DEGREE PROJECT IN THE FIELD OF TECHNOLOGY
DESIGN AND PRODUCT REALISATION
AND THE MAIN FIELD OF STUDY
INDUSTRIAL MANAGEMENT,
SECOND CYCLE, 30 CREDITS
STOCKHOLM, SWEDEN 2020

Towards scaled agility

A case study on successfully initiating agile transformations at large banks

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by

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Master of Science Thesis TRITA-ITM-EX 2018:XYZ
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På väg mot skalad agilitet

En case studie av framgångsrik initiering av agil transformation vid storbanker

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Towards scaled agility - A case study on successfully initiating agile transformations at large banks

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Abstract

Large banks are facing challenges from a new regulatory and competitive landscape which have led to 30 % of banks adopting agile using the Scaled agile framework (SAFe). The transformation process towards agile is complex and has led to a change process covering aspects such as a product development, leadership and organizational design. Currently scientific knowledge on how to conduct an agile transformation successfully is lacking. The current explorative case study aimed to provide an empirical contribution assisting theory building in the field of scaled agile. Empirical data was collected through thirteen semi structured interviews, totaling ten hours combined with ten ethnographic observations spanning 34 hours.

The subsequent findings identified four approaches to scaling agile combined with eight aspects of scaled agility providing a new depth regarding how to apply them and what to achieve. The four approaches identified were: creating a virtual organization, standardization of agile methods, unifying around one portfolio and, changing towards an agile mindset. The eight aspects include strategic agility, payoff agility, business agility, product agility, agile organization, tools agility, people agility, and organizational culture. The eight aspects where synthesized into a framework from the fields of agile software development, agile portfolio management, Scrum, SAFe, Lean, New product development, Lean product development, aspects of change, emergent change models, organizational design, resistance to change, and organizational culture. In addition, insights from previous agile transformations was conducted by researching benchmark studies of the bank ING.

The results indicated an initial successful implementation as the interviewees expressed joy in working with the new methods. Furthermore an effective use of all four major approaches to scaling agile was evident. The results showed that the scope of the transformation kept growing and was managed through iterative improvements. Integration of already agile parts of the organization such as projects was enabled, and initial changes in leadership and delegation as well as new roles were managed. However some struggles remained regarding product development which could not be conducted in a fully agile way due to large releases and a regulated environment. In addition dependencies between different teams limited the creation of autonomous teams capable of delivering end to end. Furthermore as the work was visualized the amount spent on non value adding activites such as preparing low value task could be avoided, which however required extensive refinement. The focus on the new methods furthermore led to less time spent with customers. One challenge that emerged was that the

virtual organization started to interfere with the traditional organization. A shift in power from hierarchies to teams took place. Aspects such as recruitment and rewards remained in the old structure highlighting a double organizational culture. This provides some uncertanty regarding further adaptions in the long run.

The study has provided an empirical contribution as well as conceptualization of the approaches and aspects of scaled agility which provides hypothesis that assist future theory building. In addition the implications showed to be noteworthy from as sustainability pespective by enabling ecnomic benefits such as efficency and new IT-infrastrucutre combined with good jobs and limited enviromental impacts. To validate the results more studies could be performed at other companies, other parts of banks as well as more extensive data collection such as quantitative approaces and long term observations.

Key-words: Agile, Scaled agile, Agile portfolio management, Scrum, SAFe, Lean product development, Change management, Organizational design, Organizational culture

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Godkänt	Examinator	Handledare
	Lars Uppvall	Anna Jerbrant

Sammanfattning

Stora banker möter utmaningar från ett nya regleringar och ökad konkurrens som har lett till att 30% av bankerna har infört agila metoder genom Scaled agile framework (SAFe). Omvandlingsprocessen mot agile är komplex och leder till en förändringsprocess som täcker aspekter som produktutveckling, ledarskap och organisationsdesign och som för närvarande saknar vetenskaplig kunskap om hur den ska bedrivas framgångsrikt. Denna undersökande fallstudie syftade till att tillhandahålla ett empiriskt bidrag som hjälper till med teoriuppbyggnad inom området skalad agile genom hypotesformulering. Empiriska data samlades in genom tretton halvstrukturerade intervjuer, sammanlagt tio timmar, i kombination med tio etnografiska observationer som sträckte sig över 34 timmar.

Från fynden identifierades fyra metoder för att skala agile i kombination med åtta aspekter av skalad agilitet som ger ett nytt djup angående tillämpningar av dem och vad man ska uppnå. De fyra identifierade tillvägagångssätten är: skapandet av en virtuell organisation, standardisering av agila metoder, förenande kring en portfölj och förändring mot ett agilt tankesätt. De åtta aspekterna inkluderar strategisk agility, payoff agility, business agility, produkt agility, agile organisation, tools agility, resurs agility och organisationskultur. De åtta aspekterna av scalad agilitet var syntetiserade till ett ramverk baserat på ämnesområdena agil programvaruutveckling, agil portföljhantering, Scrum, SAFe, Lean, New product development, Lean produktutveckling, aspekter av förändring, framväxande förändringsmodeller, organisationsdesign, motstånd mot förändring och organisatorisk kultur. Dessutom samlades insikter från tidigare agila transformationer på banker genom att undersöka en benchmarkstudie av banken ING.

Resultaten visade på initiala framgångar i genomförande då intervjuobjekten uttryckte at de metoderna var givande att arbeta med. En framgångsrik användning av alla fyra huvudsakliga tillvägagångssätt för att scala agila metoder observerades. Resultaten visade att den planerade omfattningen av omvandlingen ökade under processens gång och hanterades genom iterativa förbättringar. Integrering av redan agila delar av organisationen som projekt möjliggjordes och initiala förändringar i ledarskap och delegering liksom nya roller hanterades. Vissa utmaningar återstod emellertid som berörde produktutveckling som inte kunde genomföras på ett fullständigt agilt sätt på grund av stora leveranser och den starkt reglerade miljön. Dessutom utgjorde beroenden mellan olika team en utmaning för införandet av autonoma end-to-end team. Eftersom arbetet visualiserades kunde man också undvika mängden arbete på aktiviteter som inte tillförde värde. Förberedandet av dessa uppgifter krävde omfattande tidskrävande

förfining. En nackdel med det ökade arbetet mellan olika avdelningar var att dialogen med kunder minskade. En utmaning med den virtuella organisationen var att den störde den traditionella organisationen. Till exempel genom att fördela makt från tidigare hierarkier till nya team. Dessutom kvarstod aspekter som anställningar och belöningar inom den traditionella strukturen vilket ledde till en dubbel organisationskultur. Detta kan ge en viss osäkerhet när det gäller ytterligare anpassningar på lång sikt.

Studien har gett ett empiriskt bidrag till agile såväl som en konceptualisering av såväl tillvägagångssätt som olika aspekter av skalad agilitet inför framtida teoriskapande. Dessutom visade sig den agila transformation vara positiv utifrån ett hållbarhetsperspektiv genom att möjliggöra ekonomiska fördelar som effektivitet och ny IT-infrastruktur kombinerat med ansenliga arbetsvillkor och icke ökande miljöpåverkan. För att validera resultaten kan fler studier behöva utföras hos andra företag, andra delar av banker, mer omfattande datainsamling inkluderande kvantitativa metoder och mera långsiktiga observationer.

Nyckelord: Agile, Scaled agile, Agile portfolio management, Scrum, SAFe, Lean product development, Change management, Organizational design, Organizational culture

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Foreword

This master thesis was conducted as the final project for the degree program in Design and Product Realization and the master's program in Industrial Management at the department of Industrial Engineering and Management at KTH Royal institute of technology.

I would like to thank my supervisor Anna Jerbrant for the encouragement and guidance. I would also like to thank the examiner Lars Uppvall for the feedback and support during the seminars. I would also like to thank the other participants from the seminars for their feedback. Finally, I would like to thank the people at the case company for their support and participation in the study.

Abbreviations and terminology

APM:	Agile portfolio management.
ART:	Agile release train.
DaD:	Disciplined agile delivery.
DevOps:	Development and operations.
Epic:	SAFe terminology for larger assignments usually containing several features.
Feature:	SAFe terminology for assignment that can be undertaken by one team.
FinTech:	Financial technology which in popular use refers to companies specializing in financial technologies.
LeSS:	Large scale scrum.
LPD:	Lean product development.
NPD:	New product development.
PI:	Program increment.
PO:	Product owner.
RTE:	Release train engineer.
SAFe:	Scaled Agile Framework.
Scrum:	An agile framework of agile software development.
SM:	Scrum master.
SoS:	Scrum of scrums.
ST:	SAFe terminology for major assignments usually consisting of several epics.
TSM:	The SAFe methods – A matrix of methods for scaling agile.
WSJF:	Weighted Shortest Job First.
XP:	Extreme programming.

1. Introduction

In the following section the path to discovery of the identified gap in knowledge and the approach of the study to fill the gap is described, by providing a background of the state of current knowledge leading up to a problem statement, and the purpose and research questions of the study.

1.1 Background

The need for flexibility and adaptability for banks is increasing as new competitors such as *financial technology companies* (FinTechs) and large tech companies have emerged in the market that offer financial services unmatched by banks in the most profitable parts of the value chain (EY, 2018) (McKinsey and Company, 2016). The requirements to offer new services put pressure on the traditional product oriented siloed operations traditionally employed at banks. The solution-oriented software development that is necessary does not match the traditional organization (PWC, 2014). The initial successful initiatives to adapt to the new market by traditional banks, such as Morgan Stanley's lending platform Marcus, have been built on brand new IT infrastructure since the old infrastructure did not offer the required capabilities. For existing systems to be able to cope with the new customer demands there are big requirements on improvements in the core banking systems. At the same time recent regulations such as MIFID2, EMIR, AML, PSD2 put high demands on reporting, which results in IT-developments (PWC, 2014). As a result, resources are taken from new developments (ADDQ, 2019). In order to cope with the difficulties banks have started to investigate new ways of working. Project management in banking have shifted from traditional waterfall planning to an agile approach (McKinsey and Company, 2019).

Agile which surfaced from the agile manifesto in the early 2000s as an initiative for software development has since been adopted into several fields (Putta et al., 2018). While initially mostly applied in smaller companies, as successes have grown, agile has increasingly been applied at a larger scale (Putta et al., 2018). In the financial industry the bank ING has become a symbol for the possibilities as they implemented a companywide implementation of agile methods across business, IT, and operations using D*evelopment and operations* (DevOps) and inspiration from Spotify (Calnan and Rozen, 2019). One of the most prominent ways conducting large-scale agile transformation has been to utilize scaled agile methods such as the *scaled agile framework* (SAFe) (Putta et al., 2018). SAFe incorporates agile methods such as daily scrums and stand ups as well as second generation Lean principles and methods such as Kanban boards. It is aimed at coordinating several teams with up to a total of around 150 members. While adoption of the model is increasing there is still limited research regarding SAFe (Putta, et al., 2018). Emerging research in agile methods have investigated challenges and success factors for SAFe implementation such as resistance to new roles, difficulties integrating and transforming different types of teams in the model (Kalenda et al., 2018). Several studies have demanded more empirical studies in the field to be able to draw conclusions (Paasivaara, 2017).

While there are several whitepapers on successful large-scale transformations there is a lack of published studies on success factors in large scale transformations (Kalenda et al., 2018). The fact that large companies struggle to utilize agile methods due to legacy systems and organizational structures have also been studied (Kalenda et al., 2018). As agile methods are extensively adapted and tailored to each organization it raises the question of what should remain to still consist of an agile transformation. Additionally, to what level are companies who have conducted successful transformations fitted and adapted their company into agile structures. In addition, while agile methods in some parts of the organization might be conducted without changing the overall structure of the company large scale transformations potentially change the entire organizational design. To change the entire organizational design several challenges emerge regarding how to conduct the transformation process. Large scale transformations have been investigated for a long time and identified as difficult due to the transition process which create unmatching aspects of organizational design (Galbraith et al., 2002). Furthermore, as the desired state of agile transformations are unclear the dynamics of optimizing emergent change must be handled. Top management are for large scale transformations not able to predict every detail and they need to delegate mandates which in turn leads to a changing role of leadership in the organization (Todnem, 2005). In conclusion the transformation process of large-scale agile methods is complex because agile methods lack clear definitions. In addition, the adaption process is not well studied and in particular the changes in organizational design.

1.2 Problem formulation

To become more adaptable to internal and external changes banks have turned to the field of scaled agile frameworks which aim to scale agile practices from a team level to an organizational level. The resulting large-scale agile transformation process is challenging as the methods require a large amount of adaption in a regulated environment with legacy systems with a discrepancy between the ideal state. This furthermore results in question of how benefits of agile methods are achieved at a large bank that can streamline the process to create scaled agility. In addition, the transformation process is an emergent change conducted during an ongoing changing organizational design and leadership.

1.3 Purpose

The purpose of this explorative case study is to investigate the transformation to scaled agile practices at a large bank. The aim is to identify agile methods used and how the resulting scaled agility emerged. Due to the popularity of the methods in the financial sector but with few available studies on the implementation the present study aims to fill the lack of empirical data on the methods identified by previous research, in order to contribute to theory building in the field. Furthermore, the study aims to provide practitioners highlights regarding successful implementation, thus, bridging the gap between research and current practices in agile methods.

1.4 Research questions

Research question	
RQ: How is the transformation process towards scaled agility accomplished at a large bank?	
Sub questions	**Objective**
SQ1: How are scaled agile methods applied at a large bank?	Understanding how agile methods are used in the transformation process.
SQ2: How is the emergence of scaled agility challenging for a large bank to achieve?	Understanding the challenges of achieving scaled agility at a bank.
SQ3: How does a large bank overcome the hinders to greater scaled agility?	Identifying solutions to overcome the hinders to scaled agility.

1.5 Delimitations

The scope of the study was to investigate an implementation of agile methods at a large bank. A bank was chosen as a case as they commonly conduct agile transformations using SAFe. Additionally, it is of interest for further research for example Paasivaara (2017) established the need for more studies in different contexts. The study was limited to investigate the implementation of one virtual department at the chosen bank consisting of around 150 employees. The virtual department was chosen as it was one of the largest and most complex in the company and therefore will likely face and identify more scaling challenges than at a smaller department. The limitation to one department is also due to the limited time available for the research which combined with a qualitative, explorative approach would not be fulfilled with a larger scope. The decision was made to follow an implementation process rather than an analysis or design that would not be suitable for the chosen company and the virtual department. The limitation of looking at SAFe as opposed to similar frameworks such as *Large-scale Agile* (LeSS) or *Disciplined Agile Delivery* (DAD) is due to the use at the researched company and relative popularity in usage in the industry in general.

1.6 Structure of the thesis

Chapter 1: Introduction
Chapter 2: Literature review
Chapter 3: Theoretical frameworks
Chapter 4: Methodology
Chapter 5: Results
Chapter 6: Discussion
Chapter 7: Conclusions and implications

2. Literature review

The literature review aims to consolidate different fields covering aspects of large-scale agile transformations. In addition, as SAFe serves as a major part in the transformation a focus is on the fields that have served as its subcomponents. During the literature review the most cited papers overall and among contemporary studies in the field of agile, change management and Lean, and others have been examined. A common theme sought for in the literature were approaches centered around accepting change rather than minimizing it which have been applied in product development, project management, software development and in organizational change and design.

The literature review starts off with covering the concept of agile beginning with its origin in software development and the contemporary wide spanning concept of scaled agility used in large scale applications and its subfields such as product agility and organizational culture. Thereafter the different aspects of scaled agility are investigated through related subfields.

The fields covered in the literature review are as follows: agile software development which describes the origin and traditional applications of the methods including traditional views of when to avoid using it ending with large scale applications and general success factors. The field of agile portfolio management is covered which serves as one of the major scaling factors in SAFe, describing its components as well as challenges and success factors for its application. Thereafter the agile frameworks of Scrum and SAFe are covered highlighting the role and importance of frameworks to apply agile. Thereafter the field of Lean is described which served as a foundation for agile and the practical approach of a list of methods are included in agile and in particular SAFe. Then two approaches to flexible product development of LPD and NPD. As they serve as guidance for product development in SAFe and subsequently provides guidance regarding transforming the product development process. Finally, the field of change management is covered highlighting how to conduct a large-scale transformation at a company, including challenges and approaches to change such as classifying and preparing for change. Thereafter the two major challenges of large-scale transformations of resistance to change and the impact on organizational design and subsequently the effect on organizational culture are described. To conclude the literature review a benchmark study of a large scale transformation at a bank is described highlighting how the different fields commonly emerge in practice.

In conclusion the literature review covers the bodies of knowledge regarding the aspects of scaled agility and the approaches to achieve it. Finally the fields of the results of the literature review have been synthesized into two frameworks, first, the aspects of scaled agility and secondly the methods in SAFe.

2.1 Agile

In the following chapter the foundations, principles and suitability of agile is described followed by a presentation of agile portfolio management and agile frameworks, all important in agile transformations.

2.1.1 Foundations and principles of agile

Agile originated from the creation of the agile manifesto in 2001 by a group of software developers aiming to consolidate their best practices from experiences of iterative software development (Dingsøyr et al., 2012; Dybå and Dingsøyr, 2008; Highsmith and Cockburn, 2001). Agile as a concept largely evolved from values defined in the manifesto (Highsmith and Cockburn, 2001).

- Individuals and interactions over processes and tools
- Working software over comprehensive documentation
- Customer collaboration over contract negotiation
- Responding to change over following a plan

The original authors early on defined agility as the combination of flexibility and Leanness and suggesting that agility is a concept derived from Lean (Conboy and Fitzgerald, 2004). Contemporary definitions are largely consistent with the original definition and Dingsøyr et al. (2012) define flexibility as the ability to create change no matter proactive, reactive or embracing change by connecting the inner components to its environment. Leanness is defined as contribution to perceived customer value. In combination the definition of agility is to fast embrace change and learn from it while maintaining a high contribution to the customer value through connecting its components and relationships to the environment.

The concept of agile has since expanded outside of software development into fields such as project management (Serrador and Pinto, 2015). For large scale applications the concept of agile appears in different ways and is subdivided into different types (Laanti, 2014). Laanti (2014) proposed that eight aspects of scaled agility are present in large companies which are shown in table 1.

Table 1: Aspects of agility for large companies based on Laanti (2014)

Aspect of scaled agility	*Definition*
Strategic	The ability to change the core business through a strategic sensitivity, leadership unity and resource fluidity
Payoff	The ability to put capacity in the most profitable aspects of the business through prioritizing work on future value.
Business	The ability to identify and apply the immaterial benefits of the product ecosystem based on insights from external and internal aspects.
Product	The ability to change the products through modification, version, personalization, configuration and refreshing to new and existing customers.
Agile organization	An organization with an appropriate combination of formal organizational structure and informal network to support agile ways of working.
Tools	The use of tools that are adaptable for new purposes as the purposes change.
People	The ability to move work around the organization based on changes in prioritization and focus
Organizational culture	An organizational culture that support agile values and ways of working

2.1.2 Suitability of agile for different applications

Agile software development was initially viewed as suitable only under some conditions but has largely expanded beyond this restricted view. Dybå and Dingsøyr (2008) summarize the five most prominent critiques of agile; first, agile is nothing new, second, agile's focus on a team level creates suboptimal design decisions, third, there is no scientific backing of the methods, fourth, the practices are rarely applicable by the book and, fifth, agile is only suitable for small teams.

Other studies have also concluded that agile is largely dependent on a successful implementation (Chow and Cao, 2008). Chow and Cao (2008) state that success factors include a lot of external and internal matching as well. For example, the right support from management such as strong executive support and hands-off leadership, rewarding in an agile way, matching project management, requirements and the right nature of the project such as non-critical and variable scope (Chow and Cao, 2008). Boehm and Turner (2005) established that adoption of agile software development in traditional organization was hindered by legacy systems, adaption of HR, new requirements and combining subsystems. Furthermore, traditional organizations often blend agile methods with stage gate models where the overall scope is defined by the stage gate process while work in the stages are conducted in an agile way (Cooper, 2016). The benefits of a combined approach include design flexibility, improved coordination, communication, and prioritization as well as a higher morale. However, downsides include the difficulty of finding people that can dedicate fully and challenge of linking to the rest of the organization including reward systems as well as being overall too bureaucratic (Cooper, 2016).

2.1.3 Agile portfolio management

Agile portfolio management (APM) emerged from project portfolio management but has since been expanded to include other types of portfolios such as resources and IT developments (Stettina and Hörz, 2015). Project portfolio management allows a global view of available resources and a subsequent allocation across projects according to the company's strategy (Stettina and Hörz, 2015). APM furthermore provides speed and flexibility in the process. A research topic in the field has been how to enable larger organizations to achieve the capabilities of smaller entrepreneurial companies (Stettina and Hörz, 2015).

A challenge with agile project management is that while it increases project success it also increases difficulties in managing the overall portfolio of projects (Sweetman and Conboy, 2018). A resulting challenge for large companies is that agile methods clash with current management practices (Stettina and Hörz, 2015). The benefits of agile methods are the frequent feedback loops, iterative reviews, and close customer contact, properties that could be lost when combined with traditional structure Hoda et al. (2010). As a result, APM requires changes to a substantial part of the organizational structures and routines.

The goal of project portfolio management may according to Martinsuo and Lehtonen (2007) be divided into three types; maximizing financial values of the portfolio, linking the firm's strategy to the portfolio, and adaption based on an organization's capacity. Traditionally the goals were executed through five activities; identifying, prioritizing, allocating, balancing, and reviewing the portfolio (Stettina and Hörz, 2015). While the function of APM is the same agile practices emphasize micro activities such as team coordination meetings, stakeholder meetings, and retrospective reviews (Stettina and Hörz, 2015).

For large organizations, these micro activities must coexist with traditional sequential project management and legacy systems (Stettina and Hörz, 2015). Financing of projects also clash with APM and usually must be integrated (Krebs, 2008). In order to establish APM, Krebs (2008) suggest that three portfolios must be integrated, project, resource, and asset portfolio. The resource portfolio for example includes people and the asset portfolio includes systems. The three portfolios each have common challenges that should be optimized. The main challenges to the project portfolio according to Krebs (2008) include too many projects and an unsuitable mix of projects, for the resource portfolio a lack of vision, and projects without the correct resources and lack of feedback and for the asset portfolio legacy systems as roadblocks and an underestimate of total cost of ownership. As practical advice for establishing APM Vähäniitty (2012) suggests to publicly prioritize all activities, ensure that there are no incentives on local optimization and appointing a steering group to decide on prioritize and resources.

Kalliney (2009) additionally to the above mentioned factors, states that common problems in APM include alignment with the company's overall vision and strategy, managing dependencies and cross team risks and managing the competence of the silos regarding knowledge and skills. Furthermore Kalliney (2009) highlights that as agile split-up product management across teams makes business agility difficult to achieve as cross product dependencies are not identified and managed, leading to the forming of stronger silos. According to Kalliney (2009) the alignment to high level strategic objectives to specific developments is essential but difficult in practice as the visibility into the daily work of the teams is limited. While communication channels are established by linking tasks to strategic goals, if the descriptions are incomprehensible for people outside of the teams it is difficult in practice to optimize tasks (Kalliney. 2009).

According to Stettina and Hörz (2015) there have been three conclusions of the effect of APM. The frequency of routines and micro activities in one part of the organization drives the need interaction in other parts of the organization further driving agile implementation across different departments (Stettina and Hörz, 2015). Autonomous teams take over traditional aspects of project management changing the role of a project and portfolio management. In order to drive a closer interaction across different portfolios an understanding of how the interactions will take form, and a shared understanding have to be formed (Stettina and Hörz, 2015).

The scaled agile frameworks furthermore fulfill four functions (Stettina and Hörz, 2015). First, transparency is increased through a common sharing of resources and work tasks in order to strengthen trust, decision making and resource allocation. Secondly, collaboration across areas is reinforced by the regular feedback-loops created by artifacts and rituals of agile methods. Thirdly, strategically managed portfolios are created with a shared responsibility which increases commitment for the overall results. Fourthly, an increased focus on teams over individuals and structures removes conflict in resource allocation and result to growing team capabilities. APM is in practice executed through the use of scaled agile frameworks which highlight practices to scale agile methods (Kalenda et al., 2018).

2.1.4 Agile frameworks

In practice agile practices are implement through the application of agile frameworks which are built on the values of agile. The original authors stated that, Scrum among others as the initial agile methodologies (Highsmith and Cockburn, 2001). The prominent frameworks for scaling agile are *Scaled agile framework* (SAFe), *Large-scale scrum* (LeSS) and *Disciplined Agile Delivery* (DaD) (Kalenda et al., 2018).

2.1.4.1 Scrum

The Scrum framework is based around a team and defines roles, workflow and specific artefacts and ceremonies to enable agile development. The key role in Scrum is the developer which in practice are coders, IT-architects or other roles that conduct all the work in the team. Two other roles are formed around managing the development namely the *product owner* (PO) and *scrum master* (SM). The PO is responsible for representing the customer by optimizing the value that the team is going to provide which primarily includes converting needs into potential developments and managing stakeholders (Dybå and Dingsøyr, 2008). The SM's primary role is to remove obstacles facing the developers (Dybå and Dingsøyr, 2008). The SM's roles include ensuring adherence to Scrum by the developers, for example by defining features in a way that they are understood by the developers.

The workflow in Scrum is based on increments called sprints commonly with a duration of around two weeks (Highsmith and Cockburn, 2001). Throughout the work several ceremonies are used dedicated to different objectives. The work in each sprint is planned through an event where the possible developments defined by the PO are picked by the team and discussed in detail (Schwaber and Beedle, 2002). Throughout the sprint a daily stand up meeting is commonly used where the developers can discuss the progress they have made and discuss any current hinders (Dybå and Dingsøyr, 2008). At the end of a sprint two events take place, the sprint review and the sprint retrospective. In the sprint review the work that has been completed in the last sprint is demonstrated (Schwaber and Beedle, 2002).

In the retrospective the sprint is discussed in order to identify the continuous improvements (Schwaber and Beedle, 2002). Scrum uses a backlog of potential developments called features or stories that are defined around a delivery of value directly or by enabling future value deliveries (Highsmith and Cockburn, 2001). The backlog is sorted based on business value which can be defined as a combination of several different aspects such as customer value, cost reduction, but also downsides such as technical debt (Schwaber and Beedle, 2002). The backlog is continuously refined throughout the sprint to enable an up to date view of the customers' needs (Schwaber and Beedle, 2002).

2.1.4.2 The scaled agile framework (SAFe)

The scaled agile framework (SAFe) is a framework integrating practices from agile and Lean in order to scale agile methods Putta et al. (2018). There are disparate views on the goal of SAFe but one common view is to be able to adopt agile at an enterprise level. Kalenda et al. (2018) state that agile methods were originally designed for one team and therefore did not address scalability issues. SAFe provides a collection of best practices ranging from managing strategic issues such as governing core strategic decisions down to agendas for individual meetings (Kalenda et al., 2018). There are other similar frameworks of which prominent ones include LeSS and DAD (Putta et al., 2019). Distinctive of SAFe is the larger offering of different roles, events, artefacts and practices (Razzak et al., 2017). The SAFe methods are a collection from numerous existing agile approaches which can be applied in a modular way based on organizational needs (Razzak et al., 2017). SAFe divides the department into three levels; portfolio, program and team, as well as optional value stream level (Kalenda et al., 2018). The portfolio level manages core strategic decisions, the program level manages, supports and synchronizes the agile teams, and the team level manages the work on a team level according to agile methods such as Scrum, Kanban and XP (Kalenda et al., 2018).

At the portfolio level a structure called the program portfolio management team exists which has the responsibility for content and governance of the program. The team should have business managers and executives with knowledge of the enterprise business strategy as well as technological and financial limitations. The main functions of the grouping is to manage the portfolios' vision, strategy, funding and governance (Vaidya, 2014). The program portfolio management is also responsible for developing investment themes from which budget allocation is based on. In practice it is conducted through the use of backlog of epics. SAFe divides epics into two types, business, and architecture. The business epics are large customer-based initiatives such as large product developments spanning different teams. The epic's role is to capture the necessary development to be able to realize benefits. In addition, architecture epics are potential cross cutting initiatives such as large IT developments to improve the current portfolio solutions for future demands.

Each program consist of one *agile release train* (ART) that comprise of up to around 100 members divided into around ten teams (Alqudah and Razali, 2016). Each ART should be able to contribute value or business capabilities (Alqudah and Razali, 2016). Each program has a product manager that is responsible for the development and prioritization of the program backlog (Vaidya, 2014). The backlog on a program level consists of features that are broken down by the teams based on their workflow (Vaidya, 2014). The program manager additionally works together with the team's POs to optimize their backlogs and direct their work (Alqudah and Razali, 2016). Furthermore, each program has an architect that has responsibility for the architecture for all teams (Vaidya, 2014). Additionally, each program has a *release train engineer* (RTE) that has the program level responsibility of the risk, managing processes within the program and escalating difficulties (Alqudah and Razali, 2016). A user experience (UX) designer is also present in each program to manage a consistent user experience across the individual systems and components (Vaidya, 2014).

In addition to the specific roles four groupings exist in the ART called: business owner team, DevOps team, system team and the release management team. The business owner team is ultimately responsible for governance and the ROI of delivered features by the ART (Vaidya, 2014). The release management team is responsible for the synchronization of releases across product lines. The DevOps team is responsible for the cooperation between development and operations for the ART aiming to identify and conduct improvements. The system team manages and supports in the construction and deployment of the development environment infrastructure and conducts testing. The system team is also responsible for organizing an event called system sprint demo where teams showcase the entire system to different stakeholders. The work in the program is conducted in program increments that start off with a PI planning event. In the PI-planning event the features in the ART backlog are divided among the teams. Features that are chosen for the increment are displayed on a program board. In order to assign features to the program board any potential dependencies to other stakeholders including other ARTs must have been solved before through handshakes. During the work of the increment *scrum of scrums* (SoS) meetings that are setup as daily standups in Scrum where progress, hinders and assistance are discussed.

Teams in SAFe can work using several different agile methods such as Scrum, Kanban and XP (Kalenda et al., 2018). The team structure is defined not unlike Scrum teams and consist of five to twelve team members (Alqudah and Razali, 2016). Two special roles are defined in the teams, the PO and the SM (Alqudah and Razali, 2016). The special roles are usually dedicated to one team but in case of limited resources might have 2-3 teams (Alqudah and Razali, 2016). The PO is responsible for prioritizing and refining team backlogs and by filling it up with new features. While the goal is the use of cross-functional feature teams it is also possible to have system oriented component teams (Vaidya, 2014). The teams should ideally be autonomous end to end teams and with the competence to design, build and test the work (Alqudah and Razali, 2016). While a lot of the work in the teams is set up like Scrum they are not expected to provide potentially shippable increments (PSI) in every sprint, instead releases are only expected roughly every quarter in sections called *program increments* (PI) (Vaidya, 2014).

2.2 Lean

In the following chapter different perspectives on Lean are described

2.2.1 Mindset or toolbox - Perspectives on Lean

While the methods in Lean were derived from the manufacturing industry, the authors had originally intended a broader application of the concepts. Lean has subsequently been expanded to concepts such as Lean thinking and Lean product development (Gupta and Sharma, 2016; Khan et al., 2013; Womack and Jones, 1994, 1997). Application of these wider principles has subsequently been adopted in several fields such as banking (Dos Santos and Cabrita, 2016). Many Lean principles and practices have also later been integrated in agile methods such as SAFe (Laanti, 2014). Lean has not been clearly defined but is largely applied in four ways based on the view of Lean as a mindset, tools, an end goal, or a continuous process (Dahlgaard-Park and Pettersen 2009). The different approaches are shown in figure 1. As Lean has been integrated into other fields it is often applied as a toolbox. For example, SAFe uses mostly strategic Lean concepts such value stream mapping. Lean thinking view Lean as more than a set of tools and emphasizes the importance of establishing an improvement process towards a continuous value stream (Bicheno 2004).

	Discrete (operational)	*Continuous (Strategic)*
Ostensive (Philosophical)	Leanness	Lean thinking
Performative (Practical)	Toolbox Lean	Becoming Lean

Figure 1: Different approaches to Lean based on Dahlgaard-Park and Pettersen (2009)

2.2.2 Lean wastes

Lean thinking approach define how customer value is delivered as a value stream which include the steps required to provide the product or service (Dahlgaard-Park and Pettersen, 2009). Each activity is then classified as value providing, waste or non-value adding but necessary. Eight different types of waste are defined in Lean production that can be applied in other contexts as well which are shown in table 2 (Womack et al., 1990).

Table 2: Eight types of waste as defined in Lean based on Womack et al. (1990).

Types of waste	
Defects	Producing products unwanted by the customer
Waiting	Producing things to early
Unused talent	Limited possibilities to utilize skill and limited knowledge sharing
Over processing	Doing things to a product unwanted by the customer
Inventory	Unnecessary work in progress items or raw materials
Overproduction	Producing more than necessary
Transportation	Risk delay and loss of product
Motion	Unnecessary strain on system

2.2.3 The Lean toolbox

The practical approach towards Lean is utilizing Lean as a toolbox of methods. Dahlgaard-Park and Pettersen (2009) defines 32 different practices listed in table 3 that define the Lean toolbox. The different tools can be applied to increase value.

Table 3: Lean toolbox based on Dahlgaard-Park and Pettersen (2009)

Lean toolbox	
1. Continuous improvement	17. Autonomation (Jidoka)
2. Setup time reduction	18. Statistical quality control (SQC)
3. Just in time production	19. Teamwork
4. Kanban/Pull system	20. Work force reduction
5. Poka yoke	21. 100% inspection
6. Production leveling (Heijunka)	22. Layout adjustments
7. Standardized work	23. Policy deployment (Hoshin kanri)
8. 5S/Housekeeping	24. Improvement circles
9. Andon	25. Root cause analysis (5 why)
10. Small lot production	26. Value stream mapping/flowcharting
11. Time/Work studies	27. Education/Cross training (OJT)
12. Waste elimination	28. Employee involvement
13. Inventory reduction	29. Lead time reduction
14. Supplier involvement	30. Multi manning
15. Takted Production	31. Process synchronization
16. TPM/Preventive Maintenance	32. Cellular manufacturing

2.3 Flexible product development

In the following chapter the major types of flexible product development methods Lean product development and new product development are described.

2.3.1 Lean product development

Lean product development (LPD) consist of an application of lean thinking in the product development process integrating aspects such the value stream and continuous improvements. Hoppman (2011) divides LPD into ten different components which are highlighted in table 4. The product development process in LPD consist of a concurrent approach were several product development processes are conducted simultaneously. Concurrent engineering processes include a change from waterfall methods in which the steps were conducted sequentially into a stream centered around a pull from customer demand (Khan, 2013). To be able to perform several product development processes at once a few practices are applied which are further described below. LPD emphasize an iterative approach to product development where multiple solutions of the product are kept by delaying specifications to allow flexibility in design. This allows for early problem solving to iterate the product later.

Table 4: Components of Lean product development based on Hoppman (2011)

Components of Lean product development
Specialist career paths
Workload leveling
Responsibility based planning and control
Cross project knowledge transfer
Simultaneous engineering
Supplier integration
Product variety management
Rapid prototyping, simulation and testing
Process standardization
Set based engineering.

In addition to be able to sustain the concurrent flow Khan (2013) state that a knowledge-based environment is necessary to understand the flow and reuse of knowledge. Leon and Cross (2011) further emphasized that knowledge sharing is further enhanced by cross functional teams working with the product end to end. Furthermore, knowledge-based network needs to transfer knowledge across the entire product development department. In practice the authors suggest a continuous improvement-based approach using rotation of roles and creating networks at different levels. Furthermore, to support the development of specialist skills Hoppman (2011) mentions that specialist career paths are necessary. Hoppman (2011) mentions that commonly engineers are promoted to general management and administrative tasks quickly leading to the department loosing technical skills in the process. In a Lean organization according to Hoppman (2011) dual career paths of specialist and manager are possible to develop specialties in addition to managerial talents.

Workload leveling is another component in LPD that is necessary to keep a predictable even flow (Hoppman 2011). To efficiently utilize shared resources and multi project management to be efficient it requires single projects to be predictable. Furthermore, concurrent work among different functions require clear prioritization, synchronization, and consistent execution. In addition, achieving a level flow in product development requires building capabilities to bridge bottlenecks and the availability of extra capacity.

Further the leadership to optimize LPD requires a responsibility-based approach in contrast to a top down control Hoppman (2011). In a top down approach people conducting the work are not involved in the planning but are given assignments. In a responsibility-based system the people executing the tasks define their own value streams. A structure is commonly implemented to ensure prioritization, synchronization, and consistent execution. Toyotas model is called *Hoshin Kanri* and consist of a process of breaking down higher level objectives into meaningful achievable lower level objectives that are aligned across different stakeholders Morgan and Liker (2006).

Khan (2013) defines value focused techniques as a part of LPD in addition to the components defined by Hoppman (2011). Value focus techniques are defined by Khan (2013) as basing development on customer needs, creating a value stream mapping to understand customer needs and having a multi project plan and strategy to focus on the most important projects. Gautam and Singh (2006) further emphasize rigor in establishing the customer's perception and willingness to pay for improving current products. Most product improvements require research and development resources to fund investment in manufacturing as well as a potentially increased maintenance and reduced quality (Gautam and Singh, 2006). As a result, a price increase might be necessary which will not be covered if the customer does not perceive the improvement as substantial. Furthermore, customers might expect constant improvements to products potentially without extra costs.

2.3.2 New product development

New product development (NPD) theory which is a field in product development research that has evolved parallel to development of LPD. NPD methods were formed around identifying best practices for how large organizations can gain a competitive advantage from the product development process (Griffin, 1997). There are some variations, but overall NPD presents product development as an seven-step process referred to as the BAH model which is illustrated in figure 2 (Griffin, 1997).

Figure 2: BAH model for the product development process (Griffin, 1997)

In practice the different steps are conducted through a stage gate model (Griffin, 1997). A gate process takes place where the idea tested and after which it is either abandoned or moves on, directly, or after some modifications. In that way the development is controlled by ensuring that the idea has been screened and ensured by different metrics and that alternative designs have been investigated. It to some extent stems from the same problems identified by agile methods in the need of managing change. NPD identified four different challenges facing product development such as increased competition, rapidly changing market, higher rate of technical obsolescence and shorter product life cycles (Griffin, 1997). One of the fundamental concepts of NPD is the product development mortality curve which in initial research showed that for every successful product around 60 ideas are considered (Griffin, 1997). Furthermore, NPD is based on the idea that cost of change of a product increases drastically later in the development process and that a lot of it emerge from early design decisions. By having a thorough idea generating and screening process potential alternatives are identified early on. The different alternatives are kept for as long as possible, to avoid commitment to only one idea to early (Griffin, 1997). Similarly to agile NPD stage gate models can integrate iterative methods in the early screening. However, NPD research have also acknowledged that service firms can use fewer complex processes with fewer steps and therefore develop services faster. For services Griffin (1997) states that a market driven process is a critical success factor.

2.4 Change management

In the following chapter the field of change management is described highlighting different types of change and how to appropriately deal with them.

2.4.1 The challenges of successful organizational change

Change management emerged as methods for preparing, implementing, and sustaining change (Lewin, 1947). As change has become an ever-present element of organizations the boundaries of the three-stage model have become blurred. Moran and Brightman (2001) defines change management as "The process of continually renewing an organization's direction, structure, and capabilities to serve the ever-changing needs of external and internal customers". In the current environment of constant change, managing change has become one of the most important tasks of a manager (Graetz, 2000). Change management is often reactive as need for change is unpredictable (Todnem, 2005). Furthermore as 70 % of all change programs fail, the implementation and management of organizational change is essential (Balogun and Hailey, 2008). Buchanan et al. (2005) state that the contemporary focus on constant change potentially results in a limited focus on sustaining it. In addition, implementations of change commonly suffer from initiative decay where new practices are abandoned (Buchanan et al., 2005). The success of large organizational changes is furthermore difficult to estimate as current practices and performance targets might become obsolete (Buchanan et al., 2005).

2.4.2 Adapting to different types of change

Several studies have focused on defining different categories of change. Todnem (2005) divided change based on scale, rate and origin of change. In addition, change has been sub-divided chronologically, commonly as adaptions from the phases described by Lewin (1947) i.e. preparing, implementing, and sustaining change.

Dunphy and Stace (1993) divide change into four categories based on their scale, fine tuning, incremental adjustment, modular transformation, and corporate change. Fine tuning usually takes place at department or division level to match the corporate strategy, processes, people and structure (Todnem, 2005). The goal of a fine tuning can be to refine processes, and create specialist units (Todnem, 2005). Incremental changes are according to Todnem (2005) conducted to modify management processes and organizational strategies. Modular transformation furthermore constitutes a major change to one or a few parts of an organization while radical corporate wide transformations concern corporate changes (Todnem, 2005).

Traditionally one assumption regarding organizational change has been that organizations are not effective or can improve performance while undergoing change (Rieley and Clarkson, 2001). Constant changes in contrast were considered to result in a never-ending change process which would be less cost efficient (Todnem, 2005). However later studies have acknowledged that the ability for organizations to undergo continuous change has become essential (Rieley and Clarkson, 2001). In practice incremental changes are an ongoing process of monitoring, sensing, and responding to the internal and external environment (Luecke, 2003). The change process in addition has a changing rate of occurrence throughout the change.

Todnem (2005) defines seven types of rate of change. The different types are based on the fundamental ones of discontinuous change which jumps from one state to another also referred to as big bang methods and incremental changes that goes on for a longer period. In addition, some changes go through cycles of incremental and discontinuous changes were a jump is made and then moves on to an incremental change until the next big change takes place. The incremental change might be characterized as bumpy where in the long-term change is positive but have periods of recessions. A combination of rate of change and size of change is presented by Balogun and Hailey (2008) which characterizes change into four categories. The size of change is defined as a transformation or realignment based on the scope where a transformation cannot take place within the current organizational frames. Large changes are characterized in Balogun and Hailey (2008) model as an evolutionary or revolutionary change based on the rate of change and small changes are characterized as adaption or reconstruction.

2.4.3 Surviving in a fast-changing environment

A preparation for change was deemed essential in traditional change management as old practices had to be discarded before new could be learned referred to as unfreezing in Lewin's (1947) model of change. More recent studies have emphasized that change is often not planned or would at least be an oversimplification. In order to provide a comprehensive approach to understanding change Todnem (2005) states that there are four types of change; emergent, contingency, by choice, and planned. Planned change, according to Todnem (2005), mostly consists of small scale and incremental changes while large scale, rapid, open ended change processes on the other hand are more difficult to plan. Attempting to plan for more complex types of changes utilizing timelines, stated goals and practices has been criticized as it makes the change too dependent on senior managers. Furthermore, contemporary studies have stated that in a fast-changing environment top down approaches to change will not be able to manage all necessary organizational changes (Todnem, 2005). To manage change, bottom up approaches are suggested where the management of change gets redistributed. As a result a company needs to become an open learning system where the need for change in terms of strategy and change becomes emergent from how the company in its entirety acquires, interprets and process information about the external and internal environment (Dunphy and Stace, 1993). This in turns requires that the company has a thorough understanding of how to leverage from and identify roadblock in strategy, structure, people, style, and culture (Burnes, 1996). Burnes (1996) furthermore suggests a contingency approach to change were change models are picked based on the usage and that not one model is fit for every change. Several frameworks have been developed for managing emergent change e.g. Kanter et.al (1992), Kotter (1995) and Lueke (2003) which all put more emphasis on the emergence in contrary to start of the change process.

2.4.4 Resistance to change - the importance of readiness for change

Inspired by the first step of the Lewin (1947) three stage model unfreezing, specific research efforts in change management has investigated whether actions can be taken before a change to prevent resistance to change (Holt et al., 2007). Coch and French (1948) established that involvement of the participants affects resistance to change. Armenakis et al. (1993) states that by studying employees' perception of a change can indicate the success of an implementation. This perspective provides additional measures apart from the change process to understand the success of change. Holt et al. (2007) concluded that studies in readiness for change have identified four important aspects to consider: the content, context, individual readiness, and the process for change. However not all factors are possible or practical to be equally considered during an organizational change. Holt et al. (2007) proposes that readiness can be evaluated through the perceptions of; capabilities of the organization to implement the change, the appropriateness of the change to the organization, the management commitment, and the perceived benefits of the members. Emergent change models such as Kotter's (1995) eight stage model encompass the different aspects in the initial stages of the implementation. In addition to an overall view of a change several models exist that emphasize that individual's commitment to change pass through several stages.

2.4.5 Conducting a large-scale transformation process

The overall structure of the change process is mainly based around a current state, a desired state, and a transition process while as mentioned earlier there are several different aspects of the different phases. As stated by Balogun and Hailey (2008) larger transformation requires changing fundamental aspects of an organization which cannot be conducted within the current organizational structure leading to difficulties in the transition. Galbraith star model illustrated in figure 3 highlights the five different aspects of organizational design that are changed in a large transformation process as strategy, structure, processes, rewards, and people (Galbraith et al., 2002). Galbraith et al. (2002) emphasizes that all the parts are connected and affect each other and therefore must be aligned. However, Galbraith et al. (2002) also emphasize that transformations usually follows a set flow of strategy, structure, process, rewards, and people leading to an initial emphasis on structures and processes.

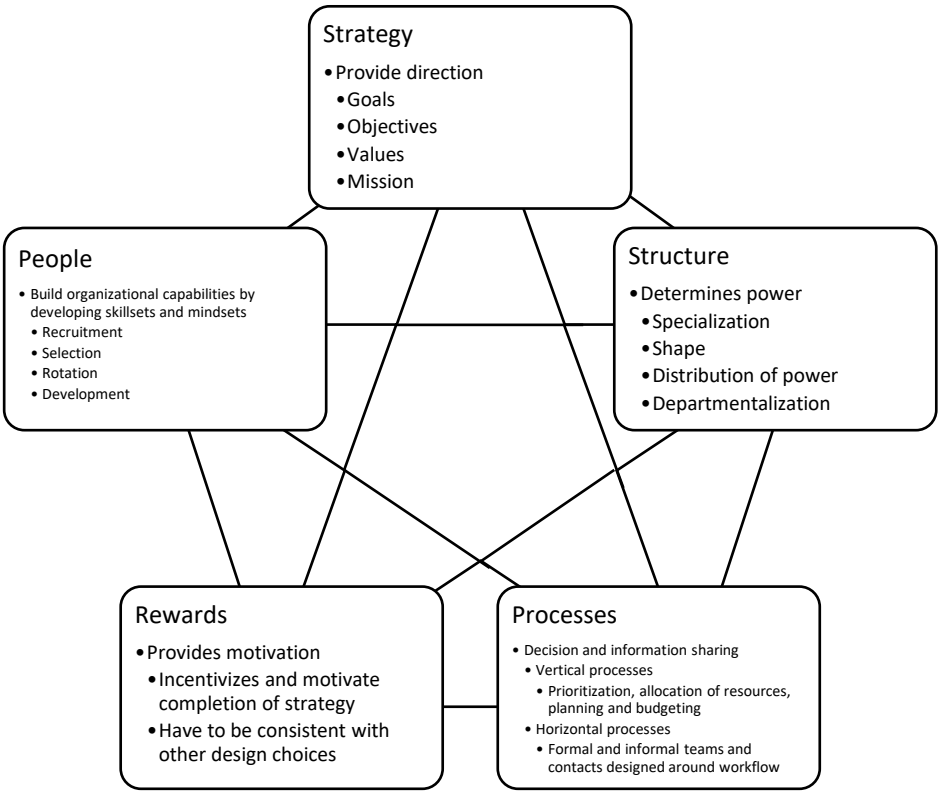

Figure 3: Galbraith star model of organizational design (Galbraith et al., 2002).

2.5 Organizational culture

Organizational culture is defined by Wiener and Vardi (1990) as "a system of shared values which produces normative pressure inside organizations, affects motivation of members of the organization and enhances their commitment". In order to define the organizational culture at companies several different frameworks have been created highlighting different types of organizational cultures. Sackman (1992) defined that in large organizations the organizational culture varies across departments leading to the forming of subcultures.

According to Galbraith et al. (2002) organizational culture results from five different aspects of organizational design: strategy, structures, processes, rewards, and people. The combination and interactions between the aspects affect the organizational culture. Furthermore, the aspects must be aligned to create a coherent organizational culture. Organizational culture therefore is linked to the organizational design.

Handy (1976) defines four different types of organizational cultures: a power culture, role culture, task culture, and person culture. A power culture emphasizes strong control and power structures. In a role culture the power is delegated but is based on personal power of individuals instead of expert powers. Role cultures often have strong functional departments. A task culture is defined as where power is concentrated in teams with the expertise to complete tasks. In a person culture, individuals are emphasized over the organization which however according to Handy (1976) is not suitable in the long run.

Cameron and Quinn (2011) further stated that organizational culture can be classified based on aspects of flexibility and stability as well as internal and external focus. The result is a matrix of four different organizational cultures, clan, adhocracy, hierarchy, and market. A clan culture is described by Cameron and Quinn (2011) as where leaders are considered mentors and the organization is held together by loyalty. In addition, it is characterized by a long-term focus in human resources. Furthermore, success in a clan culture is defined by sensitivity to customers and concern for people. An adhocracy is defined as dynamic, entrepreneurial and creative and is united by commitment to experimentation and innovation. Success in an adhocracy is defined as creating new and unique products and services. In a hierarchy culture procedure govern and leaders are coordinators with a focus on efficiency. Rules and policies unite the organization. Success in a hierarchy culture consist of dependable deliveries. In a market culture focus is on getting work done and people are competitive and goal oriented. Leaders are tough and demanding and the culture is united by winning. Success is defined in market share and penetration.

2.6 Benchmark study – ING bank

The bank Internationale Nederlanden Groep (ING) is a Dutch multinational bank with over 54 000 employees serving over 40 regions (Calnan and Rozen, 2019). The bank was picked as a subject to study due to the similarities to the studied company as a European multinational bank. The agile transformation at ING has been studied by Kerr et al. (2018) and Calnan and Rozen (2019) which served as benchmark studies. In addition, the process of ING's transformation serves as a role model as their experiences are likely to be applicable to the case company. ING was largely facing the same issues as other banks such as legacy systems and long development times which makes it an interesting case. The scaling approach of ING was conducted without the use of frameworks which further highlights success factors independent of any framework.

2.6.1 Implementation process

The overall process of implementation has by later studies been divided in three steps (Calnan and Rozen, 2019). First, it was started within IT and operations as a DevOps venture. The initial focus was on creating a continuous flow of IT-development and deployment limiting handovers to create a better flow (Kerr et al., 2018). Organizationally it led to uniting teams around solving a problem rather than tasks on an individual level ordered by management. This allowed a managerial change towards a more coaching approach where the leadership shifted to remove organizational obstacles and champion their success, which further lead to more spread of the ideas (Calnan and Rozen, 2019). The first venture started with the development of a new mobile banking app where the team responsible worked according to Scrum framework. Secondly, an implementation in the business side started. The phase was distinguished by being experimental and driven by aiming to remove the friction between the newly established agile DevOps teams. The third step included scaling agile practices. The effort was based on ING management visiting Spotify's office (Kerr et al., 2018). They observed the team structures at Spotify which included combining team members into tribes, guilds, and chapters which were formed around different value deliveries and centers of excellence. The concept of a multiple level virtual organizations was then brought back and integrated in the implementation at ING.

2.6.2 Resulting solution

The resulting solution for the agile transformation included a formal division into agile teams as the main organizational structure combined with the Spotify model of virtual organizational layers on top of the traditional organizational structure (Kerr et al., 2018). Furthermore, a value-based organizational culture was implemented. The finalized team structure was formally adopted by rehiring people to the new agile roles. This forced a cultural change as the team members had to motivate their fitness to the new roles. The overall team structure has largely remained unchanged since. The solution eventually reduced the equivalent of 30 % of the full-time roles in the company (Calnan and Rozen, 2019). The continuous improvements also continued. Agile values became an important part in the concluded outcome. Managers had to undergo vast transformations in their leadership by changing their management from command and control into more of coaching role. This further resulted in some challenges regarding managing autonomy which required a responsibility-based leadership. For developments leadership now only provide guidance while the specific implementation was left to the teams.

3. Theoretical frameworks

In the following chapter two theoretical frameworks concerning aspects of scaled agility and the SAFe toolbox are presented.

3.1 Aspects of scaled agility (ASA)

The different aspects of scaled agility in large-scale agile transformations is illustrated as a conceptual framework in a Venn diagram in figure 4. The framework defines scaled agility as an overarching ability consisting of many smaller aspects. The scaled agility framework provides a way to understand and adapt the agile transformation based on which aspects and fields of scaled agility that are desired to be improve. In addition, it shows the links between the fields covered in the literature review and aspects of scaled agility. The aspects of scaled agility were originally defined by Laanti (2014) who fused different aspects of scaled agility. However, Laanti (2014) did not cover in detail all fields concerning the aspects and challenges and adaptions to achieve them. Therefore in the present study, models and concepts from different subject areas have been synthesized into the different aspects. The headlines highlighted in figure within the bubbles are covered and linked to the literature review conducted in the present study. The main components of the framework are the eight aspects of scaled agility: strategic, payoff, business, product, agile organization, tools, people and organizational culture.

Strategic agility is the ability to change the core business through strategic sensitivity, leadership unity and resource fluidity. The aspects of sensitivity and unified leadership is covered in the change management section and partly emerged in the agile section. Payoff agility is the ability to put capacity in the most profitable aspects of the business through prioritizing work on future value. The aspect is mostly covered in the APM section as well as in emergent change approaches in the change management section. Business agility is the ability to identify and apply the immaterial benefits of the product ecosystem based on insights from external and internal aspects. The ability is mainly covered as an extension of product agility in the sense of identifying the immaterial properties of products which is covered in the LPD and NPD sections. In addition, the ability is also related to adaptability in the IT-systems which is partly covered in the sections concerning flexible product development and agile. Product agility is the ability to change the products through modification, version, personalization, configuration and refreshing to new and existing customers. The ability is covered in the flexible product development section. An agile organization contains an appropriate combination of formal organizational structure and informal network to support agile ways of working. The aspect is covered in the change management section in particular the organizational design. Tools agility is the use of tools that are adaptable for new purposes as the purposes change. The tools agility is covered in the agile section. People agility is the ability to move work around the organization based on changes in prioritization and focus. The aspect is covered in the change management section in particular change readiness, resistance to change, and in parts of the sections concerning agile and flexible product development. An agile organizational culture support agile values and ways of working and is mainly covered in the change management section in particular the organizational design section.

The aspects of scaled agility are to varying degrees overlapping. The aspects of product, people, tools, culture, and organization are largely mutually exclusive and internally focused. The payoff agility is derived from the five internal aspects. Business and strategic agility are more externally focused aspects but based on different external focus. Strategic agility mostly focus on creating and executing an strategy in an agile way whereas business agility relates to external factors derived from the immaterial properties of the products offered by the company.

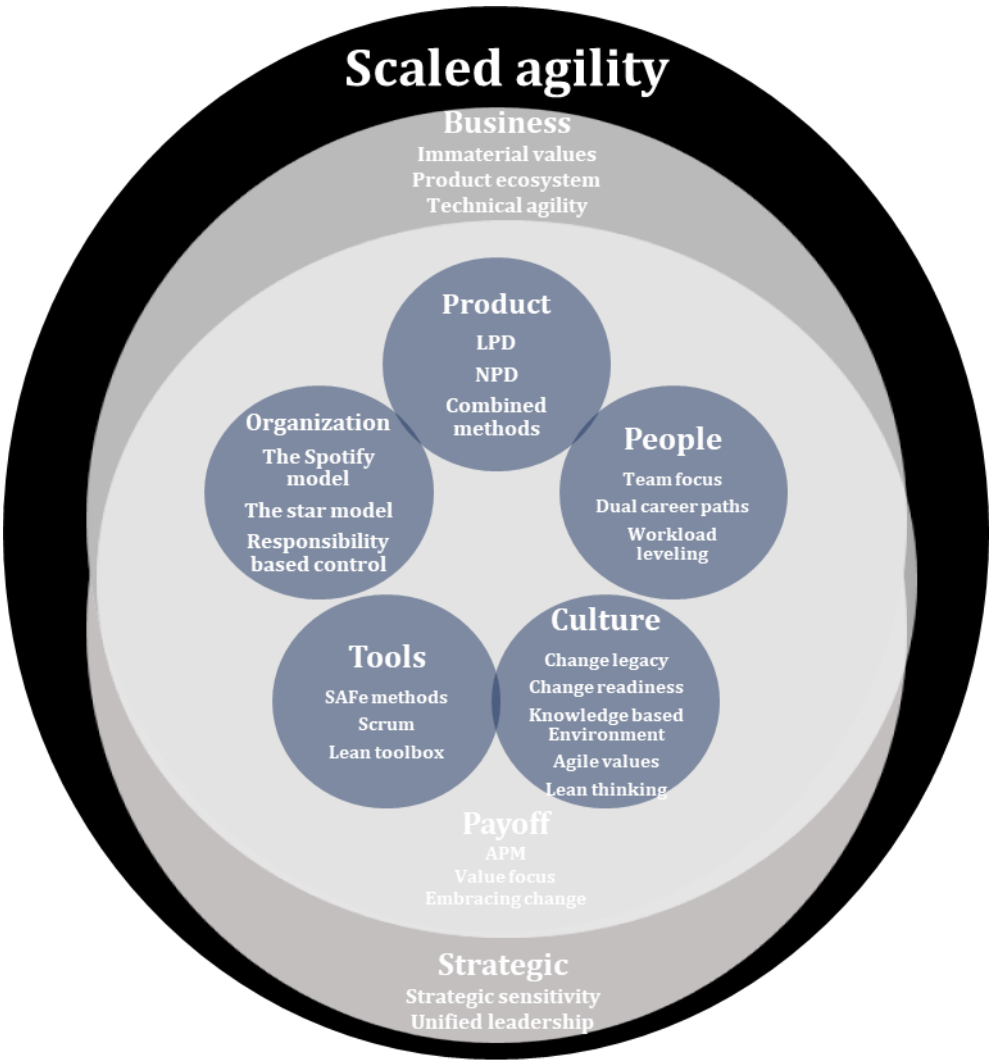

Figure 4: Aspects of scaled agility (ASA) adapted from Laanti (2014).

3.2 The SAFe toolbox (TST)

The SAFe toolbox is a theoretical framework that includes the tools for scaling agile originating from SAFe and is illustrated in table 5. The word tool is used as a wide term to cover a variety of aspects such as a team role to a group of people. The framework provides a foundation for further discussions regarding the application, benefits, and scaling approach of the tools. In addition, it simplifies the understanding of the concepts used in practice at the investigated company as they can be mapped to tools in SAFe. The tools framework uses two classifications. First based on whether the tool covers the portfolio, program or team level. The classification assists to distinguish the portfolio, program and team levels in practice at the company. Second, a classification is made whether the tool consists of a group, artefact, ceremony, activity or role.

A group is formed around a purpose related to scaling agile such as the ART management team which has the responsibility for the content and governance of the ART. An artefact is a specific instrument used to support scaling of agile such as the ART backlog in which all potential developments are prioritized. Ceremonies are certain events sanctioned by SAFe such as the PI-planning in which all features to develop in the coming period is decided. Activities are day to day actions conducted such as refining the features in the backlog. The roles are officially defined and distributed in the virtual organization such as the SM who is responsible for assisting the team such as by removing obstacles.

The framework was adapted from Kalenda et al (2018), Alqudah and Razali (2016) and Razzak et al (2017) which covers the components of SAFe and how they are applied. The headlines of groups, artefacts, ceremonies, activities and roles were derived from the studies but slightly adapted. Razzak et al. (2017) mention that SAFe as consisting of roles, events, artefacts and practices, and groups. The headlines of roles, artefacts and groups where used and events rewritten as ceremonies and practices as activities. While the components of SAFe have been studies before, the illustration based on a synthetization is therefore new.

Table 5: *The SAFe toolbox (TST)- adapted from Kalenda et al. (2018) and Alqudah and Razali (2016).*

The SAFe toolbox					
	Groups	Artefacts	Ceremonies	Activities	Roles
Portfolio	Program portfolio management	Epics (business/architecture), Strategic themes, Portfolio backlog, Lean budget, Investment themes		Creating TCO/Lean budget	Portfolio owner
Program (ART)	Product management, Business owner team, DevOps team, System team, Release management team	ART backlog, ART roadmap, Architectural runway, Features	ART management, Scrum of scrums (SoS), Backlog prioritization, PI planning, PO-sync	Refining program backlog	Product manager, Release train engineer, IT-lead, Operations lead, Business lead, Architect, CX designer
Team	-	Team backlog	Daily standups	Refining team backlog,	Product owner, Scrum master

4. Methodology

This chapter describes the methodology of the study in terms of research design, data collection and analysis.

4.1 Choice of methodology

The study is established around an explorative purpose. An explorative study is defined by Blomkvist and Hallin (2015) as a study aiming to examine a phenomenon that has limited scientific studies associated to it or discover new dimensions of a problem. Yin (2002) defines an explorative case study as a study where phenomena that are investigated do not have one set of outcomes. The explanation fits the description of the field of scaled agile methods by previous studies which have stated that the implementation's challenges, and success of the implementations varies. Alternative purposes for the study would also have been possible and were also investigated. A descriptive purpose combined with a study aiming to describe the phenomenon was considered as it could have provided an empirical contribution but would however only have limited impact on potential theory building and was therefore discarded. Two other types of purposes of the study were considered. An explanatory purpose which explain the cause and effect of a phenomenon and a predictive purpose which predict the effects of the phenomenon were considered (Blomkvist and Hallin, 2015). The alternative approaches would have required accepting the validity of previous theories outside of the scope of their studies. The loss of an intimate relation to empirical data does according Eisenhardt (1989) increase the risk of flawed theory building.

To identify a meaningful problem formulation, the potential contribution was considered. The study could potentially contribute in four different areas: theory, methods, analysis, and empirical evidence (Blomkvist and Hallin, 2015). By investigating potential areas to contribute to, a gap of empirical data was identified for tailoring of scaled agile frameworks and challenges in the financial sector. Focus on contribution to methodological development was also considered, as best practices were sought for by the project sponsor. The choice was however discarded as it would have required a longer time frame. Based on the above-mentioned criteria a choice was made to make an empirical contribution.

Baxter and Jack (2008) state that a qualitative case study methodology enables the study of complex phenomena within their contexts. The alignment of the possibilities of a qualitative case study with the aims of the explorative purpose and contribution to enhancing empirical knowledge made it particularly attractive for the study. The choice to use a case study was based on the fulfillment of Baxter and Jack (2008) four criteria for when to use a case study. The first criterium is that the study aims to answer “how” questions, second that it is not possible to manipulate the behavior of the involved, third that you wish to study contextual conditions, fourth that there are no clear boundaries between the phenomena and the context (Baxter and Jack, 2008). The criteria are fulfilled as the purpose of the study is to answer a how question, that focuses on understanding the contextual conditions of agile methods and does not aim to change the behavior of the participants. The decision process for picking a case methodology was largely based on three comparative studies of case study methodologies (Baxter and Jack, 2008; Gehman et al., 2018; Yazan, 2015).

Of the case study methodologies covered in the comparative studies Eisenhardt (1989), Yin (2002) and Stake (1995) where considered. Eisenhardt (1989) was ultimately chosen. The criteria not to choose the Yin (2002) method as the primary method was due to the suitability of an interpretivist approach in analyzing ethnographic observations and interviews. Eisenhardt (1989) was chosen over Stake (1995) due to the focus on the role of a case study in theory building which is beneficial in aligning the study with the research purpose and contribution.

The study is also based on an abductive approach between theory and empirics. Abductive analysis is a qualitative data analysis approach for theory construction (Timmermans and Tavory, 2012). An abductive approach is alternative to traditional deductive and inductive methods. In a deductive approach, theories and ideas are first identified in literature, then hypotheses are created based of the literature and tested based on the empirics to be verified or falsified (Blomkvist and Hallin, 2015). As only limited research exist in the field of scaled agile methods the resulting theories of a deductive approach would not be substantial, and the approach was therefore considered difficult to adopt. With an inductive approach the empirics are be based on an identified problem and literature is used to better understand the findings (Blomkvist and Hallin, 2015). Blomkvist and Hallin (2015) state that with an inductive approach the empirics identify the literature. The approach is quite suitable for an explorative case study. An abductive approach however was used as it further enables a superior approach for creating theories (Timmermans and Tavory, 2012). Charmaz (2009) states that grounded theories start with inductive analysis of data but in the interpretation moves beyond induction. Using an abductive analysis theoretical knowledge should not be set aside during the project (Timmermans and Tavory, 2012). According to Timmermans and Tavory (2012) a researcher should start with a wide theoretical base as possible and develop it during the research process. Throughout the study, literature was identified and reviewed but it was however not applied on the empirical data until after empirics had been thematized. This approach, which included an inductive part of the study followed by a deductive part, was considered to be most relevant for the present study.

A pilot study was conducted at the initial stage of the research project. The initial problem formulation, purpose and research question was largely based of experiences from the researcher and two initial meetings with the case company during the fall of 2019. During the meetings, the challenges the company were facing were discussed in detail. However, as the implementation was still in an analysis and design phase several different revisions had happened since the meeting at the start of the study. The pilot study was therefore performed in order to get a more thorough understanding and several perspectives on the research problem. The pilot study consisted of collection of empirical data in the form of interviews and ethnographic observations as well as read up of similar case studies, and the topics of agile, Lean, project management, Agile portfolio management (APM) and knowledge management. Resulting from the pilot study a refined problem definition, purpose and research question based on empirical findings of the pilot study were created.

4.2 Research design

The overall aspects of the research design are illustrated in figure 5. An abductive exploratory approach to the case study was used to identify and evaluate potential hypothesis for future theory building based on Eisenhardt (1989). The abductive approach consisted of three steps. The first step involved an inductive pilot study in order to identify a problem definition based on empirical findings from interviews and observations. An initial research question was defined in order to focus efforts (Eisenhardt, 1989). The pilot study assisted the choice of cases by providing a rescope to find theoretically useful cases that can replicate or extend theories (Eisenhardt, 1989). In parallel, literature from various fields was investigated in an uber read up (Blomkvist and Hallin, 2015). The pilot study furthermore constituted a trial for the methods of the study, thereby assisting the instrument and protocol development process of the case (Eisenhardt, 1989). The second step of the case study included an inductive phase of data collection in the form of interviews and ethnographic observations. The multiple data sources strengthen grounding of the theories through triangulation (Eisenhardt, 1989). The identified data was continuously reviewed and analyzed throughout in order to speed up analysis and identify adjustments to the data collection (Eisenhardt, 1989). The continuous review furthermore assisted the familiarization process of the thematic analysis (Braun and Clarke, 2006). The inductive phase was concluded by a thematization of the results. Relationships between the different insights were mapped to search for the "Why" behind the relationship (Eisenhardt, 1989). The themes furthermore sharpened the construct definitions by clarifying the hypotheses (Eisenhardt, 1989). The third step of the case study included a deductive analysis of the literature. Comparisons with conflicting literature provided internal validity and sharpened constructs while similar literature sharpened generalizability.

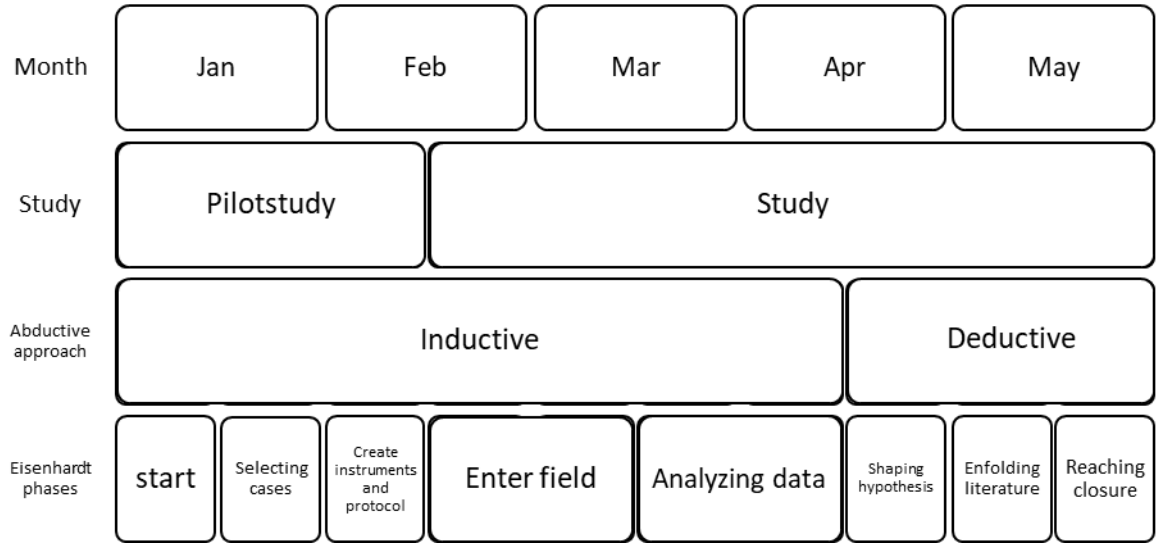

Figure 5: The research design based on Eisenhardt (1989)

4.3 Literature review

In order to build rigor in the literature review process a structured approach was employed to identify and review the literature. The purpose of the literature review is according to Brocke et al. (2009) to reconstruct the accumulated knowledge in a portfolio. Furthermore, the literature search makes up the foundation that determines the construction in later analysis (Brocke et al., 2009). A literature review additionally contributes to avoid reinvestigation into what is already known and results in an effective use of the existing knowledge base (Brocke et al., 2009). Brocke et al. (2009) further state the importance of a thorough description of the process of searching literature for future scholars to review the exhaustiveness of the review. In the study a combined review process of search and evaluation has been adapted from Brocke et al. (2009). A six-step process has been applied. First, a review scope was defined, second, the topic was contextualized and keywords created, third, a database was identified, fourth, the search was conducted and the keywords were revised, fifth, the literature was reviewed for relevancy and sixth, the literature was analyzed and synthesized.

In the first step the scope was defined which included defining whether methods or theories in a field is sought for. A choice was made to search for theories. In the second step the topics such as agile is conceptualized into for example, agile software development, agile project management etc. In addition, keywords were created based on the conceptualization. In the third phase the database was decided. The database "web of science" was selected. In the fourth phase the appropriate keywords are tested by searching them in the database and then they were revised if unsuccessful. The keywords and number of hits was documented. In the fifth phase the relevancy of the identified literature was determined. In the study the literature was sorted based on number of citations, and then narrowed down to the last five years (2016-2020) for a second run. The titles and abstracts of the resulting literature was then read to determine the relevancy and discarded if determined irrelevant. Then a backward and forward search of the literature was used. Backward search is defined as reviewing the references of the articles identified in the keyword search and a forward search as reviewing additional sources that have cited the article (Brocke et al., 2009). The relevancy of the literature found in the backward and forward search was determined based on an initial view of citations of the articles and by reading the titles and abstracts. Any literature deemed relevant was included. In the fifth step the literature was then reviewed first by a reading of the abstracts and a full text read up. In the sixth step the relevant literature was analyzed and synthesized.

4.4 Data collection

In the following chapter the data collection methods are described in detail.

4.4.1 Data collection methods

Eisenhardt (1989) state that the most common methods for theory building research such as qualitative case studies are interviews and observations. Eisenhardt (1989) further state that the triangulation made possible by multiple data sources can provide stronger substantiation of constructs and hypothesis. The data collection in this study includes the use of two sources of empirical data from interviews and participant observations. Both sources are qualitative which is in contrast with some case study literature. Yin (2002) based on a positivist approach emphasizes the combination of quantitative and qualitative methods whereas the interpretivist Eisenhardt (1989) and Stake (1995) state that a case study can be built on qualitative data alone (Baxter and Jack, 2008).

Qualitative interviews can be divided into two types according to Blomkvist and Hallin (2015) unstructured and semi structured. According to Blomkvist and Hallin (2015) in an unstructured interview only the overall topic is decided in advance but not the expected result and is suitable in the beginning of the study. The goal of an unstructured interview is to obtain descriptions of the world of the interviewee in order to analyze the meaning of the depicted phenomena (Brinkmann and Kvale, 2018). In the pilot study the interviews were unstructured. In a semi structured interview an interview guide is prepared beforehand with topics and question areas to discuss that are dealt with in an order that fits the conversation (Blomkvist and Hallin, 2015). In addition to the interviews participant observations were used. Blomkvist and Hallin (2015) describe observations as a systematic observation and documentation of a case subject that is suitable for explorative studies.

The multiple data sources provide rigor and credibility in the data collection (Baxter and Jack, 2008). The data sources are highlighted in the figure 6. Different data sources can also be converged in the analysis enabling potential synergistic effects (Baxter and Jack, 2008). The data collection and analysis were overlapping which according to Eisenhardt (1989) has the benefit of flexible data collection due to the ability to adjust during the data collection process. Furthermore Eisenhardt (1989) states that continuous adjustments in data collection instruments can be used to inquire specific emergent themes from the study. In the initial phase of the work, a pilot study was used in accordance with Yin (2002) to test both the interview method and participant observations and which were subsequently revised by a more thorough interview and observation process in the main study.

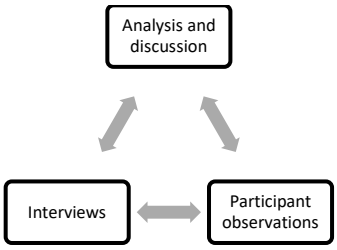

Figure 6: Data sources used

4.4.2 Ethnographic observations

Participant observations were conducted where the researcher participated in meetings and other gatherings at the case company observing the process and taking notes. The ethnographic observations were conducted based on Emerson et al. (2011). Emerson et al. (2011) provide a six-step guide for participating, documenting, and analyzing observations which is highlighted in figure 7. The structure approach to the observations assisted the understanding of how the observations were going to be used which helped optimizing the note taking.

In the first step the observations to participate in were chosen. A non-random sampling was used to pick the observations based on availability but aiming to provide an exhaustive account of the scaled agile methods. (Blomkvist and Hallin, 2015). The observations were picked based from the ceremonies used at the virtual department within the case company to provide an exhaustive view of the applications of different methods. The ceremonies that were deemed as interesting were the PI-planning, retrospective meeting, ART management and backlog prioritization. The observations are described in detail in table 6. The PI-planning furthermore included several SoS meetings. Two PI-plannings took place during the extent of the study however the second largely took place through digital meetings due to covid-19 and was not accessible. In each PI-planning the features to be completed in the next PI were picked. The process to pick features covered discussions around most of the scaled agile methods used such as feature prioritization and removing dependencies. All teams in the virtual department were present physically which made it suitable to get good observations by allowing shadowing people ranging from management to team members in the various activities. The PI-planning also enabled spontaneous ethnographic interviews with different people. After each PI-planning one retrospective meeting took place but only one was accessible due to restrictions due to covid-19. The retrospective meetings were picked as they specifically highlighted challenges and solutions that had emerged. The ART management meetings took place each week and were interesting as the major issues of the week were discussed. The backlog refinement and prioritization meetings were also interesting as they covered a wide range of challenges that emerged as different tasks had to be removed.

During the observation notes were written down. During the initial two observations no specific method was used for the field notes while in later observations Emerson et al. (2011) ethnographic field notes were used. The note taking was tested and improved upon throughout the study. The note taking focused on what was experienced as unexpected, significant. Furthermore, strong reactions from the observed were noted to understand what was unexpected and significant from the observed perspective (Emerson et al., 2011). Furthermore time, date and place and the stated purpose of the gatherings as defined by participants of the observations were noted to later categorize the observations. The notes were after the observations rewritten in an extended version were the jottings were completed to full sentences to understand the meaning of the jottings. The sentences were then noted and reviewed for inspiration for changes to the analysis and interviews. Finally, the field notes were extended to a narrated segment to create a comprehendible story of the observations.

The narrated segments were then coded and thematized. To be able to combine the observations with the interviews a single coding system was based on the categories defined by the sub questions meaning specific methods, challenges, and solutions in the data were noted. The codified data was then analyzed together with the interviews based on a thematic analysis. To combine the two observation methods meant more focus could be spent on identifying common trends in the data in the empirics instead of creating extensive empirics. On the other hand, the codification of two different sources will not be completely comparable as they have different requirements regarding validity and reliability which is further highlighted in the research quality chapter.

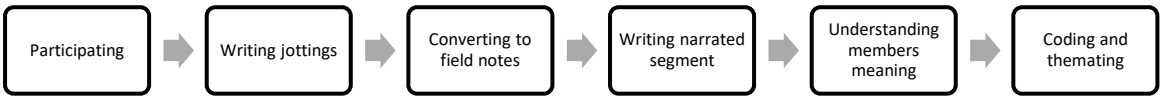

Figure 7: Ethnographic observation process based on Emerson et al. (2011).

Table 6: List of observations

Observation event	Categorization for coding	Purpose of event	Date	Length	Observation method	Data collection method
PI-planning (part 1)	Observation 1 (O2)	ART pick features for PI	2020-01-13	8 Hours	Participant observation	Field notes
PI-planning (part 2)	Observation 2 (O2)	ART pick features for PI	2020-01-14	8 Hours	Participant observation	Field notes
Retrospective meeting	Observation 3 (O3)	Discussion of last PI	2020-01-22	2 Hours	Participant observation	Ethnographic field notes
ART management 1	Observation 4 (O4)	Set up structure for ART mgmt	2020-01-23	2 Hours	Participant observation	Ethnographic field notes
ART management 2	Observation 5 (O5)	Regular planning	2020-02-06	2 Hours	Participant observation	Ethnographic field notes
ART management 3	Observation 6 (O6)	Creating roadmap	2020-02-13	2 Hours	Participant observation	Ethnographic field notes
ART management 4	Observation 7 (O7)	Refining roadmap	2020-02-20	2 Hours	Participant observation	Ethnographic field notes
Backlog refinement and prioritization	Observation 8 (O8)	Evaluation of features using VSJF	2020-02-21	4 Hours	Participant observation	Ethnographic field notes
Backlog prioritization 1	Observation 9 (O9)	Prioritization of features	2020-03-04	1,5 Hours	Participant observation	Ethnographic field notes
Backlog prioritization 2	Observation 10 (O10)	Prioritization of features	2020-03-05	3 hours	Participant observation	Ethnographic field notes

4.4.3 Interviews

The interviews were prepared and executed based on Brinkmann and Kvale (2018). The resulting interview process is highlighted in figure 8. The first step of the interview process consisted of thematizing. The thematizing was adapted from the purpose of the investigation to understand the *why* and *what* that should be identified in the study (Brinkmann and Kvale, 2018). The thematizing was continuously reviewed as the purpose and research question was revised throughout the study. The designing phase of the interviews was first conducted by reviewing the entire process from interview to report. Based on the purpose of the study the sought for knowledge from the interviews was derived. The resultant aim of the interview was to provide a detailed account from the different roles in the virtual department to reflect different experiences of the transformation. Based on this the selection of respondents was decided. The main sampling used was nonrandom sampling where selection was based on availability of potential respondents (Blomkvist and Hallin, 2015). Furthermore, a snowball sampling was used where respondents referred further respondents leading to identifying more potential samples (Blomkvist and Hallin, 2015). To further define the role of each interview a purpose for each interview was defined as guidance. Before the interview was conducted an interview protocol was created for each interview that highlighted the areas sought to be investigated in each interview and several potential questions to the interviewee. The protocols can be viewed in appendix 1. During the interview, the potential questions were complemented by spontaneous follow up, probing and specifying questions. During the interview, the use of unusual terms and strong intonations were listened for to identify potential areas that were interesting to the interviewee. For each interview, an audio recording was used, and notes taken during the conversation.

The recording and notes were reviewed after each interview and potential learnings for observations and interviews were noted. As a result, the protocols were also expanded as a better understanding of the problem developed throughout the study. At the start of the interview a short briefing of the interview was conducted in order to provide the interviewee a grasp of the both the interview and the interviewer in order to make the interviewee feel comfortable to talk freely. The briefing started with a description of the purpose of the interview and the study in general. At the same time, a permission to record the conversation was asked for and the rights of the interviewee to deny participation including withdrawing statements was described. Then the confidentiality of the interviews was mentioned, that the interview would be anonymized, and that detailed accounts of corporate specific information would not be shared publicly or among other employees. The interviewee was then informed of the use of the interview by explaining the overall strategy regarding consent requirement, confidentiality, and good use of the study to the interviewee (Blomkvist and Hallin, 2015). The analysis of the interview started with a transcription of the interviews. The transcription consisted of an interpretation process between the two discourses of oral and written language which constitutes a risk for validity (Brinkmann and Kvale, 2018). To try and translate phonological subtilities and emotions in the transcription was not used as mainly the content of the interviews was sought for. As the study was completed by only one researcher only one transcriber of the interview was used.

The finished transcriptions were reviewed by a relisten of the audio recordings to ensure the reliability. The initial coding constituted of a condensation into brief statements and sorted under different categories based on the methods, benefits, challenges, and solutions. The statements were then combined with sub coding of the other interviews and observations. Based on the combined data themes were identified using thematic analysis discussed further in data analysis chapter. In table 7 the interviews are described including the role of the participant, the purpose of the interview, and specifics about the analysis.

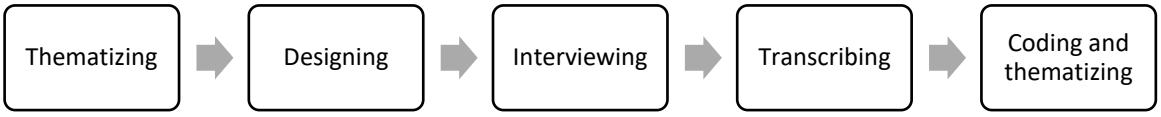

Figure 8: The interview process adapted from Brinkmann and Kvale (2018)

Table 7: List of interviews

Participant	Categorization for coding	Purpose	Date	Length	Type of interview	Data collection
Release train engineer	Interview 1 (I1)	Understanding implementation	2020-02-05	60 Minutes	Unstructured in person interview	Voice recording
Portfolio manager	Interview 2 (I2)	Understanding analysis and design	2020-02-07	60 Minutes	Unstructured in person interview	Voice recording
Companywide agile lead	Interview 3 (I3)	Understanding company wide strategy	2020-03-05	60 Minutes	Semi structured telephone interview	Voice recording
Product Owner	Interview 4 (I4)	Understanding product owner perspective	2020-03-13	30 Minutes	Semi structured telephone interview	Voice recording
Product Owner	Interview 5 (I5)	Understanding product owner perspective	2020-03-13	60 Minutes	Semi structured telephone interview	Voice recording
Product Owner	Interview 6 (I6)	Understanding product owner perspective	2020-03-13	45 Minutes	Semi structured telephone interview	Voice recording
Program (ART) manager	Interview 7 (I7)	Understanding ART-manager perspective	2020-03-18	45 Minutes	Semi structured telephone interview	Voice recording
Scrum master	Interview 8 (I8)	Understanding Scrum master perspective	2020-03-25	45 Minutes	Semi structured telephone interview	Voice recording
Scrum master	Interview 9 (I9)	Understanding Scrum master perspective	2020-03-26	45 Minutes	Semi structured telephone interview	Voice recording
Portfolio lead	Interview 10 (I10)	Understanding Portfolio strategy	2020-03-30	60 Minutes	Semi structured telephone interview	Voice recording
CX lead (ART)	Interview 11 (I11)	Understanding integration of CX	2020-03-31	45 Minutes	Semi structured telephone interview	Voice recording
Program (ART) manager	Interview 12 (I12)	Understanding ART-manager perspective	2020-04-28	45 Minutes	Semi structured telephone interview	Voice recording
Lead Architect (ART)	Interview 13 (I13)	Understanding role of the architect	2020-04-28	80 Minutes	Semi structured telephone interview	Voice recording

4.5 Data analysis

The data analysis process is adapted from the iterative six-step process of thematic analysis defined by Braun and Clarke (2006). The entire data analysis process is illustrated in figure 9. In the data analysis process the data from interviews and observations were combined. The analysis process started during the data gathering as key points from interviews and observations were combined with a continuous read up of literature. The initial thoughts and insights were written in working documents. As a saturation point was reached in the empirics the analysis process was structured.

To analyze the data the interviews were transcribed and the observations written as narrated segments. The two data sets were combined in the first level of coding defined as subcoding. This stage corresponded with the generating initial codes defined by (Braun and Clarke, 2006). The subcoding was based on a single insight such as "feature emerge outside of intake funnel" and categorized based on the research subquestions of methods, benefits, challenges and solution. The above-mentioned feature was categorized under challenges. This initial subcoding consisted of a condensation of the source material. The subcoding also assisted in removing confidential phrases and information ingrained in the statements from interviewees.

The coding constituted a pattern analysis based on prevalence of the findings in the subcoding. The prevalence was not defined quantitatively however the thematic conventions of "a number of", "many of" and "a majority of" were used to provide a level of prevalence. For the next level thematizing into codes and themes was develop iteratively. An inductive approach was used forming themes emerging from the data. The thematizing focused on a couple of themes to provide depth and complexity rather than covering the entire data set. The thematization was performed with some level of abstraction in order identify the underlying intentions in the statements. For example, the earlier mentioned sub code of "feature emerge outside of intake funnel" could be analyzed as refusal in using the intake funnel, or a not comprehensive process or that external parties are unaware of how to use it. These lead to different ways of analyzing that would be lost if only prevalence or other criteria were used. Different themes were therefore created and iteratively changed on a code and theme level. The final chosen themes are described in detail in the results section.

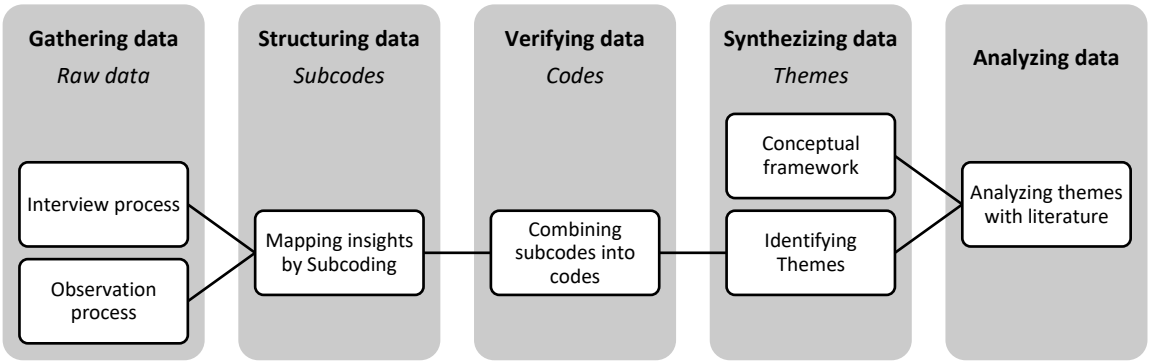

Figure 9: The data analysis process

4.6 Quality of research

In the following chapter the validity and reliability of the methods are described.

4.6.1 Validity

The case study aims to provide understanding of general phenomena based on observations at one company. In order to be applicable the external validity is essential. According to Yin (2002) external validity is determined in the research design. In order to build in quality regarding validity of the case study several different aspects of the study have been considered. Regarding the overall validity of the study, Yin's (2002) constructs of different types of validity were considered. Since Yin (2002) especially aims to secure the rigor in case studies the criteria have been applicable to the present study. Furthermore, validity has also been examined from the qualitative nature of the study. Specifically, the validity of the interviews and observations has been evaluated. Brinkmann and Kvale (2018) have been used regarding validity in the interviewing process and Emerson (2011) was used regarding the use of observations. Construct validity is defined by Yin (2002) as "finding the right operational measures for the concepts being studies". In order to build construct validity three of the tactics defined by Yin (2002) has been used. For example, multiple data sources have been used. A structured chain of evidence has been established to be able to track the origin of all suggestions. In addition, drafts of the study have continuously been reviewed. Internal validity is defined by Yin (2002) as establishing the causal relationships between concepts. In practice making sure that the study measures what is meant to be measured. It has been aimed to get several basis for each finding. First of all the triangulation of sources limits any errors resulting from one method. Furthermore a pattern matching approach was used in the coding to estimate the prevalence of the results. There were a few biases in the study. First, the researcher had previous experience from the department which constitute a bias. In the selection of respondents people that the researcher had worked with before were avoided but several were known beforehand which constitutes a risk of bias. A standardized structure of the interviews and a pre-prepared protocol were used in order to limit a possible bias.

4.6.2 Reliability

Reliability in a case study is difficult as the conditions present during the information gathering process cannot be replicated through a retrial of the study. In order to provide reliability in the study Yin (2002) has been used for guidance. Yin (2002) suggests that a case study protocol is developed and utilized continuously in order to document the entire research process. A case study structure was used based on Eisenhardt (1989). Furthermore, an audit trail from data gathering to conclusions has been established where all conclusions can be derived from empirical data. The data gathering was also difficult to ensure reliability. The reliability of ethnographic observations is especially difficult to replicate, even if two researchers are observing the same situation disparate narrated segments might still occur (Emerson et al., 2011). The observation process was documented extensively in order to deduct statements to their original observation. Interviews are relatively easier to ensure reliability as they were recorded, and it was possible to relisten to the interview to check any discrepancies between the resulting transcriptions and the recordings. Furthermore, the interview process was also documented using protocols in order to create a structured data gathering process. In the analysis process the thematization was conducted in several steps that were documented which enables future researchers to review the documentation in order to retest the conclusions.

4.7 Ethical considerations

The ethics of research can be condensed into the four principles of information requirement, consent requirement, confidentiality and good use (Blomkvist and Hallin, 2015). The main ethical quandaries of the study were the dynamic between the researcher and the observed, and the collection and usage of data. The qualitative approach of the study required extensive interpretation and descriptions of the research subjects which constituted a challenge. As the study was conducted together with a company the interviewees responses could potentially be potentially be sensitive or even harmful if the respondents if the respondents were incorrectly cited or if material were shared in a careless manner. Furthermore, the importance of only gathering information that was useful for the study was imperative. The sponsor of the study was furthermore a manager to several of the interviewees further created a difficult dynamic.

In order to solve challenges several different approaches have been used regarding different aspects of the study. Confidentiality for three different parties has been considered. First, confidentiality regarding information about the case company is secured. Second, confidentiality is kept regarding the identity of the interviewees. Thirdly, responses of the interviewees are not shared between interviewees. Confidentiality also constitutes a purpose from a research perspective. By establishing the terms of confidentiality, it enables more openness from respondents regarding conditions at the company which otherwise would constitute a source of error affecting the validity of the results. The ethical considerations of the study have also been stated to all respondents during interviews and observations. Thereby allowing the respondents to understand the terms and the possibility to adapt to them during and after the data gathering have taken place. In practice the four requirements of information consent, consent requirement, confidentiality requirement and good use requirement have been disclosed. Good use of all collection of all data has also been considered. Before data collection have begun the purpose of the data have been discussed beforehand. A purpose for all data gathering were defined which were disclosed to the interviewees.

Understanding the different stakeholders that are affected by the study has also been considered. The researcher's personal interest regarding the results and investigated organization has also been considered. The researcher had previously worked at the researched company and department which constitutes a potential bias in the research. All personal links have been investigated and disclosed in the study. To reduce any bias interviews with individuals who have previously worked together with the researcher have been avoided and limited. To keep openness regarding the findings methods and results have been openly accounted for throughout the paper. By establishing an audit trail of the results from interview to themes, the origin of all statements is open. Avoiding bias in the judgement of others research has also been considered. First a structured approach towards gathering literature has been used where articles have been prioritized based on citations. Replicability of the literature review have been considered through openness regarding choice of database, keywords, hits, and articles found through backward and forward search. That respondents and other stakeholders are disclosed in a factual manner have also been considered. Observations and interviews have been documented by notes and audio recordings, respectively. The observations have also been looked at with an interpretivist approach in order to understand intentional meaning of all statements considering for example sarcasm.

5. Results

The following chapter covers the empirical findings of the study originating from the observations and interviews. The empirical findings are described around four different approaches to scale agile which were identified in the data from the interviews and observations. The results are presented based around the four major themes which constitute the third level of coding after sub codes and codes. The codes from which the themes were derived are highlighted in figure 10.

Figure 10: Four themes derived from the data analysis

The themes emerged from a thematic coding as highlighted in the data analysis section. Initially subcodes were formed around insights concerning challenges and solutions. Themes and codes were derived from an iterative process where different ways of categorizing the insights were tried. One major insight identified in the subcoding was the ambiguous nature of the transformation where several views on what constituted the transformation existed. For example, while a lot of the discussions in the observations and interviews concerned the use of methods, several participants stated that the goal was not just methods. In addition, several described two parallel roles in two "worlds". The final thematization was based around four different approaches towards scaling agile. The four themes are: creating a virtual organization, standardization of agile methods, uniting around one portfolio and changing towards a new mindset. The themes concern the four major approaches employed by the company to scale agile.

The theme virtual organizations concerns the transformation of creating a new virtual organization on top of the traditional structure covering the traditional structure, the approach to creating the new virtual structure and the ultimate design of the virtual organizational structure. The theme of standardization of agile methods concern how IT-development is conducted in the financial industry both traditionally and during the implementation at the company. Then the specific challenge of adapting agile methods to a distributed setting is described and finally the resulting agile methods applied at the company is illustrated in a matrix adapted from the TST framework. The theme uniting around one portfolio concerns the design and challenges of creating a unified portfolio. In addition the challenge of dependencies in the delivery of the tasks are highlighted. The theme changing towards a new mindset concerns the process of uniting around a new mindset by describing the knowledge acquirement process, the resistance to change and the challenges for management including the new role of leadership and the change management and finally concluding with a description of the perspectives on the success of the change.

5.1 Uniting as one virtual department

In the following chapter the agile transformation is described from the perspective of the implementation of a virtual organization.

5.1.1 Traditional organizational structure

The investigated company is one of the largest banks in Sweden. The bank's overall organizational structure is divided into different areas based on several different aspects such as regions and customer segments. The organizational structure is illustrated in figure 11. The customer segments consist of large organizations and combined group for smaller companies and private customers. Furthermore, some groups are independent areas and subsidiaries such as an investments, insurance, and certain regions. Furthermore, there are separate groups for operations, IT, and a combined support functions which include legal and compliance. The business groups are after the initial segmentation mostly divided into product areas such as loans. The business department is responsible for developing and maintaining the current product offering which includes tasks such as developing new products and managing internal and external stakeholders such as sales and customers. The IT-department's responsibilities include maintaining and developing IT-systems and services. The operations departments responsibilities include managing day to day activities such as errands from customers while continuously identifying improvements in processes and ways of working. Each area has their own line organizations including separate management hierarchies. The investigated ART covers an integration of several different business groups mainly large corporations, IT, operations, staff functions and regional business groups.

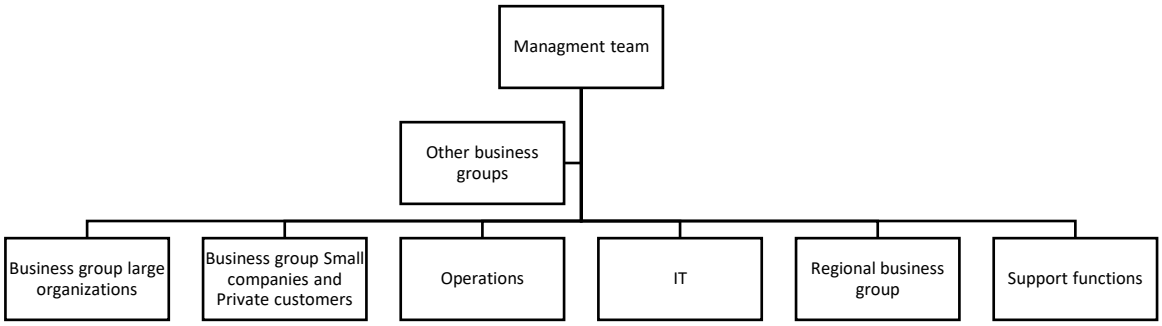

Figure 11: Organizational structure of the case company

5.1.2 Approach to the transformation

The large-scale agile transformation started with the forming of virtual departments. The agile transformation was initiated companywide from an agile center of excellence but largely realized by the departments. As the virtual department were meant to cover all parts required for end to end deliveries it required combining parts of several different departments. The chosen way to divide was mainly through different products and the researched virtual department was formed around a product area. The organizational structure was segmented based on categories such as customer types, and regions however several functional groups existed in parallel such as IT, operations, and staff functions. Parts of all these groups were combined in the virtual department. The design of the virtual organization was largely based of SAFe, but additional approaches were combined with aspects from the Spotify model. Several observations and interviews stated that agile at a scale does not happen naturally for large organizations and that a tipping point must be forced to be adopted at a large scale.

A need to become more agile at a company level had however become apparent based on both external needs such as adapting to new competitors and internal such as unpredictable plans. Agile methods had been used before the large-scale transformation in different parts of the organization such as in software development and project management. However agile implementations at a team level were perceived as not standardized enough to be scaled. According to some of the interviews the use of virtual organizations were in the interviews stated to push the implementation. Several interviews also stated that it also risked resulting in an overemphasized focus on methods. According to some of the interviews, to limit the risk of focusing too much on methods the transformation was conducted using a toolbox approach of SAFe. The approach according to several interviews meant that the models were fitted to match the company in contrary to fitting the entire organization into SAFe. To design an optimal virtual organization could not be estimated in detail beforehand according to several interviews and was therefore meant to change.

5.1.3 Virtual organization structure

The virtual organizational structure's main component consist of portfolios, ARTs, and teams. The virtual organizational structure is illustrated in figure 12. The subject of the study has been one ART. The portfolio which the studied ART is a part of consists of three different ARTs. The studied ART was formed around one product area. The second ART were formed around subdivisions of the product area and a third was formed around businesses intelligence activities connected to the two product areas. The teams in the ART varies in structure and constitute of IT-system based teams, cross functional teams, and a project team. Some teams in the ART already existed in a similar form within the IT-department. Most teams however had a PO from the business side of the organization.

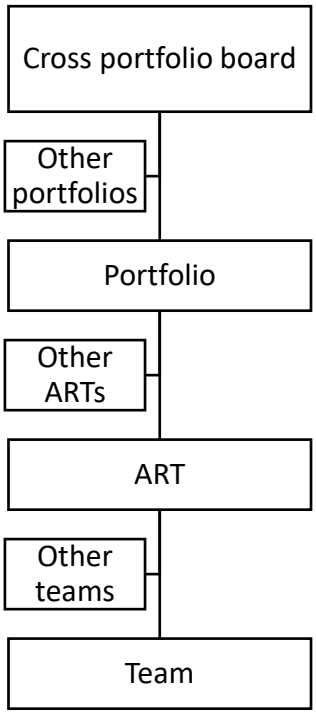

Figure 12: Virtual organizational structure used at the case company

5.2 Uniting around ways of working

In the following chapter the agile transformation is described from the perspective of the unification around ways of working.

5.2.1 IT- development in the financial sector

Most financial services are delivered through IT and banks were among the early adopters in mainframe era of computers. Therefore, the IT-architecture of the bank has developed over several decades, and there are several different layers in the IT-systems ranging from mainframe computer systems to cloud based solutions, and external parties such as Swish. Correspondingly the team types within IT also vary greatly based on the systems they are developing in. The depth of knowledge required to work in the different systems is substantial and new employees could take years to become efficient according to the observations. A continuous modernization process has been ongoing to move functionalities enabling creating services without developments in the mainframe computers. However, as this process is only in the initial stages and as a result a lot of developments still ends up far down in the IT-systems. On a single system level, the prioritization is complex as new services are contending with improvements on existing systems as well as regulatory based developments.

To unite the IT-developments there previously existed a uniting structure to manage new developments. Previously new developments were managed by cross functional committees consisting of people from the business side, together with IT-architects, among others. The committees planned the work at IT for the coming periods based on a shared budget. The intake process for developments had to combine proposals from different customer segments as well as projects. The committee's plans often had to be adapted due to constant internal and external changes such as due to a regulation project growing. However not all the work of the teams was heavily affected by the old structure. On the IT-side the teams previous experience of cooperating with the business side varied. Some teams had worked with developments for projects which gave them some experience whereas some had previously little contact with the business side.

The implementation of the virtual organization replaced the old structure and thereby changed the interactions between the departments. As the ARTs were implemented product management team members from the business side took on responsibilities as POs of the virtual teams thereby creating cross functional teams including members from business and IT. The change required more extensive work with IT from the business side. The people from the business side had varying experience of working with IT depending on previous experiences in the old structure. The POs all had to acquire new knowledge regarding the functionalities and daily work of the IT-teams. Some of the IT-teams had to some extent been autonomous and managed incoming developments through meetings where estimations were made regarding possibilities to deliver tasks. However as new tasks emerged the previous deals sometimes had to be revised making the deals weak. Official agile roles such as SMs to manage the work in the IT-teams varied. Some observations and interviews showed that the standardized approach of POs and SM made it possible to achieve a better stakeholder management as ongoing prioritization where syncing in the SoS and the common backlog. Likewise, the team's commitments became more predictable as they were backed by the official prioritization.

However, for the component-based teams the knowledge of the IT-systems still only existed within the teams and mostly among the most senior members and as a result they only had the knowledge to make estimates around completing features. Some observations and interviews stated that a shift will be ongoing towards the end to end teams promoted by SAFe as IT infrastructure is developed and knowledge of the skills of the different people grows.

5.2.2 Agile in a distributed setting

Agile methods emphasize face to face communication over documentation however as a large company operating in different countries a distributed setting is inevitable. In practice the methods must be applied and adapted to the conditions of distributed work. During the case study this was especially put to test as the covid-19 pandemic led to both a stop for travel and subsequently to more extensive remote work. The main challenge regarding remote work was the PI-planning events where everyone in the ART was present. The initial PI-planning events in January 2020 that kicked off the transformation was conducted with everyone in the ART present in Stockholm. Team members situated outside of Stockholm had to travel there. In the second PI-planning in March however all international travel was banned, and large groups were not allowed which led to a distributed meeting where several rooms were used. The third PI-planning is to be conducted entirely through virtual meetings. The ART furthermore consist of teams that in themselves are split across regions. After the first PI-planning event where all ART members gathered several stressed the benefits of gathering all in one room allowing getting agreement and commitments from different people. After the second PI-planning some observations and interviews stated that the teams had still been able to complete the work, but the agreements were more difficult to follow for external parties. Several observations and interviews emphasized the improvement from working together across the traditional structures of business, IT, and operations daily as challenges could be discussed and resolved directly. Overall, the interviews and observations shoved that the distributed environment had not been an obstacle to the agile methods. However, the teams had largely existed in a similar structure before and were used to work in a remote setting. Furthermore, some interviews stated that if the teams structures had changed at the same time the work could have been more difficult.

5.2.3 The used Agile methods

An overview of the agile methods used at the case company can be seen in table 8 below. The components are discussed further later in the chapter. The methods are divided based on the levels used in SAFe defined as portfolio, program, and team and in addition based on groups, artefacts, ceremonies, activities and roles. The artefacts are specific standardized definitions of different tasks such as feature which define a potential development that could be conducted by a team. The ceremonies are specific gatherings formed around different goals such as prioritizing the backlog of features. The activities constitute informal tasks of individual members in the ART resulting from using the other agile methods such as prioritization. The roles are specific roles given to different members in the portfolio.

Table 8: The SAFe toolbox – as applied by the case company

The SAFe toolbox – As applied by the case company					
	Groups	Artefacts	Ceremonies	Activities	Roles
Portfolio	Portfolio management	Epics, Strategic themes, Portfolio backlog, Lean budget	Epic prioritization, Portfolio management meetings, Cross Portfolio management	Creating strategic themes Creating portfolio vision Creating portfolio Backlog of epics Prioritizing backlog of epics Refining epics Creating TCO/Lean budget Coordinating flow Managing dependencies/Stakeholder	Portfolio owner, Portfolio lead, Operations lead, IT-lead, Chief architect, Portfolio manager, CX-lead, Portfolio agile coach
Program (ART)	ART management, Scrum masters, Product owners, Product management	ART backlog, ART roadmap, Architectural runway	ART management, Scrum of scrums (SoS), Backlog prioritization, PI planning, PO-sync	Defining ART Creating a roadmap Feature prioritization Defining teams Managing dependencies	Release train engineer, IT-lead, Operations lead, Business lead, Architect, CX lead,
Team	-	Features, Team backlog	Team backlog development, Team backlog refinement	Managing new tasks/features Backlog prioritization Feature refinement Managing stakeholders	Product owner, Scrum master

5.3 Uniting around one portfolio

In the following chapter the agile transformation is described from the perspective of the unification around one portfolio. Prior to the implementation the teams had their own backlogs of items but during the transformation the backlogs were combined into one. To be able to have a backlog that covers all task the portfolio was created in three levels: strategic themes, epics and features. The strategic themes mostly consisted of larger ongoing initiatives such as a new product development, the epics could for example consist of a part of a strategic theme such as one aspect of a product development and the features consisted of specific developments. Each ART had a backlog of features and each portfolio had a backlog of epics. The chapter describes the creation and the challenges emerging from the process of uniting around one portfolio.

5.3.1 Conceptualizing high level customer needs using strategic themes

The highest level of the portfolio is the concept of *strategic themes* (ST) which was adapted from SAFe to provide guidance of larger needs of the organization. The STs mostly consisted of larger initiatives. Some observations and interviews shoved that the STs represent the voice of the customer by enabling prioritization based on the needs identified by the different segment areas. Furthermore, some interviews and observations mentioned that the STs simplified the stakeholder management as not all segment departments had to be present at all prioritization as the needs were made explicit.

Furthermore, some observations and interviews stated that the STs provide the segment organizations with an understanding of how the needs are addressed in the planning. By mapping the epics and features to the STs it was possible to prioritize work according to the fulfillment of the STs. Furthermore, it provided another heuristic in addition to the WSJF method from SAFe. In practice there were some challenges with the use of the STs. Some observations showed that so many of the features were aligned to the STs that some teams took on too many tasks to be able to fulfill all assignments related to the STs. This led to committed features not being delivered or delayed. Some observations showed that there was some uncertainty when aligning the STs as many epics and features were connected to several different themes and created difficulties if the value of the themes is different.

5.3.2 Aligning lower lever assignments using epics

The second level in the value stream consisted of epics which were used to align the different features displaying their role in a larger initiative. Some of the epics were derived from the STs and some only existed as epics. In the transition to the use of epics several interviews and observations showed that there were some uncertainties regarding what defined the different levels as some assignments were initially misclassified. Some features turned out to be too large were redefined as epics. Some observations showed that the explanation for the alignment of some features to the epics was not obvious in all cases. The epics' refinement into features were planned according to a roadmap. This constituted a challenge in some instances where the epic's place in the roadmap was supposed to base on their prioritization that had not been completed. In practice estimations were made which were reasonably accurate. However, the review of first PI period showed that many more features had been refined and worked on than would be possible to complete within an observable timeframe. Some observations also showed that not all features that were part of a highly prioritized epic were themselves as important. The epics as a result shifted prioritization towards larger items. Some observations and interviews also showed that some epics had too large scopes. Not all epics that were too large could be further divided whereas some were dependent on each other, but some epics could be divided.

5.3.3 Creating, refining and prioritizing the features

The lowest level of the portfolio that was structured was the feature level. The features defined on a team level what to deliver and were in many cases connected to larger epics and STs. Before the teams could pick the features, they had to be refined and prioritized. The refinement process identified what had to be delivered as well as dependencies to other stakeholders. Some amount of refinement of features was necessary to be able to make a prioritization. Every feature had a feature description that provided guidance which balances between being comprehensible for developers but also understandable for other stakeholders. Perfect understanding of the features content and value was not aimed for as it would have required comprehensive refinement. The prioritization of all features was conducted together by the POs over several meeting. In the first meeting the WSJF algorithm was used to define an initial prioritization. Over four rounds the business value, time criticality, risk reduction, and duration of all features were estimated. The different aspects where graded based on Fibonacci numbers. The features were written out on paper and put up on a wall. While putting up the features their relative value to features on a similar position was discussed and the features were then moved around. The initial prioritization therefore become dependent on the PO's ability to understand their features' value relative to others.

During the prioritization, some features were missing, and many had not been refined fully which made discussions around the features at times difficult. Furthermore, the team members had difficulties to understand some parts of the features such as their role in the value chain and in the architecture, which required competencies outside of the teams. In the initial stages refinement and work was ongoing around many features that turned out to be low priority. The concept of minimum valuable products was at times not valid on a feature level as many had to be picked together as a part of a larger release.

5.3.4 Managing dependencies

Dependencies exist within agile structures such across teams, ARTs, and portfolios, among other parts of the organizations, such as large projects and external parties, such as customers, suppliers, and government agencies.

Most of dependencies required common planning with the two parties as the dependencies were to parties further up or down in the value chain. Some observations and interviews stated that ignoring downstream dependencies would result in queues. Furthermore, dependencies downstream resulted in time criticality increasing the importance of features relative to their individual value contribution. Additionally, some features could not be deployed on their own as they were released in combination in channels. Dependencies on upstream deliveries furthermore delayed the start of the development features resulting in work on lower prioritized features. Furthermore, some features consisted of bottlenecks that stopped further work downstream.

The dependencies were solved in different ways depending on the stakeholders. Dependencies within the ART were sorted in a structured approach through the use of SoS and PI-planning. As dependencies emerged throughout the refinement design upfront was required for several features. Dependencies across ARTs within the portfolio were largely sorted through the central epic planning. In the portfolio epics that had dependencies were classified as bottlenecks which were prioritized in cross dependencies. The dependencies across portfolios were either sorted through handshakes with individual members for smaller dependencies and larger dependencies using a cross dependency board.

The process of solving dependencies was according to several interviews and observations improved through the common adoption of SAFe especially of high prioritized features who could point at a high priority in their portfolio which was commonly understood. Larger initiatives outside of the portfolio structure were integrated through the cross-dependency board as well. They had a big impact on reprioritizing, due to originating for example as regulation, and tended to grow and identify needs throughout the process. Larger initiatives furthermore could give a heads up for potential needs. External deals with suppliers were not integrated and created strong dependencies and deadlines that could not be shifted. In conclusion the overall view from observations and interview stated that agile visualized and made dependencies easier to manage. However, the dependencies in several aspects shifted focus from maximizing from individual features to managing larger deliveries.

5.4 Transforming towards an agile mindset

In the following chapter the agile transformation is described from the perspective of the journey toward achieving a Lean agile mindset based on the aspects of knowledge acquirement, resistance to change, change for management, change process leadership and perspectives on change.

5.4.1 Knowledge acquirement

To gain knowledge about agile methods all team members took part in an education in SAFe. Some individuals had their education during the fall of 2019 while some had it as a two-day session before the PI-planning in January 2020. Furthermore, to gain knowledge of the methods two agile coaches were present at an ART and portfolio level. Some observations and interviews stated that different knowledge of the concepts is required at different levels. The middle management level was highlighted as requiring more knowledge than individual developers.

In addition to knowledge regarding the concepts, practical application was mentioned as more difficult. Furthermore, some interviewees emphasized the discrepancy between understanding the concepts and expecting an impact on the work. Several observations and interviews stated that they did not know what to expect regarding the impact of the organization initially. However, as they saw the methods in use and experienced an improvement they further believed in the significance of the concepts. In addition to knowledge about the agile methods, several observations and interviews stated that the knowledge sharing between departments, teams and individuals was an important part of the agile transformation.

5.4.2 Resistance to change

Resistance to the agile transformation was expected according to several interviews and observations. The methods required substantial changes in ways of working and collaboration which could have resulted in resistance to change. However, the resistance was mentioned in several interviews as limited in the implementation. Many interviews and observations stated that the perceived improvements displayed with the change to agile methods reduced the resistance. There was some resistance in the initial stages as many of the artefacts and ceremonies were not conformed to fully among members. Resulting however were several discussions regarding the definition of the concepts and standardized ways of adapting to them. Several interviews stated that the new ways of working were rewarding. To sustain the positive view of the methods could however potentially become difficult if more changes are made according to some interviews and observation.

Furthermore, some observations and interviews stated that the concepts had been accepted so well since only small aspects of the day to day work had been changed. If larger aspects would be changed, such as breaking up component teams into feature teams, it could lead to more resistance. Furthermore, several of the observations and interviews stated that the increased transparency will be key to the transformation but also difficult to achieve. There was still a lack of understanding of the work of other teams. Furthermore, it was stated that the change for management could potentially be a significant source of resistance. Several interviews and observations showed that management were aware of their need to change and actively took on new roles. Overall, the most difficult aspect was mentioned to sustaining and gaining a proactive approach to break down dependencies and creating bottom up initiatives.

5.4.3 Change for management

Several interviews and observations stated that an overall change in leadership was important as teams had to be empowered mainly through a delegation of mandates. Furthermore, the role of leadership in the virtual organization was an additional challenge. Some interviews and observations further stated that it will require new structures as well to understand the accountability of all stakeholders when working with agile. Traditionally the management was conducted within the different departments of business, IT and operations. As the virtual organizations were implemented management responsibilities had to be defined. Initially some responsibilities were still managed at the departments and some were moved to the virtual organization.

The management in the virtual organization was integrated into one in the ART-management group where IT, business, and operations managers together with architects, an agile coach, and a CX-lead, led the development of the ART. In the ART, management issues from different teams were discussed and initially resulted in status reports about work done at the different departments. Some responsibilities were resolved through discussions at the ART management. Several observations and interviews stated that an ideal state of the virtual organization could not be identified beforehand, and the initial idea had to be revised. The same approach was taken in the development of the management of the ART.

Initially the structures of SoS, PO-sync and ART management were created. Out of these forums more specific forums were formed around different objectives such as a PO-sync for creating the backlog of features. Overall, some interviews and observations stated that it will important that the leadership change from command and control to servant leadership with more focus on the coaching side of leadership. This view was shared by the leaders at the company as well. Several leaders also stated that they had given power to the teams to decide more on the implementation and much of the leadership was coordinated with a bottom up perspective focusing on tasks that the teams wanted to focus on. The shift towards empowering teams further strengthened as the implementation progressed and the leaders realized that they will not be able to manage everything themselves and mandates were delegated to the teams.

5.4.4 Change process leadership

Several interviews and observations stated that the change towards working in ART will stretch on for some time. During the transition, the need for leadership to manage the process emerged which that had to be managed by the leaders. The leaders were expected to change to a more coaching perspective in their leadership. The leadership furthermore had to make this adaption at the same time as the overall leadership structure had to change. Some challenges due to the change in leadership was expected. However, the change in leadership was dealt with pragmatically. An iterative approach was used in the change management where feedback was gathered from the teams to guide the leadership. The SAFe advocated retrospective meeting where POs and ART management met especially functioned as way to collect insights.

Adaptions were also made when more information was needed. Initially the change process aimed to design and form new teams around features which was delayed. Furthermore, the management was conducted by collecting insights from the forums with POs providing a bottom up approach to identifying the necessary change. In addition, the agile coach who had experience of conducting agile transformations to provide guidance regarding the implementation was present at the management meetings. This acted to provide an understanding of the appropriateness of different aspects of agile methods. The coach acted in between the management and team members by providing coaching to both parts during the PI-planning and continuously throughout the different functions such as SoS and ART-management. The coach furthermore assisted to identify the capabilities of the ART to commit the transformation.

5.4.5 Perspectives on success

The success of an agile implementation was mentioned as difficult to determine as the goal of the transformation is not necessarily rewarded in the old structure. Some of the observations and interviews stated that while they are creating new ways of working, they are restricted to working within the old governance structure. Some aspects such as KPIs, rewards and managing competence was still managed in the line organization. Furthermore, measurements related to the ways of working has not been established both related to day to day errands such as promoting a breakdown of features into as small items as possible in combination with more long-term goals such as knowledge sharing. Furthermore, the more visionary goals of agile such as a change in mindset was even more difficult to pin down.

The overall goal of increasing the company's business agility will be a lagging measure and will as a result not be known until later. To be able to measure progress of the different teams was mentioned in several observations and interview to be key. However, due to the different types of teams few measurements would be fair to apply across the ART. For example, there were differences in experience of working in the teams and the individual roles which impacted the effectiveness of the teams. On the other hand, for the long-established teams to be effective is expected. As a leading indicator of success, the happiness of the different teams was mentioned among some of the interviews as a measurement to measure the success of the change. Furthermore, some teams had a hard time to deliver because of dependencies which they could not affect. However, to remove dependencies is an important measure of the success but individuals possibly only have limited impact on it. Nonetheless, all interviews and observations stated that they had experienced improvements. Mainly communication was mentioned as improved which made dialogs with other stakeholders easier.

6. Discussion

Companies conduct agile transformations to become more adaptable to changes in the environment resulting from both external aspects, such as ability to adapt to customer demands, and internal aspects, such as synchronizing unpredictable agile teams. The desired state is defined as having achieved scaled agility. To gain knowledge of how the transformation process is conducted to achieve the desired state a case study at a large bank has been conducted. The results show that the agile transformation included the establishment of a virtual department, unifying around one portfolio, standardizing agile methods, and creating a common mindset. The change towards desired state proved to be challenging but several benefits were also apparent. To understand the benefits, the findings of the interviews and observations were mapped and analyzed based on the current knowledge of scaled agility from the aspects of strategic agility, payoff agility, business agility, product agility, organizational agility, tools agility, people agility, and organizational culture as defined by Laanti (2014). The aspects are highlighted in figure 13.

Figure 13: Aspects of scaled agility (ASA) framework overview

The different aspects are overlapping as outlined in the conceptual framework but nonetheless provide different perspectives on how an organization can achieve scaled agility. The concepts of strategic, business and payoff agility presents larger aspects that are aimed to be achieved utilizing the fulfillment of the sub aspects such as tools agility. Strategic agility is the capability to realign the core business of the company. Payoff agility constitutes to which degree work is spent on the tasks with the highest payoff. Business agility concerns developing an understanding of the organization's role in the surrounding ecosystem by identifying immaterial values of the product offerings and adapting based on the knowledge. Product agility is the ability to modify and personalize products towards new customers and existing customers. An agile organization constitutes an organization that has a combination of formal and informal networks that support agile ways of working.

Tools agility is the use of tools that are adaptable for new purposes as processes change. People agility is the ability to move around work among individuals. Organizational culture concerns how the company culture affect the agile ways of working. The different aspects are to varying degree apparent in the case company and not all are necessary to achieve benefits of an agile transformation. However, by mapping the findings of the interviews and observations to the agility it is possible to identify which aspects that are apparent in an agile transformation in general and which are most relevant for a large bank to achieve scaled agility.

6.1 Strategic agility

When scaling agile one aspect that emerges is how a possible strategy should be employed. While strategy is not directly related to agility, when teams work in agile ways the increasing number of changes results in that the strategy themes to become more dynamic. So how is the concept of strategy related to agility to improve the agility of the strategy. Laanti (2014) defines strategic agility as resulting from the combination of strategic sensitivity, leadership unity and resource fluidity. The end goal of strategic agility is according to Laanti (2014) to create an ability to change the overall business model.

To manage strategic sensitivity is related to strategy development. There is a disagreement on how to develop a strategy in agile way. The main decision regard on what level the definition of customer needs should take place, in the teams or in some overarching structure. The SAFe methods use of LPD emphasize teams defining customer needs and how they should be fulfilled. The empirics showed that the employees stated that in promoting teams defining customer needs, the SAFe methods had a too weak trust in the organization's ability to understand the customer needs. It was mentioned that customer needs are already known and do not have to emerge on a team level. However, the empirics showed that interactions with customer is not the responsibility of the team members but rather the business organization and the POs in their product specialist roles. Customer interaction had been reduced in the implementation due to effort spent in the new PO roles potentially reducing the strategic sensitivity. It was furthermore stated that customer needs are known, but due to the regulated environment and complex IT-systems limit the possible designs which is further discussed in the product agility chapter. In addition, it was mentioned that teams might lose the overall perspective which is further discussed in the business agility chapter. Strategic sensitivity was also mentioned in the benchmark study at the agile transformation at ING (Calnan and Rozen, 2019). At ING the transformation was started by developers that stated that they were limited by traditional methods in their development. Furthermore, it was specified that not allowing the IT-teams freedom would not have allowed them achieve developments on time. There is therefore a slight discrepancy in the need for strategic sensitivity between ING and the studied company which however might be due to other factors.

Achieving leadership unity through strategy is related to the development and deployment of strategy. Traditionally strategy is developed by management and performed by the team members. To achieve unity with a top down approach has been identified in previous literature as difficult. Earlier studies have identified that strategic alignment is difficult in practice while communication channels are established using STs, epics and features, they are often not comprehensible for other stakeholders, which makes communication difficult (Kalliney, 2009). In the study the challenge of communicating strategy was demonstrated by the fact that many of the feature and teams PI-objectives were not comprehensible.

In addition, defining strategy in a way that it can be applied by everyone in practice makes it abstract (Stettina and Hörz, 2015). The difficulties of applying abstract STs was also apparent in the empirics as it showed that many features were connected to several epics and that while some features were connected to important epics, they in themselves were not important. To resolve the drawbacks of a top down strategy deployment it was combined with a bottom up approach. The strategic portfolio enabled a combined way to refine the deployment of the strategy. While the overall STs and epics were initially defined and prioritized by the ART and portfolio management the deployment in the ART backlog was discussed. In the backlog refinement meetings, the POs had the opportunity to weigh in on the final prioritization. This potentially also resulted in a decreased resistance to the usage of the portfolio. Stettina and Hörz (2015) stated that the strategic portfolios of SAFe provide teams with a shared responsibility which increases the commitment for the overall results. The role of the agile methods implementation to achieve leadership unity is further discussed in the tool's agility chapter. The overall leadership unity had some traditional leadership challenges related to organizational culture such as a debt from previous agile methods which are discussed in the organizational culture chapter. Overall achieving leadership unity emerged as an important factor to achieve scaled agility and strategic agility. The benchmark study at ING had managed the unification of leadership by unifying behind value-based culture where teams became empowered to work with problem solving rather than fulfilling tasks given by management (Calnan and Rozen, 2019). At ING it was stated to have united management and developers where the leaders got to focus more on coaching. The shared experience further indicates that leadership unification is an important factor to achieve strategic agility while the approach might differ. In common however is the combined top down and bottom up approach using responsibilities and the use of agile methods and tools combined with a new approach to leadership.

Resource fluidity in relation to strategic agility is connected to whether there are possibilities and roadblocks to the deployment of strategy relating to internal capabilities. It is associated to the ability to adapt to changes no matter the type of change; external or internal and planned or emergent (Dingsøyr et al., 2012). Several roadblocks in resource fluidity were identified at the case company. Several challenges were related to the flexibility due to specialization which is further discussed in the people agility chapter. A learning organization network can act as a solution to create a responsive organization according to Dunphy and Stace (1993) which is further discussed in the agile organization chapter. However, while the importance and challenges related to strategic agility was identified in the case company they were also perceived as the most difficult to change. Overall, the solutions to resource fluidity were not perceived to be achieved quickly as they required long term knowledge sharing. This was also consistent with the benchmark study at ING which had resulted to a forced radical change in resource agility by rehiring people in a new desired structure with new roles (Calnan and Rozen, 2019). The radical approach at ING showed to be successful but had also required a long-term knowledge sharing between the departments prior to the radical change. Furthermore, the study at ING showed that they had been able to deploy their strategy better in the short term, in the long term they had experienced similar challenges in flexibility. Overall resource fluidity was mentioned as an important factor to achieve strategic agility while not necessarily the most efficient to change. The hinders and solutions identified related to strategic agility are highlighted in figure 14.

Figure 14: Strategic agility – Hinders and solutions

6.2 Agility of payoff

Another sought for outcome of scaled agility is to create an adaptability to maximize the work spent on the tasks with highest payoff. Laanti (2014) defines payoff agility as building in options thinking in investments and building capacity to work on the most profitable aspects. The payoff in the studied company was optimized in two steps by first implementing APM to establish the current payoff and then adapting the portfolio. The establishment process was finalized during the study and showed that there were clear challenges regarding payoff agility. The observations showed that a large share of the total work did not commit to business value directly. However, while many tasks did not directly provide value, they were necessary for enabling future value providing work. Therefore, while payoff is not optimized in the short term there might be sub optimization in a long-term perspective if solely short-term value is estimated. The choice to unite around one portfolio further highlights the additional tradeoff between providing teams autonomy and alignment to central goals. Previous studies have stated that agile methods potentially create suboptimal design decisions in regulated environments with legacy systems as they require combining different subsystems which is difficult to change (Boehm and Turner, 2005).

The empirics showed that the agile teams often had to bring in IT-architects to be able to grasp the complexities which support the findings of previous studies. Studies in SAFe have observed that resource allocation is improved through the transparency and the shared commitment of agile methods (Stettina and Hörz, 2015). Previous studies have also emphasized the difficulty for individual team members to establish a full understanding of others' work (Stettina and Hörz, 2015). As the teams have the final say in the prioritization the use of a unified portfolio furthermore put much emphasis on team members capabilities to grasp others work (Stettina and Hörz, 2015). However, in practice the empirics showed that management was brought in to give a final say in some unclear cases which highlight the semi autonomy resulting from scaling agility. This contrasted with the suggestion of previous studies to support agile through a hands-off approach (Chow and Cao, 2008).

In addition to challenges regarding autonomy previous studies have established that agile teams might commit to features without a vision, resources, and a lack of feedback from different stakeholders (Krebs, 2008). The use of aligning features to epics and STs aimed to establish a vision for individual features. Furthermore, the payback has by previous studies been strengthened when items are connected to the overall company strategic objectives (Martinsuo and Lehtonen, 2007). In the case study the commitment to STs however at times resulted in an overcommitment of features to fulfill all tasks related to the STs. It highlights a slight tradeoff where providing a vision lead to commitment to features which do not have resources. Furthermore, the empirics stated that due to the dependencies to other stakeholders understanding the capabilities will be important to show predictability for other stakeholders. One of the key aspects affecting the ability to prioritize based on payoffs is that due to the regulatory environment a lot of features focused on developments without any potential business value. In addition, in those cases the stakeholders are external parties such as government agencies where delays are not possible. APM studies have stated that in traditional organizations limiting cross dependency risks are important but however also shift focus in the portfolio to risk reduction rather than business value (Kalliney, 2009).

However, one aspect in the payoff agility highlighted by LPD studies is that cocreation and fast prototyping enables identification of the immaterial values that an organization's products provide Hoppman (2011). Studies in APM have also stated that the benefits of agile result from the fast feedback loops and iterative reviews which might be lost if focus solely is on the portfolio level (Hoda et al., 2010). Therefore there is also tradeoff between predictability and flexibility. The empirics showed that customer interactions had been reduced in the implementation which highlights another tradeoff whether the focus on existing needs reduce the possibilities to identify other developments with a higher payoff. The increased focus and specialization might also risk developing silos in product management as identified in other studies (Kalliney, 2009). Another aspect resulting is that of the agility of the payoff could be limited if potential cross portfolio developments are not identified as more focus is spent on the portfolios.

The benchmark study at ING showed that they had experienced an increase in work spent on the highest payoff work as they had reduced their workforce by 30 % after the agile transformation (Calnan and Rozen, 2019). ING also mentioned the use of a value based organizational culture. However, payoff agility was not highlighted at ING as the primary focus consisted of breaking down barriers and establishing the value flow in the organization. Both studies seem to show that payoff agility can be identified and potentially improved utilizing agile methods. However solely focusing on payoff agility also showed to provide a too narrow view on payoff as the concept simplifies deliveries strictly to payoff. The hinders and solutions identified related to payoff agility are highlighted in figure 15.

Figure 15: Payoff agility – Hinders and solutions

6.3 Business agility

Business agility focus on achieving an understanding of the immaterial properties of the offering on a company level in contrast to the solely customer driven focus of strategic agility which mainly constitutes of executing the known desired developments. As stated in the empirics the need for business agility originated from the risk of competition from companies with other value proposition than banks such as large tech companies for instance Google. Therefore, the agile transformation also meant to provide an understanding of potential adaptability beyond customer demands. Business agility is defined by Laanti (2014) as forming mobile business solutions where the value is adapted based on customer demands. Business agility is stated by Laanti (2014) to provide an understanding of the overall product ecosystem and create additional value from it.

An ecosystems perspective requires defining the role of the bank based on both external and internal factors. From an external perspective the overall role of the bank in the ecosystem must be defined. This external perspective was not discussed extensively as a part of the overall agile transformation in the case study. However, the empirics showed that banks have in general, promoted by a new regulatory environment, ventured into open innovation initiatives where they are cooperating with other stakeholders. In addition, the external strategic ventures were however adapted throughout the transformation. To share the responsibility for the product strategy a product management forum was created were the POs together with some management architects and CX were present. The possibilities to adapt products in an agile way are further discussed in the product agility chapter.

An internal perspective was however more apparent. To understand the particulars of the company Laanti (2014) defines process and technical agility as the two major parts. The process agility has been extensively discussed in other chapters and was a major part of the transformation. The technical agility however was not as discussed. The long-term strategy for the technical agility was mainly worked with utilizing the architectural runway. One major emerging theme from developing technical agility is the complexity and the number of subsystems existing in the IT-infrastructure. In traditional software development, agile was deemed most impactful for non-critical and with a variable scope (Chow and Cao, 2008). This type was only accurate for some parts of the system. The technical agility therefore is indicated to be a roadblock towards developing capabilities to provide and capture the immaterial value of the product ecosystem. As reflected in the empirics however it has evolved over period of decades and is not pragmatic to change in the short term.

The benchmark study at ING also showed that the agile transformation was conducted in combination with a redefinition of the role of the bank from an ecosystem perspective (Calnan and Rozen, 2019). ING defined a slogan based on the role of the company from an external perspective. ING defined their role as a technology company with a banking license. At ING the shift aimed to put the technology in the center while also aiming to focus on developments which benefit from the banking license. This definition is furthermore in line with the proposed role of banks in the new regulatory landscape. For example, PSD2 defined for example the role of payment initiation service provider and account information service provider in addition to the role of the bank for companies which enable companies to provide financial services without acquiring a banking license (Finansinspektionen, 2019). However, the outcome of this definition of ING is not as clear as it does not define the internal capabilities. It does however suggests that business agility is part of the agile transformations at banks.

In conclusion the need to develop an understanding of the immaterial properties of the product ecosystem defined as business agility is apparent in agile transformations. The further definitions into external and internal view emphasize that external perspectives are limited in the resulting agile transformation. However, the internal aspects are more apparent but not necessarily pragmatic to change. The hinders and solutions identified related to business agility are highlighted in figure 16.

Figure 16: Business agility – Hinders and solutions

6.4 Product agility

The ability to adapt the products offerings which is one important aspect of agility is one challenge when adopting agile methods since how products are adapted varies greatly across industries. Laanti (2014) defines product agility as the ability to modify and personalize products towards new customers and existing customers.

NPD studies suggest that much of the cost to redesign a product emerge in the early design of the product (Griffin, 1997). To limit the cost of redesign the concept of a minimum viable product has become an important concept where products are reduced to the minimum design that still provides value for the customer (Hoppman, 2011). By presenting the product to customer, feedback can be gained to understand how to provide the most value of a product and thereafter adapt it. The concept of minimum viable product and LPD had already been used at the case company prior to the agile transformation. However, in practice the product agility is varyingly across products but overall, the agility to adapt the products is relatively low and a big upfront design is used, and adapted stages mostly known beforehand.

Legacy systems have been one roadblock for agile methods in traditional organizations (Boehm and Turner, 2005). The major source for it is that the deliveries are based on legacy IT-infrastructure that is complex and difficult to change. The empirics however showed that the product agility varies and can be higher in systems that are not based around the IT-system furthest down. Furthermore, the empirics stated that the regulatory environment demands an extensive process of determining risks from the product releases. Therefore, while attempts have been made to make the development process agile it largely still requires screening in several steps.

LPD further emphasize cross knowledge transfer and specialization (Khan, 2013). The empirics showed that knowledge transfer across silos had been strengthened. However due to the structuring of the portfolios based on products have largely specialized the product management in some of the IT-systems through their roles as POs. It has also been established in previous studies that the product management spends more time on product development over product strategy after an agile implementation which potentially lead to stronger silos of individuals (Kalliney, 2009).

Studies of agile implementations at large companies have also stated that in practice the agile methods in deliveries are often combines with stage gate models for the larger phases in the development (Cooper, 2016). This is like the approach of the application at the case company where the individual deliveries are divided according to traditional phases, but the phases are integrated with smaller deliverables. Furthermore, studies have stated that a usage of cocreation and fast prototyping can be used to provide an agile approach in the screening that ensures that the most value is provided through the product (Griffin, 1997). At the case company the Lean startup method used at parts of the product organization does this in one aspect and is combined with a double diamond service design thinking based on SAFe. However, while the product agility is one part of enabling business agility the organizational design questions appeared in the empirics to be more challenging for the company.

The benchmark study at ING emphasized the need to change the overall methodology of product development (Calnan and Rozen, 2019). At ING the developers have stated that the traditional applied product development methods would not be enough to fulfill the customer demands of fast product development. As a result, the overall product development process was mainly changed through new ways of working and for some developments such as the mobile app reducing the formal requirements on the product development process. The integration of business and IT at ING also resulted in a shift in focus for the business side towards development over strategic work. The similarities between the cases indicate that product agility is an important factor in the overall transformation. While organizational elements of product development such as being able to integrate product development projects have changed due to the agile transformation the overall product development process have not changed. This highlights the ambiguity of large scale implementations of agile as benefits of scaled agility can be achieved without changing the product development process. The hinders and solutions identified related to product agility are highlighted in figure 17.

Figure 17: Product agility – Hinders and solutions

6.5 Agile organization

The effects of the overall organizational design affect the scaling process. For example, how departments are defined, how do the different teams communicate and how is the power distributed. Overall, the traditional silos that naturally form in an organization largely affect the freedoms and responsibilities that enabled and prevents the use of agile methods. Laanti (2014) defines an agile organization as including a combination of formal and informal networks that support agile ways of working. The Spotify model discussed in the benchmark study at ING focuses on the ability to establishment different types of virtual organizations as major part of an agile transformation process (Calnan and Rozen, 2019). In addition to forming virtual departments certain traditions in agile such as DevOps investigate the relationship between formal organizational structures such as IT and operations, and subsequently have much strictly focused on breaking down the barriers of the organization. While these methods put the value deliver flow in center it also largely focus on internal aspects of the organization.

A large part of the transformation at the case company has been to change the organizational structures and networks. The Galbraith star model from change management states that an organizational design consists of strategy, structures, processes, people, and rewards (Galbraith et al., 2002). All the aspects must be linked to provide an effective organizational design suggesting that a change in one aspect requires a change in the other aspects as well. While, change management state that large transformations often require changing many of the different aspects certain aspects are traditional prioritized. Transformation processes are often initiated through changing the structure and processes according to a strategy. As a result, the people and reward structures are lacking throughout the transformation. This pattern was also observable in the study as the implementation while having a more visionary end goal initially largely focused on finding the appropriate structures and processes.

Studies in agile methods suggest a hands-off leadership is fitting to achieve team's effectiveness (Chow and Cao, 2008). The empirics showed that the case organization aimed for establishing a servant leadership in addition to traditional control functions. This however constituted some challenges as the control was delegated throughout the development of the agile structures and could and in some parts was still conducted by management. APM studies have furthermore suggested that agile methods clash with structures in traditional organizations (Stettina and Hörz, 2015). Studies in APM have furthermore suggested appointing a steering group to manage the overall structures (Vähäniitty, 2012). This was implemented at the case organization and provided a foundation for identifying structures and processes that were necessary. LPD studies suggest creating a responsibility-based approach to management where responsibilities based around meaningful individual goals (Hoppman, 2011; Morgan and Liker, 2006). Furthermore, studies of SAFe adoption suggest a team-based focus over individuals and structures to avoided establishing local incentives (Stettina and Hörz, 2015). A team and responsibility-based management approach was also prominent at the case company as new structures were formed and delegated. The resulting combination of informal and formal structures at the case company constitutes several different groupings and processes at the company.

However, the structures were not centered around the value deliveries initially and the overall organizational structure was divided into business, IT and operations which do not match the horizontal value flow. Some semiformal structures existed prior to the implementation to bridge the gaps such as projects for large initiatives and committees regarding IT-development. The empirics showed that people only felt part of their department rather than the overall value flow.

Several fields state the importance of establishing a learning function which should be supported by the organization including APM (Stettina and Hörz, 2015), LPD (Khan, 2013) and Change management (Dunphy and Stace, 1993). Two structures are mentioned in LPD as key specialization and cross knowledge transfer (Hoppman, 2011). The implementation of agile methods has taken the first steps towards structuring the informal networks through the processes and activities in the agile methods. However, the reward structures for creating new informal networks do not exist in the context of the value stream which is an important factor in the organizational design (Galbraith et al., 2002).

Centers of excellence exist combining some extra resources such as CX, agile coaches and IT-architects through formal and informal networks which is emphasized in LPD to level flow (Hoppman, 2011). However, there is only a limited amount of extra resources available for development resources to move around between teams. Furthermore, the developed team structures while united at an ART and portfolio level do not unite around specific deliverables.

The benchmark study at ING showed a strong focus on establishing an agile organization through the forming of virtual departments inspired by the Spotify model (Calnan and Rozen, 2019). At ING the virtual organization functioned as a step towards changing the actual organizational structure. The transformation process at ING however also highlighted the importance of forming informal networks. ING stated that their initial DevOps ventures were founded on developers connecting in their spare time. While the transformation at the case company contains a stronger focus on the portfolio over organizational structure the similarities indicates an importance of organizational agility as a part of scaled agility. In addition the organizational agility appears to be one of the most adaptable parts during the agile transformation. The hinders and solutions identified related to an agile organization are highlighted in figure 18.

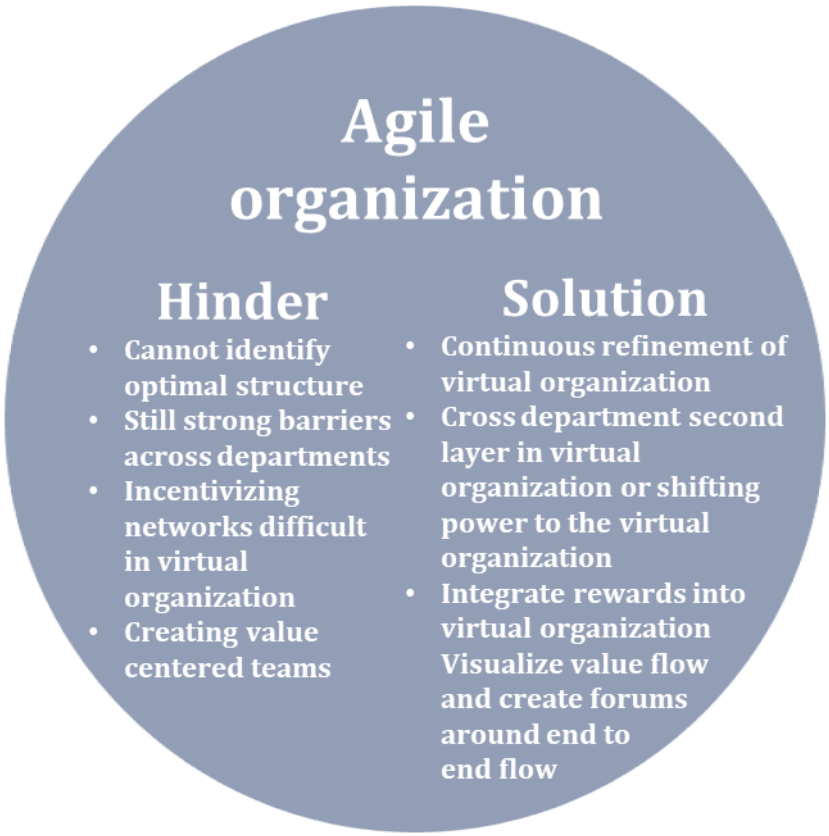

Figure 18: Agile organization - Hinders and solutions

6.6 Tools agility

Despite while originally defined as values and principles agile has been implemented through frameworks consisting of agile methods. Laanti (2014) defines tools agility as the use of tools that are adaptable for new purposes as processes change. In a scaling context this also becomes important as studies of APM have identified that agile methods in teams becomes unpredictable and difficult to manage at a portfolio level (Sweetman and Conboy, 2018). This results in a need for unified agile tools beyond a team level. The establishment of a common way of working at the case company has been identified as a theme of the transformation. The methods largely replace similar tools that were in use previously. For example, the traditional committee-based division of IT tasks was based on a common ownership and uniting different segments' needs. The goal of the traditional structure is therefore likewise to maximize the overall portfolio's value. The goals of agile methods are as defined by APM to avoid a lack of vision, avoiding developments that lack resources and increasing feedback in the process (Krebs, 2008). Several of these challenges were shown in the empirics to have existed previously. The limited flexibility of the traditional tools was stated by several interviews as a roadblock to adapt to internal and external changes such as a growth in scope of a project.

The implementation of agile methods largely consisted of the use of new tools which enables more flexibility. However, some of the tools were not used in a completely agile way due to other externalities. For example, the concept of the MVP was not always applicable as a product could not be completed fully in one increment but instead one step of the product could be implemented and used. The portfolio level was initially heavily based on large initiatives with few iterations and adaptions. The new tools however promoted dividing features into smaller parts. Especially the WSJF algorithm was highlighted by the empirics as leading to identification and breakdown of larger items.

Studies of the benefits of the use of SAFe have stated that the tools should promote collaboration regular feedback loops created by artifacts and rituals (Stettina and Hörz, 2015). The case company showed that more intense feedback loops were provided by the tools and rituals such as the SoS engaged teams in collaboration. However, the empirics also showed that the collaboration did not visualize the entire flow that needed collaboration initially. Especially business side aspects such as collaboration with customers and to some extent with different segment organizations were highlighted as lacking.

Furthermore, SAFe methods have been stated to focus on teams over individuals and structures (Stettina and Hörz, 2015). While often presented as positive the empirics however also showed drawbacks in the focus on teams for scaling. Several teams did not have the capabilities for end to end deliveries and therefore required collaboration across teams. The used tools supported the communications across teams, but the empirics also showed that in many cases only individuals in different teams were sought for. There might be a risk in missing out on the focus on teams. Studies in LPD have stated that individual specialization and knowledge sharing should also be promoted which was not as highlighted in the focus on teams (Hoppman, 2011). The empirics furthermore showed that challenges in the overall resource fluidity were not highlighted in the tools such as the capabilities to form end to end feature teams. The individual perspectives were not highlighted in the tools such as POs double roles and individual differences in skills within teams. The hinders and solutions identified related to tools agility are highlighted in figure 19.

Figure 19: Tools agility – Hinders and solutions

6.7 People agility

Scaled agile methods emphasize commitment to shared responsibilities over individual which require large adaptions to common goals from the individuals (Stettina and Hörz, 2015). To successfully unite around business value requires an ability to move around work among individuals which is defined as people agility (Laanti, 2014). APM has stated that the overarching perspective avoids sub optimization. However, while from a systems perspective resulting in an optimization the overarching point of view might lose the individual perspective. Studies of large-scale implementations of agile in traditional organizations have stated that legacy systems and organizational structures interfere with achieving optimization (Boehm and Turner, 2005). Disregarding the individual perspective might risk the success of the transformation. According to change management studies changes for individuals are often a large source for resistance to change (Armenakis et al., 1993). Therefore, changes on an individual level would be expected to lead to resistance to change. In addition, since the teams are at the same time empowered in the transformation the accountability for reducing resistance to change is uncertain. Previous studies have stated that decreased transparency from team members is one sign of resistance to change in agile transformations which is difficult to identify (Kalenda et al., 2018).

The empirics stated that the possibility to move individual people from teams are not possible without limiting the capabilities of the teams. The challenge shows the inherent difficulty of the virtual organization perspective is that a fully value centered organization is difficult to achieve. The ability to move around resources furthermore varies in different departments. The business side was able to adapt and take on PO roles in teams where they had not previously worked with. However, it required extensive retraining of knowledge of the IT-teams that they became POs of. The empirics showed an overall view that it was not possible to create feature teams due to the difficulties of moving around people. Change management literature state that readiness for change requires both a belief in the organizations appropriateness and capabilities to conduct a change combined with personal benefits from the change (Holt et al., 2007). The empirics therefore suggest a low readiness for change of the people agility.

Several of the teams were dependent on some key people resulting from variances in experience as the IT-systems took time to learn. Tracks for individuals to acquire specialist knowledge are highlighted in LPD (Hoppman, 2011). The empirics however showed that the need for specialization result in a tradeoff with the people agility. Due to the long time to educate people the use of common resources to fill up bottlenecks in the value stream was not used which is emphasized in LPD (Hoppman, 2011). As the people agility in the new structure largely existed in the business side as they were split around while the IT-teams were relatively the same. However, the agility around roles largely result from the IT-architecture which is heavily dependent on IT-systems that have a need for extensive maintenance and improvements work in addition to the product development. In the long run the limited people agility will remain a roadblock towards an ideal agile value stream. The hinders and solutions identified related to people agility are highlighted in figure 20.

Figure 20: People agility – Hinders and solutions

6.8 Organizational culture

The transformation towards an agile mindset and an overall cultural change in contrast to just the use of methods was mentioned in several interviews and observations. Laanti (2014) emphasizes that when the organization's culture and values rival agile values and culture the overall scaled agility will be affected. Change management literature state that the legacy from traditional organizational culture resulting from previous experiences of changes affect how new changes are adopted (Todnem, 2005).

The interviews and observations showed the importance that the establishment of the virtual organizations is combined with a learning network where the barriers of the traditional departments may be removed. The strong functional departments in the traditional organization indicates that a role culture traditionally exist in the company where power is delegated and held by individuals (Handy, 1976). The transformation required adaption from individuals into new roles and skills as well while still partly belonging to the traditional organization. One additional roadblock towards the cultural change was that agile methods and mindsets had already been in use in various parts of the organization. Some participants therefore believed that a maturity regarding agile methods already existed among several teams. This however also led to a belief that the suitability for agile methods had already been tried in many parts of the organization and furthermore that the implementation would simply be the same. This in some parts made it difficult, for example, to create a shared backlog rather than individual team backlogs which were perceived as more agile.

The desired culture appeared to be a clan culture as an increased sensitivity to customers and concern for people where mentioned (Cameron and Quinn, 2011). The clan culture was also integrated in the agile ceremonies such as jointly conducting the portfolio prioritization. The portfolio management led to a clash between hierarchy culture and a clan cultures when the leaders of the traditional organization stepped in to coordinate which is the traditional approach in a hierarchy culture (Cameron and Quinn, 2011).

An overall shift towards promoting collaborative skills in addition to specialization in fields was another aspect of a change in the culture. From a change management perspective, the success of changing individual mindsets require identifying perceived individual benefits (Holt et al., 2007). This perspective is contrasting to agile principles however which states that teams are to be prioritized over individuals and structures (Highsmith and Cockburn, 2001). The star model of change management furthermore states that organizational culture results from the organizational design and therefore is dependent on synchronized structures and processes as well as rewards and people strategy (Galbraith et al., 2002). The virtual department approach led to a change of structures and processes whereas rewards and people were still managed in the line organization. In addition, as the change also aims to empower teams to take on traditional top down responsibilities such as how to conduct potential developments also had to lead to an organizational culture change for both managers and teams. LPD emphasizes a responsibility-based approach to rewards and roles to avoid a command and control heavy reward system (Hoppman, 2011). A responsibility-based approach was used throughout the implementation as management spent a lot of effort in delegating and finding responsibilities. The reward systems and people management was not in scope of the virtual organization. The focus in the traditional organizational structure on people compared to the virtual organizations focus on teams can be viewed as conflicting role and task cultures (Handy, 1976). Furthermore, it highlights conflicting subcultures resulting from the conflicting organizational design from creating the virtual departments (Sackman, 1992; Galbraith et al., 2002). In conclusion a change in organizational culture seemed desired towards clan and task cultures over hierarchy and role cultures and was implemented in the virtual organization but however clashed with the traditional organizational structure leading to subcultures forming.

The benchmark study at ING also showed a major organizational culture change as a part of the transformation (Calnan and Rozen, 2019). The initial transformation that was limited to DevOps had resulted in a change for managers to take on more of a coaching role. The initial implementation also led to a spread of the culture across departments as the initial user championed the successes. A major transformation of the organizational culture at ING was forced through the rehiring as the virtual organization became the actual structure to solve the clash in organizational culture. This forced a mindset change as everyone had to reapply to the jobs and people were designated new roles based on the new culture. In the resulting solution ING also emphasized a new relationship between managers and teams where the managers only provided guidance while implementation of task was conducted by the teams.

Overall, the organizational culture change to an agile mindset was stated as important in both the benchmark study and the case study. The approaches to achieving were conducted in different ways. While ING forces a rehiring the case company in an iterative approach handed out mandates for a responsibility-based leadership. The hinders and solutions identified related to organizational culture are highlighted in figure 21.

Figure 21: Organizational culture– Hinders and solutions

6 Conclusions and implications

In the following section the conclusions and implications of the study are presented. The conclusions consist of five parts. First, the research questions are answered, second, the theoretical contributions of the study are examined, third, the sustainability aspects are discussed, fourth the ethical considerations are reviewed and, finally, the thesis concludes with a discussion on the limitations of the study and gaps for future research.

The answer to the research questions are discussed initially by answering the sub questions followed by answering the overall research question. The first sub question is answered through the four approaches to scale agile which were discovered as themes in the data analysis. The aspects are discussed based on how they were applied and their role at the case company. The second sub question is answered based on the eight aspects of scaled agility through the ASA framework discussed based on how they emerged at the case company. The third sub question is answered based on the hinders and solutions in achieving the eight aspects of the ASA framework. The overall research question is answered through an overall reflection of the transformation process based around the answers of the sub questions.

In the theoretical contribution section, a reflection around the approach of the study is followed by a discussion regarding how it has been fulfilled. The sustainability aspects are described based on the goal and aspects of sustainable development and the role of researches, followed by a discussion regarding which are relevant for the current study and how they have been fulfilled. The ethical considerations are discussed around the aspects of ethics considered and how they have been considered. Finally, the limitations concerning validity and generalizability are mentioned followed by a discussion regarding potential openings for future research.

7.1 Answer to research questions

In the following section the research questions are answered.

7.1.1 How are scaled agile methods applied at a large bank? - SQ1

The results showed that the agile methods were applied in four different ways identified in the themes of the results which are highlighted in figure 22.

Figure 22: *Approaches to scale agile*

First, the transformation process consisted of creating a new virtual department centered around value delivery. The virtual department drove towards the agile transformation in the following ways:

- It created the necessary tipping point to start a large-scale implementation that previously had not occurred at the organization despite the use of agile methods in teams previously.
- The virtual organization enabled identifying midpoints towards the desired state enabling an emergent approach towards the ideal organizational structure.
- The virtual department enabled breaking down silos between the different departments that prior to the transformation process acted as hinders towards the change.

Second, the agile methods acted to unite around a common agile way of working through the implementations of ceremonies, activities and groupings which resulted in the following aspects:

- The unified ways of working enabled a standardization that was necessary to scale the agile methods used at a team level in varying parts of the organization.
- Agile ways of working was promoted by a motivation and a new incentive to break down tasks and collaboration.
- The unified methods also assisted in distributing power across teams from the line organization which was necessary for autonomy by bottom up approaches towards defining and prioritizing tasks.
- The unified methods also assisted in understanding the drawbacks and improvements in specific methods enabling an understanding and application of agility beyond methods.

Third, the agile methods unified the different departments around a single portfolio which had the following effects:

- The unified portfolio provided a collective commitment and incentive towards maximizing financial value but also to focus on single prioritization for new product developments, projects together with maintenance, and the improvements of the traditional systems.
- The unified portfolio also simplified the stakeholder management by highlighting and resolving dependencies and creating a trust and transparency into other departments' prioritization.
- The portfolio perspective also enabled the integration of larger initiatives to be conducted in an agile way by enabling a mix of iterative methods with fulfillment of long-term strategic goals. Furthermore, single items could be understood in their larger context through strategic themes.
- The agile approach to the portfolio management enabled integration of iterative and unpredictable parts such as projects without compromising other ventures.

Fourth, the agile methods enabled a transformation towards an agile mindset in the following ways:

- A change in leadership for the management towards coaching was promoted as bottom up methods were enabled.
- The developers were driven to a new mindset by allowing a common commitment to larger perspectives.
- As benefits for the individuals were shown motivated a change towards agile ways of working.
- A mindset was improved by showing proof in the agile methods which led to promoting and spread across different parts of the organization.

7.1.2 How is the emergence of scaled agility challenging for a large bank to achieve? - SQ2

The study identified that scaled agility can be viewed as a combination of eight different aspects highlighted in the ASA framework which can be seen in figure 23. The eight aspects are discussed in separate sections below.

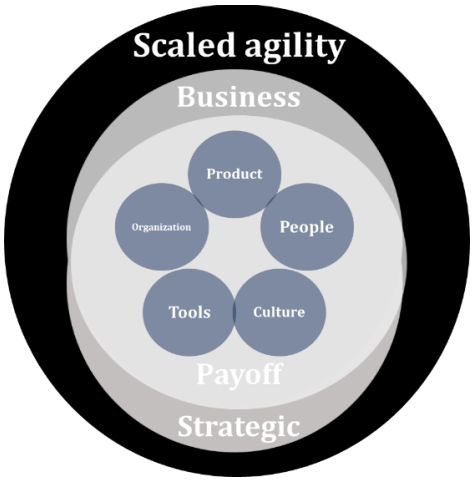

Figure 23: *Aspects of scaled agility (ASA) overview*

7.1.2.1 Strategic agility

The strategic agility is defined as the ability to change the core business and could derived from strategic sensitivity, leadership unity and resource fluidity. The strategic sensitivity was challenging as it was somewhat neglected in the agile transformation. The strategic sensitivity activities were largely conducted at the business department which had experienced a shift from product strategy to development during the transformation as the strategic aspects were not included in the SAFe methods. Furthermore, the strategic employment was perceived as difficult as the STs, epics and features were at time difficult to understand and apply which made the link to strategy at time challenged. Overall, the strategic sensitivity was not perceived as a major challenge towards scaled agility. The unified leadership was largely employed successfully while some challenges emerged. The unified ownership of the portfolio was perceived as reducing resistance to change through a shared commitment. The resource fluidity aspect of strategy was perceived as challenging as specialization in teams limited shifts in ways of working as teams were limited to work within their specialties. Furthermore the resource fluidity was determined as difficult to change as it required long term knowledge sharing within and across teams.

7.1.2.2 Payoff agility

The payoff agility is defined by the ability maximize the work spent on the highest payoff activities. The payoff agility was optimized by establishing the current payoff and optimizing it using the shared portfolio. The ability showed to be limited due to a large number of tasks that did not commit to business value due to being enablers for other ventures and as a part of regulation projects. Furthermore the payoff showed to be tradeoff between autonomy and alignment to the central goals as suboptimal design choices could emerge due to the complex environment. In addition, the payoff of individual features showed to be difficult to evaluate leaving much responsibility on the ability grasp others work which in previous studies have shown to be difficult. Working on tasks with a lack of vision, resources and feedback showed to exist at some level. Visionless developments were avoided through connection to epics and STs but in practice required a lot of subjective evaluations such as features which in themselves were unimportant while connected to important epics. Furthermore, the strategic connection showed to result in an overcommitment of features to fulfill objectives. Iterative customer co-creation ventures which have been stated as benefits of agile methods were limited potentially limiting the payoff gained from the methods. Furthermore, the shift from strategic product management to development focus potentially limits the identification of high payoff ventures.

7.1.2.3 Business agility

The business agility focuses on benefitting from the immaterial properties from the product ecosystem. The approach is based on the organization understanding its role in relation to the external environment and internal factors. An external perspective aiming to understand the company's role in the ecosystem was not in focus in the study and work related to it was potentially even more limited after the transformation as strategic work was limited. Overall a general open innovation strategy was aimed for. However, to gain the internal capabilities to capture immaterial values such as through business intelligence and fast iterations was more frequently discussed. Internal business agility is devised into process and technical agility. Technical agility was especially supported throughout the transformation. For example, the architectural runway served to improve on the complex IT-infrastructure. The overall technical agility due to legacy systems was overall low and not achievable to change soon. The business agility aspect of scaled agility showed to be difficult to achieve.

7.1.2.4 Product agility

The product agility constitutes of the ability to modify and personalize products delivered by the company. Iterative approaches towards product development using MVPs had already been in use at the company while in practice the minimum viable product showed to be quite large and often required several iterations. Therefore, the product development consisted of a combined stage gate method with iterative approaches in the different steps. In practice the product development required big upfront plans to fulfill risk and regulation requirements and due to the complexity of the legacy systems. More agile approaches towards product development was possible in some systems. In addition, the product agility benefits from understanding the customer which requires a knowledge transfer which has been reinforced due to the collaborations across departments. Co-creation with customers which is emphasized to aim the developments were not as prominent, but it was stated the customer needs were largely known. The product development process had also remained largely the same in the transformation. In conclusions while some aspects of product agility were challenging, they also proved to be difficult to solve as they resulted from factors that were difficult to change.

7.1.2.5 Agile organization

The concept of an agile organization defines that a company needs a combination of formal structures and informal networks that support the agile ways of working. The establishment of the virtual organization largely consists of aiming to establish the appropriate structures and networks. The company had traditionally worked to break down barriers across IT and operations through DevOps ventures. In addition to manage the change in the establishment of the organization the ART management served as a steering group. However, the transformation towards the new organizations showed a lack in alignment in the organizational design as structures and processes changed while reward and people structures remained the same. However, identifying an optimal agile organization have been emphasized as difficult even after the establishment of the virtual organization requiring continuous improvments.

7.1.2.6 Tools agility

Tools agility consist of the use of tools that adaptable for new purposes as the processes change. When scaling agility, new agile tools for managing beyond a team level were needed. Tools such as from APM aimed to provide flexibility in parts that were traditionally managed through planning. Agility provided benefits from the continual feedback and collaboration for the teams such as during the SoS. The results showed that while the agile tools supported cross team collaboration, they did not visualize the collaboration between individuals. This implied a higher resource fluidity allowing communication with anyone in a team which in practice was not possible.

7.1.2.7 People agility

People agility refers to the ability to move around work among individuals to maximize payoff. The people agility become essential in agility for example to solve bottlenecks. The people agility was low, and it was stated that moving around people would reduce the capabilities of the teams. This perspective was not as emphasized in the agile transformation which focused on teams over individuals. Losing the individual perspective could become a challenge as resistance to change often result from individuals and individuals are not incentivized. In addition, previous studies have shown that resistance to change is hidden through reduced transparency. The people agility at the case company varied across departments and was highest among the business side. In addition, the people agility was low due to the IT-architecture required specialization in the systems. Overall, the people agility proved to be difficult to achieve scaled agility.

7.1.2.8 Organizational culture

Organizational culture supports scaled agility by defining values which either support or hinder agility. The previous experience of change have been stated to create a legacy that affect how new changes are perceived. At the company agile methods had been used in parts of the organization which both simplified the application but also at times resulted in challenges to display the cultural changes of the new transformation. A collaborative culture must be supported by the team members to create a learning network that cross over departments. Furthermore, a change requiring collaborative skills over specialization was sought for. While the aimed organizational culture was known the implementation required an appropriate organizational design to support it. The transformation lacked rewards and people strategy in the virtual organization which limited the possibilities to affect it.

7.1.3 How does a large bank overcome the hinders to greater scaled agility? - SQ3

The different aspects proved to be varyingly difficult for a large bank to achieve and the identified hinders and solutions to scaled agility are highlighted in table 9 below.

Table 9: Hinders and solutions of the scaled agility aspects

Agility aspect	***Hinder***	***Solution***
Strategic agility	• Limited focus on product strategy • Spreading strategy across the organization • Resource fluidity	• Integrate product strategy in PM forum • Continuous improvement of methods • Change in rewards and management to support collaboration
Payoff agility	• Dependencies shift focus • Legacy systems • Subjective evaluations • Overcommitment	• Identifying and solving or creating forum • Architectural runway • Continuous improvement towards data driven decision making • Emphasize predictability over efficiency
Business agility	• Overlooked external aspects • Limited technical agility	• Integrate ecosystem strategy • Increased flexibility in legacy systems
Product agility	• Large releases • Regulated environment • Big upfront planning needed	• Prioritize MVPs in intake process • Integration of staff functions into virtual organization • Increase customer collaborations
Agile organization	• Cannot identify optimal structure • Still strong barriers across departments • Incentivizing networks difficult in virtual organization • Creating value centered teams	• Continuous refinement of virtual organization • Cross department second layer in virtual organization or shifting power to the virtual organization • Integrate rewards into virtual organization • Visualize value flow and create forums around end to end flow
Tools agility	• Individual perspective overlooked • Resource fluidity overestimated • Difficult to apply tools such as epics in practice	• Integrate individual responsibility-based management • Adapt expectations on fluidity and focus on high fluidity parts • Adaptions and standardization of the tools
People agility	• Limited fluidity reduce even workload • Individuals not incentivized • Specialization within departments and teams needed	• Create adaptable extra resources and COPs • Integrate individual reward system through responsibility-based roles • Incentivize knowledge sharing
Organizational culture	• Previous experience benefit and hinder new culture • No short-term solution to increase collaborative capabilities • Organizational design not synchronized during transformation	• Continuous coaching in agile methods • Coaching from leaders and long-term people strategy • Integrate all aspects of organizational design in virtual organization

7.1.4 How is the transformation process towards scaled agility accomplished at a large bank? - RQ

The study aimed to analyze the agile transformation at a large bank. The results showed that the major components of the transformation included the establishment of a virtual organization, a common portfolio, a unified way of working, and a change towards a common mindset. In addition, the results were assessed against previous knowledge of scaled agile methods in the context of eight aspects of scaled agility which identified challenges in achieving scaled agility.

Due to the complicated process of an agile transformation the initial scope grew to affect most aspects of the organizational design such as structures and processes as well as rewards and people. A leadership change took place where the leaders in the organization had to adapt from a command and control role to a coaching role. In addition, several traditional planned management roles such as developing strategies and managing the portfolio were delegated to empower teams. In addition, this resulted in major changes for some teams as they, as well as the responsibility to understand and prioritize their own work, also had to develop an understanding of their role in the overall virtual structure. Furthermore, new tools were implemented that supported agile ways of working such as breaking down larger items. This furthermore enabled an integration of projects in the organization. As more tasks were delegated to the newly established virtual organization, questions emerged regarding to what extent the virtual organization should take the place of the traditional organization.

Some particulars of the banking industry emerged in the study that challenged the overall achievement of scaled agility. The portfolio of developments includes many maintenances due to legacy systems as well as regulation related tasks that did not directly provide value. In addition, the product developments mostly consisted of activities too large to complete in one team. As a result, designing end-to-end teams showed to be difficult highlighting the specialization within the teams. In addition, the transformation led to a shift from strategic planning towards a focus on incremental short-term plans regarding developments. In conclusion while the transformation process is complex and ambiguous the company has managed to conduct a successful early stage transformation using an initial major rollout followed by iterative steps towards the desired state. Whether the iterative approach will be successful in the long run remains to be seen and evaluated especially as the longevity of the hybrid organization is uncertain, and potentially leading up to another scale transformation where the virtual organization fully takes on the organizational structure.

7.2 Theoretical contribution

The study has aimed to study the applications, challenges and solutions of scaled agile methods in the financial sector. The field only has limited empirical data about applications in different industries and the study can thereby contribute to the field through gap filling. The study aims to fill a gap between the concepts and applications and the body of knowledge regarding how to successfully apply them. However due to the nature of the study it is not possible to generalize the entire field based on solely the result of this study. The study aimed to provide an empirical contribution which in combination with the qualitative approach provide support in theory building as highlighted by Eisenhardt (1989).

The abductive approach derived from Eisenhardt (1989) intended to provide the first step in theory building in the field of scaled agile methods. The approach included a two-step process where an initial inductive phase described the transformation process conducted at the company. In the second phase a deductive approach was utilized were methods from different fields were applied to the data. The initial theory building in the field of scaled agile methods has centered around the concepts of scaled agility and its different aspects which was built upon and used as a structure to identify relevant fields. This facilitated several different bodies of knowledge providing different perspectives to analyze the data. By applying theories from the underlying fields such as LPD, NPD and APM, it provided possibilities for further hypothesis on the conceptual links between the subfields and the overarching field of scaled agile methods.

Results from the abductive approach in the present study provide an empirical contribution to the field of product development and the bodies of knowledge of LPD and NPD as they were applied. In the field of product development, the gap between iterative approaches and stage gate models is highlighted in the study. Furthermore, from a change management perspective the concepts of organizational design are expanded on virtual organizations, in addition with the categorizations of types and origins of change resulting in highlighting the gap of managing emergent change. In addition, the concept of Lean thinking in relation to agile transformations was discussed. Overall, the theoretical contribution consists of a hypothesis construction regarding the conceptual links between subfields of scaled agility and their role in the success of scaling agile.

7.3 Sustainability aspects

When conducting the study different aspects of sustainable development relevant for the study were considered. The analysis concluded that sustainable development had to be considered in the methods, results and implications. One of the most prominent definitions of sustainability was defined by the Brundtland Commission in 1987 which defined sustainable development as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (Colglazier, 2015). The aim of sustainability is to not compromise future needs over short-term needs. Furthermore, sustainability is divided into economic, social, and environmental sustainability (Colglazier, 2015). Economic sustainability concern the global long-term economic growth which contains many subcomponents such as increasing productivity. Social sustainability concerns the impact on people improving the lives such as creating good jobs and services. Environmental sustainability concerns sustainable use of resources including the long-term health of ecosystems and renewable resources.

In addition, sustainable development have furthermore been divided into seventeen sustainable development goals by United Nations (UN General Assembly, 2015). The sustainable development goals are furthermore based on an enlarged definition of sustainability as meets the needs of the present while expanding the ability of future generations to meet their own needs (Colglazier, 2015). However, while using the individual targets previous studies have stated that dependencies between them must be understood to avoid tradeoffs and aiming to find synergies. For example, productivity increases in the coal mining industry is to some extent increasing growth but harming the other goal and the long-term sustainability. Colglazier (2015) defines the role of researchers' role regarding the sustainable development goals as to accelerate the expansion of scientific knowledge and technologies for the future.

In this study the eighth, ninth and twelfth of the sustainable development goals were mainly impacted (UN General Assembly, 2015). The eight goal considers sustained economic growth in combination with decent work by increasing productivity and expanding access to services and benefits from economic growth (UN General Assembly, 2015). The study's conclusions aim to increase the productivity and expanding the services provided by the company. This constitutes a contribution towards the sustainable economic growth. However, the transformation at the company also presents a challenge as the roles of the employees and their work are changed based on the implications of the study. In addition, it has been necessary to make sure that jobs are not lost or working conditions are worsened by the suggestions. The study has to some extent aimed to find synergies between the aspects of decent work and economic growth as the methods have aimed to empower people and teams. In addition, the transformation was perceived as providing and giving tasks which to some extent seems to have accomplished the goal. The intersection between economic and social sustainable development is therefore the sustainability aim of the study.

In addition, the ninth goal considers creating the infrastructure for sustainable economic and social development (UN General Assembly, 2015). The UN especially highlight the role of banks in expanding the access to new financial services (UN, 2019). The conclusions of the study aims to increase the capabilities of the banks to understand and expand the immaterial values provided by the services. In addition, the expansion should have in mind how the value is distributed. This in turns presents a challenge regarding whether the expansion benefits increasing access to financial services. However no long-term evaluations of the distribution of the value provided have been studied potentially missing improvements.

The twelfth sustainable development goal considers sustainable consumption and production patterns (UN General Assembly, 2015). Traditionally economic growth has followed an increase in use of natural resources creating a tradeoff between economic and environmental sustainability. To ensure sustainable consumption and products partly requires efficiency and reducing waste and focusing on economic growth that can be achieved without an increase in use of natural resources. Both aspects have been implicated during the study. First, an overall productivity increase has been aimed for in the changes in the organization and a shift towards high payoff tasks. In addition, the services provided by the financial sector are provided using new software which can provide additional services without extra natural resources and therefore shifts focus to sustainable growth. One tradeoff between economic and environmental sustainability resulting from the conclusions are the increase focus on face to face communication over digital methods which due to the distributed organization initially resulted in increased travel. However, the results also showed the applicability of the methods in a distributed setting potentially providing reducing the tradeoff between economic and environmental sustainability.

7.4 Ethical considerations

The ethical considerations in this study resulted both from social and research ethics which were combined in one approach. The ethics were considered based on the four aspects of information requirement, consent requirement, confidentiality, and good use (Blomkvist and Hallin, 2015). The confidentiality requirement limits the publication of the raw data in the empirics as they might harm or be sensitive the company and the participants. This limits the traceability of the results but in contrary to risking the integrity of the participants they were not disclosed. The participants were describing the state of the work in the company thereby also risking disclosing information that potentially might have been harmful or in other ways sensitive to them or others. This risk potentially limited the honesty in the responses. To avoid too much restriction in the responses from the participants the purpose of the study and interview was disclosed to provide an understanding. This was however countered by utilizing an interpretivist approach were the responses were analyzed to accurately portray the participants and their responses and reflections.

7.5 Limitations and future research

Due to the available time to conduct the study only one company was studied. This constitutes a challenge regarding the validity for applications in other organizations as well as contexts. However, the purpose was not to provide an all-encompassing evaluation for successful agile transformations but rather underlying a process for identifying adaptions, and the results could still prove valid for future research. However, to provide further validity multiple more studies must be conducted to validate the results which open up for future research. Quantitative success factors could be used to provide practical approaches as the underlying concepts that increase the success have been highlighted.

In addition, as non-random sampling was conducted in the choice of respondents there might be a risk of sample and selection bias which affects the depiction of the transformation process. The limited choice of respondents was necessary due to the available time to conduct the study, however, the sampling allowed a reduction in sample size while identifying the most important views. A random sampling approach study is one potential future research topic.

Due to the limited amount of studies in the field, the present study has been built on concepts that were developed in other fields. Literature reviews have been conducted and consist mostly of previous case studies. The selection of fields to analyze the results required a subjective evaluation which constitutes a bias as also concerns the choice of literature. Still, this presents an opportunity for future research to provide literature reviews of the subfields that scaled agile have evolved from.

Due to the time constraints as the study was conducted as a Master's thesis only the initial stages of the transformation process was studied. This was chosen as previous studies have stated that the transformation usually takes place in separate clearly defined steps which seemed to have been the case in this study as well. This however constitutes a bias as the transformation process will continue and the described case is only a snapshot that might not accurately describe future steps. For future research longitudinal studies of agile transformation must be conducted to identify the long term effects of the overall transformation process.

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Appendix 1 – Interview protocols

Interview protocol 1 – Interview with agile coach

Purpose: *Understanding context and purpose of implementation*

Introduction and Ethics

- Describing purpose of study both overall and the interview in particular
- Asking for permission to record
- Description of secrecy and use of material
- Rights of interviewee

Information about the interviewee

- What is your role in the organization?

State of the implementation

- What have been implemented so far according to SAFe and what is planned to be implemented?

Purpose of the implementation of SAFe

- What challenges are the bank facing overall?
- What challenges are the department facing?
- Which of these challenges have lead to the implementation of SAFe?
- What are the goals of the implementation of SAFe?

Implementation of SAFe at a bank

- Are there any unique challenges for implementing SAFe at a bank?

Challenges and solutions

- Which challenges have arisen so far?
- How are they going to be dealt with based on your experience?

Interview protocol 2 – Interview with Portfolio manager

Purpose: *Understanding context and purpose of implementation and previous structure*

Introduction and Ethics

- Describing purpose of study both overall and the interview in particular
- Asking for permission to record
- Description of secrecy and use of material
- Rights of interviewee

Information about the interviewee

- What is your role in the organization?

Information about the old structure

- How did the cross department structure work?
- What was the reasoning behind the setup of the cross department structure?
- What parts of the new ART structure existed in the cross department structure?

Setup of the portfolio and ART

- How does the team structure look in the ART?

Future plans

- What is the plan for the future?

Use of SAFe framework

- Are there any activities that are not originating from the SAFe framework?

Initial challenges at implementation

- What challenges have emerged so far?

Interview protocol 3 – Interview with companywide agile lead

Purpose: *Understanding companywide agile vision in context to ART and previous agile and lean implementations*

Introduction and Ethics

- Describing purpose of study both overall and the interview in particular
- Asking for permission to record
- Description of secrecy and use of material
- Rights of interviewee

Information about the interviewee

- What is your role in the company?
- What is the role of your department?

Understanding initiative in a historical context

- What led to the start of this initiative?
- What are the biggest challenges that the bank is facing?

Previous Transformations

- Did you take part in the previous lean implementation initiative?
- Could you the describe the initiative?
- How did the initiative go?
- Are you brining with you any learnings from the last implementation?

Understanding the role of SAFe in the initiative

- What is the role of SAFe in the implementation?

Benefits of using SAFe

- What is the reason for using the SAFe framework?

Challenges during the implementation

- What are the biggest challenges you have dealt with so far?

Adaption and solutions to the challenges

- Is the implementation different in the different ARTs?
- What solutions do you see to solve the problems?

Interview protocol 4 – Interview with product owner

Purpose: *Understanding the work and challenges of the product owners*

Introduction and Ethics

- Describing purpose of study both overall and the interview in particular
- Asking for permission to record
- Description of secrecy and use of material
- Rights of interviewee

Information about the interviewee

- What is your role in the company?
- What is the role in the agile organization?

Purpose and benefits of the implementation

- What are the biggest challenges that the bank is facing?
- What is the reason for this initiative in your opinion?

The role of the product owner

- How has your role changed since you started working as a product owner?
- How is your role now?
- What are the biggest challenges you have faced in your new role as a product owner?
- Have you made or plan to make any differences in your role based on any learnings from the first program increments?

Team experiences

- How did the last program increment progress in terms releases?
- Could you describe the last PI-planning from your teams' perspective?
- What have been the biggest challenges you have had to deal with on a team level?
- How have you dealt with those challenges?
- Have you made any changes based on any learnings from the last program increments?

Overall experience of implementation

- What have been the biggest challenges so far overall?
- Do you believe that the team members are satisfied with the implementation so far?

Interview protocol 5 – Interview with program manager

Purpose: *Understanding the work and challenges of the chief product owner*

Introduction and Ethics

- Describing purpose of study both overall and the interview in particular
- Asking for permission to record
- Description of secrecy and use of material
- Rights of interviewee

Information about the interviewee

- What is your role in the company?
- What is the role in the agile organization?

Purpose and benefits of the implementation

- What are the biggest challenges that the bank is facing?
- What is the reason for this initiative in your opinion?

Structure of the ART

- Could you describe the setup of the ART?
- Where did the people in ART work before the implementation?

Development of the ART

- What challenges or benefits did you have in mind when developing the ART?
- How have you designed the ART?
- How does the teams look in the ART?

The role of the program manager

- How has your role changed since you started working as a product owner?
- How is your role now?
- What are the biggest challenges you have faced in your new role as a product owner?
- Have you made or plan to make any differences in your role based on any learnings from the first program increments?

ART experiences

- How did the last program increment progress in terms releases?
- What have been the biggest challenges you have had to deal with on a team level?
- How have you dealt with those challenges?
- Have you made any changes based on any learnings from the last program increments?
- Have you planned any future changes in the ART?

Overall experience

- What are the biggest challenges overall with the use of SAFe?
- What have been the biggest improvements so far?

Interview protocol 6 – Interview with scrum master

Purpose: *Understanding the work and challenges of the scrum masters*

Introduction and Ethics

- Describing purpose of study both overall and the interview in particular
- Asking for permission to record
- Description of secrecy and use of material
- Rights of interviewee

Information about the interviewee

- What is your role in the company?
- What is the role in the agile organization?

Purpose and benefits of the implementation

- What are the biggest challenges that the bank is facing?
- What is the reason for this initiative in your opinion?

Team setup

- Could you describe your team?
- How did you work before the use of SAFe?

The role of projects in SAFe – Only to former project manager

- What type of projects have you worked in?
- Are there any special characteristics of projects in the financial sector
- Have you based your project management on any framework or methods for project management previously?
- How has the role of the project manager changed?
- Has the role of project manager worked well with the new ways of working?
- How would your project progress with a lower overall priority?
- Has defining your project as a team worked well?

Team experiences

- How did the last program increment progress in terms releases?
- Could you describe the last PI-planning from your teams' perspective?
- What have been the biggest challenges you have had to deal with on a team level?
- How have you dealt with those challenges?
- Have you made any changes based on any learnings from the last program increments?

Overall experience of implementation

- What have been the biggest challenges so far overall?
- Do you believe that the team members are satisfied with the implementation so far?

Interview protocol 7 – Interview with CX-lead

Purpose: *Understanding CX and service design with SAFe*

Introduction and Ethics

- Describing purpose of study both overall and the interview in particular
- Asking for permission to record
- Description of secrecy and use of material
- Rights of interviewee

Information about the interviewee

- What is your role in the company?
- What is the role in the agile organization?

Purpose and benefits of the implementation

- What are the biggest challenges that the bank is facing?
- What is the reason for this initiative in your opinion?

CX in the context of SAFe

- What aspects of CX/service design are you working with?
- How did you work with CX/service design before SAFe?
- Did you face any challenges before?
- How are you planned to work or currently work with CX/Service design?
- Have you faced any challenges?

Challenges as CX-lead

- Have you faced any challenges in your role?
- Have you planned to change anything in your role?

Overall experience of the implementation

- What improvements have you gained since working with SAFe?
- What challenges have you faced on a ART level since working with SAFe?
- Have you planned to make any changes in the ART for the futures?

Interview protocol 8 – Interview with Portfolio lead

Purpose: *Understanding the work and challenges at Portfolio management*

Introduction and Ethics

- Describing purpose of study both overall and the interview in particular
- Asking for permission to record
- Description of secrecy and use of material
- Rights of interviewee

Information about the interviewee

- What is your role in the company?
- What is the role in the agile organization?

Purpose and benefits of the implementation

- What are the biggest challenges that the bank is facing?
- What is the reason for this initiative in your opinion?

Structure of the Portfolio

- Could you describe the setup of the ART?
- Where did the people in Portfolio work before the implementation?

Development of the Portfolio

- What challenges or benefits did you have in mind when developing the Portfolio?
- How have you designed the Portfolio?
- How does the teams look in the Portfolio?

Portfolio management

- How have your worked within Portfolio management?
- Have you made any changes so far in Portfolio management?

Cross Portfolio management

- How are you working cross Portfolios?
- How do you work with departments that are not working in an agile way?

The role of the Portfolio lead

- How has your role changed since you started working as a product owner?
- How is your role now?
- What are the biggest challenges you have faced in your new role as a Portfolio lead?
- Have you made or plan to make any differences in your role based on any learnings from the first program increments?

Portfolio experiences

- How did the last program increment progress in terms releases?
- What have been the biggest challenges you have had to deal with on a team level?
- How have you dealt with those challenges?
- Have you made any changes based on any learnings from the last program increments?
- Have you planned any future changes in the ART?

Overall experience

- What are the biggest challenges overall with the use of SAFe?
- What have been the biggest improvements so far?

Interview protocol 9 – Interview with ART architect

Purpose: *Understanding the role of the architect with SAFe*

Introduction and Ethics

- Describing purpose of study both overall and the interview in particular
- Asking for permission to record
- Description of secrecy and use of material
- Rights of interviewee

Information about the interviewee

- What is your role in the company?
- What is the role in the agile organization?

Purpose and benefits of the implementation

- What are the biggest challenges that the bank is facing?
- What is the reason for this initiative in your opinion?

Role of architect in the context of SAFe

- What aspects of architecture are your working with?
- How did you work with Architecture before?
- Did you face any challenges before?
- How are you planned to work or currently work with architecture?
- Have you faced any challenges?

Challenges as Architect-lead

- Have you faced any challenges in your role?
- Have you planned to change anything in your role?

Overall experience of the implementation

- What improvements have you gained since working with SAFe?
- What challenges have you faced on a ART level since working with SAFe?
- Have you planned to make any changes in the ART for the futures?