

Karsten Kjensmo

Implementing a digital toolkit for organizational transformation in a growing enterprise

Master's thesis in Informatics
Supervisor: Babak A. Farshchian
September 2019

Karsten Kjensmo

Implementing a digital toolkit for organizational transformation in a growing enterprise

Master's thesis in Informatics
Supervisor: Babak A. Farshchian
September 2019

Norwegian University of Science and Technology
Faculty of Information Technology and Electrical Engineering
Department of Computer Science

 **NTNU**
Norwegian University of
Science and Technology

Abstract

Digital toolkits and the process of implementing them is a steadily increasing phenomenon in organizational structures both in the private and public sector. There exists a suite of digital toolkits that address various issues facing the operation of organizations. Expertise in how to successfully implement these digital toolkits, customize them for individual needs and the best way to go about this process is not yet ubiquitous or fully explored. By engaging in a case study involving interviews with and observation of the actors involved in implementing a digital toolkit in a growing private organization, light is shed on pitfalls and challenges regarding the implementation of a toolkit that has broadly reaching consequences for the organization involved. The case study follows an implementation process that suffers from setbacks and sheds light on why these setbacks occur. The underestimation of resources required to complete the implementation, its consequences and the unsteady progression towards the implementation's objectives all contribute to these setbacks. The observations of this process can contribute to a set of best practices in engaging with digital toolkits and undergoing the process of implementing them.

Acknowledgements

I wish to express my gratitude for the people that gave me access to their companies in order to write this thesis. With special thanks to the person who gave me the drive and the person who gave me the opportunity – thank you very much. You two know who you are. Thanks to family and friends, for all your support along the way, with further gratitude to my old man, for being a regular sparring partner all throughout my education. Finally, thanks to my professor, for being the Clint Eastwood of supervisors in a task that faced more turbulence than we'd have liked it to.

Table of Contents

1	Introduction.....	- 2 -
1.1	Thesis structure	- 2 -
1.2	Purpose.....	- 2 -
1.3	Research questions	- 3 -
2	Theoretical background.....	- 4 -
2.1	Introduction to digital toolkits	- 4 -
2.2	Stickiness.....	- 4 -
2.3	Reducing the cost of using and implementing a toolkit.....	- 5 -
2.4	Digital Transformation	- 8 -
3	Methodology	- 10 -
3.1	Note on anonymization.....	- 10 -
3.2	Relating theory to reality	- 11 -
3.3	Background on case studies.....	- 12 -
3.4	Generalization of case study results	- 13 -
3.5	Research design and data collection	- 14 -
3.6	Data analysis	- 20 -
3.7	Delimitation of the case study	- 20 -
4	Case description	- 21 -
4.1	Overview of toolkit functionality	- 21 -
4.2	Overview of software user interface.....	- 22 -
4.3	Main screen	- 23 -
4.4	The actors	- 29 -
4.5	Toolkit “lifecycle” process, from sale to implementation	- 31 -
5	Findings	- 32 -
5.1	The actors	- 32 -
5.2	Testing phase.....	- 46 -
6	Discussion.....	- 47 -
6.1	Addressing the research questions.....	- 47 -
6.2	Analysis of the customer’s implementation effort.....	- 48 -
6.3	Toolkit efficacy	- 51 -
6.4	Impact on existing company structure.....	- 53 -
6.5	Future work	- 54 -
6.6	Concluding remarks	- 56 -
7	Appendix.....	- 57 -
7.1	Note on anonymization.....	- 57 -
7.2	Sources	- 57 -
7.3	Sample interview guide	- 59 -

List of figures

FIG 1: IDEAL CUSTOMIZATION OF TOOLKIT OVER TIME	- 7 -
FIG 2: POOR CUSTOMIZATION OF TOOLKIT OVER TIME.....	- 7 -
FIG 3: IMPACT OF A DIGITAL TRANSFORMATION [MATT ET AL., P. 341].....	- 9 -
FIG 4: [THE TOOLKIT] MAIN SCREEN	- 23 -
FIG 5: AVAILABLE FUNCTIONALITY	- 23 -
FIG 6: A SAMPLE REPOSITORY PROJECT CONTAINING SEVERAL CASES AND CATEGORIES.....	- 24 -
FIG 7: SAMPLE OF A DOCUMENT CATEGORY TEMPLATE	- 25 -
FIG 8: SAMPLE OF A WORKFLOW VIEWING PANE	- 26 -
FIG 9: SAMPLE WORKFLOW	- 26 -
FIG 10: TASKS FUNCTIONALITY	- 26 -
FIG 11: SAMPLE TASK.....	- 27 -
FIG 12: SAMPLE TEMPLATE AND HOW IT CONNECTS WITH THE WORKFLOW MANAGER.....	- 27 -
FIG 13: SAMPLE REPORT PARAMETERS.....	- 28 -
FIG 14: SAMPLE REPORT GENERATION	- 28 -
FIG 15: RELATIONSHIP BETWEEN THE ACTORS	- 29 -
FIG 16: DIGITAL CASE FILE FOR A CAR PURCHASE CONSTRUCTED IN THE SOFTWARE	- 43 -
FIG 17: THE FIGURE SHOWS THE UPDATED, DIGITALIZED PROCESS, CONSTRUCTED IN THE SOFTWARE'S WORKFLOW MODULE.....	- 44 -
FIG 18: FUNCTION COMPLEXITY OVER TIME	- 52 -

List of tables

TABLE 1: LIST OF INTERVIEW SUBJECTS.....	- 15 -
TABLE 2: TESTER QUALITIES	- 46 -

1 Introduction

This is a master thesis in Informatics at the Norwegian University of Science and Technology (NTNU). The thesis' overall subject is the use of digital toolkits for organizational transformation within a growing company. It centers on the assessment of the implementation of software with the aim of digitally transforming work processes, and takes the form of a case study. A research subject willing to give insight into the process was engaged by the retailer of the software. This research subject is a car sales company located in Norway. The thesis originated during an interview with a leading figure in the company that retails and implements the software, whom desired an inquiry into certain elements of the software and its reception and efficacy. Particular emphasis was placed on the software's perceived complexity in terms of functionality and user interface, and the issues that might arise from this complexity during implementation and preliminary use of the software. I engaged with the developer and the retailer of the software, and followed the car company during the process of the implementation of the software. At the end of this process, an analysis of the process as well as its implications and the company's reflections on the software's complexity was made.

1.1 Thesis structure

In Chapter 1, the topic is introduced and the purpose and research questions are described. In Chapter 2, the theoretical background for the topic is given, covering digital toolkits and the process involved in implementing them. Chapter 3 presents the methodology chosen for researching the topic. Chapter 4 describes the case, giving accounts of the toolkit and the actors being examined in the case study. Chapter 5 contains the findings from this research process. Chapter 6 discusses the findings from the research and places them in context with the objectives of the case study, and suggests future work. Chapter 7 is the appendix for the thesis, containing sources and auxiliary documentation.

1.2 Purpose

The purpose of the thesis is to contribute to the body of knowledge on digital toolkits and how they impact digital transformations when end-users customize these toolkits to their own needs. I will focus on a company and what it experiences during this process of customization and implementation, and what results can be drawn from the new system. The goal is an analysis of decisions made during the process and a resulting list of best practices.

1.3 Research questions

In order to draw palpable conclusions from the case study, the following set of research questions are posed:

1. **RQ1:** *What impact did the digital transformation have on the company?*

Digitalization efforts are relatively new on the mass market scale, and are being undertaken by an increasing amount of private companies and public institutions alike. It involves the disruption of methods of working that have been used for long periods of time. These methods involve not only the way in which tasks are solved, but also which people are involved in solving them. Digitalizing this process does not necessarily result in a disruption of all the elements involved, but it may. If it does, considerable thought must be put into the consequences of the digitalization, both for good and for bad.

2. **RQ2:** *How does a company in transition handle the use of the digital toolkit and what decisions does it make during the implementation of this toolkit?*

- a. **RQ2A:** *What can be learned from the decisions made during this process?*

The company in question – the customer – is a company experiencing rapid growth. This rapid growth has necessitated a change in methods and structure to match the new operational scope, and in order to optimize existing processes. The company itself has discovered the needs for this change, and selected the software they feel is best to manifest these changes. The process of implementing these changes is separate from the changes themselves. It is of interest to see how a company goes about manifesting these changes, and what the chosen methods result in.

3. **RQ3:** *How does the general usability of a toolkit impact its effect on digital transformation?*

- a. **RQ3A:** *If so, what changes can be done to improve the usability of the toolkit?*

Unless the users of the software are experts or particularly technically savvy, an increase in complexity results in an increase in difficulty in using the software. This increase in difficulty in turn results in a difficulty in training new users to navigate and operate the software, which slows down the rate of which the software can be distributed to new clients. This is of interest to the retailer and the developer in terms of increasing units sold, and of interest to the customer in terms of utilizing the software effectively.

2 Theoretical background

This section of the thesis will describe the relevant theory to different elements of the case study, cover digital toolkits and argue why the software in question can be described as such, as well as the qualities that define a good digital toolkit and its criteria for being used successfully.

Furthermore, the section will cover digital transformations, which can follow from toolkits specifically designed to facilitate this process. Criteria for successful digital transformations and research describing best practices will also be described. Finally, the section will define end-user customization. The purpose of this section of the thesis is to give the reader an overarching understanding of the objectives, possibilities and impact that the software can have on the customer.

2.1 Introduction to digital toolkits

One of the challenges involved in creating a good tool for digital transformation is understanding and reacting to the various needs of the businesses involved. Products must respond accurately to user needs if they are to succeed in the marketplace. [1] Traditionally, products are developed by the solution manufacturer first querying the customer base to understand what problems they need solved. Then, once this problem is understood, the manufacturer designs a product intended to solve this problem. The solution is tested, and after an iterative process where this solution is tested again, the product is finally put on the market for users to buy. The process of understanding and accurately responding to user needs can be a costly process, both in time and resources. [1] An alternative to this approach is to develop a universal *toolkit*, from which the users themselves can innovate. From this toolkit, the users can utilize what they need in order to customize their own precise solution to their own specific problems. These toolkits are not entirely universal, but often designed to fit the needs of a certain domain or industry. By this definition, the software in the case study can be classified as a digital toolkit, within the domains of information management and workflow optimization.

2.2 Stickiness

Stickiness is one of the ways to define a good toolkit. The lower the stickiness is, the better the toolkit. A toolkit can be rated according to whether or not it fulfills a set of desirable traits. A trait that defines a good toolkit is how easy it is for the end-user to pick up the tools in it and use them correctly without first having to undergo extensive training. Little instruction is required in the use of a hammer; its purpose is intuitive upon a glance. Another trait that defines a good toolkit is that it can be used to solve a number of different tasks, having a greater chance to fulfill the needs of

the individual user. Apart from its most known use, a hammer can also be used to pry up floorboards, smash away loose masonry, or in unconventionally, crack an egg. One way to define these two important traits is via the concept of *information stickiness*. The end-user has a specific task to overcome, and requires both the information to overcome it, as well as the capability of the tools to do so. When it is difficult to transfer both the problem-solving information and the problem-solving capability needed by the end-user from one entity to another, then that transfer is considered *sticky*. [2]

“The stickiness of a given unit of information in a given instance is defined as the incremental expenditure required to transfer it to a specified locus in a form useable by a given information seeker.” [1, p. 4]

Stickiness is thus a concept that in part determines how useful a toolkit is. The more of a demand there is on the user to invest time and resources into understanding the use of the toolkit, the less appealing it is to implement that toolkit.

There are several other factors to consider when transferring information. The end-users themselves may not be technically competent or may not be in a state to receive and process the information, such as a situation where they have to handle their regular tasks on top of learning the new system. There are many factors such as these which can reduce the *absorptive capacity* – that is, the ability to understand and capably use the information – of the personnel that needs to receive the information. [3]

The urgency for unsticking the information can also depend on the heterogeneity or homogeneity of the industry the toolkit is designed for. The more heterogeneous the target audience of the tool is, the more of an incentive there is for investing in ways of making the information less sticky, as there is a broader field of diversity in the recipients of this information.

2.3 Reducing the cost of using and implementing a toolkit

The staff seeking to implement the toolkit may need additional assistance in the processing information. This generally involves *unsticking* the information required. This is most useful in industries where the customers’ needs are heterogeneous. The number of times the information has to be transferred from one locus to another in different formats is an incentive to the manufacturer to make a generalized product that the user can then manipulate. [1] Rather than making one product for each individual situation, it is more attractive to create one solution that each individual can customize to their needs.

There are ways to go about in alleviating the costs of implementing toolkits and the digital transformation they may entail.

2.3.1 Technological gatekeepers

Assistance from specialists can be introduced to reduce the stickiness of the information, reducing the cost of transfer of information from the one locus to the other. The specialized personnel that support digital toolkits have been dubbed “*technological gatekeepers*”, and these can have a carrying impact on the cost of information transfer. [3, 4] Specialists in communication with the customer and aligned with the customer’s needs – or with the capability to attain this alignment – can quickly customize the toolkit for the customer’s specialized needs. Depending on the size and reach of the toolkit in question, the specialists often take the form of outside consultants that are familiar with the toolkit and the technologies involved in the toolkit.

2.3.2 Making information explicit

It is, of course, preferable if this layer of technological gatekeepers is not required for the success of the toolkit to be implemented. Preferably, the customer orders the toolkit and upon receiving it can use it to their own needs without further involvement from the manufacturer of the toolkit. The information required to use the toolkit should be as explicit and easily digestible as possible. In the case of digital toolkits, one way to increase usability is by having a self-explanatory user interface that does not require a lot of effort to understand and use.

2.3.3 Using a toolkit in changing situations

One of the strengths of a highly customizable toolkit is that it can be successful in a problem area with heterogeneous demands. The toolkit can be altered if the situation for its use changes to fit the new problem area. As shown in figures 1 and 2, a company may implement a toolkit to solve a set of problems prevalent at the time of implementation, but this problem group may change over time, requiring the toolkit to change as well.

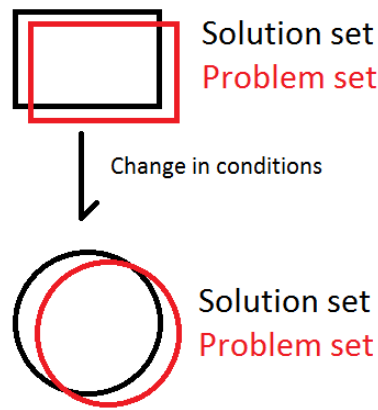


Fig 1: Ideal customization of toolkit over time

The toolkit is less ideal if it cannot be altered this way.

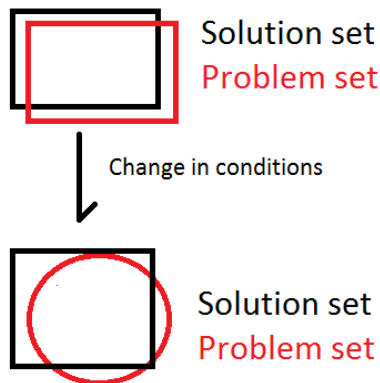


Fig 2: Poor customization of toolkit over time

A measure of the toolkit's efficacy is thus how alterable it is. This does not merely depend on the toolkit itself, which must be capable of this change and also not too complicated to change, but also its users, who must be proficient in the toolkit's use in order to customize it. It can be considered useful to ensure that the company trains staff in expert usage of the toolkit in order to facilitate this possible need for customization.

2.3.4 End-user customization

End-user customization and digital toolkits go hand in hand. The toolkit is designed so that the end-user has influence over what the final product should look like – in essence, it transfers part of the design process from the manufacturer to the user. End-user customization, enabled by toolkits, can be part of a digitization strategy in order to reduce the risk of failure during digitalization. A product that is customizable has a greater chance of leading to a successful digitalization because it can be customized to fit ongoing processes of change in an organization.

2.4 Digital Transformation

A digital transformation is the process an entity goes through when it converts previously manual processes into digitalized processes. [5] More and more companies are looking to digital tools to improve their business. Often these digital tools transform the company in some significant way. A digital transformation can often impact more sectors of the business than are originally intended and anticipated. It may impact roles that are previously filled by analog tasks; it may impact the products the company sells, business processes, supply chains and sales channels. [5] Depending on which areas are impacted, it may further necessitate a restructure of the company's internal responsibilities and communication, and it may require additional systems in order to function properly. These can all incur additional costs. A digital transformation can therefore often require more resources than expected in capital, time and manpower.

2.4.1 Digital transformation strategies

Thus, when a company sets out to engage in a digitalization project, it is considered good practice to formulate a *digital transformation strategy* in which to facilitate the transition from analog to digital.

“[...] A digital transformation strategy is a blueprint that supports companies in governing the transformations that arise owing to the integration of digital technologies, as well as their operations after a transformation.” [5, p. 340]

The aim of this strategy is to foresee potential consequences and formulate plans to work around them, as well as discover areas of use of the digitalization that are not immediately obvious.

“Owing to this wide scope and far-reaching consequences, digital transformation strategies seek to coordinate and prioritize the many independent threads of digital transformation.” [5, p. 339]

The digital transformation can differentiate itself from mere implantation of new software by spanning several sectors of a company. Matt *et al.* [5] demonstrate this with the following figure (Fig. 3), showing how entirely different segments of a corporate structure are impacted by a digital transformation.

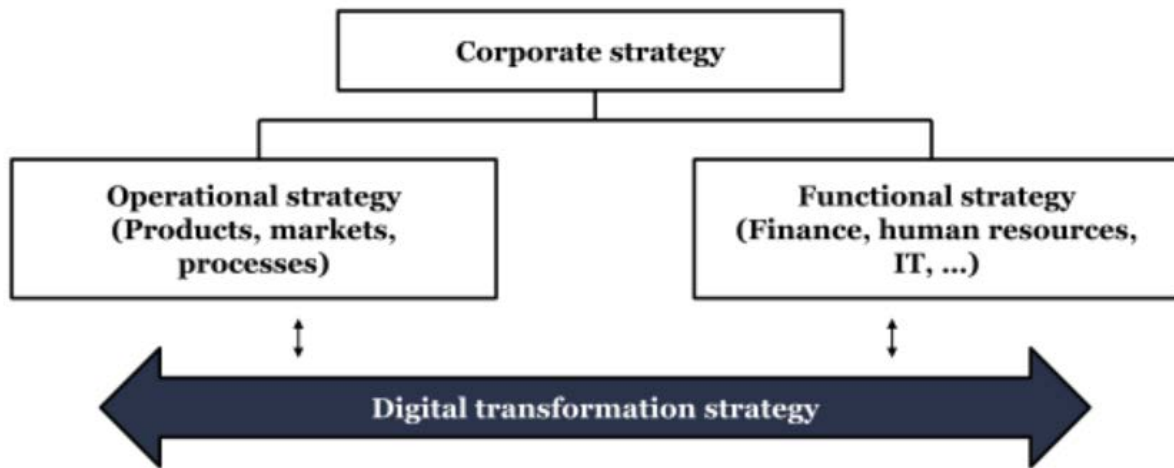


Fig 3: Impact of a digital transformation [5, p. 341]

2.4.1.1 Digital transformation framework

Matt *et al.* [5] furthermore lay out a suggestion for a *Digital Transformation Framework* (DTF) for organizational management to follow in implementing this change, based on several case studies in the field. This framework lays out the core areas that need assessment prior to engaging in a digital transformation. The strategy covers four dimensions, which combine to create the total effect of the transformation.

First, the company should assess its ability to *use the technology* and decide whether to become a creator of market standards, or instead to follow in ready-made niches. This depends on the scope of the transformation being undertaken, and how many areas of the company they expect it to impact. Certain problems may need tailor-made solutions to overcome, the company may have a particularly skilled technology team, or, conversely, ready-made solutions may be available cheaply, or the company may deem it lacks the technical expertise to implement its own solutions.

Second, the company should make efforts to foresee how the implementation of the technology may alter the *value creation* in the company. The technology implemented may change the way in which sales are made, the way in which the product is marketed or distributed, and it may change which employees interface with the product. A switch in which a brick and mortar store begins to sell its wares online to a more digital market may bring with it an entirely new audience, which in turn may require entirely new advertising and sales strategies.

Third, the company should plan ahead and make efforts to determine how the new technology will alter the *structure of the company*. A transformation into a new system of processes may bring with it demands for entirely new positions, to satisfy potential expansions into new markets or to

shore up technical issues that may arise from the new system. Conversely, the transformation may make older positions redundant or obsolete.

Fourth, the company must plan for the *financial aspect* of the transformation. This is the engine without which the vehicle does not move, as every other dimension must be funded. Digital transformations can be costly endeavors, for which the company must be sufficiently financially prepared. A digitalization may be necessary to ensure survival – as can be the case with the brick and mortar store being forced towards online markets – and the transformation may have to occur within a given time frame in order to keep the company afloat. Regardless, companies should investigate the need to conduct digital transformations well ahead of necessity.

«To ensure the successful rollout of a digital transformation strategy and fully exploit its intended effects, it is essential to closely align the four different dimensions» [5, p. 341]

A successful digital transformation thus depends on a few clearly identifiable traits. Success can be determined by solid planning ahead of time, competent delegation of responsibility, thorough comprehension of the implications of the transformation, and a willingness to adapt along the way. Companies that take some or all of these steps safeguard themselves from the additional costs and unintended consequences that can incur from a shaky implementation of a digital transformation.

3 Methodology

The approach taken to the research will influence the empirical study in several different ways. It impacts data collection, by dictating the set of methods relevant to the research, and it impacts the way the research will be analyzed and considered in the context of the body of knowledge on the topic in question. In this section, the method of research chosen will be described, what this method offers, as well as how this relates to research theory and how this method of research is evaluated.

3.1 Note on anonymization

This thesis was done in coordination with three companies, all of which are tied to the software in question in some way. The companies all desire an anonymization of the data involved, as information in the thesis can be subject to analysis by market competitors and is thus sensitive. For this reason, the four main entities of this thesis will be anonymized: the software and the three companies involved.

1. *The toolkit or the software*, which will be described extensively in the thesis. The software is a digital toolkit with functionality that can be described as enterprise resource software and an information management system.
2. *The developer*, owning and developing the software. The developer is motivated by updating the software in accordance with the market's desires.
3. *The retailer*, selling the software. The retailer is in direct contact with the market and holds exclusive rights to selling the software. The retailer is motivated by selling the software.
4. *The customer*, in the process of implementing the software. The customer is motivated by optimizing processes and archiving information.

3.2 Relating theory to reality

There are two approaches to relating a theory to the reality it aims to describe. These are called the *inductive* and *deductive* approaches. The inductive approach can be described as inquisitive and exploratory. The researcher engages with a phenomenon in reality, and from observations and testing of that phenomenon seeks to generate a theory that describes the phenomenon in a greater context. The deductive approach travels that route from the other end, starting with an existing theory and designing hypothesis based on that theory. From the hypothesis, the researcher designs a research strategy to test that hypothesis.

«Deductive means reasoning from the particular to the general. If a causal relationship or link seems to be implied by a particular theory or case example, it might be true in many cases. A deductive design might test to see if this relationship or link did obtain on more general circumstances.» [6, p. 7]

Where the inductive approach enters a phenomenon with no presuppositions and observes the phenomenon and then seeks to describe it, the deductive approach observes the existing set of theories, and engages with the phenomenon to test these theories. Deduction thus begins with an expected pattern and tests if that pattern matches with reality. The deductive approach is preferable if there exists a set of theories and hypothesis on the phenomenon, and if the time available to complete the study is not unlimited.

This thesis can be described as mainly deductive, as it seeks to test theories on digital transformation and digital toolkits from existing theories, with a unique set of parameters in a unique case.

3.3 Background on case studies

The approach to the research is based on an in-depth case study. A case study foregoes examining an entire field of similar entities, focusing in on a single *case* in that field examining details within that single case.

“A case study focuses on one instance of the ‘thing’ that is to be investigated: an organization, a department, an information system, a discussion forum, a systems developer, a development project, a decision, and so on. This one instance, or case, is studied in depth, using a variety of data generation methods (interviewing, observation, document analysis and/or questionnaires). The aim is to obtain a rich, detailed insight into the ‘life’ of that case and its complex relationships and processes.” [7, p. 141]

This approach to research is generally considered qualitative rather than quantitative, although it can contain quantitative elements. A qualitative approach entails limiting the number of research subjects, and in turn gaining greater insight from this limited number of subjects, being able to place the data gathered in a richer and more informative context. A quantitative approach, by contrast, gathers information from a greater number of subjects, but is limited by this to gathering only comparatively superficial data. In a case study, quantitative data is mostly used to enrich a comparatively qualitative selection from a larger field.

“A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and the context are not clearly evident.” [8, p. 13]

The case study thus examines the greater context in which the studied phenomenon takes place, under the assumption that this context shapes the phenomenon. This context can include social relationships, overarching politics and culture, history of previous events in that context, and a slew of other factors that can arguably impact the phenomenon in some way. The case study looks to examine all of these factors. Rather than examining only the house, it examines the street, the town, the country, the continent, all of which helps to put the house in a more complete context.

“A case study does not test hypotheses, as in experiments, but from studying a particular instance, insight can be gained and knowledge generated that might also be relevant to other situations.” [7, p. 142]

A case study is characterized by a set of distinguishing qualities:

1. *Focus on depth rather than breadth.* The researcher seeks to uncover as much information as possible about the given case being studied.
2. *Natural setting.* The case is not isolated from its context, but rather the researcher seeks out the setting of the phenomenon and examines it there. The researcher does not seek to interfere with the case by separating it, and the point of the case study is lost unless it is allowed to continue with its natural course of action.
3. *Holistic study.* All factors are taken into account as a cohesive whole, rather than being isolated into separate entities when the case in question is examined.
4. *Multiple sources and methods.* The researcher looks to use as many sources of information as possible in order to cast light on the issue being examined. [7, p. 142]

There are three different types of case studies: exploratory, descriptive and explanatory. [8]

Exploratory study is used in a new field of investigation, where there is little existing literature and the field must be investigated in order to begin to form the set of questions that research might be interested in answering. An exploratory study might, for instance, be used to discover a set of problems within a given system, in order to understand what questions should be posed in order to solve those problems.

A descriptive study seeks to give an account of *what* occurred during a phenomenon to a rich level of detail, examining the issue from several perspectives.

An explanatory study does the above, but also looks to examine *why* events happened during the phenomenon, and looks to link these factors together in an overarching description of the effects of each factor.

3.4 Generalization of case study results

An understandable critique of case studies is that the data found in a case study and conclusions drawn thereof is only applicable to that case study. Each case study separates itself by having a truly unique set of circumstances when examined as a whole. While many of the circumstances can be replicated, case studies still delineate themselves by the uniqueness of the people and circumstances involved. Unlike experimentation that does not involve dynamic parameters such as human beings or unique circumstances, each unique case study is impossible to replicate entirely.

It is, however, possible to create conclusions based on the data that are applicable to cases with enough similarity to the case examined – with the correct amount of *generalization* applied.

Although some factors in the case study may be unique – and the people in them in their

circumstances always will be – other factors and similar circumstances will be found in other cases. These generalizations are arguably the main contribution of case studies, as they provide underlying data for a set of similar phenomenon as well as a detailed description of the factors involved in that particular phenomenon.

“Cases might be similar on the basis of their physical location, history, social mix, technical basis or organization type.” [7, p. 145]

Four main types of generalizations can be described: [9]

1. A *concept*, which is described as a new idea or notion that emerges from the analysis, which may require new terminology to be introduced in order to describe it proficiently.
2. A *theory*, which is a coherent collection of concepts and propositions. This may take the form of a framework which seeks to incorporate several factors and processes in order to describe an overall phenomenon.
3. *Implications* that arise from a case study are suggestions about what may occur in similar cases with similar parameters in similar contexts. This may take the form of a suggested set of best-practices protocols to solve a certain problem.
4. *Rich insights* are the final nominated category, which does not fit in the above three but still provides a useful understanding of the phenomenon being studied.

This case study is arguably a combination of the latter two forms of generalizations described; implications and rich insights. It provides data that is applicable to small-to-medium sized companies with relatively few IT support staff that are undergoing digitalization processes involving complex software. This software can be customized according to the company’s objectives.

3.5 Research design and data collection

The phenomenon is a process of digital transformation using a toolkit and involving three companies, each with individual purposes and roles. The research was designed to give an optimal understanding of each company, the decisions that influenced each step along the way of the process, and the individual actors in the process, and their motivation and contributions.

3.5.1 Outline of task

The thesis is designed as an exploratory case study. The task set was to observe a company as it implements a digital toolkit, and observe the process of this implementation and toolkit customization. Once completed, I would then examine the results of the digital transformation in comparison to the objectives set by the companies themselves. To do this, I would use the methods of personal interviews, document analysis, observation, questionnaires and surveys, to gather both qualitative and quantitative data in an attempt to get as full an understanding of the phenomenon as possible.

3.5.2 Interviews

The interviews were a key part of my data collection, and provided the richest amount of insight into the perspectives of each actor involved. Most interviews were conducted in person and on location at the subject's place of business, with the exception of the developer's representative, who I interviewed over Skype. Below is a table giving an overview of the interviews, followed by a detailed description of the interview subjects and the aims of the interviews conducted.

3.5.2.1 Interview overview

Table 1 contains a list of the interviews conducted.

Name	Organization	Role	Length	Goal
T.B.	Retailer	Professional Services Manager	30 minutes	Insight into overarching strategy, history with developer.
J.O.	Retailer	Pre-sales Specialist	40 minutes	Insight into presales process, connection and interest in the software, connection with developer.
L.C.	Retailer	Implementation Specialist	85 minutes	Insight into implementation process, connection with customer.
T.C.	Developer	Product Innovation Manager	50 minutes	Insight into toolkit, current strategy, vision for development.
T.P.	Customer	Chief Technology Officer (CTO)	70 minutes	Insight into company technological history, company development, structure, work processes, technology use, technological motivations for digitalization.
F.S.	Customer	Chief Financial Officer (CFO)	25 minutes	Insight into company financial history, company expansion history, work processes, financial motivations for digitalization.

Table 1: List of interview subjects

3.5.2.2 *Practical information about the interviews*

The interviews were recorded on digital tape recorder (Zoom H2), and a backup was recorded on a smartphone (Huawei P9). I approached the interviews as relatively casual conversations, with the aim of getting as much information as possible, as I was aware that I was requesting proprietary information from my interview subjects. Each interview was aimed to be between twenty-five and forty-five minutes, but some went over that time as the subject was willing to talk at length. The interviews were critical for building the case description and understanding the motivations of each actor. I translated the interviews from Norwegian to English from the recordings where necessary, and transcribed in English. The audio files from the interviews have been deleted as per NSD (*Norsk senter for forskningsdata* – Norwegian Centre for Research Data) regulations. A sample interview guide has been attached in the appendix.

3.5.2.3 *Interview description*

I selected interview subjects from four distinct subgroups.

1. *The developer.* This to gain an insight into the platform itself; its capabilities, its strengths, its weaknesses, its participating members and its motivations for altering the toolkit according to certain objectives. To this end I interviewed the product innovation manager, who had an overview not only of the software's current capabilities, but also set the tone for which changes were to be made to the program. The desired changes gave insight into the software's potential pitfalls, and how these could affect the customer implementing the toolkit.
2. *The retailer.* The retailer would be responsible for assisting the customer with the implementation of the software, and had insights into how the product was sold in accordance with its strengths. The retailer had direct contact with the customer, and could provide an analysis of the customer's work structure per the problems the customer wished to solve. The retailer also had expert insight into the use of the software and a history of interaction with customers. To this end I interviewed three persons from the retailer;
 - a. *The professional services manager.* This individual is responsible for the overarching strategy involving the software. This individual held insights into the current market, the retailer's view of the software and its visions for the future of the software as sold by the retailer.

- b. *The pre-sales specialist.* This individual held key insights into the history of involvement between the retailer and the developer, and had lengthy experience in selling the software and the process involved with this. Where the professional services manager mentioned in a) had an overview of the overarching strategy and long-term goals of the software, the pre-sales specialist was able to provide insight into how the retailer viewed the software on a short-term strategic basis, as well as give insight into how the retailer interacted with customers in the early stages of the process.
 - c. *The implementation specialist.* This person was key to the implementation process and had thorough knowledge of and insights into the customer's objectives. The implementation specialist also fostered a close relationship to the CTO, and the two were central actors in driving the process forward. The implementation specialist was responsible for shaping the toolkit to the specifications of the customer, and gave insight into the technical process as well as the progress of the process along the way.
3. *The customer implementation staff.* This included the section of the company responsible for implementing the software rather than the subset of employees who would be using the software. The customer implementation staff was interviewed in order to understand the process from their perspective, as well as their motivations for going into the process. Further, I wanted to know why they had selected the toolkit in question, what problems they intended to solve, as well as the financial aspect, to understand what they felt they had to gain from implementing the toolkit. I wished to discover what the process would look like from their perspective, and what impact the implementation of the software would have on their workflows, their financial returns, and the structure of their company. I interviewed two main actors responsible for the implementation from its genesis.
- a. *The Chief Technology Officer.* This person was instrumental in the process. The original desire for a solution originated with the CTO, and he was closely involved in the process of selecting the toolkit, understanding its potential uses and solving the technical issues that might arise. The CTO was furthermore chiefly responsible for understanding the software from a technical perspective, and would be responsible going forward for maintaining the software and its potential future uses.

- b. *The Chief Financial Officer.* The CFO also held a great amount of responsibility for selecting the toolkit and understanding its potential uses. This person also held an interest in technology and along with the CTO was responsible for understanding the software and how it was used. Furthermore, the CFO held a financial perspective on the software, and I wanted to interview him to gain insight into what benefits the digital toolkit could offer in terms of financial savings, as well as how much the software would cost to implement. This became more interesting as the software implementation encountered difficulties that resulted in delays.

4. *The customer's main sales staff.* This was the group of people who would eventually end up using the software in the preliminary stages of the software's implementation, and consisted of three salespersons and their supporting sales secretaries. I was primarily interested in discovering what they experienced while using the software; how they felt the customization of it suited their needs, what difficulties there were with learning to use and using the software, and whether or not the implementation of the software assisted them with their daily tasks. To this end I intended to interview them in two distinct states; the first, shortly or directly after implementation, to discover what difficulties there may be in learning to use the software. I wanted to test if the software's graphical user interface and level of complexity offered any barriers in learning to use the software, as these were complaints lodged by the retailer and the developer of the software. In the second state, I would return a few months after the initial implementation after the software had been in use for a time, and the sales staff had grown accustomed to its use, to see if any of the problems persisted, and to see the software's efficacy was satisfactory once the learning curve had been ascended.

Other persons were not formally interviewed but still provided insights. These include the developer's senior software developer, who provided some insight into historical customer relationships previous to the developer's involvement with the retailer, and the technical construction of the software and what possibilities and limits this entailed. I also spoke to the sales lead of the customer, who gave insight into some further motivations for the implementation of the software as well as the sales process and the actors involved in this.

3.5.3 Observation

In this section I will describe how I observed each actor involved in the course of the process.

3.5.3.1 Customer and retailer

Underway, I sought to observe the process from the perspectives of the three companies involved. To this end, I attended meetings between the customer and the retailer as they implemented the software, as well as workshops where the retailer trained the customer in use of the software. Here I observed what issues were discussed, how the progress of the implementation was coming along, and how the various actors interacted with each other.

3.5.3.2 Developer

To gain insight into the developer's perspective, I attended community calls for the company's internal staff, as well as a conference/workshop in Poland. This conference included the production innovation manager and the senior developer representing the developer, as well as a cohort of staff from the UX company they had engaged to improve the software's graphical user interface. This company had done research into what consultants and a few select customers had reported as issues with the software's interface, as well as lay down a solution set for how to improve these problems. The conference mainly consisted of an information exchange, where the UX company staff quizzed the developer staff on functionality from the software; what they wanted to accentuate and focus on, and how this would propagate into the design.

3.5.4 Document analysis

I examined the documentation for the toolkit, which detailed its uses and features. I also examined company literature to learn more about how the companies operated, what they offered and what they aimed to achieve, and sales brochures for the toolkit. The developer had also recently launched a portal for feedback, in which users of the software could provide feedback on what existing features of the toolkit were problematic and what issues the toolkit could be improved to solve.

3.5.5 Questionnaires and surveys

I intended to gain quantitative insight from the customer once the software had passed its initial test phase with a select sales staff and been implemented in the larger company as a whole. The company has several subdivisions around the country, all of which will receive some version of the toolkit. This was to give additional insight to the qualitative interviews, and see if the data from the two groups lined up.

3.6 Data analysis

For data analysis I have reviewed the interviews and observation notes and encoding the data according to topics relevant. To this end I used the software NVIVO [10], which is software for qualitative analysis of text, audio, video and images. The software allows the user to mark sections of text, mark timestamps in audio files, snippets from video files and mark images to then give them an information code. These codes can then be viewed in totality, and data compared from the various sources to build a cohesive analysis. My conclusions are drawn from comparing stated goals in interviews with noted observations and results from the process.

3.7 Delimitation of the case study

The thesis focuses on a single company and its attempt at digital transformation. This limits the case study to a single entity of a single industry, which in turn limits the general knowledge that can be gleaned from it. Furthermore, the study is limited to a single software suite for digital transformation, in an industry where several competitors exist. These programs have differences in a variety of parameters – some offer more functionality, some less, some are more complex, and some are simpler. Furthermore, the support structure around the software is limited to two consultants from the retailer responsible for assisting in the implementation of the software. The consultants could have a different set of qualities that would change the course of the implementation. This goes for all actors involved in the process – they are defined by their qualities, and what they are capable of or not may vary in different organizations.

Other companies that have or were undergoing digital transformations were sought engaged, but declined due to the potential sensitivity of the information required, as well as the additional workload it would be to assist me in gaining insights.

3.7.1 Limited by time

The research did not reach all of its goals. The full implementation of the software did not take place in the time allotted to the research project. There are many factors that contributed to the delay of the software implementation, which will be discussed later. This limits the scope of the thesis to:

1. An investigation of the motivations behind implementing the toolkit, as well as motivations behind how the toolkit is developed and sold.
2. The set of functionality chosen by the customization of the software by the customer, and what impact this set of functionality is intended to have on the company.
3. The process of implementation, and how the different actors behave during this process.

I will discuss the potential for accomplishing the remainder of the thesis' original goals in the Future Work section.

4 Case description

The toolkit is defining in this process as it describes the set of options available to the customer in order to customize solutions to the problems it wishes to overcome. In this chapter, the toolkit is described. First, a complete set of the toolkits features as described by the retailer. Second, a demonstration is presented of how the software operates when implemented and customized, giving a visual overview of how it functions and what problems it can be used to solve. Third, a presentation of the life cycle of the toolkit from sale to implementation is given.

4.1 Overview of toolkit functionality

The software is a toolkit with a large set of functionality that spans several areas of use. The features of the software are presented to the customer by the retailer as follows. [11]

4.1.1 Information Capture

The toolkit offers a selection of tools to capture, organize and manage information. This functionality covers a set of areas. Paper documents can be scanned and recognized using a capture client made by the developer. Large batches of documents can be imported and indexed using barcodes or OCR recognition for automatic capturing of index data. There are also a set of advanced options for complex document scanning, such as automatic recognition of document types or invoice suppliers.

4.1.2 Archive and distribution functionality

The toolkit comes with information management software that enables documents to be digitally archived, stored securely and deleted once the legally mandated time period has expired.

Documents can be scanned and automatically saved and indexed. Once the document has been entered into the system, it can be digitally sent to the mandated employee for review and validation using the toolkits workflow module.

The toolkit *navigation module* enables users to find information, either by performing a full text search similar to search engines, or by using specific index data associated with the document that is being sought. The toolkit also contains a *viewing module* that can be used to view, edit and check documents in or out of the system. Documents can be opened in the program originally used to create the document.

4.1.3 Workflow management

The toolkit enables its users to digitalize their business processes. By moving away from a physical, paper-based process to an electronic process, the time needed to complete the formerly manual process is reduced. Furthermore, this digitalized process can improve internal communication, document visibility, document traceability, and reduce errors that can come from complicated manual processes. Workflows can be designed by the end users themselves, with drag and drop interface. Some features of the workflow include email notifications for task progress, a history of the workflow which shows what steps have been undertaken by who and when, workflow delegation, as well as advanced systems for document coordination.

4.1.4 Mobile & remote access to data

The toolkit also features an application for remote access to the data stored in it. This application has limited functionality compared to the main system, but still allows users to find and view documents, take pictures with their remote devices and store these images directly into the toolkit, access and process workflow tasks, update index data in document structures, and information from third party software to the toolkit's databases.

4.1.5 Integration with third party functionality

The toolkit features an extended capability to integrate with other software solutions. This can lead to an increased value for both systems, as one allows the other to work more efficiently. The toolkit comes with an application programming interface that allows end users to customize its functionality and pair it with third party programs.

4.1.6 Security

The toolkit contains a set of security features. It includes a backup system that ensures documents are moved to other locales of storage than the primary database. It also contains functionality that allows electronic signatures both internally in the program as well as an extension that allows third party electronic signatures to be added for additional security.

4.2 Overview of software user interface

The toolkit consists of a vast suite of functionality, with the option to extend with a series of plugins that handle various specific tasks. The core functionality of the software centers on the process of document handling, information sharing and workflow management.

A simplified sample of the main functionality is listed below:

4.3 Main screen

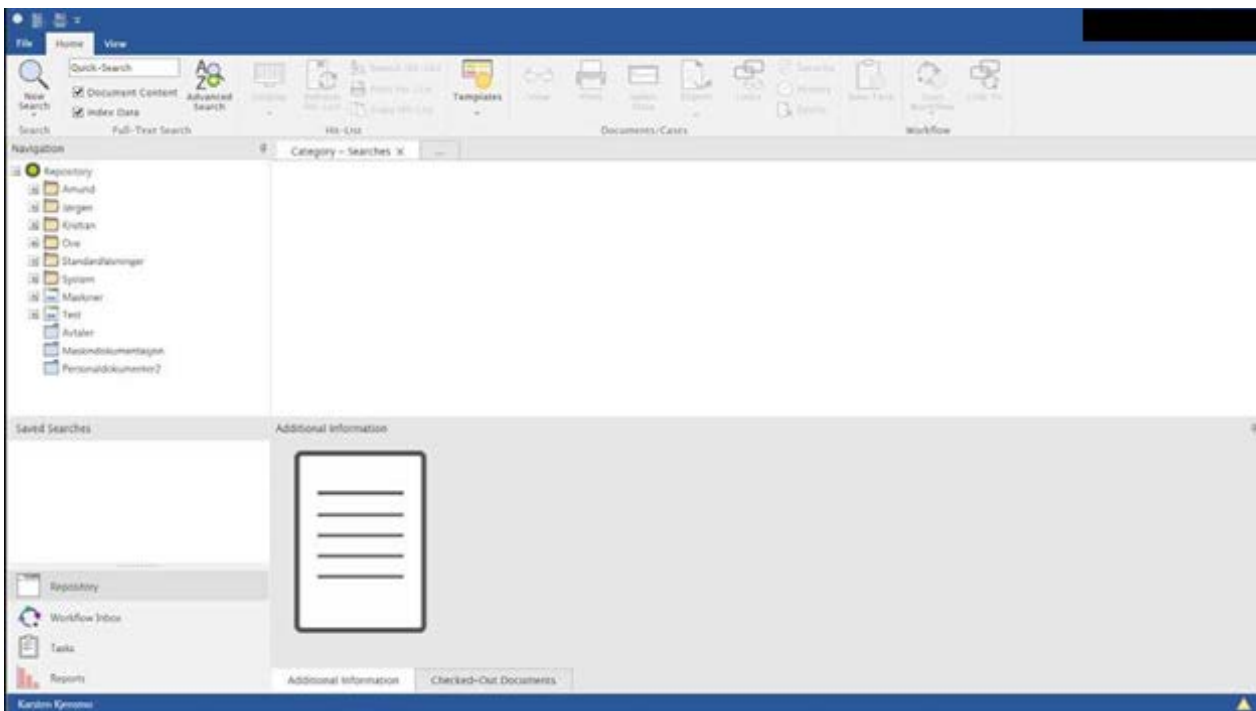


Fig 4: [The Toolkit] Main screen

4.3.1 The toolkit Main Screen

The main screen in fig. 4 gives an overview of the available functionality and allows for navigation to the software's many sub-functionalities. At the bottom left is the most important sub-menu, which gives access to view panes of the software's four subcategories.

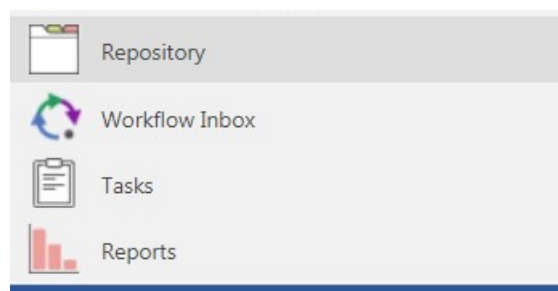


Fig 5: Available functionality

4.3.2 The main information managers of the software

The categories in fig. 5 are the main subcategories of functionality in the toolkit. The repository contains *Case files* and the functionality to create, modify and organize these. The *Workflow Inbox* is an overview of the files in the user's workflow process, describing their status in the process. The *Tasks* tab contains a breakdown of the current task list regarding documents, as well as the

ability to create Tasks for other users. The *Reports* tab gives an overview of the business processes handled by the toolkit's system.

4.3.3 Repository

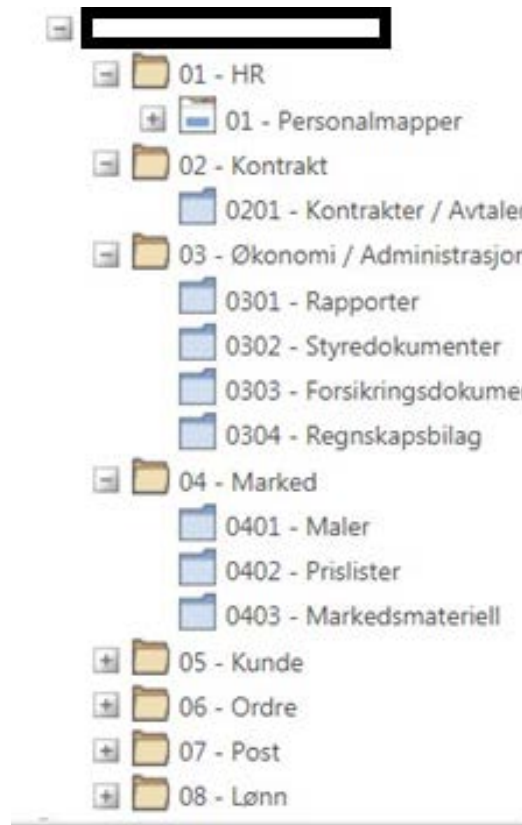


Fig 6: A sample repository project containing several Cases and Categories

In the *Repository* pane shown in fig. 6, all categories and case definitions are listed.

4.3.4 Cases

The easiest way to explain the concept behind the electronic cases or binders is to consider the paper based equivalent. This could consist of a file binder, perhaps with a cover page containing overall information, for example, the case number and customer details. Inside there could be a number of file dividers to distinguish the different types of documents belonging to the case. For example, reports, quotes and correspondence. In the toolkit the equivalent electronic form would consist of a case definition which contains the overall information and then individual categories which define the type of documents contained in the case.

4.3.5 Categories

The toolkit uses *Categories* to classify documents. A category defines the index data that will be associated with each document saved to the toolkit. When a category is created, as demonstrated in fig. 7, one or more index fields are added using a graphical user interface (GUI) based design tool. When users save a document to the toolkit, they enter values for one or more index fields (e.g. an invoice number from the original scanned document). When users search for documents they can narrow the result set by entering specific index field values.

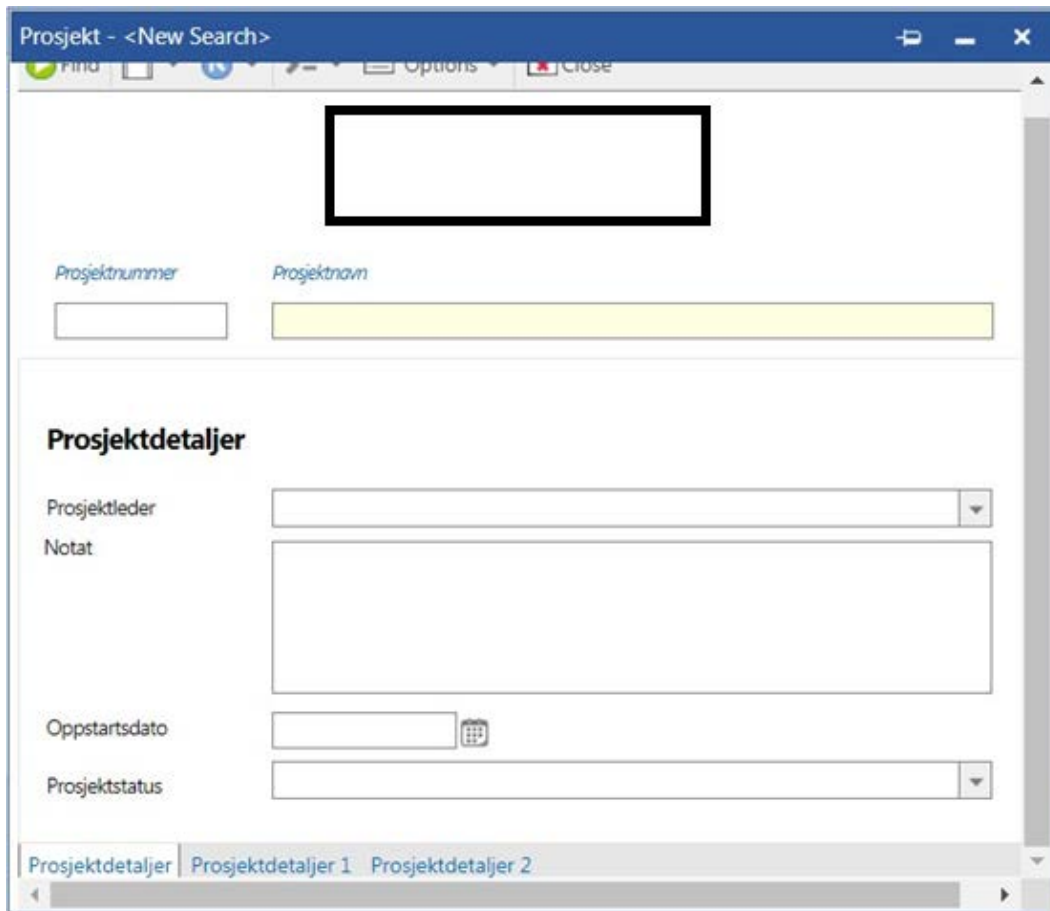


Fig 7: Sample of a document Category template

4.3.6 Workflow

The toolkit includes a comprehensive *Workflow* module that allows the automation of business processes, as well as grants an overview of the processes to the user. Workflows, shown in figures 8 and 9, are configurable and users can access tasks directly from the toolkit or via an email link. When a user opens a workflow task, the associated document or case is opened.

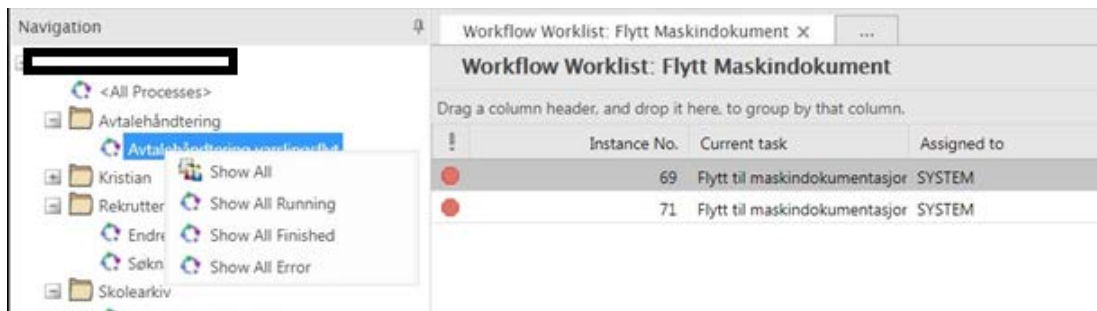


Fig 8: Sample of a workflow viewing pane

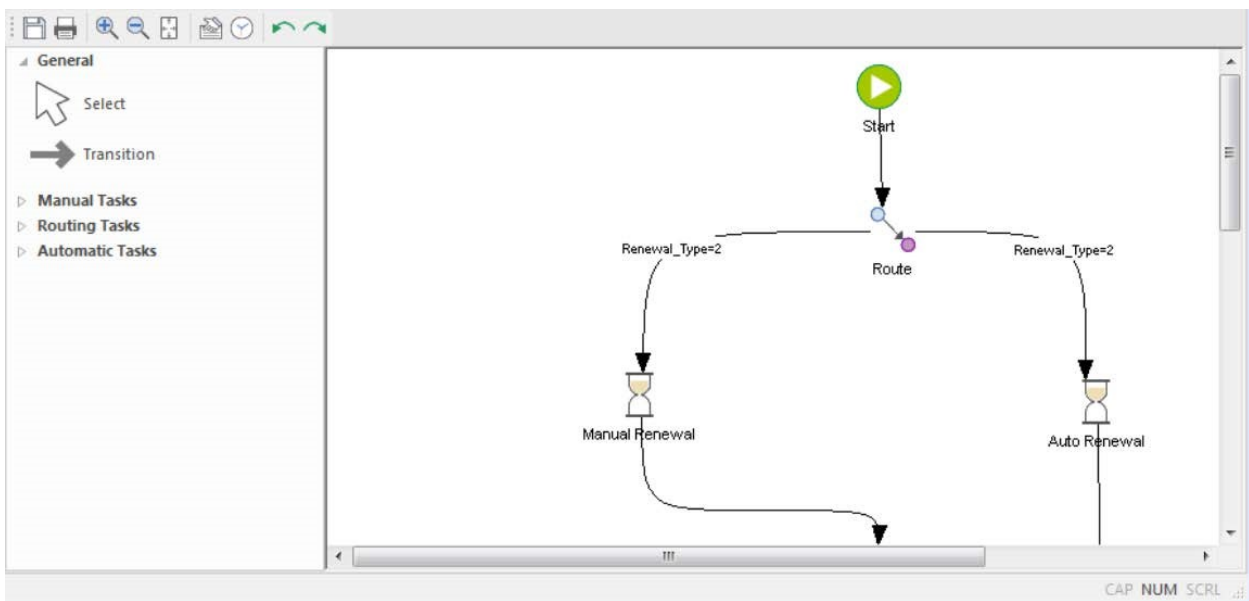


Fig 9: Sample workflow

4.3.7 Tasks

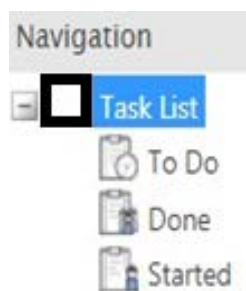


Fig 10: Tasks functionality

The *Task* options, shown in fig. 10, as the user sees them – are broken down into what is to be done, what has been done, and which tasks have been started.

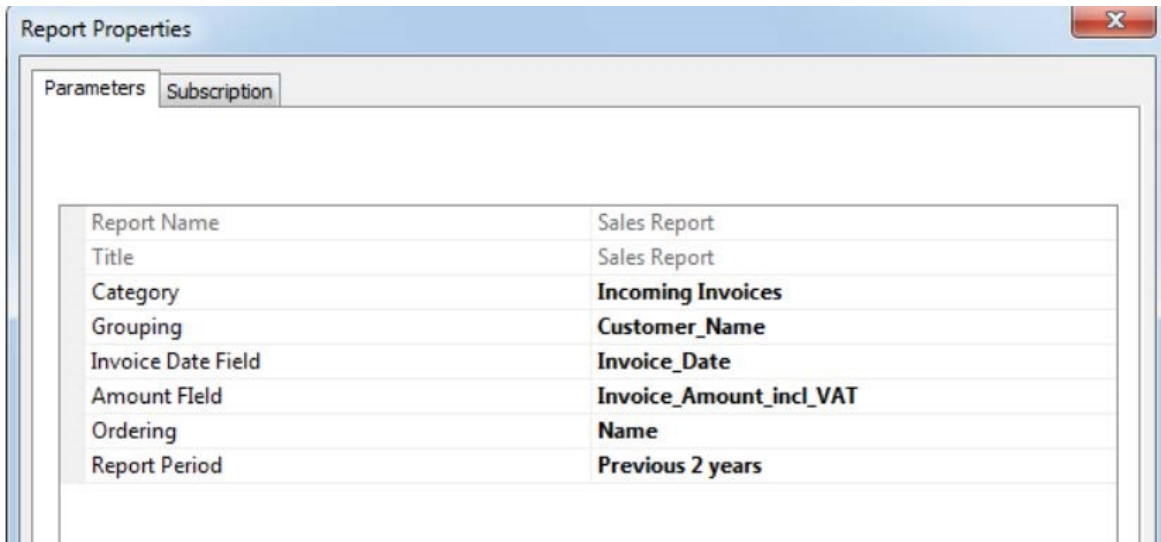
Fig 11: Sample task

A sample task in the *To Do* section is shown in fig. 11. The task is to move a document from one repository to another and displays which employee the task is assigned to, when it was started, due dates, the amount of documents to be linked, as well as an error handling message on why the task has not been completed. A field that required data was not filled, and thus, the document has been taken from the work process and into the task field, assigned to the user responsible for filling out the dependent field. A sample template is shown in fig 12.

Fig 12: Sample template and how it connects with the workflow manager

4.3.8 Reports

Reports are highly customizable and must be connected to a database in order to generate. *Reports* are tied to the company’s business data and return a multitude of different data, shown in figures 13 and 14, depending on which additional modules have been installed.



The screenshot shows a 'Report Properties' dialog box with a 'Subscription' tab. It contains a table with the following data:

Report Name	Sales Report
Title	Sales Report
Category	Incoming Invoices
Grouping	Customer_Name
Invoice Date Field	Invoice_Date
Amount Field	Invoice_Amount_incl_VAT
Ordering	Name
Report Period	Previous 2 years

Fig 13: Sample report parameters

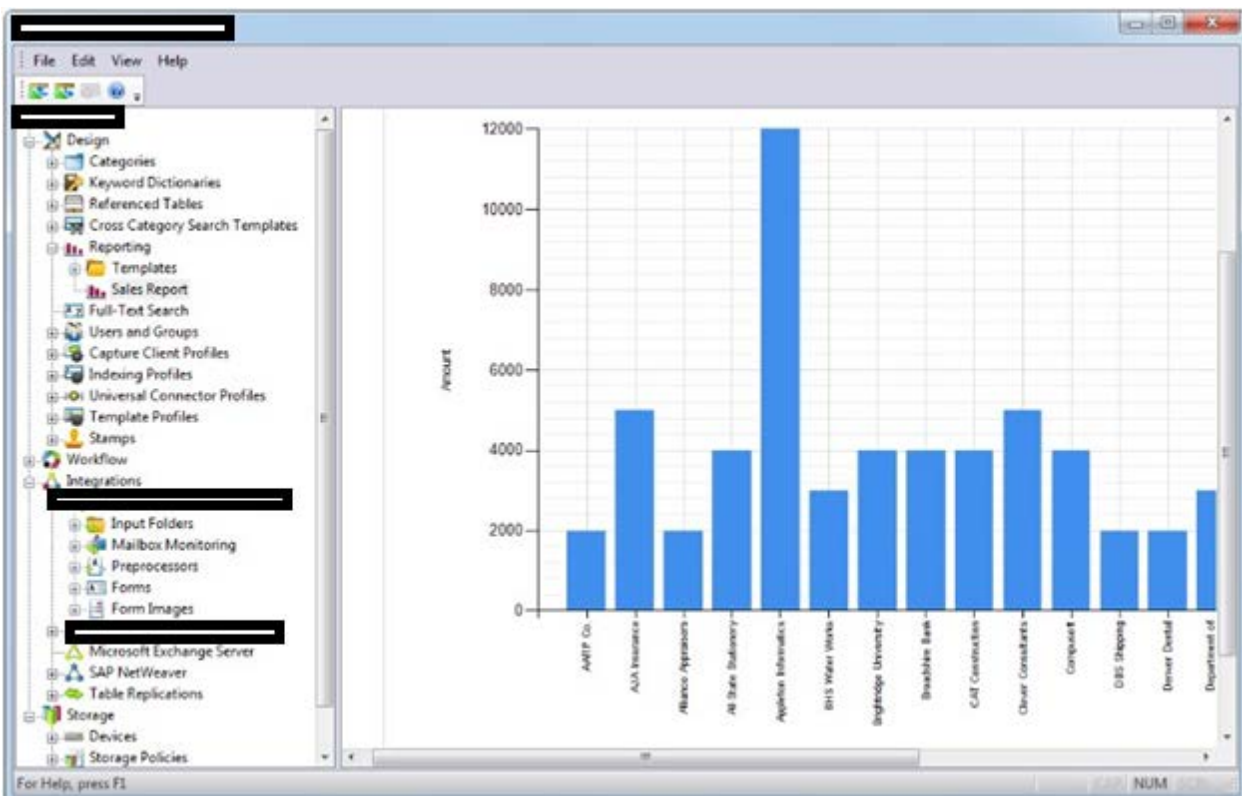


Fig 14: Sample report generation

4.3.9 Summary

The above functionality gives an overview over the part of the toolkit that is customizable by the user.

4.4 The actors

In this section I will give an overview of the actors. The actors are represented by the developer, the retailer and the customer. The developer develops the toolkit in question, and is responsible for its maintenance and evolution. The retailer is responsible for selling the toolkit and assisting in its implementation. The customer is responsible for implementing the problem in order to solve challenges posed by the customer. A simplified diagram of the relationship between the three actors is shown in fig. 15. The three actors will be described in greater detail in the Findings section.

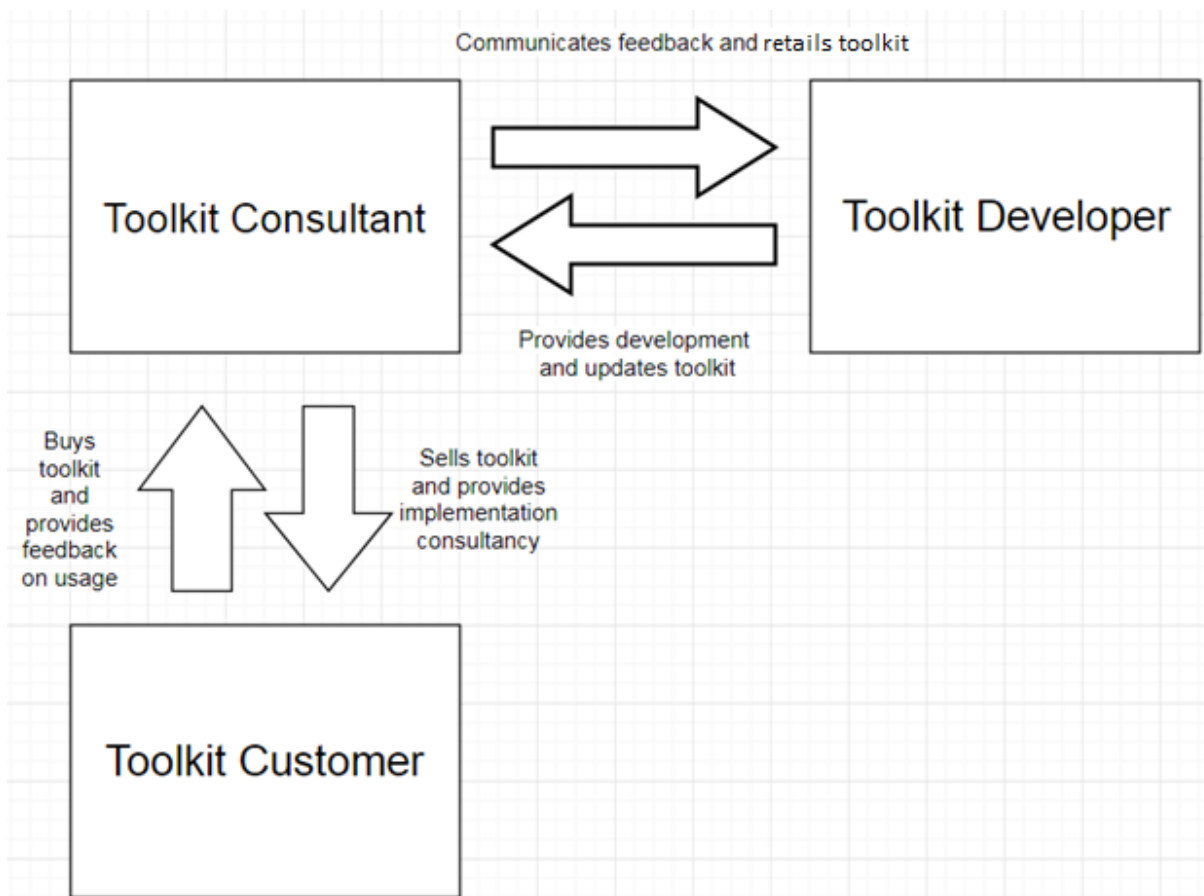


Fig 15: Relationships between the actors

In short, the developer makes the toolkit, and the retailer sells the toolkit and instructs in its use, and the customer implements and customizes the toolkit according to its objectives.

4.4.1 Motivation for digital transformation

The actors look at digital transformation from different perspectives. The developer looks for ways to improve the system to achieve higher standards in functionality, accessibility and design.

«The value [the toolkit] offers lies in streamlining processes. When businesses have complicated back office processes, such as invoice processing, with several stages of approval or waiting for dependencies, etc. [The toolkit] automates this.»

[12, T.C., Product Innovation Manager]

The retailer looks for ways to pitch the product to the individual customer in such a way that the customer either discovers a possible benefit to the optimization of a digital toolkit, or that the customer feels satisfied that the product can deliver that optimization.

«There are two ways to approach [the sale]. Either cater to specific problems, or present an overall framework, and within that present customizable flexibility.»

[13, J.O., Presales Specialist]

The customer is a company in rapid growth. Along with its transformation from a relatively modest company in 2011 to a company in the process of corporatizing in 2019, [14] demands for information storage, control and management have grown. The company was originally interested in a searchable archive system. Now, the company looks at how the product can improve their business function, by reduction of time, reduction of information confusion and misplacement, communication issues and costs.

“It turned out that all of the contractors we talked to could satisfy our needs for OCR and archiving[...]. [The retailer] was the only company that bit on the bait on whether or not we could do more with this archiving system and doing more with the information. Can we make the structure even better? – can we get the whole process flow into it? – and assign roles? – and [the retailer] didn’t hesitate for a second.» [15 T.P., CTO]

All three actors are interested in an improved product that can deliver the streamlining of tasks and access to and storage of information.

4.4.2 How is the problem with the toolkit described by the actors?

The problem as presented by the retailer and the developer is that the software functionality and presentation of software functionality is too complex. This causes difficulty for the seller, in that the retailer must be able to communicate the software’s functions in a way that the customer can easily digest. [13] The sales process is currently considered too complicated.

«[The toolkit] is a framework with building blocks. It's difficult to sell a framework – you have to have some specific concepts, such as going after some concepts that are in demand, or targeting specific industries.» [13, J.O., Presales Specialist]

From the developer's point of view, the software suffers in functionality clutter, making it difficult for the user to understand what functions are on offer, as well as overwhelming the user with needless complexity in tasks that they do not use. The issue the developer is most concerned with is the development of the Web client which allows access through a browser. This part of the suite is currently seeing the most investment of time and resources in improving. [12]

4.4.2.1 Current market

At the current point in time, paper usage is still dominant, and processes for digitalization are beginning. Business Information Services (BIS) is currently around 5 % of the retailer's market. [16] The retailer believes that this market will and can be expand in the coming years, as it has been in the preceding five years. The expansion of this market is felt in the retailer's division in Trondheim, where staff is being increased to sell and implement BIS solutions. These BIS solutions are directly linked to the toolkit. There are different markets in different regions, and regions with larger technology markets, and with cultures where technology is used more, see more of an expansion in this field. [13]

The industries the toolkit performs strongly in are certain industries with sub-departments that have horizontal structures, such as Finance and HR, as well as a few specific vertical industries, such as legal and health care. [12] The developer is fully aware of the competition within its field, but has more focus on their customers' needs than what the competition is developing. They view it as less important to be ahead of all the functionality of the competition than it is to fill a certain niche in the market. The customer satisfaction is highly valued. [12]

4.5 Toolkit life cycle process; from sale to implementation

The toolkit is a software suite that contains a formidable and expanding set of functions. This set of functions is considered too complex and too broad by the developer and the retailer, making it overwhelming for the customer. [12 , 13] In order to limit the suite's options into something that the customer wants to use, a subset of the functionality is selected for the customer to make use of. The whole suite of functions is available to the customer, but the software is customized to make this simpler for the customer. The retailer engages in a process known as *presales*, in which the

customer's needs and desires are documented in detail. The presales specialist engages in a study of the customer's information flow and work processes, interviewing the relevant employees and examining relevant documents in order to build a case file on the customer. [13] The presales specialist must, in essence, learn how the customer's business works. The presales specialist then offers a package of recommended functionality.

«I had to conceptualize this for the customer. I interviewed several entrepreneurs to see how they handled documents and processes – and then presented solutions in [the toolkit] to these entrepreneurs.» [13, J.O., Presales Specialist]

From there, an implementation specialist engages with the company, preparing the suite of functionality in accordance with the existing information systems. This means digitalizing existing information, converting paper forms into digital versions, preparing information input in accordance with the toolkit, and training the necessary staff in use of the software suite. [15] This process extends over several months depending on the customer, and involves on-call assistance from the implementation specialists to deal with problems the customer may face.

5 Findings

In this section, I will describe my involvement with the companies during the process of implementing the toolkit and undergoing the digital transformation, including the actors involved, and their motivations for involving themselves in the process. The emphasis is on what problems and complexities the actors find with the toolkit, how these actors interact with each other, and how they view the future of the software.

5.1 The actors

The actors involved span three companies, each serving a distinct role, and each participating in the process to varying degrees.

5.1.1 The retailer

The retailer is closely involved in the process. In the earliest stage of the process, it is the retailer who has convinced the customer to invest not only in the product but also the consultants required to implement the product. The retailer bears responsibility in the process by ensuring that the customer feels that its needs have been met and that the software has been implemented to an acceptable standard. The retailer must therefore have expert-level knowledge of the software. The retailer must also undergo a research process in which the customer's work processes, goals and current structures are understood. This will ensure that the software can be correctly customized

according to the customer's desires, alongside whichever employees of the customer's company that are involved in dictating the objectives of the implementation of the software.

5.1.1.1 Pre-sales specialist

The pre-sales specialist plays a key role in the early part of the process. It is the pre-sales specialist who pitches the software to the customer, and is well served by understanding what features of the software's toolkit are useful to the customer. Not only which tools that are useful to the customer according to the initial set of objectives, but also which further set of improvements the toolkit can offer the customer. In this case, the pre-sales specialist won the contract for the retailer by making the customer aware of what additional functionality could be useful. The pre-sales specialist remains in the process as an auxiliary support to the implementation specialist once the implementation has begun. [13, 15, 17]

5.1.1.2 Implementation specialist

The implementation specialist is the retailer's main actor in the process. The implementation specialist shares responsibility with the pre-sales specialist in understanding the customer and its work processes and desired objectives. The implementation specialist must also be an expert user in the software, being responsible for setting up the initial system that the customer will use. This includes customizing the various functionalities that the customer desires, according to their specifications. The implementation specialist continues to work closely with the customer during several stages of the implementation;

1. The planning phase, in which the desired objectives are laid out;
2. The design phase, in which the layout and functionality of the software is designed;
3. The construction phase, in which this functionality and layout is constructed;
4. The testing phase, in which the software is tested in the target context of the company;
5. The adjustment phase, in which any discovered faults are corrected or desired adjustments made as per the response of the test.

The implementation specialist remains in contact with the customer after the completion of the project to ensure the customer's satisfaction with the software. [17]

5.1.2 The retailer's perspective

The retailer describes the toolkit as a framework with which many solutions can be tailored. [12 , 13 , 15] This provides the retailer with a variance of options in fitting the solution to the

customer's specific problem. This requires a process in which the customer's needs are discovered; often these customers are pre-existing, and there is a knowledge base on the customer. The retailer must first discover and understand the process by which the customer operates; how information flows within the company, as well as how information enters and leaves the company. This information can be anything from sales orders to employee data. When the retailer has plotted the process of information flow, the retailer then offers a customized solution to fit that process, arguing for weaknesses of the former model and strengths of the newer model.

5.1.2.1 *Genesis: Corporate plan*

The retailer has existed as a company since 1937, specializing in products related to imaging and optics. The company has seen a slow but steady growth from national to international to global market, expanding both in products and services. It has branched out to cover other sectors and niches related to optics, one of these being document handling systems, which make use of scanning optics to store and organize documents. [13, 16]

Beginning in 1996, the retailer launched a long-term plan consisting of several phases to strengthen its financial structure and competition viability. [18] The plan involved optimizing the skillset the retailer's employees already had to offer, wherein it introduced various business innovations, expanding on its traditional optics market. One of these areas was business solutions. [16]

5.1.2.2 *Association with the developer*

In the late 2000s, the retailer engaged in cooperation with the developer. The developer delivered a digital archiving system, which over time has evolved to the product described in this thesis as *the toolkit* or *the software*. The retailer owns 49 % of the developer. [13] The relationship between the two companies is mutually beneficial; the developer is a development company that provides and evolves the product; the retailer functions as its sales organ. [12, 13, 16] The retailer has a worldwide sales network and a relationship with many existing customers. This gives the developer a way into a market that otherwise would have required heavy marketing. As the front to the customer, the retailer also functions as a feedback channel, giving the developer a basis for making decision. The customers provide information on difficulties with the software, which the retailer then communicates to the developer. [12]

5.1.3 The developer

The developer plays a limited role in customer services. While not directly involved in the process with the customer, the developer is responsible for adjusting the software as per the customer's feedback. The developer has, as of yet, little contact with the actual customers and receives little feedback from them. The developer desires to improve the software, and receives feedback via the retailer, who is in direct contact with the customer along the way.

5.1.3.1 Product innovation manager

The product innovation manager carries the responsibility of pushing the software forward in the areas where change is desired. This means understanding the market and the desired outcome of the updated product, and the changes necessary to achieve this update. These changes include updates, expansions or limits to functionality, potential separation of functionality into various sub-programs, and changes to the graphical user interface. The product innovation manager must thus acquire information from the retailer and the few original customers with which the developer has direct contact, and balance the desired updates according to the capabilities of the software development team, the budget allocated for innovation, and the desires of the management team. The product innovation manager maintains contact with a network of retailers and developers, and coordinates the effort for improving the software. The product innovation manager also engages third-party companies that can improve the software, such as research companies to discover faults and desired changes, and design experts for a graphical user interface overhaul.

5.1.4 The developer's perspective

The developer's main interest in the process is gaining insight from customers as to how the software should be improved. The developer already has a strong idea of what direction they wish to take the development of the software, and have taken steps to begin this process.

5.1.4.1 Association with the retailer

The developer was originally a company developing and selling software that focused solely on data archiving. The retailer began an association with the developer, and saw opportunities for expanding the functionality to cover a wider range of features. [13, 16] The retailer currently owns 49 % of the developer, and is therefore its main stakeholder. It further functions as the exclusive sales partner of the developer. As such, the retailer brings feedback from customers, as well as requests for changes and updates to the software.

«[The retailer] has direct contact with the customer base, and work with them much closer than we do at [the developer]. [...] We're primarily a development company. [The retailer] brings demands, feedback and requests to [us]. [They] speak up when something is not right.» [12, T.C., Product Innovation Manager]

Given that it has more contact with the customer base, the retailer also approaches the developer with the potential for new markets. These new markets can be tapped into under a certain set of conditions, e.g. if a particular new function that can serve this new market is developed. [12]

5.1.4.2 Product Innovation

The developer is mainly a software development company. Other than software developers, it employs a number of regional business development managers, and, recently, it has created the role of product innovation manager. This reflects the developer's changed philosophy, in which innovation of the product has become an important factor. The product innovation manager is responsible for road mapping the future of the software; which functionality to take forward, which features to select for business value, and carrying these features through the development process. [12] The software has been described as being an "expert application", which is not considered a compliment by the developer. [19] It means that the software is difficult to learn, difficult to use, and difficult to master, something which limits the user-base to a few tech-savvy people. This was viewed as an acceptable trait in previous generations, where the use of the software was limited to a few expert users in each of their client bases. However, as information management has spread from a core of tech-savvy users to a more ubiquitous use, the developer sees a need to simplify its software suite. [12] The developer itself describes the software as a "mature product" [12], meaning that it contains layers of successively added functionality. This functionality has been added without a streamlined plan, as each layer has been added conditionally over years, often in response to requests from the at-the-time smaller client base. [19]

«[The toolkit] is a very mature product. There's a lot of functionality – which makes it customizable, and that's a strength, and hasn't been a problem with the traditional tech-savvy user. [...] It can be overwhelming for the non-technical user, especially with a cluttered interface.» [12, T.C., Product Innovation Manager]

Currently, 40–50 % of the development budget is allocated to new features and product innovation. [12, 19]

5.1.4.3 Complexity and function versus simplicity and form

The developer asserts that the younger generation expects easy interfaces, and believes it is feasible to aim for ease of use as a carrying quality of the software. Previously, one could expect a higher level of technical depth and its accompanying degree of complexity over a simpler user experience. Now, however, this has begun to reverse along with an expanding general IT user base, and the market has to respond to this change. [12] The developer asserts that their software contains a deep set of tools and that it is highly customizable, which is a main feature and a carrying strength for the software.

For future versions of the software that contains both this strength of utility as well as an ease of use, the developer envisions a segmentation of the software. With this segmentation, there would exist different use cases fitting different customers and different professions with different needs. Functionality would thus be divided into separate categories depending on what kind of user from what kind of field in what kind of industry that engages with the software. When opening the software, a human resources specialist may then be looking at a different set of functionalities than a salesperson might be looking at. By contrast, in the current software, the user must manually navigate the entire software suite even if only a minor portion of it is useful to that user.

«We want to look at the concept of profiles. If you're doing a certain task, such as HR, then you can click on that task, and the options relevant to that task are presented to you, rather than you having to find them.» [12, T.C., Product Innovation Manager]

Some processes are more oriented towards cooperation horizontally in the company it is employed in. This means that the processes have sub-dependencies, such as is the case with the customer involved in this study, in which it is favorable that the software is equally accessible to all dependent entities.

User experience improvement is therefore a high priority for the future vision of the company, with a major user experience initiative underway, targeting the web-based version of the software in its first stage. [12] The developer wishes it could do more tracking of their customers and how they are using the software, and what limitations they have to work around in order to improve the software optimally. [12]

5.1.4.4 *The developer's vision for the future*

The developer is interested in going from an expert application to an application capable of *Rapid Scalable Adoption*, in which many new users can use the software. [12] They are currently engaged in the research phase of this project. A set of auxiliary companies have been engaged in this process, including a research firm. This research firm has conducted interviews with a number of different partners to get an idea of where most attention should be focused, and what the core functionality of the software is and should be focused on going forward. A user experience initiative has begun, employing a design company to redesign the user interface from scratch. The developer asserts that the current software, even in its lightest form, is not satisfactory, and the goal is to make a lighter client before segmenting functionality. [12]

5.1.5 *The customer*

The customer holds a lot of responsibility in the implementation process. The actors involved not only serve to select the goals at the outset of the process, but also define the set of problems to be solved, and dictate the way these goals and problems are to be approached during the course of the process. The customer has appointed a team of three actors from distinct operations fields within the company. They include the CTO, the CFO and the sales lead.

5.1.5.1 *CTO*

The CTO bears a lot of responsibility for driving the project forward from the technical point of view. This is a critical element of the process, as it involves the actual implementation of the software. The CTO must understand the dynamics of the process, and react to the limits set by the CFO and the goals set by the sales lead. The CTO handles technical errors that may occur along the way, as well as limitations that may be set on the software by auxiliary systems. The software needs auxiliary systems in order to complete its function for the customer, and the CTO is responsible for solving conflicts that may arise between these systems and the software. This will be addressed further in the discussion. [15]

5.1.5.2 *CFO*

The CFO plays a key part in the process, which is ultimately motivated by financial gain. The aim of the implementation of the software is to reduce costs by way of increasing efficiency and optimizing a process that can potentially cause costly errors in miscommunication. The CFO has

to balance the costs of implementing the software against the potential profits to be reaped. In this case, the CFO also has technical interest and experience, and works closely with the CTO. [14]

5.1.5.3 Sales Lead

The sales lead plays a smaller but equally important part in the process. The sales lead has intimate knowledge of the sales process, which is the process that the customer seeks to improve with the software. [20]

5.1.6 The customer's perspective

The customer is interested in solving a set of problems that have arisen from an increased operational scale. These problems were initially centered on information management, but due in part to the retailer, the customer also saw potential in optimizing key processes within the company. The first and most important process for the customer is optimizing the process by which it makes its revenue as a car sales company: selling cars.

5.1.7 The physical process of selling a car

The customer's digitalization project is oriented towards improving and optimizing the process for the sale of a car. The sale of a car involves an extended series of steps which must be carried out in a specific order, with specific deadlines, all of which must line up with the ordering, production and delivery of the car. This process takes up to several months – and the involvement of a large amount of time, several people and a large amount of documentation that spreads across several organizations leads to the potential for complications. [14, 15]

“Today our biggest manual process – and also the most important – is the process of selling a car. There are a lot of documents and steps involved in this process – insurance, contracts, financial guarantees, order details, as well as special needs that we have to keep track of for the customer.” [14, F. S., CFO]

A car sale takes different forms depending on factors such as whether or not it is a used car or not, but the basic sale follows a process. It involves several actors:

- i. The customer.
- ii. The salesperson.
- iii. The sales lead.
- iv. The sales secretary. The sales secretary assists the salesperson by keeping track of current customers, their deals, deadlines, and all the paperwork required therein.

- v. The order case file, consisting of all the documents detailing the purchase. This case file currently exists in both physical and digital formats. These documents include:
 - a. Information on the customer.
 - b. Information on the car being purchased.
 - c. Whether or not the customer is trading an older model for a reduction in price.
 - d. Additional services desired by the customer, such as insurance.
 - e. Information on financing.
 - f. Information on delivery and invoice.
- vi. TACDIS Dealership Management System (DMS). [21] TACDIS is a suite of software tied to the brand of cars sold by the customer, and handles a series of record-keeping tasks, such as customer management, workshop optimization and test drive management. TACDIS DMS records and transmits the information that the car factory will require to construct the model to the customer's specifications.

Previously, all of these actors and the actions they needed to take were tracked and monitored manually, by in-house email and verbal communication. The actors engage in the sale of a car, which follows this process: [15, 20]

- i. The customer interacts with the salesperson and selects the desired car.
 - a. This does not just include the model of the car, but a myriad of minor factors, ranging from interior design, to car radio, to insurance plan.
 - b. The customer also provides financial information on how she intends to pay for the vehicle and provides required documentation to be vetted with the bank by the car company.
 - c. The customer selects a possible insurance plan for the car.
- ii. These details are forwarded from the salesperson to the sales secretary, and entered by the sales secretary into a physical record.
 - a. The physical record is then to be entered into the TACDIS DMS system.
- iii. The order proceeds once the financial information has been vetted by the car company via the customer's bank.
- iv. The car manufacturer is forwarded the details for the ordered car, which enters production when a slot is available for it.
- v. The customer is contacted to agree to a handover following the delivery date.
- vi. The financial transaction is finalized, and the car handed over to the customer.

- vii. The car company contacts the customer to secure satisfaction. This is the final step of the transaction between the car company and the customer.

5.1.7.1 Issues with physical process

The physical process relies on manual work and has no automated processes. Currently, the sales secretary, who has long experience, has a personalized system to keep track of the orders and customers. [20] The amount of sales increases the amount of documentation that needs to circulate to the various actors, and this increases the chances of fault and confusion in this process.

Some of the issues that come up in this process are as follows: [14, 15, 20]

- An actor in the process forgets to forward the necessary document.
- An actor in the process forgets to fill out necessary information or provide a necessary signature.
- An actor in the process is informed too late about a change or requirement that has yet to be completed for the process to move forward.
 - a. This can go unnoticed until critical junctions are passed.
 - b. This can cascade to impact other parts of the process – a delay in one junction can quickly propagate to delays in all the other junctions in the process. An example of a worst-case scenario is financing of the car being incomplete, and for this to be discovered after the car has been ordered, constructed and delivered from the factory.
- An actor forwards a document to the wrong actor.
- The customer demands changes in a part of the process where information has already been propagated, and the change of that information is a costly or complicated task.
 - a. This change can go incomplete, for reasons mentioned above. This results in negative outcomes, such as reduced customer satisfaction.

5.1.8 The digitalized process

The digital version of the sales process introduces several new concepts that optimize the process. A sample of a digital case file is shown in figure 16.

“As of today, it all exists in a single physical file, which is then scanned, and we throw away the paper version – but still, there’s a lot of paper floating around. It’s a process we’ve wanted to make as digital and automatic as possible and get an automatic flow.” [15, T. P., CTO]

5.1.8.1 Automation

The physical process contains several steps. In these steps, the actors involved must by their own initiative move the process forward and keep track of required deadlines and documents. This leaves the process open to error, and a single error along the way in the process can have drastic consequences on the process as a whole, resulting in delays or customer dissatisfaction. The digital process removes a great deal of the effort required in task-keeping, as automated reminders and forwarding of documentation is introduced into the process. Where before a physical paper had to be moved from one location to another by an actor in order for another actor to sign or approve the documentation, the software handles this process digitally, freeing time and energy for the actors involved. Furthermore, automation reduces the risk of errors occurring in that domain.

5.1.8.2 Reduction of communication complexity

The physical system involves human actors having to relay messages to several institutions. Which documents are to be forwarded to which institution at which time is pre-ordained, and follows a methodical succession of steps. This process is largely automated under the digital system, reducing chances of errors or oversights. Information relevant to the different tasks in the process are relayed automatically as the steps of the process move forward. Communication between actors in the process can now be done in the software and attached to the specific tasks to which the communicated information is relevant. This reduces the complexity of the communication, leading to less misunderstandings and lowers the chance of relevant information being miscommunicated.

5.1.8.3 Centralized information storage

Every actor in the process has access to the required information at any given time, and need not be physically present to access the information. The access to information offered to each individual actor in the process is simplified. The information relevant to each step of the process is easily tracked, and each case file contains all the information relevant to the specific sale. This means that all information relevant to the case is contained within it, in the same software, and the information relevant to each actor is accessible by that actor.

Create New Case [Redacted]

[Create] [Help]

[Redacted]

<Required>

Kundeordrenr	Ordreversjon	Tacdis Status	Kontraksdato	Filial
[Redacted]	<Required>	<Required>	<Required>	<Required>
Ordremappe opprettet	Selger	Versjonsdato	Status Ordremappe	
16.06.2019	<Required>	<Required>		

KUNDE OG BIL DINBYTTE TILLEGGSTJENESTER FINANSIERING BILBESTILLING UTLEV./FAKT.

KUNDE	BIL
Kundenummer	Bilordrenummer (DOIN)
<Required>	
Fornavn	Bilbeskrivelse
	<Required>
Adresse	Nybil / Bruktbil
<Required>	<Required>
Postnummer	Modell
<Required>	<Required>
Poststed	Reg. nr.
<Required>	
E-post	Farge
<Required>	<Required>
Mobil	Bruktbilgaranti
<Required>	
	<input checked="" type="checkbox"/> Utgåp leasing

Fig 16: Digital case file for a car purchase constructed in the software

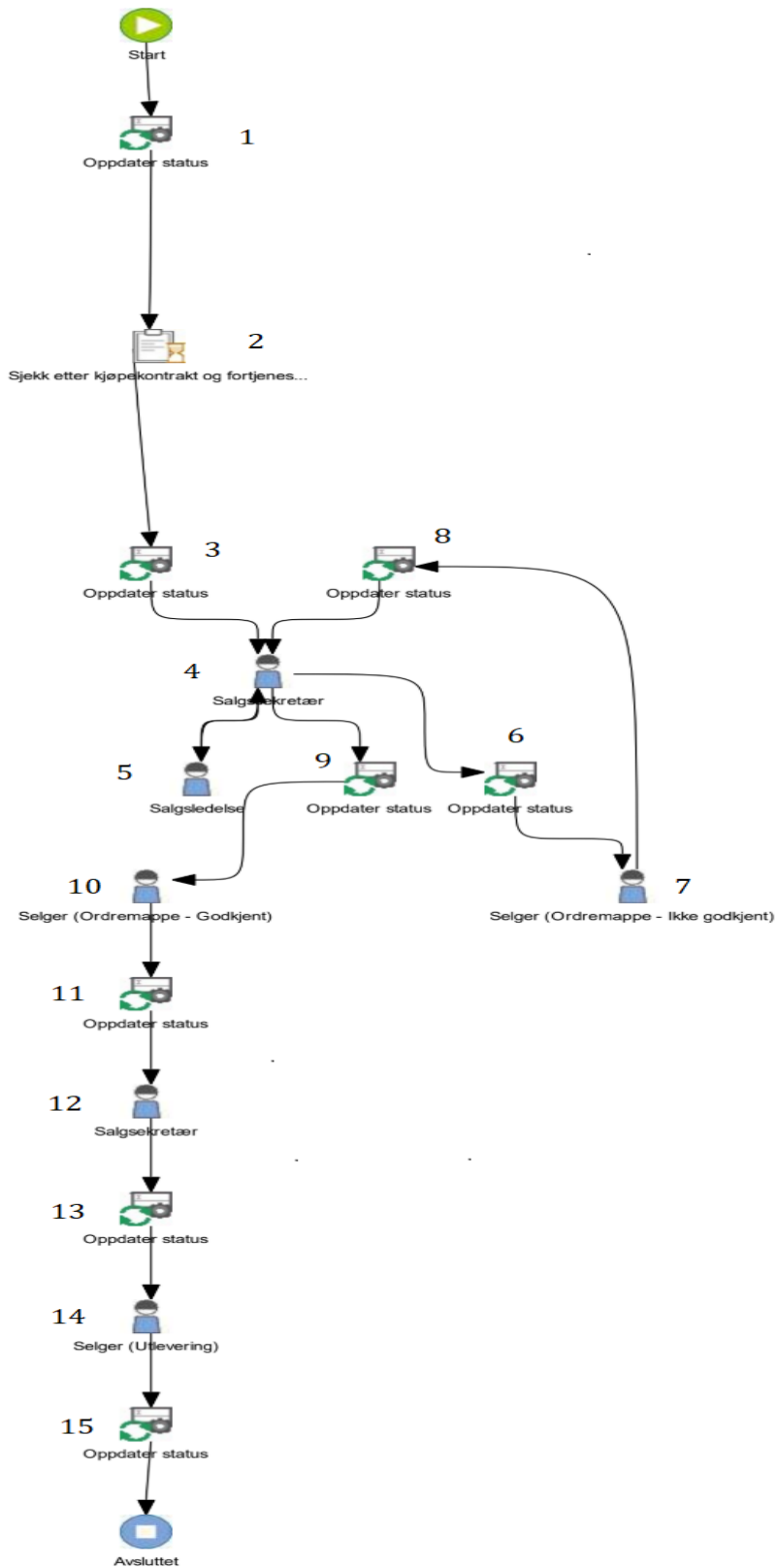


Fig 17: The figure shows the updated, digitalized process, constructed in the software's Workflow module.

5.1.9 The digital process

The steps of the digital process, shown in figure 17, are as follows:

- i. All actors in the process are presented with a *status* window upon opening a certain car sale case. A car sale involves a methodical series of steps executed in succession. This status window reports the current progress of the car sale – which task is currently to be done, and which actor is responsible for moving the process forward.
- ii. The two first steps of the sale are securing two vital contracts: the contract detailing the terms of the purchase, and a file containing a calculation on the profit the car company will make. This step stops progress until the documents have been provided – typically, a case file is not opened until a customer has visited the dealership and signed the contract.
- iii. The status is updated to show that the contracts are provided in the case file, and that responsibility of moving the process forward is now on the sales secretary.
- iv. The sales secretary reviews the contract and the profit calculation. On the basis of this review, one of three possible steps are triggered.
- v. If there is a discrepancy in the profit calculation or contract, then the sales lead is contacted, and receives the task to control the case file. This could be for several reasons – the one most prominently mentioned is that the salesperson made an error in his favor on the profit calculation. If foul play is suspected, the sales lead takes it from there, and the process ends there, and the sale is postponed or cancelled.
- vi. The status is updated to show that the case file is not approved. This could be due to clerical errors or missing information.
- vii. The salesperson receives the files along with commentary about what must be done to get the case file approved.
- viii. The status is updated to show that the salesperson has made changes, and the case file is returned to the sales secretary for review.
- ix. The case file is approved. Status is updated to notify the salesperson.
- x. The salesperson receives a series of subtasks to complete.
 - a. Update the customer with expected delivery.
 - b. Give notice to the customer when the car has arrived.
 - c. Mark the car as arrived.
 - d. Agree upon a time for delivery of the car.
 - e. Check registration fee.
 - f. Activate insurance.
- xi. When completed, the status is updated to reflect that the sales secretary must act.

- xii. The sales secretary receives the task to review the above tasks before delivery of the car.
- xiii. The status is updated to notify the salesperson of a final task – to call the customer a few days after delivery of the car and check on customer satisfaction.
- xiv. A final status notification marks the sale as closed.

5.2 Testing phase

The software was intended to be tested in up to three phases.

5.2.1.1 Phase 1

The first phase of the testing was to be done internally by the three staff members appointed to be responsible for the implementation of the software. This testing was at its simplest phase – to ensure that the desired functionality was in place, that all parts of the process were covered by the software, that information passed through the software without glitches, and that the software could be used by the intended end-user to its full effect. This test phase discovered several problems, as mentioned above, and succeeded in its goal of discovering all top-level flaws of the software. [15, 17]

5.2.1.2 Phase 2

The second phase of testing involved actual users of the software. The company intended for three top salespersons – and their accompanying sales secretary auxiliaries – to test the sales process functionality of the software. The three salespersons were selected for having attributed that could reveal strengths and weaknesses of the software. The qualities listed in Table 1 – technological proficiency, experience with similar software and perceived orderliness – have little to do with actual salesmanship proficiency. These are determined by qualities like personal charisma, customer empathy and understanding the product line that is sold. This gives the company the ability to test the software on salesperson of roughly equal performance, but with different styles that may or may not be benefited by the software. [14, 15, 20]

Tester/Quality	Technologically proficient	Experienced with same or similar software	Perceived orderliness
Tester A	X	X	X
Tester B	X		X
Tester C			

Table 2: Tester qualities

This gives a grading scale on the qualities the company was interested in testing for, with one salesperson achieving all the relevant qualities, a second two out of three, and a third none of the qualities.

The testing was conducted haphazardly, as it occurred during a time of high sales pressure for the company. The testing was limited to only a few situations over a few days, in which the salespersons mostly played around with the functionality of the software. This happened towards the end of my involvement in the product, so only piecemeal feedback was available via second-hand reports. The response was uniform; all testers saw promise in the use of the software, none reported difficulties with the user interface, and all desired to use the software further. The resulting preliminary testing was therefore positive. [20]

5.2.1.3 Phase 3

A possible phase 3 would involve reworking the software as to the needs of the testers in phase 2, as well as general tweaks before launching the software to one of the cities in which the company operates. The needs of the software are varied, as the different sizes of different offices around the country have different roles, and thus the workflow must be tailor-made for these environments. The CTO reports an adequate understanding of the software to perform these changes without the use of outside consultants. [15]

6 Discussion

In this section, I will reflect on, interpret and discuss the findings I made during my data collection process. I will deconstruct the data and form some conclusions from it as per the objectives set in the Purpose section of the thesis.

6.1 Addressing the research questions

As discussed previously, I was unable to reach all the goals set at the outset of the thesis. Of the three research questions, one was left entirely unaddressed and one was only superficially addressed. The final one was answered in full.

1. **RQ1:** *What impact did the digital transformation have on the company?*

I was unable to answer this question in the time allotted. I will return to this in the Future Work section, and discuss what can be done to answer the question satisfactorily and how I suggest doing it.

2. **RQ2:** *How does a company in transition handle the use of the digital toolkit and what decisions does it make during the implementation of this toolkit?*
 - a. **RQ2A:** *What can be learned from the decisions made during this process?*

I was able to answer this question as I followed the implementation process closely, using interviews, observations and document analysis. I will discuss the decisions made along the way and how these decisions impacted the implementation process in the following section.

3. **RQ3:** *How does the general usability of a toolkit impact its effect on digital transformation?*
 - a. **RQ3A:** *If so, what changes can be done to improve the graphical user interface?*

I was able to gain some superficial insights into this. Some of this insight originated from observations during meetings, as well as feedback provided by the design company hired by the developer, whose conference I attended. The testing phase was beginning as the process of writing the thesis was coming to a close, and I gained some insights via a third party from preliminary use of the salespersons of the customer. I will discuss my interpretation of the findings in the following section.

6.2 Analysis of the customer's implementation effort

The following sections are aimed at addressing RQ2, regarding the process of implementing the software. I will here examine the strategy employed by the customer, and what effects this had on the implementation of the software. I found several challenges along the way that contributed to the delay of the implementation.

6.2.1 Undertaking several digitalization projects at once

The undertaking of this digitalization process was not done in isolation. The literature described in section 2.5.1 on digital transformation strategies recommends that a company undergo a single digital transformation at a time. This is for two key reasons: 1) The digital transformation often demands a heavy tax of resources; financial, time and manpower. This has varying degrees depending on the scale of the digital transformation to be undertaken, yet the amount of resources demanded by the transformation can go underestimated, leading to delays in implementation and furthering the cost of the transformation. 2) The digital transformation often impacts the company horizontally, affecting other parts of the organization that subsequently have to undergo changes in order for the transformation to be successful. The customer undertook two digitalization processes

at once; the one I examined and one that was outside the scope of the task. The second digitalization involved much of the same personnel as the one being studied. Because of this, time had to be divided between not only the two digitalization processes, but also the day-to-day tasks of the personnel involved.

6.2.2 No dedicated digitalization specialist

The process of implementation had no central figure to drive it forward. Responsibility was divided between three roles in the company, and involved the expertise of at least one regular outside consultant, demanding four different people to regularly meet to drive the software implementation forward. There was no clear responsibility on who should set these meetings, and it was often driven forward by the outside consultant and the CTO. Events important to the customer disrupted the progress. [14, 15] The vision for the implementation of the software was not clear, and was under regular review by the team tasked with its implementation. With no central role to tie the different areas of expertise together, the project suffered from regular fragmentation and delays resulting from this fragmentation.

6.2.3 No clear long-term plan

Apart from the goal set originally by the team appointed to drive the task forward, there was no clear long-term plan. No deadline was set for the project. Delays would be costly, not only in the time taken from the team, but also in expensive consultancy costs from the retailer. I tried to gain some insight into the elements that would make up a long term plan – such as what the desired work efficiency improvements were, and if the customer had any metrics on how they wished to see this improved. I also requested insight into the financial reasoning of the decisions made, in order to discover what financial gain the customer saw in purchasing this software and training its employees to use it. No clear answer was given. Not all information was made available to me in this regard. Nonetheless, with no clear markers, objectives or deadlines set for the implementation of the software, it was regularly pushed back and there appeared to be no specific goal-oriented incentive for completing the project.

6.2.4 Delays resulting in loss of information

Meetings for driving the process forward often involved four key personnel: The CTO, the CFO, the sales lead and the consultant from the retailer. Each member of the team had to be brought up to speed on the current state of the implementation, as well as the objectives for the immediate next steps of the implementation and the problems barring the way to those objectives. Furthermore, due to the iterative process of the implementation, the customer had reflected on

some subpart of the system and desired it expanded or changed. Due to this regular delay, key information both on how the software operated and what it was capable of had to be repeated by the consultant, and time during these meetings was dedicated to rehearsing information delivered at a previous meeting.

6.2.5 Technical issues with third-party software

The process intended to be improved by the implementation of the software involved other third-party software that functioned in an auxiliary role. A key part of the process of ordering a car is inputting the specifications from the order – that is, car type, desired paint color, build and so forth – into the car manufacturer’s ordering system. This system, called TACDIS, is used by the manufacturer to see what cars have to be produced, where they have to be sent and what precise specifications they should be manufactured to. TACDIS interacts with the software during the sales process, as information from the sale is forwarded and input directly into this software. A major issue arose with some information not being ported correctly, or simply disappearing from the system entirely. Solving this problem demanded a high level of database programming proficiency, and while both the CTO and the implementation consultant attempted to fix it over a period of time, they eventually realized that it was outside their scope of expertise. An outside database consultant was hired to solve the problem. This consultant was in high demand, and thus, it took some time before the consultant was able to work on and actually solve the problem.

6.2.6 Test phase coinciding with prime sales season

The implementation of the software was nearing completion towards the beginning of the summer months. At this stage of the process, the software had been set up by the consultant and adjusted by the customer team, and was nearing its early testing phase. This test phase involved three salesmen from the car company. Unfortunately, that time of year is also the peak sales time. The salespersons involved in the testing were thus preoccupied with a high volume of sales. This revenue-generating window of time was naturally judged to be of more importance than the testing of the software at that time. Thus the testing was at first delayed, then minimalized to a three-day run with superficial interaction with the software.

6.3 Toolkit efficacy

This section looks to examine the efficacy of the toolkit.

6.3.1 *The impact of software complexity*

In this section, I will address RQ3, which concerns itself with the efficacy and complexity of the software itself. This includes an examination of the graphical user interface, which was pointed to as a problem area by both the retailer and the developer. The software's inherent functionality complexity and the role of auxiliary staff in the form of technological gatekeepers will also be scrutinized.

6.3.1.1 *Graphical user interface*

This is a challenge that has faced the software. The developer is well aware of the complexity of its software. [20] The software has been gradually developed for well over a decade, and the method of advancing the software has been based on incremental user feedback. Two problems have arisen from this:

1. The software has grown around an existing user base.

This means that the user base has to a certain degree dictated the direction in which the software has gone. Given the age of the software, this user base is defined by being expert-level users, as they originate from a time when IT was more niche than it is today. [12, 20] This has resulted in an increase in complexity for a user-group that is already comfortable with the software. The development team has noticed the trend towards complexity, but upon suggesting or recommending changes, existing users have protested the change to software they were already comfortable with. In order to avoid losing the existing customer-base, the developers have felt locked in to building on to a system that they felt was too complicated.

This is slated to change, and with the addition of the retailer and its capabilities, a new approach to the software is now desired. [12, 13] The software wishes to simplify its functionality, and aims to do so in a series of ways. These include separating functionality into task- or industry-related subsections, as well as streamlining the cluttered user interface and optimizing the space that the software uses to signal the various tasks it is capable of.

2. The software has grown in such incremental ways that overarching problems have become difficult to address.

The function complexity in the software has grown over time, each unit building on the unit before it. This means that to change the way the software is structured involves an amount of work that

makes the undertaking extremely costly, as the software would have to be rewritten and redesigned from nearly scratch. [20]

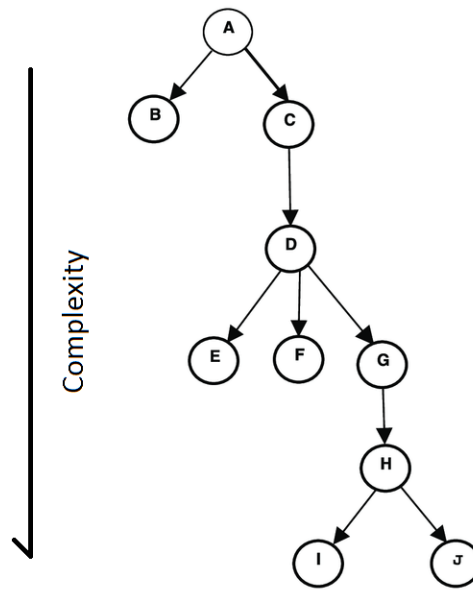


Fig 18: Function complexity over time

As visualized in fig. 18, changing an underlying element to the software (A) would entail an unsustainable change all the way down the line of functionality (I, J). This would take too much time and effort from the development team, as well as the costs incurring from the customers already satisfied with the existing system, and resistant to change.

The software has since established new platforms, including a separate mobil-centric app, compatible with older versions of the software. The point of this software is to make the user interface intuitive and responsive, cutting down on the effort required to understand the system. The functionality of the app is somewhat limited in that it offers a more streamlined experience. Its functionality is limited to the tasks most commonly performed by its users, [12, 20] such as accessing information archives, viewing documents and viewing workflow processes. By limiting the functionality and streamlining the user experience, the developer aims to cut down on the complexity of their system, and making available functionality more explicit to its users.

6.3.2 Need for technological gatekeepers

The software is considered expert-level software, and demands a considerable amount of time for several tasks before it can be used. Firstly, it must be designed in accordance with the customers' needs. If this task is left to an IT employee without previous knowledge of the software and nothing but the manuals for help, it is a difficult process that may not guarantee the best results. A

third-party consultant is often required to design the individual elements of the software to suit the users' needs, be that information centralization or workflow process construction. Secondly, after the software has been designed, the system must often be tested against the real-world environment it is to be used in, and corrections often have to be made, again requiring the consultant's assistance. Thirdly, the users of the software must be trained in its functions, a process that can be handled in-house after a few high-level users internally in the company have been trained in it. Finally, a follow-up phase is often conducted, where final faults and adjustments are made after the software has been introduced to the broader company. An enduring element of this process is the outside consultant – here in the form of the retailer implementation specialist, whose job it is to ensure that the software has been correctly configured and used. [17]

This is one of the reasons why the developer and the retailer have established a business partnership: The developer does not have the manpower or reach to be able to send its consultants to its customers to the extent that this is required. The retailer steps in to fill both the role of sales and that of implementation, having consultants who have specialized in both these areas. [13]

While a majority of the software's users are interested in solving problems of information centralization and workflow optimization, the various companies have different ways of operating. Given the software's current level of complexity, these operational differences mean that each instance of the software has to be customized for the user by consultants from the retailer. This process can be lengthy, difficult, and a multitude of detrimental events can occur along the way that complicate the process and/or exacerbate the costs of undertaking it. Furthermore, once the software is correctly customized, the end-users must be made familiar with it. Owing to the complex nature of the software, the users must be trained by these consultants in how to correctly operate the software. Once this expertise is ascertained by the end-users, specialists within that company can continue to expand or alter the use of the software according with evolving needs. One of the factors that contributed to the software being selected over its competitors was the set of tools offered by it. The original task that needed to be solved was organizing a chaotic archive. Yet, when the retailer presented the software, the consultant also demonstrated the wider use of the software's toolkit. This was noticed by the CTO of the customer, who spotted potential for other fields of use, such as process optimization. [15]

6.4 Impact on existing company structure

In this section, I will discuss the way in which the implementation of the software would change the company's structure, in terms of what tasks were previously solved by human employees that would now be solved by an automated system.

6.4.1 Changes in roles and responsibilities following from implementation

The original intention of the implementation of the product was to centralize information distribution and optimize and streamline a sales process. During the implementation of the software, it was discovered that roles would have to be altered to fit this new paradigm, impacting more than just the sales process itself, but also the human resources engaged with it. The original sales process had tasks that were delegated to employees designated as *sales secretaries*, responsible for handling the flow of documents and information for the salespersons, as well as keeping track of deadlines for these documents. In the new, automated system, the job of information management and task deadline tracking is handled by the software, and thus the primary role of the sales secretaries becomes redundant. The customer expressed keen interest in finding new responsibilities for these employees. [20]

6.5 Future work

In this section, I will discuss the limitations on the research, and what future work can be done, both to gain greater knowledge on the problem area and to investigate some of these limitations.

6.5.1 Limitations

The thesis was part of an informatics degree and thus had a set limit of time to be completed, running from August of 2018 to June of 2019. The original implementation of the software was to be started in October of 2018 and completed three-to-four months later. This would give me time to examine the process along the way, conduct interviews and surveys directly after the software was implemented on a select preliminary group, and return a few months later to conduct the same interviews and surveys. This first group would allow me to gain insight into the program's usability by way of graphical user interface and functionality complexity – while I would be able to control for that by returning a few months later to interview the same staff on how they felt about the program after a few months of use and training.

6.5.2 Software efficacy

The implementation project never reached completion. As such, it was not possible to figure out if the software fulfilled the objectives of optimization stated by the customer. Research on this could only be done by returning to the customer and examining the state of the software and the customer's opinion on it once this implementation is completed.

6.5.3 Structural changes

Another aspect of a completed implementation is how the software would impact the structure of the customer's company. Job roles in the company were slated to be impacted, as discussed in the section on changes in roles and responsibilities following the implementation, and the customer expressed a desire to find alternate tasks for the jobs that would be replaced by the automated system. It could be of interest to see how the company managed this alteration of responsibilities, and to examine in further detail what impact the program had on the company's structure.

6.5.4 Program complexity

It would be useful to discover how the program's perceived complexity impacted its successful implementation as a digital toolkit. Research into the program's perceived complexity should take two avenues.

6.5.4.1 Graphical user interface

The first avenue to explore is whether or not users feel that the graphical user interface unnecessarily complicates the program's functionality. This was a prime complaint from both the retailer and the customer, who felt that the graphical user interface was a barrier in both learning and using the program. Here, it would be useful to do a more thorough study of how the graphical user interface impacts the use of the software, and to what degree the customer in question felt it impacted its use. The software is slated to get a graphical user interface overhaul. A study could be done before and after the rollout of this overhaul, to see if there is any marked difference.

Preferably, research would be done to compare the user interface in four stages:

1. The software in its current form, when it is new to users.
2. The software in its current form, when users have had time to adjust to it.
3. The overhauled software, when it is new to users.
4. The overhauled software, when users have had time to adjust to it.

By comparing these four metrics, we could gain insight into the significance of the graphical user interface overhaul.

6.5.4.2 Functionality clutter

The second avenue to explore is the functionality clutter of the toolkit. It is currently considered by the retailer and the developer to be too cluttered – and that opening the toolkit can be confusing,

by seeing the amount of tools in it, without clear distinctions on their use, and with many tools irrelevant for the user being displayed. The developer has discussed plans to streamline the toolkit by separating its functionality into what would be useful for different professions. It could also be useful to explore a certain degree of user customization, allowing functionality to be selected by the end-user to shape its own toolkit.

6.6 Concluding remarks

This thesis was an examination of a company undergoing a digital transformation by way of utilizing digital toolkits. I was given access to proprietary information by the companies involved, and primarily used interviews and observations along the way to gather data and compared this data with the objectives at the outset to formulate my conclusions about the process. The implementation process turned out to be marred by challenges that arose from the company's inexperience with such digital transformations, along with undertaking too many concurrent projects and underestimating the amount of resources and time that would be required to complete the process successfully. I would have liked to examine the issue more, by scrutinizing the results of the implementation and the usability of the program as rated by the end users, as well as the potential for the toolkits evolving use.

The findings from this thesis can be used to shed light on the challenges facing a company in growth when undertaking the process of change that follows implementing a digital toolkit with ramifications for the working process of the company. The case study highlights a set of errors that can cause delays and failures in reaching digital implementation goals, specifically regarding the planning of the digital transformation. The case study provides insights into the digital transformation process and contributes data that supports a set of best practices in an emerging field.

7 Appendix

7.1 Note on anonymization

Some of the sources reveal the actors; their websites, transcriptions of their interviews, their documentation, and so on. The sources are available upon request and confirmation with the actor in question – please contact the author at kjensmo@gmail.com for the sources.

7.2 Sources

- [1] von Hippel, E., Katz, Ralph (2002) *Shifting innovation to users via toolkits*. Management Science. Vol. 48, No. 7, pp. 821–833.
- [2] von Hippel, E. (1994) “*Sticky Information*” and the Locus of Problem Solving: *Implications for innovation*. Management Science. Vol. 40, No. 4, pp. 429–439.
- [3] Cohen, Wesley M., Levinthal, Daniel A. (1990) *Absorptive Capacity: A New Perspective on Learning and Innovation*. Administrative Science Quarterly, Vol. 35, March issue, pp. 128–152.
- [4] Katz, Ralph. (1984) *Organizational Issues in the Introduction of New Technologies, Managing Professionals in Innovative Organizations*. Cambridge, Massachusetts: Ballinger, pp. 442–456.
- [5] Matt, C., Hess, T., Benlian, A. (2015) *Digital Transformation Strategies*. Business & Information Systems Engineering. Vol. 57, No. 5, pp. 339–343.
- [6] Wilson, J. (2001) *Essentials of Business Research: A Guide to Doing Your Research Project*. Sage Publications Ltd., Thousand Oaks CA.
- [7] Oates, Briony J. (2006) *Researching Information Systems and Computing*. Sage Publications Ltd., Thousand Oaks CA.
- [8] Yin, R.K. (2003) *Case study research. Design and methods* (3rd ed.). Sage Publications Ltd, Thousand Oaks, CA.
- [9] Walsham, G. (1995) *Interpretive case studies in IS research: Nature and Method*. European Journal of Information Systems, Vol. 4, pp. 74–81.
- [10] NVIVO: <https://www.alfasoft.com/en/products/statistics-and-analysis/nvivo.html>
- [11] This source has been anonymized, as it reveals the retailer. It links to the product site of the retailer. Available upon request.
- [12] T. C., Product Innovation Manager, the developer.

- [13] J. O., Presales Specialist, the retailer.
- [14] F. S., CFO, the customer.
- [15] T. P., CTO, the customer.
- [16] T. B., Professional Services Manager, the retailer.
- [17] L. C., Implementation Specialist, the retailer.
- [18] This source has been anonymized, as it reveals the retailer. It links to documentation regarding the retailer's corporate business plan. Available upon request.
- [19] W. G., Senior Software Developer, the developer.
- [20] T. B., Manager, the customer.

7.3 Sample interview guide

Interview w. T.C., [Developer] Product Innovation Manager

Thursday Jan 10 2019.

Theme: [Developer] and its approach to product innovation, the challenges involved with this and vision for the future.

Time allotted for interview: 25—45 minutes.

Marketplace and Cooperation

- 1. Could you describe your position at [The Developer], and how this position contributes to [The Toolkit]?*
- 2. How would you describe the strategic value [The Toolkit] has to offer its customers?*
- 3. Could you describe how [The Developer] cooperates with [The Retailer]?*
- 4. Could you describe how your position as Product Innovation Manager interacts with [The Retailer]?*

Competition and Challenges

- 1. Could you describe the challenges [The Toolkit] faces?*
 - a. Is the barrier of technology literacy considered to be too high?*
 - b. Is the availability of functionality considered to be too overwhelming?*
 - c. Is the graphical user interface considered to be too complex?*
- 2. Does [The Developer] analyze its customers?*
- 3. Are there any industrial sectors that are more likely to make use of [The Toolkit]?*
 - a. Can any assumptions be made of the technical level of these sectors?*
- 4. Is there an awareness of competition?*
 - a. Which entities do you consider to be the competition?*
 - b. Does the rate of improvement aim to be ahead of the competition?*
- 5. Could you quantify what amount of attention and resources are given to product innovation?*
 - a. What actors are involved in improving the program?*
 - i. Is there a process for discovering what kind of actors that would need to be involved? [Ex: software developers, marketers, researchers]*
- 6. Could you describe this process?*

Future vision and Improvements

1. *In which way do you receive feedback from the customers?*
 - a. *Is there a process for acting on this feedback for future development?*
2. *Complexity and function versus simplicity and form:*
 - a. *The trend for mass markets leans towards ease of use. Is this possible, given the tasks [The Toolkit] has to handle?*
3. *Is it possible to summarize [The Developer's] vision for the coming years?*

