and the innovation partner. The reason for that is to make sure that the innovation partner will develop multiple possible solutions that are suitable for the case company. Therefore, the case company’s knowledge has to be integrated, in order to develop and evaluate the

digital solutions from the innovation partner during the path towards the implementation. A risk-analysis is performed to secure that the digital solutions can be integrated by proactively detect different kinds of risks before implementing a digital solution. Therefore, the involved parties are able to minimise risks before it occurs. With a selection and evaluation of suggested digital solutions, a prioritisation of which digital solutions are the most suitable for the case company will be decided. Considerations of different criteria's have to be done. In this step, different qualitative tools can be used, such as problem analysis, FMEA, QFD, Pugh matrix and prioritisation matrix. The final step in the digital roadmap considers if an identification of the chosen digital solution could be effective for other processes within the case company as well. Therefore, an analysis of the other processes has to be executed. The different steps in the Prioritisation phase and the Digital roadmap in a chronological order are visualised in Figure 26. The output of the digital roadmap is a prioritised and evaluated digital solution that is suitable for the case company.

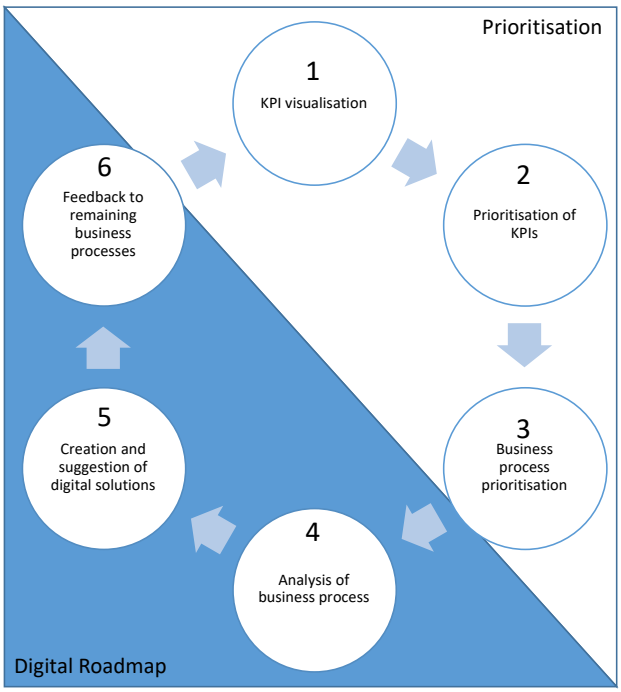

Figure 26: Visualisation of the interaction between the phase of Prioritisation and the Digital Roadmap

To take in consideration, the sequential phases through the Conceptual Cooperative model is a structured approach to develop digital solutions based on current state where KPIs and business processes have been prioritised. This is not the only possible case. To have in mind, digital solutions are constantly developed and delivered to businesses and customers. Therefore, to collect already existing digital solutions could be essential. Still, even though already existing digital solutions are considered to be optimal, a valuation of how they could contribute to business processes need to be

performed. In that case, the loop between the phase Prioritisation and the Digital roadmap starts at circle number five and continuous from that start.

7.4 ESTABLISHMENT AND IMPLEMENTATION

The authors have delimitated from the last step of the Conceptual Cooperative Model, Establishment and Implementation. Despite that, the authors have a suggestion of how the step could look like, even though the phase is not fully established. Firstly, a proof of concept has to be done to observe how the digital solution could physically be presented. A Proof of Concept in this case, is a validation to show that the digital solution works. The responsibility of the Proof of Concept is assigned to the innovation partner. If the Proof of Concept is considered to be successful, the implementation of the solution at the case company's process/processes is done. The last step in the final phase concerning a follow-up to control if the KPI has changed together with an evaluation of the digital solution and the whole project. The output of the entire step will be an integrated digital solution in the process.

8 DISCUSSION AND CONCLUSIONS

This chapter is separated in two discussions, a result discussion of the Conceptual Cooperative Model and a discussion of how this research has been executed.

8.1 DISCUSSION OF RESULTS

Consequences of an exponential development of technology will continuously challenge companies, especially SMEs, where limited resources can be allocated to meet digital opportunities. This also indicates that organisations in any size need to go from traditional operations to meet new solutions. Additionally, by going from traditional behaviours also requires courage, power and creativity. It can be difficult to change the organisational culture to better meet digital changes and innovative improvements. Still, digital challenges transform the society in different perspectives and changes happen more frequently and rapidly. Moreover, organisations would consider being more open to change initiatives by reshaping the organisational culture.

SMEs are considered to have limited digital knowledge and expertise could be difficult to collect internally and digitalisation will continuously affect how organisations operate. Consequently, by cooperating with external expertise and partners is considered to be a necessarily expected tactic and is already a common approach. Digitalisation is a necessary aspect to take in consideration to stay competitive in a present digital changing society. Therefore, there is a need to relate digital initiatives and changes to the overall business strategy. Change initiatives of digitalisation need encouraged leadership leading a digital change with support and engagement from top management. By having encouraged leadership is one step toward a digital change, but an integration of a digital mindset in the rest of the organisation is also a prerequisite, as the quality cornerstone model express. Significance, digital solution and opportunities could result in replacing human labours, which could increase the resistance of a digital transformation when jobs are replaced by digital tools. Still, new jobs could be generated by technology developments as well. In that sense, the human perspective need to be taken into consideration. Resistance to change will not be fully solved by the Conceptual Cooperative Model, hence an understanding of digital forces and opportunities could be enhanced if opportunities are related to the overall business strategy and with the examination of changes of KPIs. There could be other measures to observe rather than KPIs. Still, it is argued that possible future digital implementations should be integrated based on a clear strategy. In that case, KPI could be a preferable measurement.

It is important to allocate an effort of integrating a digital mindset of the first step of the Conceptual Cooperative Model by inspiration workshops and to support innovative initiatives. To be process oriented is a prerequisite for the Conceptual Cooperative Model. This is a central feature in this case, due to the importance of having an established way of working before starting to improve the process by digital proposals. Furthermore, it could be a conflict between processes with structured routines and innovation which requires flexibility and creativity. In that sense, flexibility and creativity can have limited capacity when it comes to structured processes. Still, to continuously improve the processes, innovative ideas can be required. Prioritisations and criteria included in the Conceptual Cooperative Model could be formulated differently depending on business. As previously mentioned, prioritisation

regarding process maturity is considered to be essential compared to receptiveness and independence. Different digital initiatives on different levels of digital change could be correlated with a certain process maturity. Still, this prioritisation could be affected and receptiveness and independence could be initially prioritised if there is a lack of process knowledge.

With the absence of not testing the Conceptual Cooperative Model, there is limited knowledge of how long time is necessary or how much resources should be allocated to perform the Conceptual Cooperative Model. Therefore, this will influence the credibility of the model. Several components need to collaborate, such as time, effort and resources with a beginning of a strategy towards a digital transformation. Thus, a desired entirety of the Conceptual Cooperative Model was not accomplished. The Digital Roadmap should allow an expansion of creativity where digital solutions are generated from a certain need within the processes with external expertise. Therefore, a close cooperation between knowledge about the process and external digital expertise is decisive to develop accurate solutions. It could be argued that the different approaches in the digital roadmap could be used differently depending on the process maturity and the receptiveness. It is recommended to use the first alternative in the digital roadmap, but it is possible to use the second alternative if the business processes have a high process maturity and a high receptiveness within the company.

Discussions if a digital solution could increase the process maturity have been discussed through the entire study. The researchers have varied their thoughts about it but decided that a digital solution could not increase the process maturity. During the study one or two persons from a different perspective have thought that a digital solution might increase the level of process maturity. After more discussion among the authors, their decision has been more doubtful. A digital solution will probably increase the efficiency of the process and it might also increase the process maturity, at least partly if the process maturity from the beginning is one of the highest steps.

Another aspect that has been discussed back and forth during the development of the Conceptual Cooperative Model is how to visualise the prioritisation step. Now when the authors decided to prioritise with the KPIs first, the purpose could be misunderstood since the goal of the prioritisation step is to prioritise the processes. A Conceptual Cooperative Model has been the focus of this study and not the strategic work and to make sure that it is the correct KPIs a company are studying.

8.2 DISCUSSION OF METHODS

There are limited theories regarding how to connect the research areas of digitalisation, business processes and innovation for SMEs. Therefore, this research was performed by a wide exploration of the topics. This could be related to the urgency of digitalisation and the rapid development of technology, where customer demands changes more frequently and businesses need to act correspondingly. Therefore, an effort of front-end solutions could be a short-term solution to respond to market changes. Theoretical models regarding the capacity of innovation or digital models could be further investigated and included in the frame of references. Also, another research method could be performed to develop a Conceptual Cooperative Model. The model could be developed only by

theories to increase the generalisability of the model. This could also contribute to better ability to test the model.

Additionally, qualitative methods were preferable to perform instead of quantitative methods due to the exploratory approach of this research. Qualitative methods in terms of interviews were conducted considerably early in this case in parallel to the literature study. The literature study could be performed over a longer period of time to minimize the risk of not including the full range of relevant questions for the interviews. Several interviews were transcribed, which increased the output of the analysis since it was feasible to listen to the interviews numerous of times.

By only collaborating with one case company could affect the generalisability of this study. Still, the Conceptual Cooperative Model was evaluated with relevant partners, which provided fundamental essential insights from all stakeholders involved. Besides, the Conceptual Cooperative Model is considered to have a relevant generalisability, due to the mindset of the researchers have had during the study as well as the evaluations on the way.

The evaluation of the Conceptual Cooperative Model was done by design reviews. More than four design reviews could have been performed to develop the model even further. Still, the design reviews was conducted with all involved parties, where different suggestions from everyone involved could be collected. By only performing design reviews, there is a risk of missing other insights that could be collected, for instance from a practical test. Therefore, it was important to encourage an open discussion during the design reviews to be able to observe expressions and other types of insights.

8.3 CONCLUSIONS

In the following chapter, a conclusion is presented by answering chosen research questions for this master thesis.

8.3.1 RQ1

How could opportunities for digitalisation be identified and exploited internally?

The answer to the first research question can be answered differently, depending on branch of the company and organisational aspects. Firstly, it can be preferable to get an understanding of the scope of digitalisation. Same solutions in different businesses could be exploit differently depending on goals and strategies related to the business. In a present era of Industry 4.0, digitalisation includes a broad scope of digital opportunities in relation to data, automation, digital interface and connectivity. Therefore, digital opportunities must be evaluated by the purpose of integrating digital solutions. Furthermore, to connect the existing digitalisation areas with the organisation may be necessary in order to find opportunities for digitalisation most suitable. Furthermore, opportunities could also be identified with a constant dialogue with the customer to meet customer requirements and their future requirements. By work accordingly to process management within organisations, it is a considerable

an important course of action to find opportunities internally, in this case digital opportunities. If companies apprehend the importance of process management, organisations can improve continuously by utilise digital opportunities with a basis in process management. According to the theory, a digital strategy, digital vision, leadership concerning digital encouragement and an open organisational culture are aspects that could increase the possibility to find opportunities towards a digital transformation. Otherwise, small and medium enterprises can consider a partnership with an external innovation partner in order to find opportunities for digitalisation due to their external expertise in the area of digitalisation.

8.3.2 RQ2

How could these digital opportunities contribute to improvement and development of business processes?

How opportunities can contribute to business processes can be difficult to determine due to how well the settled prerequisites for a digital transformation are established. However, different levels of digital innovations can contribute to business processes depending on processes maturity level. According to the empirical findings, the process maturity can contribute to process management in terms of how receptive a business process is and how receptive involved stakeholders are. It has been indicated that if processes have a maturity level of Awareness, digital solutions are related to continuous improvements or digitising. Therefore, in a process level of Awareness, digital solutions contribute to process management by improve the current state of how the process is currently operated. It is indicated but not fully determined that a higher level of process maturity, digital innovations and opportunities can possible be related to develop the business in terms of creating new value to customers. By creating new value to the customers, also means a change in the processes. Henceforth, it is essential to have a digital perspective if new value is created when changing the associated processes. Otherwise, there is a risk of a front-end focus when only finding new ways of creating new value to the customer. Also, by having a higher level of process, there is an estimation and understanding of customer changes of demands can be met proactively in a higher level of process maturity.

To have in mind, these opportunities could led to increased costs such as new machines, materials, systems and training for the staff by integrating new digital solutions. Therefore, digital opportunities contribute with higher costs. Moreover, even if digital opportunities will contribute to better efficiency or changes in value chains, there could be a possible risk of not implementing digital solutions due to the contribution of higher financial costs.

8.3.3 RQ3

How could the digital opportunities be prioritised and developed with an external innovation partner?

First and foremost, to better meet and prioritise possible digital opportunities, there is a need of a structure course of actions that can be observed in the Conceptual Cooperative Model. Opportunities can first be prioritised after a prioritisation of KPIs and a prioritisation process maturity based on step two in the Conceptual Cooperative Model, to make sure digital opportunities are related to organisational strategies. This is also done to define applicability and significance of digital opportunities. Based on step two in the Conceptual Cooperative Model, an evaluation according to a simplified QFD can be performed where KPIs and their connections to processes are visualised. The starting point towards a digital transformation can be prioritised according to certain criteria. In the Conceptual Cooperative Model, the criteria are related to process maturity, independence of process and capability to change. By grading importance of criteria, processes perceive a prioritising value based on those criteria to better visualise the entirety of processes shown in the QFD.

By having a starting point of which process to start digitalise, factors influence the processes are identified. KPIs, KPDs are examples of factors or other factors that may influence processes and can be detected by a fishbone diagram or brainstorming. The output of identifying factors and what influences those factors discharge in a framework for the innovation partner to develop digital opportunities based on a structured approach taken in previous steps performed in the Conceptual Cooperative Model. Suggestions of digital solutions from the innovation partner should be evaluated and further developed with accurate knowledge from the process. Knowledge from the process can be related to employees who have expertise regarding activities in the process. Suggestions of digital solutions can be prioritised according to a prioritisation matrix, a Pugh matrix or the previous performed QFD in step two of the Conceptual Cooperative Model. To summarise, digital opportunities are therefore prioritised based on a structured course of actions where KPIs and processes are firstly prioritised according to settled criteria. Subsequently, digital opportunities can be prioritised based on evaluations made by accurate expertise from the process and additionally with methodologies from different prioritisation tools such as prioritisation matrix, Pugh matrix and QFD.

8.4 FUTURE RESEARCH

The Conceptual Cooperative Model is an attempt to provide structure for SMEs to perform towards a digital transformation. To evaluate the model further, it would be preferable to test each step of the model in practise. Also, it would be beneficial to evaluate this model in collaboration with other companies in other branches to increase generalisability of the model.

It was indicated that there is a tendency and a linkage between process maturity and different levels of digital opportunities. Tendencies were discovered between a lower level of process maturity and an early stage of digitalisation or embracing digital opportunities. Future research of confirming this analysis would be of interest and a suggestion for future research. Furthermore, a future research could investigate if other types of digitalisation aspects could be related to the linkage with process maturity. Also, the receptiveness instead of the process maturity could be interesting to further investigated.

8.5 FINAL WORDS

This report summarises a master thesis involving experience and a lot of learning about digital opportunities and how organisations are challenged by integrating digital solutions to core processes. This research field of linking processes, digitalisation and innovation have been a challenge but a worthwhile contribution to explore this field even further.

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APPENDIX

APPENDIX 1

Questions related to impacts of Digital Transformation (Kääriäinen, et al., 2017)

Internal Efficiency

How is the issue handled now, and how satisfied are the stakeholders with the current situation?
What is the state of technology used to handle the issues?
What main bottlenecks exist in the current practice?
What current competencies related to the goal are available?
What are restrictions for change relating to the issue?

External Opportunities

What are the current company offerings?
Who are the current customers and what are the current customer segments?
What is the competitive advantage of the current offering compared to competitor offerings?
What are the potential new customer segments and who are the potential new customers?
What is the current state (e.g., competitors offering) in the new segment?
What would be the competitive advantage of the company in the new service or segment?
What is the cost of implementing the new offering?
What risks are involved?
What is the impact on the company's current offering and business?
What is the window of opportunity?

Disruptive change

Which current company offerings are impacted?
How dramatic is the impact on each offering (offering becoming totally obsolete current customers of the offering leaving to find opportunities in other segments, etc.)?
Which processes are involved with the change?
What competencies and resources does the company have?
Where can these competences be utilized in the future?
What is the timeframe of the change?

APPENDIX 2

Interview questions regarding digitalisation

How do you work with digitalisation today?
What differences do you see between digitalisation and digitising?
Is there a pronounced strategy or vision for digitalisation in the company?
What challenges and opportunities within digitalisation do you see in your daily work?
Do you have anything else to add?What drives the digital market forward?
What kind of digital solutions do you offer to your customers?
What challenges and opportunities do you see with digitalisation?
How can a digitalisation target look like?
What kind of digital solutions are most popular that you help your customers with?
Are there any aspects from you that we need to consider when creating this model?
To what extent do you usually participate in the process of digital transformation with the customer?
Is there any opportunity or situation where you become more involved (support)?
Is there any phase in a digital transformation where more support is required?
Do you have any tools to understand your customers' needs and their current state from a digital perspective? Why and for whom should it be digitalised?
Is there a pronounced strategy or vision for digitalisation in the company?

APPENDIX 3

Interview questions regarding Innovation

What does innovation mean for you?
How do you work with innovation in your daily work?
How do you work with your 'innovation incubator'?
The ideas you choose from the innovation incubator, is it established in any strategy?
What challenges and opportunities within innovation do you see in your daily work?
Do you have anything else to add?

APPENDIX 4

Interview questions regarding business processes

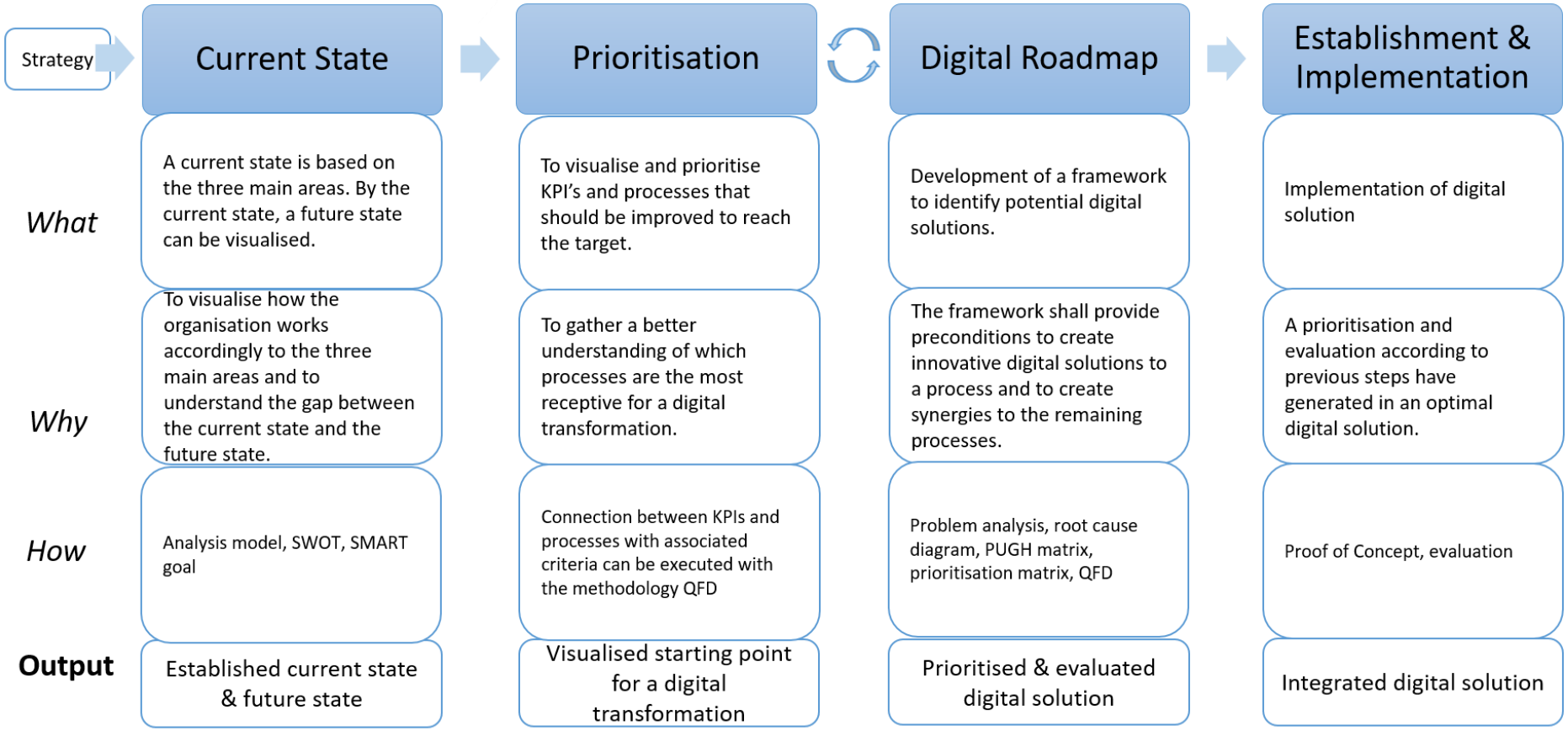
For how long have you worked with your business processes?
Do you think business processes require some type of maturity before start working with digitalisation?
Can you describe your business processes and the mapping?
Is there any business process that is more developed than anyone else?
How do you do the development of the business processes?
What challenges and opportunities within business processes do you see in your daily work?
How do you think when you choose which business processes you should start developing?
What do you think about an integration of digitalisation within your business processes?
What is the challenges for such integration?
How does the work look like with continuous improvements in the business processes? How have you worked with their business processes and for how long time?
Can you describe the core processes and the mapping of which business processes that exist at the case company?

APPENDIX 5

	Suggestions	Changes
Design review 1	*General*	
	Required knowledge in different areas	This was considered
	Visualisation of which parties should be involved in each phase	This was visualised
	Digital roadmap phase	
	To explicate the identification of factors	This was clarified
	Implementation phase	
	How to visualise each step, PoC, creation of solutions, verifying	This was changed
	Change the headline to Establishment and Implementation	This was changed
Design review 2	*Positioning phase*	
	Difficult to understand the positioning of digitalisation step	This was clarified
	Absence of market trends and/or market research	This was added
	Recommended to use another tool for goal setting	This was added
	Prioritisation phase	
	A possible risk of a too long lead time	This was discussed
	If improving one KPI, it might lead to improvement of multiple processes	This was discussed
	The value of the solution has to be considered, the effort contra the benefit	This was discussed
	A cyclic model might be necessary when working more agile	This was partly changed
	General	
	Measure and follow-up during the project, KPI	This was added
	Might be a too simplified model	This was discussed with minor changes
	The model should not intend in more meetings	This was discussed
	Tools for measuring innovation	This was discussed but not included except from guidelines
Design review 3	*General*	
	Are all prerequisites really a requirement?	The headline were changed to recommended prerequisites
	General thoughts within digital aspects might be more important than other	This was discussed and considered
	If any scales of digital transformation exist, visualise it.	This was discussed but not included
	Visualise the purpose of each step	This was added

	Each step could be visualised better and more clear	This was improved
	What, why and how in each step would visualise the model better	This was added
	Positioning phase	
	The position phase can be renamed to current state	This was changed
	Prioritisation phase	
	Synergies could be used in terms of usage of a digital solution in multiple processes	This was discussed and considered
	A loop between prioritisation phase and digital roadmap phase	This was changed
	Digital roadmap phase	
	Alternative two could be followed after finishing alternative one	This was discussed, improved and visualised differently
Design review 4	*Prerequisites*	
	Digital strategy might not always be necessary as a prerequisites	This was discussed
	The co-worker has to be receptive to change	This was discussed
	General	
	Clarifications	This was improved
	Current state	
	Inspiration workshop of possible digital solutions	This was added
	Digital roadmap phase	
	Interaction between case company and innovation partner is necessary	This was added

APPENDIX 6


Strategy
Current State
Prioritisation
Digital Roadmap
Establishment & Implementation
What
A current state is based on the three main areas. By the current state, a future state can be visualised.
To visualise and prioritise KPI's and processes that should be improved to reach the target.
Development of a framework to identify potential digital solutions.
Implementation of digital solution
Why
To visualise how the organisation works accordingly to the three main areas and to understand the gap between the current state and the future state.
To gather a better understanding of which processes are the most receptive for a digital transformation.
The framework shall provide preconditions to create innovative digital solutions to a process and to create synergies to the remaining processes.
A prioritisation and evaluation according to previous steps have generated in an optimal digital solution.
How
Analysis model, SWOT, SMART goal
Connection between KPIs and processes with associated criteria can be executed with the methodology QFD
Problem analysis, root cause diagram, PUGH matrix, prioritisation matrix, QFD
Proof of Concept, evaluation
Output
Established current state & future state
Visualised starting point for a digital transformation
Prioritised & evaluated digital solution
Integrated digital solution