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Challenges of a Scaled Agile Transformation in IT Infrastructure Maintenance

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Abstract

Agile comprises a host of methodologies emphasizing incremental, iterative work, and human centrism. Originally created for software development, organizations are increasingly adopting the practices in other functions. Unfortunately, the transformation to agile is often slow and difficult, with insufficient literature and materials to provide the needed guidance and support. In particular, there is a noticeable lack of studies on the adaption of agile in fields with high specialization and continuous work, such as IT infrastructure maintenance.

Supported by a comprehensive research undertaking conducted with a global IT service provider enterprise, this thesis outlines many real-world cases of the problems and challenges an organization faces when undertaking an agile transformation. The study follows the transformation of work practices in a pilot of three IT Infrastructure maintenance teams. Many of the findings support previous literature: 1) unsupportive culture creates a barrier to change 2) lack of investment leads to lack of training and coaching and thus the adoption of malpractices 3) the lack of top management engagement has significant indirect effects.

This thesis brings new understanding and validation to the challenges, but also serves to highlight the difficulty of transforming a company with a strong hierarchy, and deeply ingrained company culture. By analyzing the challenges and their effects through grounded theory, the aim is to provide companies in a similar situation with a better understanding of what they may be dealing with. To provide concrete suggestions, this thesis proposes a theoretical framework for how the case organization might overcome the faced issues.

Keywords agile transformation, large-scale agile, Scrum

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Tiivistelmä

Ketterät menetelmät sisältävät joukon menetelmiä, jotka korostavat inkrementaalista, iteratiivista työtä ja ihmiskeskeisyyttä. Yritykset omaksuvat näitä alun perin ohjelmistokehitystä varten luotuja menetelmiä muihin toimintoihinsa enenevissä määrin. Muutos on kuitenkin valitettavan hidasta ja vaikeaa, eivätkä kirjallisuus tai tutkimukset tarjoa riittävästi ohjausta ja tukea. Puute on merkittävä etenkin ketterien menetelmien käyttöönotossa korkean erikoistumisen ja jatkuvan työn aloilla, kuten IT-infrastruktuurin ylläpidossa.

Tämä opinnäytetyö on maailmanlaajuisen IT-palveluntarjoajan kanssa tehdyn kattavan tutkimushankkeen tukema ja kuvailee monia todellisia tapauksia ongelmista ja haasteista, joita yritys kohtaa laajentaessaan ketterien menetelmien käyttöönottoa. Tutkimus seuraa työkäytäntöjen muutosta kolmen IT-infrastruktuurin ylläpitotiimin pilotissa. Monet havainnoista tukevat aikaisempaa kirjallisuutta: 1) epäsuotuisa kulttuuri luo esteen muutokselle 2) investoinnin puute johtaa koulutuksen ja valmentamisen puutteeseen ja siten väärinkäytösten omaksumiseen 3) ylimmän johdon sitoutumisen puutteella on merkittäviä välillisiä vaikutuksia.

Tämä opinnäytetyö tuo uutta ymmärrystä ja validointia haasteisiin, mutta se myös korostaa vaikeutta muuttaa yritystä, jolla on vahva hierarkia ja syvälle juurtunut yrityskulttuuri. Analysoimalla haasteita ja niiden vaikutuksia ankkuroidun teorian kautta pyritään antamaan samankaltaisessa tilanteessa oleville yrityksille parempi käsitys ongelmista, joiden kanssa ne saattavat olla tekemisissä. Konkreettiseksi avuksi ehdotetaan organisaatiolle teoreettista viitekehystä ongelmien ylittämiseksi.

Avainsanat ketterä kehitys, skaalattu ketteryys, Scrum

Contents

Preface

This thesis owes its existence to the ADL; my dear colleague, whose unwavering support was fundamental for the completion of this work.

I also wish to thank my partner for his thoughtful input, many corrections, and boundless encouragement.

Espoo, 28 February 2022
Emmi Kranz

1 Introduction

Agile methodologies of development, which focus on human centered values such as customer-centrism and sustainable development (Fowler & Highsmith, 2001), have been growing in popularity in the recent years. According to the results of the 15th State of Agile survey (digital.ai, 2021), organizations are increasingly adopting agile methodologies outside their original domain of software development. As reasons for the adoption of agile, teams and organizations state factors such as increased productivity, reduced project risk, and improved team morale (digital.ai, 2021, p. 8).

The survey results also reveal Scrum to have become the most popular team-level agile framework, used by at least 66% of respondents (digital.ai, 2021, p. 13). Scrum was the sole methodology in use by 25 of the 42 organizations whose transformation cases were studied in a literature review by Dikert et al. (2016), and it is also the framework adopted by the department studied for this thesis. Its adoption in software maintenance operations was studied by Heeager and Rose (2015), who found that the framework required significant adaptation outside its original environment. This, as others have found, is a notable impediment to wider adoption of agile practices.

This thesis explores the challenges faced by one such organizational transformation to agile methodologies. The case company was the Finnish branch of a large global information technology service provider corporation, which had begun rolling out agile in its IT infrastructure maintenance services. I joined this department as an internal researcher for the duration of this study to identify improvement opportunities for the unit overseeing the scaled agile transformation of the organization.

Scaled agile transformation refers to the broader adoption of agile methodologies within an organization. The adoption of agile methodologies has also been studied at the human level (Chan & Thong, 2009; Koutskouri et al., 2020). In scaled transformation, the focus is on the adoption of agile practices and principles beyond isolated instances.

While the specific agile practices in use vary between transformation cases, the shared commonality behind all agile methodologies is their adherence to agile principles, laid out as part of the agile manifesto by Beck et al. (2001b). Agile practices and their adoption have been studied widely since their inception in the early 2000s (Dingsøyr et al., 2012).

Scaled transformation cases similar to this one have been studied in the past, for example by Fry and Greene (2007), who reported on the agile transformation of Salesforce.com, or Benefield (2008), reporting on the same of Yahoo!. Both of these large enterprises were early adopters of agile, adopting the new practices within a decade of the publication of the agile manifesto in 2001 (Beck et al., 2001a). Recently, similar cases have been reported on by, for example, Jovanović et al. (2017) and Lilja et al. (2021) as organizations continue to adopt agile practices.

Efforts have been made to create best practices and guidelines for organizational agile transformation, formulated by both researchers (Conboy & Carroll, 2019; Gandomani et al., 2013a; Sidky et al., 2007) and agile consultants (Brosseau et al., 2019). As all organizational contexts differ from one another, no definitive roadmap for organizational agile transformation exists.

Dikert et al. (2016) reviewed 42 agile transformation cases to study the prevalence of challenges and identifiable success factors. The authors lamented the lack of scientific papers on agile transformation, finding most publications of transformation cases to be experience reports of actors internal to the organization. They called for more research to be conducted on agile transformations. This was echoed by Fuchs and Hess (2018), who studied agile transformation in the context of digital transformation.

With my study, I aim to offer another case to add to the existing ones to increase the source materials necessary for further research into agile transformations. Many of the findings herein appear to conform to existing theories about agile transformations. Yet, as each case differs from the rest, this study provides another viewpoint into agile transformations in a unique context. The case presented in this thesis has not been previously studied or publicly reported on.

Furthermore, I present a unique way of categorizing emerging issues into department-level, company-level, and unalterable domain factors to identify the root causes of faced difficulties. Formed through grounded theory, this classification explores the causes and consequences of discovered issues, many of which have been identified in other scaled agile transformations. Similar work has been attempted in the past by Jovanović et al. (2017), who used grounded theory to explore the effects of one challenge in the agile transformation process. Utilizing knowledge internal to the case organization, I expand the effort to all issues faced by the organization.

Finally, this thesis offers a theoretical framework for recommended future actions for the organization in question based on the identified issues and their root causes. Based on existing literature, this framework provides another viewpoint for the consideration of actors working on future scaled agile transformation cases.

1.1 Overview of the study

This chapter 1 Introduction has provided the premise of the study and justification for its relevance. Next, it contains the definition of some unique terms used in this thesis, presents the research question of this thesis, and discusses its scope constraints.

In chapter 2 Case description, I describe the case department and company. I describe the chronological progression of the agile transformation effort from background predating the current pilot, to the end of this study. I

explain the intended framework of the agile system, contrast it with other known frameworks, and describe how the framework was realized. Finally, I describe the pilot teams as they were during this study.

Chapter 3 Literature review contains the theory the reader should be aware of to understand the domain and the findings of this study. I explain agile methodologies and in particular Scrum, the framework used by this study, and how they have been studied in other literature. Then, I introduce literature on agile transformations, giving examples of cases and studies. Lastly, I explore the applicability of general change management literature.

In chapter 4 Methods, I explain the methods used in this study, going through the main method of grounded theory, and the various methods used for data collection and validation.

Chapter 5 Identified issues contains the findings of this study. I discuss each of the identified issues, explaining the concepts and their relation to one another. The chapter is broken into separate sub-chapters for the domain factors, challenges, and problems.

Chapter 6 Discussion contains additional discussion of the results. I assess their reliability and compare them to findings in other literature. Then, I discuss unexpected and unclear results, and the criticality of the findings. Finally, I reflect on the limitations of the study and provide suggestions for further research.

In chapter 7 Theoretical framework for future action, I outline a theoretical framework for overcoming the identified issues. It contains an action plan of six points from pausing the transformation, through constructing the next iteration of the agile system, to iterating and improving it. Further exploration of this framework is outside the scope of this study, but I provide it here in case it may be of use in other transformation attempts, and to serve as extended discussion.

Finally, chapter 8 Summary concludes this work. I summarize the study, its relation to other literature, its progress, and findings.

In addition, this work contains two appendices. Appendix A Initial interview outline contains the outline used for initial semi-structured interviews with members of the first pilot team. Appendix B Simplified analysis tree contains the simplified visual representation of the entire analysis tree created to present the findings of this study. Parts of it are also used in chapter 5 to describe the challenges and their relation to other issues.

1.2 Definitions

I use some unique terms throughout this study to refer to particular concepts which differ somewhat from those used in other literature. With these unique terms, I seek to specify certain key concepts, as explained here.

When describing occurrences within teams, I often speak of actors called “managerial figures”. With these figures, I refer to the Scrum Master, Squad

Lead, and agile coach of pilot teams. This group may also include former managers performing managerial duties namely under SME roles, if present in the team.

Agile coaches are not typically considered managers. Instead, their role in an agile team is to "train and coach teams from scratch until they become self-sufficient in Scrum" (agile42, 2017, p. 2). However, in practice, I observed agile coaches taking a managerial stance with their teams, which is why I consider them a part of the managerial figures of teams. This practice of lumping agile coaches and managerial SMEs also helps protect the anonymity of these individuals.

Agile literature typically discusses "challenges" of agile transformations (Conboy & Carroll, 2019; Dikert et al., 2016; Nerur et al., 2005) or "barriers" (Fuchs & Hess, 2018; Pikkarainen et al., 2012) when discussing impediments to agile transformation. I use the terms "difficulties" and "issues" for the same purpose. These both collectively refer to the aspects that were difficult or problematic with the transformation; issues are a more severe form of difficulties.

This practice is in place simply to differentiate between the collective term and the category of what I call challenges, which others might refer to as barriers. I chose to refrain from using the latter term to avoid discouraging agile actors of the company. Barriers and impediments may sound to be absolute and immutable, whereas challenges can be overcome, issues must be handled, and difficulties are expected to arise.

1.3 Research question

Previous literature establishes that adapting agile methodologies to maintenance operations is difficult (Svensson & Host, 2005) and causes challenges (Heeager & Rose, 2015). Some of these challenges became evident during the first two months of my study. Simultaneously, the intended research into virtual team building became cumbersome and ultimately inappropriate, and the research topic switched to studying the agile transformation.

Dikert et al. (2016) find collecting data from a pilot to be a success factor in agile transformations. I observed that the transformation unit in charge of agile adoption at the department was not actively collecting data and offered help on this front. This thesis emerged from that redirection. Thus, the research question became:

RQ1: What difficulties emerge in the early stages of agile transformation at a service delivery department?

Through this research topic, I became a part-time member of the transformation unit, attending some of their meetings and observing the work of the unit during the data collection phase.

This research question is therefore explored from the point of view of management, rather than, for example, individual team members. The focus is on the broader picture—in essence, the success of the transformation. While individual team members may face difficulties with learning a new tool, that is not an issue to the transformation as a whole, so long as the team members are able to overcome the difficulty without it causing broader ramifications.

1.4 Scope constraints

This study is focused on the difficulties faced by the agile pilot of a service delivery department. Therefore, the scope was limited to the three agile pilot teams and the department surrounding them. Agile teams and figures at other departments were excluded.

Similarly, difficulties stemming from other sources were excluded. The organization was undergoing other transformations, but as these did not appear to affect the results of this study, they are considered entirely outside of the scope. Though it could be argued that other transformations within the organization could cause increased stress or resistance to change, I observed hardly any impact of the changes. For example, the teams did not discuss them, and they did not cause any tasks for the pilot teams.

Additionally, this study focuses on the faced difficulties, and any positive factors are thus outside the scope. Previous literature has identified success factors for agile transformations (Conboy & Carroll, 2019; Dikert et al., 2016; Gandomani et al., 2013a; Lilja et al., 2021; Pikkarainen et al., 2012) and a selection of these were present at the studied department. However, due to the time constraints of a thesis, these will be explored only briefly in the reflections, and the discussion should not be viewed as an all-encompassing representation of the agile successes of this department.

Furthermore, the short time span of the study narrows the scope down to difficulties which emerged early on into the transformation. Though the first pilot team had been practicing Scrum for approximately half a year by the time I joined the company, the large-scale difficulties it had faced had not been addressed. Thus, while the department itself thought it had passed the piloting stage and begun a large-scale roll-out, I argue that the two teams that followed half a year after the first were still pilot teams.

Hence, the scope of this study is limited to issues that emerged during the initial piloting stage. This study ended when the department sought to expand the agile transformation to the overall company, requesting high-level and large-scale changes, but the effects of these were not known at the time.

2 Case description

This chapter contains a description of the transformation case which I studied to identify issues and difficulties. Here, I first outline the progression of the transformation in chronological order. This is followed by a description of the intended agile system, where I explain the functionality of the overall model and the roles of the team members, contrasting the design with existing frameworks. Finally, I provide a description of the pilot teams as they were during the study.

2.1 Case progression

This sub-chapter outlines the progression of the department's agile transformation in chronological order. Description from before my involvement is based on internal materials and interviews with informants and may not be fully accurate. However, it grants enough detail to understand the history of the department and thus the background of this agile transformation case.

2.1.1 Background

The case organization itself was the service delivery department of the local branch of a global information technology service provider enterprise. The branch located in Finland operated as a semi-independent part of the global multinational corporation; decision-making authority was maintained locally, but larger direction was provided at the global level.

The service delivery department of this local company acted in a similar semi-independent state, whereby it had the authority to decide on its management methods but followed efforts coordinated at company level. These efforts in turn were typically inherited from the global level. Thus, while the department was somewhat separate from other functions, it experienced the larger themes as part of the whole.

This case department was for the most part managed with traditional methods and retained a strongly hierarchical organizational structure and department culture. Service delivery involved work which was largely based on clear and unalterable requirements, such as upkeep and maintenance of client infrastructure.

The department had attempted other agile adoptions in the past, most notably a lean transformation in the mid-2010s. Previous agile efforts had been seemingly discontinued at the department by the time of this study. Other departments of the local company reportedly used the Scaled Agile Framework (SAFe) with Scrum at team level. The global organization had adopted SAFe more widely and was experimenting with other forms of self-managing teams.

The ill-fated lean adoption had ended sometime between 2015 and 2018 (reports conflict). According to management, the lean adoption had progressed well locally, but was ceased when organizational restructuring shifted governance mandates to European level.

This previous transformation attempt was often brought up by informants in discussions and interviews. Department employees criticized the shift away from local governance and reminisced over the well-appreciated state of the internal culture before the shift. This hints that the previous attempt at becoming more agile had long-lasting effects. When ultimately unsuccessful, such an attempt may lead to change resistance towards future agile attempts (Fuchs & Hess, 2018).

This study was conducted during the outbreak of the Covid-19 pandemic. On the 16th of March 2020, the government of Finland had declared a state of emergency and closed public premises (Government Communications Department, Ministry of Education and Culture, Ministry of Social Affairs and Health, 2020). Following this, the studied company put into place its own restrictions, limiting access to company premises, and encouraging social distancing.

The department had worked mostly remotely for over a decade, and subject matter experts were largely distributed around Southern Finland. Members of the pilot teams reported that their work had changed little when the restrictions were put in place. As adverse effects, they reported restricted access to client premises when on-site work was required, and the often-lamented lack of annual gatherings the company had had a practice of organizing.

2.1.2 Launch of the pilot

The new agile pilot in service delivery was begun during the early spring of 2021 by instruction from the head of the department. The department had hired external consultants to aid with the initial planning and preparatory stages of the agile adoption. The consultants helped design the overall agile system and trained the first pilot team in March of 2021.

When I asked members of this team about the training, all interviewed members complained the training had been too abstract, describing it as “high-flying”. The consulting company had reportedly been chosen based on past positive experiences with the company, but it appeared inexperienced in agile transformations. It had not prepared the department for the full scale and scope of an agile transformation and had, instead, left decision-makers with the mistaken assumption that agile practices could be adopted without alterations to the teams’ environment and surrounding structures.

The first pilot client had been chosen based on client and project manager eagerness, and the team members on their allocation with the client project, the preference having been on higher allocation percentages. Team

composition had been iterated during the spring and had settled to 13 members in the core team. The choice of clients for the following pilot teams was based on similar eagerness and availability factors.

During the same spring, the department had gathered a transformation unit to oversee the agile pilot. This unit comprised six members: two members of the department's top management, two line supervisors, one supervisor from the cloud technology department which had adopted SAFe sometime prior, and the Agile Delivery Lead of the department (hereafter: ADL). The ADL was the only member with a full-time allocation to the agile project.

2.1.3 Beginning of my involvement

I joined the department in September of 2021 with the intention of studying virtual team building with the pilot teams. The two upcoming pilot teams were being trained that month, and thus I became involved with the agile pilot. The Lead Agile Coach trained the two new teams based on the materials provided by the consultancy, altering them to be somewhat more practical, and I supported her in this work.

By the end of October, I realized the environment could not support active research into team building. In agreement with three members of the transformation unit, I switched the research topic to studying difficulties with the ongoing agile transformation.

In October, the second pilot team began practicing Scrum internally, followed by full adoption including the external Product Owner. The third pilot team voiced reluctancy to begin practicing the new methodology with strong resistance from key members.

After support from management, the team agreed to practice Scrum internally among these vocal members and the team's agile coach. The team began this practice in December of 2021; by the end of data collection in January 2022 it was intending to involve all team subject matter experts and, eventually, the client PO.

2.1.4 Final state

Ultimately, the agile project remained at piloting stage at the end of the study. Pikkarainen et al. (2012) discuss the process of agile adoption in an organization through diffusion theory. This adapted theory asserts that agile is at the initial deployment stage when it is new to the practitioners themselves, and limited to a few teams (Pikkarainen et al., 2012, p. 676). Following this definition, agile remained at the deployment stage.

Sidky et al. (2007) created a five-level agile maturity model to measure the progress of a team or organization adopting agile. The first pilot team of this case may be considered to have reached the first of these five levels, which is focused on collaboration. The second pilot team was drawing close to a

collaborative level of agility as well, though it lacked task volunteering and empowerment, which would be required by the model by Sidky et al. (2007). The third team did not yet follow collaborative work practices.

Considering another agile maturity model created by Laanti (2017), agility can also be measured at portfolio, program, and team level—or, in this case, department, pilot, and team level. The model by Laanti (2017) was created for the context of software development and is thus not applicable at team level, but it can help assess the overall agility of the surrounding organization.

Laanti (2017) describes the first, "beginner" level of agility as the stage where the organization makes the decision to adopt a certain framework. This had not been done at department level, but at pilot level, all teams were using Scrum. In addition, the model asks the department to be prioritizing work and identifying tasks as Epics, which was not done. Neither did the pilot fulfill the requirements for program-level beginner agility, whereby work would be planned incrementally, and change embraced.

To summarize, various agile maturity models suggest that the agile pilot remained at a low level of maturity, though teams were beginning to reach the first stage of agility. The surrounding organization did not show any signs of this first-level agility, as it had not begun the adoption of agile practices and principles.

2.2 The agile system

The core of the intended agile system was based on Scrum as it is outlined in the Scrum guide written by Schwaber and Sutherland (2020a). The framework will be explained in more detail in the next chapter. Teams were to divide work into increments completed during sprints, holding all Scrum ceremonies (sprint planning, daily, sprint review, sprint retrospective) as designed and explained in the guide.

In order to accommodate unexpectedly emerging tasks, the adapted Scrum outline was designed to include a fast lane for issues requiring swift reactions, such as faults affecting end-users. At sprint planning sessions, the teams should consider the potential for sudden issues when planning the workload for the sprint. Each sprint was recommended to last two weeks, with alterations over holiday periods, when teams could tailor the length to suit their members' needs.

The fast lane for urgent tasks was intended to function similarly to a method called Kanban, in which the amount of work in progress is limited and members complete claimed tasks before moving on to other tasks (Anderson, 2010). This approach of mixing Scrum and Kanban practices is considered Scrumban, which is characterized by teams selectively adopting practices from the two methodologies (Alqudah & Razali, 2018).

Further adaptation from Scrum was observable in team roles. In addition to the Scrum-defined roles of Scrum Master and Product Owner (PO)

(Schwaber & Sutherland, 2020a), the teams were designed to comprise an agile coach, a Squad Lead, an Advisor, and a Solution Architect. The Scrum developer role was adapted to be called Subject Matter Expert (hereafter: SME) but designed to function identically to Scrum developers.

Despite namely containing a Scrum Master, the duties performed under this role were only a part of the Scrum-intended duties. A Scrum Master is intended serve the team, the PO, and the wider organization by aiding other actors with their agile tasks and facilitating work within the team (Schwaber & Sutherland, 2020a). In practice, the Scrum Masters merely handled the day-to-day practicalities with the SMEs, whereas the Squad Lead acted as an internal counterpart to the PO, and agile coaches spread agility in the organization.

In addition, the tailored framework contained a tribe lead-role to coordinate the work of several agile squads, as designed for the Spotify model (Kniberg & Ivarsson, 2012), or akin to a Release Train Engineer in the Scaled Agile Framework (SAFe) (Scaled Agile, 2021b). Since the pilot teams were not connected with tribes, this scaled functionality was not tested, and no employees had been appointed the tribe lead role.

The role of the Product Owner matched that of the role described in the Scrum guide. The PO was responsible for creating, communicating, and prioritizing the product backlog (Schwaber & Sutherland, 2020a) and was an external representative from the client organization.

Agile coaches were designed to aid the teams in the adoption of agile, but their duties were not specified by the consultants. In practice, the agile coaches became informants to the transformation unit overseeing the agile pilot. They informed the Agile Delivery Lead, a key representative of the unit, weekly on the well-being of the team and its agile adoption.

Advisors and Solution Architects were designed to identify business problems and formulate solutions to those to remove impediments that could threaten the work of the SMEs. These two roles were highly similar, and the career path to one could originate from the other. Both roles appeared to have been designed to be similar to the role of a Solution Architect in SAFe who is in charge of the technical and architectural vision (Scaled Agile, 2021a).

In practice, teams did not differentiate between SMEs, Advisors, and Solution Architects, referring to all equally as SMEs. When asked, even individuals designed to fill these other roles identified themselves as SMEs of the agile team. Advisors and Solution Architects were essentially experienced SMEs who participated in preparatory work but no longer executed operational work.

The Subject Matter Experts (SMEs) were designed to fill the developer role of Scrum, in which team members work together to implement solutions to tasks and improve the work of their team (Schwaber & Sutherland, 2020a). Before the transition to agile practices, they were working in much the same roles and performing the same work aside from attending the newly

introduced Scrum ceremonies. The most notable change to their work was the expected shift to an agile mindset and more inventive ways of working.

2.3 The teams

All three pilot team Squad Leads elected to adopt agile into the IT infrastructure maintenance operations for their clients. This work was characterized by the combination of predictable and unpredictable tasks. On one hand, teams could predict far into the future when to, for example, update databases or install patches. On the other hand, maintenance tasks could emerge unexpectedly through faults or incidents and require immediate and extensive attention.

All team members performed other duties beside their agile roles. Most Squad Leads and Scrum Masters managed other teams as well, and all SMEs were involved with several clients. All agile coaches were primarily allocated to work outside the agile pilot of this department. Team sizes and skill compositions varied depending on the needs of the specific client.

The first pilot team comprised 13 core SMEs and up to 30 non-core SMEs who attended meetings only when the sprint contained work designated for them. The Squad Lead of the team had previously been its customer service manager in charge of various services rendered to a certain customer. The Scrum Master had been, and still in parallel was, its service delivery manager, in charge of a subset of the services in care of the Squad Lead. Another service delivery manager had stayed in the team in an SME role but continued to perform managerial duties alongside the Scrum Master. The coach of this team also trained the two following pilot teams and coordinated the internal coach community. In this thesis, this coach is referred to as the Lead Agile Coach.

The two later pilot teams comprised similar members, including the detail of service delivery managers namely in SME roles. The second team to begin practicing Scrum comprised 9 core SMEs and an unspecified number of non-core members, who did not attend team ceremonies during data collection. The third team did not yet identify its core and non-core members but was expected to comprise between 10 and 20 core members.

Few of the members of these two later teams had previous experience with agile. In a kick-off session for the teams' agile training, 63% of attendees reported their familiarity with the agile mindset as "not at all or very little". 19% had had training but no practical experience, 6% experience but no training, and 13% both training and experience. No such data was available for the first pilot team.

The coaches of the pilot teams received no formal training and were selected based on availability and eagerness. The client representative Product Owners were similarly untrained, though the pilot's Agile Delivery Lead (ADL) provided them with walkthrough materials to explain the new agile

system. The first pilot team had one dedicated PO, the second initially three and ultimately one, and the third was presumed to begin with a singular PO.

3 Literature review

In this chapter, I introduce literature to provide the reader with the theoretical knowledge required to assess my findings. First, I introduce agile methodologies, foraying further into Scrum, and the adaptation of these two outside software development. Then, I introduce other works on agile transformations, such as cases and comparison studied. Finally, I review how general organizational change management literature could be applied to agile transformations.

3.1 Agile methodologies

Agile methodologies emerged after the creation of the agile alliance and its agile manifesto (Fowler & Highsmith, 2001). Dingsøyr et al. (2012) studied the influx of research which followed the creation of various agile methodologies, noting that agile methodologies had received much research attention, though most was focused on studying practices which emerged in industry.

The various approaches to agility are characterized by their adherence to common preferences outlined in the agile manifesto (Beck et al., 2001b):

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

Comparisons between agile and traditional approaches have received some attention in literature. In his 2010 book, Wysocki explains how, in general, traditional methods differ from agile in their focus on clearly defined and well-documented features, adherence to predefined budget and scope, and their ability to support distributed, specialized teams (Wysocki, 2010, pp. 274-275).

Nerur et al. (2005), studying challenges organizations face when migrating to agile approached, stressed the importance of shifting management styles from command and control to leadership and collaboration. The authors note that agile methodologies require an informal, people-centric culture, in which the customer's role becomes critical.

The agile manifesto outlined twelve further principles to guide the agile approach to software development (Beck et al., 2001b). These principles are characterized by their focus on continuous delivery, embracing changing requirements, frequent deliveries, collaboration between business and development, employee motivation, face-to-face meetings, valuing working software, promoting sustainability, technical excellence, simplicity, self-organization of teams, and reflection to improve.

Of note here is the principles' focus on software development. Three of the twelve principles directly mention "software", such as "working software is the primary measure of progress" (Beck et al., 2001b). Since their conception, agile methodologies have been adapted and adopted outside software development, most considerably on other information technology fields (digital.ai, 2021, p. 7).

3.1.1 Scrum

Scrum is an agile methodology created by two of the original seventeen "anarchists" behind the agile manifesto, Ken Schwaber and Jeff Sutherland. The inventors detail Scrum in guidebooks, which have been edited and improved along the years. The most recent edition of the Scrum Guide was published in 2020 (Schwaber & Sutherland, 2020a) and is available in a variety of languages, including Finnish (Schwaber & Sutherland, 2020b).

These guidebooks contain the instructions for implementing Scrum. In particular, they outline the Scrum values, roles and their duties, and ceremonies. According to the guide, Scrum is based on the values of commitment, focus, openness, respect, and courage, and relies on a self-managing, cross-functional team (Schwaber & Sutherland, 2020a).

In Scrum, the team seeks to create value for the client during short development increments called "sprints". The Product Owner of the team is in charge of prioritizing work to be done on the product backlog, from which the team chooses a selection of work to be completed during a sprint.

The Scrum meetings, which Schwaber and Sutherland (2020a) call "ceremonies", help the team conduct their work. At the beginning of a sprint, the entire Scrum team meets for a sprint planning to agree on work to be completed during the sprint. The developers and the Scrum Master then meet in "dailies" during the sprint to communicate which tasks members are working on, and how the work is progressing. At the end of the sprint, the entire team meets for a "sprint review", where the PO and stakeholders assess the results of the sprint, and a "sprint retrospective", where the team reflects on its work practices and how it could improve.

As mentioned in the introduction to this thesis, Scrum has become the most popular team-level agile framework, used by 66% of respondents to the 15th State of Agile survey (digital.ai, 2021, p. 13). This was followed by Scrumban—the combination of Scrum and Kanban—at 9%, pure Kanban at 6%, and a mixture of Scrum and Extreme Programming (XP) similarly at 6%. Scrum was also the sole methodology in use by 25 of the 42 organizations studied in the literature review by Dikert et al. (2016).

3.1.2 Agile adoption outside software development

Though literature on agile adoption outside software development remains unfortunately scarce, agile has been introduced to software maintenance, and hardware development. Studies from these offer some broadly generalized best practices for the adoption of agile, which grant valuable information for later cases.

In 2005, Svensson and Host studied the adoption of the agile framework Extreme Programming in a software maintenance and evolution organization. The authors introduced new agile practices based on the methodology Extreme Programming and noted their practical adoption in the target team. Contrasting the original framework with the adopted practices, the authors discovered that the framework required significant adaptation to suit the environment, and that the environment itself complicated the adoption of agile practices.

Notably, the authors note that planning for sprints was made difficult by incoming support issues, which had to be prioritized. This appears to be akin to the fast lane system contained by the agile system of my case organization. In addition, Svensson and Host (2005) note that introducing the agile framework as intended was made more difficult by organizational and cultural issues of the environment.

A similar conclusion was echoed by Heeager and Rose (2015), who studied the optimization of agile practices in software maintenance operations. The authors argue that due to the differences between maintenance operations and software development—the original application domain of agile—those attempting agile adoption in maintenance operations should expect the process to be more difficult.

Nevertheless, the authors succeeded in formulating nine heuristics for the optimization of Scrum in software maintenance operations, which include points such as using sprints to organize work and balancing documentation and face-to-face communication appropriately. These heuristics, which are broad and generalized without claiming to be generally applicable, are offered as "early warnings for the kinds of optimizations that may be necessary, and as suggestions for practical improvements to [practitioners'] practices" (Heeager & Rose, 2015, p. 1782).

Similarly broad are the best practices recommended by Laanti (2016), who developed a framework for using an agile approach to hardware development. This framework was focused on increased synchronization and cadence and the adoption of a "two-level rolling planning", which would include rough long-term planning in addition to more accurate short-term planning.

The best practices offered by the author are focused on outlining how an organization could formulate its own framework as the author had done through workshops. These include points such as beginning with strategic

planning to ascertain how and why agile practices might be beneficial in the target organization, and planning the rough development schedule while allowing changes to emerge.

The report on the 15th State of Agile survey states that agile practices remain mostly adopted in software development at 86% adoption rate among respondents, followed by other information technology fields at 63% (digital.ai, 2021). Large-scale agile transformations offer some insight into the adoption of agile outside software development as these transformations entail the entire organization and, similarly to this thesis study, are not limited to singular development teams.

3.2 Agile transformation

Agile transformations, i.e. the processes of adopting agile practices, have been studied from various angles. For the purposes of this study, which combines the adoption of agile at team level and organizational transformations, it is beneficial to consider both how agile is adopted at individual level and at scale, though the two are often closely interlinked.

3.2.1 Adoption of agile methodologies

Individual adoption of agile was studied by Chan and Thong (2009), who sought to uncover key acceptance factors of agile methodologies in prior literature. The authors argue that the acceptance of agile methodologies is influenced by agile methodology characteristics as well as knowledge management outcomes, which in turn are influenced by three further categories of factors. Thus, the authors identify 18 distinct acceptance factors in four categories, summarized in Table 1.

Table 1: Agile methodology acceptance factors after (Chan & Thong, 2009)

Ability-related factors	**Motivation-related factors**
• Systems development methodology self-efficacy, i.e. one's judgement of one's capability to use the methodology • Experience • Training • External support, e.g. training or consultants	• Career consequences • Top management support • Voluntariness • Subjective norm • Organizational culture
Opportunity-related factors	**Agile methodology characteristics**
• Teamwork	• Perceived usefulness

• Communication • Shared understanding • Arduous relationship, i.e. the emotional ardour or distance between the methodology introducer and adoptor	• Perceived ease of use • Perceived compatibility • Result demonstrability • Perceived maturity

In Table 1, the three categories of sub-factors affecting knowledge manegement outcomes are shown with a grey background. Notably, several of these factors are ones which an individual agile team member cannot affect, such as training, communication, and perceived usefulness of the methodology. They are dependant on the efforts of others, such as the transformation unit studied for this thesis, which was in charge of organizing training for pilot teams and communicating matters that could affect members' perceptions of agile.

These findings by Chan and Thong (2009) are noteworthy as the acceptance of agile practices is key to their adoption. Gandomani and Nafchi (2016), who studied the human aspects of agile transformation, note the absence of many of the same factors as significant challenges in agile adoption. The authors divide their findings into impediments to agile transformation, such as lack of knowledge or cultural issues, and perceptions about the change process, which include challenges such as worries about the transition and lack of belief in the change.

This research, conducted through interviews, supports the theoretical framework constructed by Chan and Thong (2009). Gandomani and Nafchi (2016) propose lack of knowledge to be the most significant impediment to the transition to agile, which agrees with the view that acceptance of agile is heavily influenced by knowledge management outcomes.

The human side of agile adoption was also studied by Koutskouri et al. (2020), who interviewed individuals that were in the process of transitioning to utilizing agile methodologies in their work. The authors discovered that transitioning to the new methodology involved three overlapping processes with particular characteristics:

1. Making sense of the new by comparing it with the old
   - An intense experience for employees.
2. Practicing with peers
   - Productivity falls.
3. Letting go of legacy
   - A difficult and gradual process driven by the employees' desire for the period of uncertainty to be over.

This latter finding reveals what other research firmly supports; agile transformations are a complex and difficult process. Individual employees' role in the change is limited, and changes are required in the larger context.

3.2.2 Scaled agile transformation cases

Scaled agile transformations, such as the case of this thesis, have been studied and reported on in the past. Efforts span across the decades since the conception of agile to transformations in recent years, and the resulting studies offer a broad range of viewpoints into large-scale agile transformations. Some cases report on phenomena that are of particular relevance for the case presented in this thesis.

Among the early reporters on scaled agile transformation cases, Fry and Greene (2007) write on the transformation of Salesforce.com, an on-demand service provider. The authors outline the transformation approach taken by the company, which involved a cross-functional roll-out team planning and implementing the changes, and discuss learned lessons and recommendations for others.

This paper is noteworthy since it offers the viewpoint of an organization which opted to change the entire company at once rather than to approach the transformation step by step. Fry and Greene (2007) consider the transformation successful and encourage others to attempt the same, giving concrete tips for achieving good results, such as getting external professional help, and creating a company-wide sprint heartbeat.

The authors also discuss success factors of their transformation case, among which they mention two as having been crucial: top executive commitment, and a dedicated, cross-functional roll-out team. Each area of organization nominated members for the roll-out team, which was also in contact with outside experts for support.

The success factors of the discussed study differ from those described by Benefield (2008), who reported on the large-scale transformation of Yahoo!, a large internet services provider. The author describes Yahoo!'s approach to large-scale transformation as decidedly step-wise and bottom-up, as opposed to the top-down approach described by Fry and Greene (2007).

For such an approach, Benefield (2008) stresses the importance of coaching, and of scaling budget to accommodate the increasing need for coaching as more teams adopt the new method. Failing to fund sufficient coaching reportedly led to teams attempting to acquire information from other sources, such as training classes or books, which had unspecified long-term negative implications (Benefield, 2008, p. 5).

In addition, the author offers statistics collected at the company to showcase the progress of the transformation. Survey respondents felt that Scrum had positively affected their teams on multiple aspects, such as productivity, collaboration and cooperation, and produced value.

These two aforementioned studies were conducted at a private company. Agile transformation efforts have also been studied in other contexts, such as the IT department of a government entity, as studied by Hajjdiab and Taleb (2011). The authors identified challenges in the transformation, and included among them the absence of a pilot, which could have been used to test agile adoption in the environment. As the most significant issue, the authors give the absence of agile coaches, stating them to be essential for the transformation of any organization.

In Finland, the host country of the department in focus of this study, agile transformations have been reported from numerous case companies. These include, for example, the telecommunications company Ericsson R&D (Paasivaara et al., 2018), the three unnamed software-heavy companies studied by Pikkarainen et al. (2012), and the pharmaceutical company Roche Oy Finland (Lilja et al., 2021). Agile practices and research on them are therefore not novel in the region, and Finland is one of the most prolific countries for agile research (Dingsøyr et al., 2012).

3.2.3 Further studies on scaled cases

The three previously described transformation cases reported on by Fry and Greene (2007), Benefield (2008), and Hajjdiab and Taleb (2011) were among the 42 company transformations studied by Dikert et al. (2016) in their literature review of similar agile transformation cases. The authors compiled a list of common challenges and success factors of large-scale agile transformations, indicating their prevalence in reported cases, as shown below in Table 2.

Table 2: Prevalence of common challenges of large-scale agile transformations, after (Dikert et al., 2016).

Challenge	**Prevalence**	**Challenge**	**Prevalence**
General resistance to change	12%	Interpretation of agile differs between teams	12%
Skepticism towards the new way of working	17%	Using old and new approaches side by side	12%
Top down mandate creates resistance	10%	Middle managers' role in agile unclear	17%
Management unwilling to change	10%	Management in waterfall mode	14%
Lack of coaching	14%	Keeping the old bureaucracy	5%
Lack of training	7%	Internal silos kept	5%

Too high workload	7%	High-level requirements management largely missing in agile	12%
Old commitments kept	5%	Requirement refinement challenging	10%
Challenges in rearranging physical spaces	14%	Creating and estimating user stories hard	14%
Misunderstanding agile concepts	19%	Gap between long and short term planning	14%
Lack of guidance from literature	21%	Accommodating non-functional testing	10%
Agile customized poorly	10%	Lack of automated testing	7%
Reverting to the old way of working	19%	Requirements ambiguity affects QA	5%
Excessive enthusiasm	10%	Other functions unwilling to change	31%
Interfacing between teams difficult	14%	Challenges in adjusting to incremental delivery pace	17%
Autonomous team model challenging	10%	Challenges in adjusting product launch activities	5%
Global distribution challenges	7%	Rewarding model not teamwork centric	14%
Achieving technical consistency	12%		

A majority of the publications studied by Dikert et al. (2016) were experience reports, which the authors note as unfortunately lacking in scientific methods. Therefore, the prevalences given above in Table 2 should not be considered the true likelihoods of the challenges arising, but are rather indicative of how problematic the challenge was found by practitioners. It hints at what a study reliant on qualitative methods could expect to see causing difficulties for members of a transforming organization.

Only 5% of the case organizations had maintained their internal silos, suggesting that the publications were mostly from organizations with a holistic approach to agile transformation, though the 31% prevalence of the challenge “Other functions unwilling to change” contradicts this. Similarly, the 5% prevalence of “Keeping the old bureaucracy” may indicate that 95% of case organizations had altered their bureaucratic practices, or simply that the maintenance of old bureaucracy was not seen as a problem in 95% of cases.

The low prevalence of issues relating to management (See Table 2) is seemingly in conflict with other research, which reports management

support as fundamental to agile transformations (Sidky et al., 2007; Worley & Doolen, 2006). This suggests that the original publications may be from organizations which did not experience fundamental barriers to agility and were ultimately able to proceed with their transformations. Dikert et al. (2016) note that the papers were typically published two years after the transformation began. My thesis is expected to be published a mere year after the beginning of the agile transformation of the studied company.

At such an early point in time, the success of this transformation is not yet ascertained, and the faced difficulties may greatly differ from those discovered at organizations which were presumably able to progress past the initial stages. Nevertheless, these findings of Dikert et al. (2016) provide valuable insight into the types of issues which might emerge in large-scale agile transformations.

In addition to the challenges listed above, the authors provide a similar prevalence comparison for success factors in agile transformations, such as the recognition of the importance of change leaders in 17% of cases, and communicating the change intensely in 12% (Dikert et al., 2016, p. 100).

These success factors are viewed as separate from the challenges. Although top management support is noted as having been vital for the success of multiple transformation cases, the lack of it is not counted as a problem. As another similarly crucial success factor, Dikert et al. (2016) note factors relating to mindset and alignment.

In their literary review, Gandomani et al. (2013a) count the absence of these success factors as issues. The authors give high significance to cultural factors such as the adoption of an agile mindset, noting also the vitality of management support. The authors discuss challenges to agile transformations from management perspective, arriving at the conclusion that all parts of the transforming organization face several barriers, challenges, and issues (Gandomani et al., 2013a, p. 2347).

Based on these discoveries, the authors assert that a well-planned change management strategy would be beneficial for agile transformations to avoid and overcome challenges. According to the authors, this strategy should include aspects relating to people, the organization, management, the process, and technology. In other words, it should consider the entirety of the attempted change.

Researchers have attempted to form such holistic strategies to help practitioners effectively navigate agile transformations. The field of organizational agile transformation is broad, and some select studies and theory will be introduced in the following chapter.

3.2.4 Organizational agile transformations

Organizational agile transformations in general, rather than through specific cases, have received some attention from researcher. Strategies and

guidelines for performing such a large-scale change have been formulated by both researchers and consultants, the latter of which will be described later.

On the researcher side, Sidky et al. (2007) created a structured framework for agile adoption in a project or organization, which proceeds through four stages and includes assessments of the agile maturity level. This maturity model contains five stages ranging from collaborative agility at the first level to ambient, or environment-wide agility at the final. The target project or organization is measured in its adherence and adoption of five agile principles. To paraphrase, these five stages are embracing change, delivering frequently, being human centric, and minding technical excellence, and customer collaboration.

Alternative agile maturity measures have been developed as well, for example by Laanti (2017), whose five-level model follows agile adoption in software development at portfolio, program, and team level to measure the overall transformation stage of the organization.

Furthermore, Pikkarainen et al. (2005) developed a condensed framework to guide their agile transformation efforts. This agile deployment framework contains four stages: selecting agile practices, planning deployment, executing deployment, and analyzing, improving, and packaging the result.

What differentiates the four-stage model developed by Sidky et al. (2007) from the rest is its first stage. At this initial stage, the authors call for making the "go/no-go decision", i.e. ascertaining whether the agile transformation should be attempted. To this end, the authors instruct to identify the potential presence of three discontinuing factors: inappropriate need for agility, lack of sufficient funds, and absence of executive support. The authors argue that the presence of any of these factors alone is enough to indicate that the project or organization is "unprepared to move towards agility and should suspend the adoption process until the environment is more supportive" (Sidky et al., 2007, p. 209).

As described earlier, the latter two discontinuing factors emerge as significant impediments in case studies as well. The vitality of top management support was explored by Worley and Doolen (2006), who sought to ascertain the reason for its significance. The authors discovered that top management support results in non-direct effects, which render it a particularly complex factor and result in its criticality. Lean is a paradigm closely similar to agile (Petersen, 2011), making these findings relevant for agile transformations as well.

The first disqualifying factor of Sidky et al. (2007), inappropriate need for agility, is likewise identified in other studies. Fuchs and Hess (2018), comparing two large-scale agile transformation cases, identified it as a barrier to agile transformation. Other identified barriers were the coordination of different organizational worlds, and the difficult selection of the right people.

Fuchs and Hess (2018) note that both agile transformation cases progressed through phases of incremental increases in agility. Each phase on the

way to organizational agility encountered challenges, which culminated into barriers to further improvement. Overcoming these barriers required organizations to implement radical changes, which rapidly increased the level of agility. The required radical changes depended on the context of the case and included such actions as implementing a top-down approach, and establishing cross-functionality.

These findings stress the importance of viewing agile transformations as an organizational change, rather than a team-level process. However, Vinekar et al. (2006) argue that organizations need not become agile in their entirety but can separate agile and traditional structures in a way that allows them to exist in parallel under one governing body. The authors agree with the view that the culture required to support agile methodologies differs from that supported by traditional, hierarchical organizational structures.

This culture shift has received attention from researchers. Tolfo et al. (2011) describe the various elements relating to agile culture and divide those into three levels to describe the depth of cultural change.

According to the authors, the first level of visible artifacts contains aspects such as agile teams, daily meetings, and active stakeholder participation. The second level, espoused values, contains for example self-organization, respect and consensus, and transparency. The third and deepest cultural level, basic underlying assumptions, contains the belief in the competence and responsibility of individuals, and stimulus to creativity, fostering innovation, and taking moderate risks.

Despite the good efforts described above, to my best knowledge, researchers have not been able to perfect a universally applicable change management strategy for agile transformations. As changes are required to both organizational structures and company culture, each agile transformation case is unique in its context. While some succeed in an all-in revolutionizing approach (Fry & Greene, 2007), others see benefits from beginning with a pilot, which is generally recommended for agile transformations (Dikert et al., 2016).

Gandomani et al. (2013b) studied key factors of agile pilots preceding a large-scale organizational transformation through interviews with agile practitioners who had lived experience of at least one such transformation. The authors discovered four key characteristics affecting agile pilots: criticality, duration, size, and required resources.

The participants in the study by Gandomani et al. (2013b) did not agree on whether the pilot project should be a training project or a real one but emphasized that the project should nonetheless be low risk. Participants agreed that the project should be short-lived, with a total duration of three to four months. Similarly, the project should be small in size, involving a minimal number of teams. Participants also agreed that the pilot should have all the business resources and technical resources it requires.

While scientific methods have not resulted in a comprehensive guide for an organization seeking to complete an agile transformation, non-scientific literature has attempted to fill the gap. This literature, often based on the experiences of expert agile practitioners, provides an additional viewpoint to consider.

3.2.5 Consultancy works on agile

Consulting companies have written extensively on agile transformations, presenting cases, adoption frameworks, and advice for management leading such changes. Choice of sources is abundant, and a select few with especially relevant points are introduced here.

In one of the more recent transformation cases, Lilja et al. (2021) describe the agile transformation of Roche Oy Finland through the viewpoint of external consultants. Working for the consulting company Reaktor Innovations Oy, two of the authors assisted the client company in its agile transformation journey.

The company implemented a new organizational structure model, in which employees belong to particular communities of skills and capabilities, and form fit-for-purpose teams to complete work (Lilja et al., 2021). This model appears to be a version of the "flow-to-work" model proposed by Brosseau et al. (2019) from the consultancy McKinsey&Company, who describe how scarce resources could be pooled to staff tasks based on need. As alternative options, the authors propose cross-functional teams, and self-managing teams.

Brosseau et al. (2019) stress the vitality of top management support before providing guidelines for performing an agile transformation. First, the authors recommend creating a blueprint to guide the transformation, which helps the organization for a clear vision and an initial design for the new operating model.

Following the creation of this blueprint, the authors recommend crating a backbone for the transformation. This backbone should contain the organization's plans for governance, business planning and budgeting, funding decision-making, performance management, roles and career paths, risk management, workforce location and workspace, and technology to be used in the new agile system.

Finally, Brosseau et al. (2019) instruct organizations to decide on an implementation approach for the change. In essence, this involves the organization deciding whether to revolutionize like Fry and Greene (2007) recommend, to approach the change step-wide with a pilot as recommended (Dikert et al., 2016), or to allow change to be emergent, akin to the management-encouraged bottom-up approach described by Benefield (2008).

Publications by practitioners stress the importance of approaching agile transformations with a holistic view (e.g. Rigby et al., 2018), and provide concrete advise for leaders attempting to first transform themselves in order to transform their organizations (De Smet et al., 2018). This approach bears similarities to general organizational change management with added agile particularities, suggesting that the much-studied field might offer relevant insight into managing agile transformations as well.

3.3 General organizational change management

Like other organizational transformations, an agile transformation is a complex process. Many of the phenomena related to organizational changes in general also emerge in agile transformations, and findings from literature relating to them appear also in agile transformation research.

Change resistance, and the heightened need for communication during organizational change have been addressed in change management literature. Piderit (2000) discussed the emergence of resistance during attempted organizational change, and categorized it into emotional, cognitive, and intentional resistance. The author argues that regarding change resistance as a fault or flaw of the resistant individual dismisses the real concerns behind the resistance and risks overlooking true shortcomings in the transformation.

In addition, Piderit (2000) describes how different combinations of the three dimensions of resistance cause ambivalence, giving an example of a conflict between negative emotions and positive cognition. The author argues that these ambivalent reactions are expressed in different ways and require different approaches to overcome. For example, emotionally ambivalent individuals may express their concerns through humor.

In such cases, ignoring the reason behind this seemingly innocent reaction risks ignoring true emotions. The importance of acknowledging emotional reactions to organizational change have been stressed in other literature as well, for example by Richardson and Denton (1996).

Richardson and Denton (1996) write on the vitality of open and active communication in effective organizational change. The authors argue that the failure to communicate the change leads to the emergence of negative rumors, which can undermine the entire change effort as cynicism and skepticism spread among employees.

In addition, Richardson and Denton (1996) note the importance of visible top management engagement. They describe transformation cases where much of the change was attributable to top executives connecting with the grass-roots level to make their support seen and heard across the organization.

Writing about organizational transformations overall, Kotter (1995) outlines eight steps for managers to transform their organizations. Converted to common errors, they are as follows:

1) Not establishing a great enough sense of urgency
2) Not creating a powerful enough guiding coalition
3) Lacking a vision
4) Undercommunicating the vision "by a factor of ten"
5) Not removing obstacles to the new vision
6) Not systematically planning for and creating short-term wins
7) Declaring victory too soon
8) Not anchoring changes in the corporation's culture

Such an outline could be applied to an agile transformation since it contains no steps that would conflict with the agile values. Kotter's outline is strongly focused on people and culture, and is supportive of the necessity to shift organizational culture to ground changes. For example, the author stresses the importance of having top management role model cultural changes through actions and challenging hierarchical culture, stating: "If the existing hierarchy were working well, there would be no need for a major transformation" (Kotter, 1995, p. 4). Inclusivity is also recommended in agile transformation cases (Fry & Greene, 2007; Pikkarainen et al., 2012).

For the first stage, Kotter (1995) recommends establishing a sense of urgency. The organization should seek to share an understanding of the pressure to change yet maintain patience to perform long-lasting change. After this, the organization should build a "guiding coalition" with the authority, ability, and experience to commit significant changes. Following this, the guiding coalition should form a clear vision, communicate it vigorously, and remove impediments from the way of the vision as they emerge.

Applying these first five steps from Kotter's (1995) outline to agile transformations, the organization should first establish an acute reason for the change—an appropriate need for agility, as put by Sidky et al. (2007). The organization should then form a cross-functional roll-out team as described by Fry and Greene (2007). This team should form a strong vision for the intended agile future, which should then be communicated actively across the organization. The necessity of open communication is emphasized in agile transformations (Worley & Doolen, 2006).

Finally, this cross-functional roll-out team should then be ready to perform radical changes to drive forward the change, as was found necessary in the cases studied by Fuchs and Hess (2018). Impediments to the actualization of the vision should be removed actively regardless of whether the change is performed step by step or via a more revolutionary approach.

General organizational change management would appear to have elements that should be applicable to agile transformations as well. While a comprehensive agile transformation strategy continues to elude researchers, we may combine existing literature from agile researchers and practitioners

with the same from the field of organizational change management to approach this complex topic.

4 Methods

In this chapter, I introduce the scientific methods used in this study. The main approach was grounded theory, and I used methods triangulation to verify findings. Methods used for data collection comprised interviews, observations, company data, coding, and a verification workshop. Each method is explained in its own sub-chapter.

In total, the research involved 94 unique subjects and approximately 108 hours of study on these subjects. Figure 1 below shows the approximate timing of the research activities.

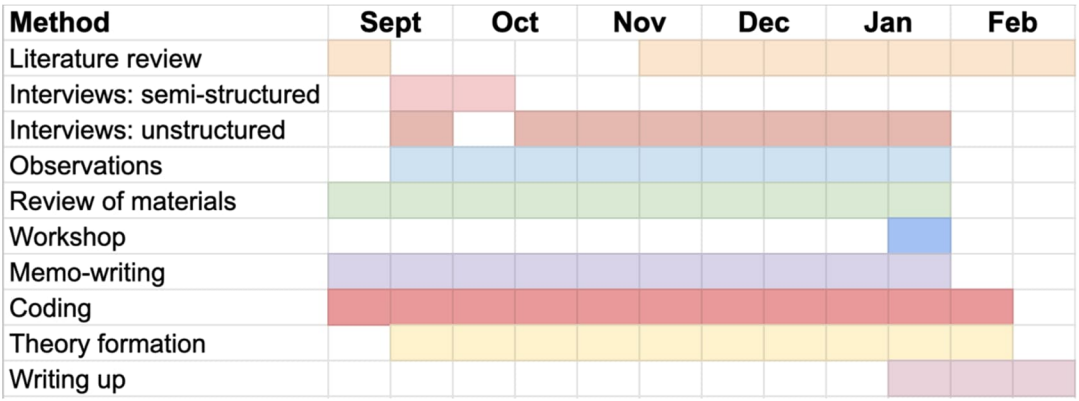

Figure 1: Timing of research activities

As Figure 1 shows, the data collection phase lasted for five months, followed by a month of finalizing the theory and writing this thesis. Coding and classifying the notes was the longest-lasting activity as I continued to polish the classification of findings as will be explained in chapter 4.6 Coding and classification.

4.1 Grounded theory

This study was approached through grounded theory. Following this method, the researcher formulates theory based on emerging data, comparing and contrasting it with new data to alter the theory as it is proven and disproven (Glaser & Strauss, 2017).

Dunne (2011) describes the three different schools of grounded theorists pertaining to the role and place of the literature review. While some argue for the need to enter the field with a blank mind, others prefer thorough literature review beforehand, and the third school seeks a middle ground.

Due to a pivot in topic, the initial literature review for this study was limited. I had originally intended to study virtual team building with the agile teams through action research and keep an eye on the transformation out of

curiosity. To this end, I read extensively on virtual teams and team building, and only reviewed a few studies on agile transformations.

I conducted more literature review during data collection to form a better understanding of the field. Towards the end of data collection, I put more emphasis on reading to polish the forming theory. This approach falls into the third school of grounded theory, where the field is entered with a loose understanding and more information collected during the study to understand emerging phenomena (Dunne, 2011).

4.1.1 Suitability

Grounded theory was created for the study of sociology (Glaser & Strauss, 2017); societal and human behavior. Since agile methodologies rely on human centrism, this supports grounded theory as a suitable means for studying the environment surrounding them and the transformation to using them. Though IT infrastructure maintenance does not fall into the realm of social sciences, I argue that managing people under human-centric methods does.

In addition, grounded theory has been used successfully in previous studies. It is the approach taken by Gandomani et al. (2013a; 2013b) and was used in a similar context to mine by Jovanović et al. (2017). The latter authors studied the causes and consequences of inadequate transition of organizational roles during agile transformation, which is comparable to my seeking of causes and consequences of issues emerging during the same.

4.2 Triangulation

In triangulation findings are verified and validated by comparing between different methods, different sources within the same method, different analysts, or different theories (Patton, 1999, p. 1193). I used all forms of triangulation, and three are described here: methods, sources, and theories triangulation. Analyst triangulation, was conducted through a verification workshop and is described in its own sub-chapter 4.7 Verification workshop.

Methods triangulation means contrasting data collected with one method with data gathered via other methods. For this study, it often meant comparing observed behavior with direct statements and survey data. For example, the lack of training was observable in the lack of following Scrum basics, was complained about by team members in interviews, and showed in training satisfaction surveys.

This system of validation is not perfect, as some issues might only produce one sort of data or arise in unexpected ways, which would not be caught by the analyst (Olsen, 2004). However, my mission was to find issues in the agile system created and used by individuals with limited knowledge of agile, especially its large-scale application. The data gathered from sources had often

already been processed and analyzed by the individuals themselves using this limited knowledge. Therefore, I had to be careful not to base my theory on direct statements, which could be based on misunderstandings.

For example, some individuals complained that the new tool should not have been introduced at the same time with the new management method. I was unable to find evidence that the tool would have caused a serious barrier to the adoption of agile, though it was evidently difficult to use. The teams overcame these tool troubles after additional training, and literature suggests that using agile practices—as forced by the tool—can be an effective way of learning agile principles (Eilers et al., 2020). Therefore, this issue was caught by observations and literature review and did not pass the triangulation check.

Triangulation of sources was more straightforward. I collected data from 77 individuals, and to ascertain the spread of issues in the pilot, I waited to see an issue emerge in more than one pilot team. To understand what was specific to the service delivery department and what was common for the company, I collected some data from other departments.

To allow for different theories, I collected data from different contexts. I studied individuals in various types of environments, such as formal and informal, solo and group settings, and with and without their direct superiors present. Had it been possible, I would have preferred to compare virtual observations with live observations, but the pandemic restrictions did not allow for this.

More theory triangulation emerged as a natural consequence of grounded theory study, which calls for comparing emerging theory with data in efforts of improving the theory (Glaser & Strauss, 2017). As a practical example, an individual not following agile practices may be exhibiting behavioral change resistance, or they may not have been taught the practice, or they simply may have forgotten it.

4.3 Interviews

I conducted both unstructured and semi-structured interviews during this study. Semi-structured interviews were beneficial at the beginning of the data collection phase, whereas unstructured interviews helped uncover more information during the active phase. In total, I interviewed 14 unique subjects and accumulated a total of 26 hours of interviews across the two sub-methods.

4.3.1 Unstructured interviews

Throughout the study, I held unstructured probing interviews when the opportunity presented itself. At the beginning, probing questions were used to build the domain knowledge necessary for formulating more structured

questions, and later on to learn more when an interesting phenomenon emerged up during observations.

In unstructured interviews, the researcher follows the narration of the interview subject and poses questions based on their own reflections (Zhang & Wildemuth, 2009). Typically, the researcher identified key informants to use in later, deeper probing interviews (DiCicco-Bloom & Crabtree, 2006).

In total, I held unstructured interviews with 10 individuals, totaling 23 hours of interviews. Table 3 shows a summary of the subjects, interview types, and total durations with each subject.

Table 3: Summary of performed unstructured interviews.

Subject(s)	**Type**	**Total duration (h)**
Agile Delivery Lead (ADL)	Solo	4.5
Lead Agile Coach	Solo	3
3 pilot team SMEs	Group	0.2
Pilot team SME	Solo	0.3
Agile coach	Solo	5
Transformation unit member	Solo	4
Software testing dept. employee	Solo	2
Operations manager	Solo	2
2 middle-managers	Group	2

I performed five initial probing interviews to gain domain knowledge; thrice with the ADL, and twice with the Lead Agile Coach. Aside from one live meeting with the ADL, the interviews were conducted as audio calls on the video conferencing tool Microsoft Teams. The sessions lasted approximately 30 minutes each and thus totaled about 2.5 hours.

The subjects for these initial probing interviews were chosen based on their organizational proximity to me and their knowledge and visibility to the agile pilot. Both remained working closely with me throughout the research period and were later consulted with more probing questions.

It is difficult to estimate how many hours were spent in probing interviews. In the active live working environment, I had the opportunity to pose questions when they arose, and these discussions often formed into unstructured interviews.

The discussion with the team members was the briefest, the call lasting 15 minutes and the chat a further 20. I had several discussions with the agile coach, totaling over five hours' worth of probing questions. Similarly, with the member of the transformation unit, I held both short unstructured interviews and lengthier ones distributed throughout the data collection phase. The longer sessions totaled three hours of interviews.

The ADL and I worked closely together, and thus, the chances to pose probing questions were numerous. We spent approximately three further hours in a distinctly interview-like setting. Similarly, the Lead Agile Coach

and I had numerous meetings to exchange thoughts, of which approximately two hours were spent in an interview setting.

Furthermore, I probed three company employees from other departments to pose questions relating to the company as a whole. I held two individual two-hour interviews, one with an employee of the software testing department, and one with an operations manager of an unspecified department. In addition, I probed the operations manager and a member of the middle management in a two-hour group interview.

4.3.2 Semi-structured interviews

To gain initial insight into the agile pilot, I held five semi-structured interviews with members of the first pilot team. In such interviews, the researcher follows and outline but is able to deviate for clarifying or specifying questions (Longhurst, 2003).

The interviews were carried out online, as video calls via the conferencing tool Microsoft Teams. Each interview lasted between 25 and 50 minutes depending on the availability of the interviewee and totaled approximately 3 hours of interviews. The language of all interviews was Finnish.

Since I lacked direct contact with the team, I prepared an introductory video asking for volunteers and asked the team's Squad Lead to share it with the team. The video elicited no responses. Therefore, interviewees were chosen based on recommendations by others. I interviewed the three managerial figures of the team (Squad Lead, Scrum Master, and agile coach), and two SMEs who were recommended by the Squad Lead.

The original purpose of these interviews was to better understand the teams, in particular from the virtual team building angle. Hence, the interview questions were focused on virtualness and teamwork (See Appendix A) rather than the agile transformation.

4.3.3 Suitability of method

Unstructured interviews provided the most in-depth information. Subjects appeared more at ease than during semi-structured interviews and did not seem hesitant to reserve time for discussion, whereas requests for more structured interviews were met with some reluctance. The freeform style allowed exploring each subject's particular viewpoints and interests.

Of particular benefit was allowing subjects to reminisce on the way the company and department used to be and what changes it had seen in the past decade. This gave knowledge of past management methods and how those were rolled out and adopted. Interviewees drew connections between the old and the new, pointing out differences and similarities. One topic that repeatedly emerged during such reminiscence was the strong managerial culture, which had been heavily enforced in years past and caused the cessation of the

lean rollout. It was spontaneously brought up by five of the 10 unstructured interview subjects.

Through semi-structured interviews, I was able to gain valuable knowledge into the domain from the point of view of department employees at different levels of the hierarchy. I chose to interview members with different roles to learn about the team and the agile system from several viewpoints, and this proved successful. The Scrum Master and Squad Lead were able to describe the team as a whole, whereas team members provided more individual, personal information about their own ways of working. The agile coach discussed the agile system in use at the company and the department.

4.3.4 Limitations

Lengthier and more numerous semi-structured interviews would have yielded more data. However, I felt that taking more time from the SMEs would have been inappropriate since my intention was to study a team in its natural environment, and because such unbillable meetings were discouraged at the department.

The restricted subject base was another limitation of this method. The Squad Lead recommended SMEs to interview based on their openness and agreeableness; SMEs that she thought would be glad to share their opinions. Such an approach might result in the ruling-out of individuals with whom she did not personally get along, which could prevent the identification of team-level management issues. However, indicators for such issues could have emerged through other methods used during data collection, which alleviates the risk of bias.

Furthermore, the main purpose of the interviews was to learn more about the basic functionality of the teams and to connect with the members. The method proved beneficial for this purpose, and the subject base limitations did not appear to be a great hindrance. Instead, the main limitation of this research method was the short duration of the interviews.

The time was insufficient to both build rapport and go in-depth into the discussed topics. One interviewee emailed thoughts after the meeting, and another stayed overtime to finish the discussions. This suggests that longer interviews would have allowed been beneficial for the study.

In addition, both forms of interviews are limited by the abilities of the researcher affected by both their interviews skills and social skills (DiCicco-Bloom & Crabtree, 2006). Unstructured interviews in particular are limited by the social skills of the researcher, who must carry out a natural conversation while posing probing questions (Zhang & Wildemuth, 2009).

Interviews were clearly limited by the questions I realized to pose. This became evident when the initial interviews with the ADL and the Lead Agile Coach had failed to equip me with the information that the teams had always been mostly remote-working. Since agile practices advocate for face-to-face

meetings, I had assumed the teams were only temporarily remote due to the pandemic. I realized this mistake during semi-structured interviews with team members as my question about remote working practices elicited the revelation.

In addition, I felt that the initial interviews were limited by my skills in building rapport. Optimally, I would have liked to perform follow-up interviews towards the end of the study to see what responses I could get after spending five months with the teams. However, due to time constraints, these interviews were not performed.

4.4 Observations

Observations were the main source of data in this study. As a company employee, I attended numerous meetings between various stakeholders and took field notes of the meetings, which were later coded and classified (See chapter 4.6).

All observations were carried out virtually via the conferencing tool Microsoft Teams. Due to the privacy settings in use at the company, users could only see groups to which they had been added. Therefore, I could not visit the virtual workspaces of groups I was not a part of and the subjects of my observations were limited to individuals whose teams I joined, i.e. there was no emergent observation of individuals unaware of my role.

To combat the limitations of the subject base, the ADL granted me permission to view her virtual work calendar. This permitted me to request attending the ADL's meetings. Thanks to her key role in the transformation, this included the majority of the mid-level agile operations. In addition to this, I gained grass roots visibility into two teams. Thus, the subject base was composed of individuals who were involved in the agile transformation up to middle management level. The roles of these individuals are given in Table 4.

Table 4: Observed meetings.

Meeting description	**Occurrences**	**Duration per (h)**	**Total duration (h)**	**Attendees**
Pilot team news	17	0.5	8.5	6 managerial figures, ADL
Pilot team ceremonies	18	1	18	26 team SMEs, 6 managerial figures, 3 client representatives
Pilot teams' coaches' news	9	1	9	3 coaches, ADL

Agile coach community	4	2	8	13 coaches
Team trainings	6	2	12	Approx. 30 attendees, 2 training organizers
Team training planning	6	1	6	3 training organizers, ADL
Transformation unit meetings	8	1	8	6 transformation unit members
Agile rollout planning /discussions	4	1	4	5 middle/lower managers, ADL
Company lectures /communications	3	1	3	7 heads of departments
Company hangouts	3	2	6	Approx. 20 company employees

Table 4 shows the breakdown of the 10 groups whose meetings I observed. The meeting description gives the main purpose of the meeting. Occurrences are the number of times I attended the meetings. The durations for each meeting are given in hours. The total duration is the summed total of time spent observing the particular group. In the right-most column, the attendees are described by their roles.

Not all attendees were unique subjects. For example, the team coaches, in particular the Lead Agile Coach, attended several different meetings and are counted as attendees in each of them. In total, the observations included approximately 91 unique subjects in groups. There were in total 78 observation sessions, and the total time spent observing was 82.5 hours.

4.4.1 Description of groups

"Pilot team news" refers to weekly meetings held between the ADL and the Squad Lead, Scrum Master, and agile coach of actively practicing teams. Both teams had their own meetings, and each meeting lasted half an hour. The managerial figures would bring news from the team to the ADL, and the ADL could deliver news from the transformation unit.

"Pilot team ceremonies" were the Scrum ceremonies of the two active teams. I attended three dailies and one sprint retrospective of the first pilot team, and sprint planning, 11 dailies, sprint review, and two sprint retrospectives of the second team. The length of the dailies varied from 15 to 40 minutes, and sprint planning, review, and retrospectives lasted two hours. Thus, on average, the ceremonies lasted 1 hour. Attendees were the SMEs and the three managerial figures of each team. One team had one client

representative who attended all non-daily meetings, and the other had two who attended sprint plannings and reviews.

"Pilot teams' coaches' news" refers to a meeting I organized, where the agile coaches of all three pilot teams could exchange thoughts and news from their teams. The ADL attended to observe and could share news from the transformation unit with coaches whose teams did not yet have their own weekly news meetings. All three pilot team coaches participated and shared actively.

The agile coach community met once a month for a two-hour call. I attended four such calls during data collection. Attendees varied, but each meeting had approximately 13 coaches in attendance, three of whom were pilot team coaches. The Lead Agile Coach prepared the meetings and brought up topics to study and discuss, such as models and frameworks for coaching. All attendees could exchange thoughts at will, and the Lead Agile Coach invited some members to hold presentations.

"Team trainings" were the training sessions of the two new pilot teams. These were non-recurring meetings organized in one month, averaging one two-hour session per week. Approximately 50 SME-level employees were invited, of whom on average 30 attended each meeting. The Lead Agile Coach provided the training, and the ADL facilitated the meetings. The main meetings were divided into smaller groups for group discussions, after which results from each group were shared in the common call. I attended both the common calls and the small group discussions.

"Team training planning" refers to the sessions held to plan for team trainings and to prepare improvements to the training materials. The ADL attended all six of these, the Lead Agile Coach four. One was between the ADL and another coach, and the remaining one between the ADL and another internal training provider.

"Transformation unit meetings" were the recurring meetings of the transformation unit during its sprints. I attended two sprint plannings and six dailies. The transformation unit met three times per week; for one planning or retrospective and two "dailies". At the "daily" meetings, unit members discussed the transformation work and updated the others on their progress. I introduced topics from research based on timely topics or direct requests and observed the ensuing discussion. At sprint plannings, I observed the unit discuss and choose tasks for the beginning sprint.

"Agile rollout planning or discussion" meetings were held between the ADL and members of the middle or lower management. These managers were line supervisors of SMEs who were members of the pilot teams or were considered for future agile teams. In these meetings, the ADL explained the agile model and the managers could pose questions and suggestions. These meetings were organized as necessary and were non-recurring.

"Company lectures or communications" were informative sessions held by heads of departments. Audience members did not take active part in the

sessions. Such sessions included company on-boarding sessions and company-wide news sessions to keep employees up to date. I observed one session to which all company employees were invited, one for managers, and one for new recruits. The heads of departments included various functions from all around the department, such as product department, HR, legal, and finance.

"Company hangouts" were informal events held online weekly. Anyone from the company was free to join one of the calls to discuss hobbies or topical news. I attended three such sessions and observed in total approximately 20 employees taking active part in the discussion. Five of these attendees were members of the agile pilot. Such casual hangout sessions were useful for observing the culture of the company and building rapport with other employees.

4.4.2 Suitability and limitations

Observations appeared to be a suitable method for studying people in a live organizational setting. Being a daily part of the organization's transformation activities enabled me to gain what Olsen (2004, p. 608) calls "a 'feel' on the situation". This was especially beneficial for navigating the cultural aspects of the transformation.

However, the lack of video feed usage at the company hindered the use of this method. Without visual cues, I was limited to assessing direct statements. I could not, for example, identify change resistance out of body language or facial expressions. Instead, I relied on the statements themselves, tonality of voice, word choices, and other such cues that could be passed on in audio-only calls.

My observations were also skewed towards members of lower and middle management and one pilot team. I gained limited direct access to another pilot team but was not able to study them as freely as the other team. In addition, I never gained grassroots access to the third pilot team and could only observe its managerial figures. However, I had observed the SMEs of the team during training.

4.5 Company data and surveys

Some company data and surveys were shared with me and gave additional insight into the company overall and the individual teams. I was able to view the organizational chart at will to understand the positions of individuals involved in the pilot and study. I could also view materials sent to clients to describe the agile model, which was beneficial for understanding the intended agile system.

In addition, I could view the feedback and ratings from the two new teams' training sessions. The survey was performed online on the survey platform

Sli.do and answers were anonymous. Attendees were asked for a star rating from one to five on how well the training had matched their expectations and could afterwards provide free-form text feedback.

More surveys were performed by the agile coaches of the pilot teams. The coaches of the two active pilot teams measured their teams on different scales and metrics. One created a 17-item 5-point scale instrument to measure different agile aspects of the team, such as the relevancy of ceremonies, and team motivation. The other coach used a 4-item 10-point scale instrument focused on psychological safety and shared understanding. Both coaches shared results from their surveys. This was highly beneficial for understanding the self-perceived progress of the teams.

4.6 Coding and classification

Raw data was collected as unstructured field notes, then grouped and coded in ATLAS.ti, a software designed for grouping and mapping out data and their relations. Specific observations were grouped into 63 more strict generalizations, referred to hereafter as “Symptoms”.

The root causes for symptoms were identified from observations and interviews. Many of these had thematic similarities, which were grouped to broader concepts. From these, I derived the parent “Problems” of the symptoms. Problems were the direct causes of symptoms and were issues which the transformation unit could address on its own.

By further grouping and conceptualizing problems, I identified company-level issues termed as “Challenges”. These were broader, more deep-rooted issues which the transformation unit or department could not address on its own.

During the analysis, sometimes an issue without a company level solution would present itself. These fundamental issues were given their own category: the “Domain factor” level. Domain factors are issues which cause difficulties but cannot be altered in the present.

This gives a structured hierarchy—a directed graph—of the origin of symptoms. Domain factor issues result in challenges, challenges create problems, and problems present themselves through symptoms. Partially increasing the difficulty of the analysis, some issues had clear overlaps: for example, the problems “Other functions limiting pilot” and “Talent resourcing issues” were hard to distinguish and contributed to the severity of one another. Hypothetically in such a case, resolving one of the issues could result in the other one resolving.

This suggests inter-level dependencies. These inter-level dependencies were at first included in the analyses and in the produced graphs. However, this degraded the legibility and understanding of the causality of symptoms. It proved beneficial to leave these out, keeping in mind that everything is

inter-linked, and solving an issue in one area may result in the resolution of issues in another unlinked portion of the graph.

To further increase the legibility of the produced graphs, certain problems were demoted to symptoms. In such cases, the potential problem was the direct cause of symptoms, but was itself clearly caused by other problems, which had highly overlapping symptoms. One option was to promote the parent problems to challenges, and another to demote the potential problem to a symptom. I chose the latter approach when the parent problems were caused by company-wide issues, i.e. challenges, and would have been inappropriate at the higher level.

Coding issues by this method is not perfectly accurate due to the interdependencies between issues. Rather, its aim as an intuitive tool is to aid in the analysis of issues, and to help discover root causes for symptoms. In addition, it was designed to provide guidance for the department on where to target improvement efforts.

4.6.1 Limitations

Naturally, with a problem as complex as the management of a department, the root causes behind the issues are not as simple as a three-level categorization system makes them appear. The challenges are broad and affect much of the domain, and addressing some of the problems could be argued to address most of the challenges. The visual presentation of the case-consequence analysis (See Appendix B) is especially simplified and does not show the effects of same-level issues on one another.

The coding and conceptualization of data was particularly limited by the inability to use another analyst for triangulation in this thesis study. All codes are based on one researcher's understanding and therefore affected by their biases. Having another analyst code and conceptualize data would have granted another viewpoint. Due to this being a thesis and thereby solo research by nature, involving another analyst was not an option.

Another source of limitations for this method were the manually taken field notes. Transcribing only the generalizations to ATLAS.ti separated the symptoms from the raw data at an early stage of theory formation. Though I could and did refer back to notes for context, this may have limited the pool of alternative theories and viewpoints to consider.

4.7 Verification workshop

Patton (1999) proposes conducting analyst triangulation of findings by showing the results of the study to its subjects or the intended users of its results. I attempted both by organizing a workshop and inviting relevant internal actors to seek verification and validation for the results.

At the end of January, I organized a virtual presentation-workshop to share my preliminary theory and seek opinions from the attendees. The workshop was held in a conference call on Microsoft Teams in January 2022. The workshop lasted for 2.5 hours and was not recorded or transcribed to protect the anonymity of attendees.

I emailed invitations a week in advance to the managerial figures of all three pilot teams, the transformation unit, four outspoken company employees with varying backgrounds, the head of service delivery, and the director of the company. The latter two were invited as a courtesy and were known not to be able to attend. In addition, the ADL attended in her dual role as a member of the transformation unit and as an unofficial advisor of this thesis. She was aware of the results before their publication and worked closely with me during this study. Hence, her input is not counted among the validating remarks mentioned in the upcoming chapters.

12 individuals attended the workshop. One of these was a member of the transformation unit, seven were managerial figures of pilot teams with representation from each team, and three were other employees known to take active part in discussions about organizational change. Two of them were from the service delivery department, and the third was connected with preparations for a fourth agile team.

I began the workshop by outlining the study and presenting each of the identified problems, challenges, and domain factors. I then gave examples of the cause and consequence trees of problems and challenges similarly to what is shown for challenges in chapter 5.2.

Next, the attendees were requested for their own opinions on faced difficulties and where they think those might originate. I explained that disagreeing with the presented analysis would not pose a risk to my research or graduation. The attendees self-organized to using the raise hand feature of Microsoft Teams to request a turn to speak.

After a 30-minute discussion, I had scheduled a 10-minute break. This was postponed by attendees' request due to active discussion, and was ultimately never held. The workshop progressed to validating the theoretical framework presented in chapter 7. I invited attendees to discuss what they think should be done next regarding the transformation. After discussion died down, I presented the theoretical framework, after which discussion continued.

The workshop served to verify identified problems and parts of the theoretical framework but did not provide validation for the cause-consequence links, or the existence of challenges and domain factors. The attendees were eager to use the opportunity to discuss problems and what should be done about them. Six problems were expanded upon: "Culture unsupportive of agile", "Lack of appropriate training", "Lack of open communication", "Lack of top management engagement", "Other functions limiting pilot", and "Talent resourcing issues".

In hindsight, this workshop was the first organized opportunity for the managerial figures of all three pilot teams to come together and exchange views. Throughout the workshop, the attendees' comments highlighted a need to be heard by the transformation unit, which was in low attendance.

The workshop provided insight into the cultural environment of the department and served as a platform for communication between teams. I would recommend a similar approach to other employees of organizations undergoing agile transformation.

5 Identified issues

This chapter introduces the identified issues following the classification system outlined in the Methods chapter. First, I give background on the domain factors, followed by explanations of the challenges, finally narrowing down the difficulties into distinct problems. Manifested symptoms are discussed in conjunction with relevant problems. In this chapter, I explain how the phenomena arose, the relations between them, and how they showed at the department. Major symptoms are examined closer in chapter 6 Discussion.

5.1 Domain factors

I identified three domain factors which appeared to be the root-cause of the experienced difficulties. In alphabetical order, these are: "Agile misunderstood as solely a management method", "Atypical scrum application domain", and "Previous culture incompatible with agile".

These domain factors are facts of the case that were unchangeable by the time this study was begun and are not "incorrect" or problematic by nature. For example, the domain factor of the previous culture having been incompatible with the newly brought-in agile ways was a fact that caused difficulties but could not be changed in the present moment.

5.1.1 Agile misunderstood as solely a management method

Scaling agile requires changes not only at team level, but for the whole organization. It typically involves changes to organizational structures (Benefield, 2008, Pikkarainen et al, 2012), culture (Tolfo et al., 2011), and governance methods (Wysocki, 2010). Not adapting other functions and management causes difficulties and may ultimately lead to the transformation being limited to team level (Dikert et al., 2016). Gandomani et al. (2013a) call for the creation of and andherence to a proper change management strategy to perform an agile transformation.

The case department initially understood agile to be a management method that could be applied over pre-existing structures with limited changes. When I introduced the topic of agile culture, transformation unit members in close contact with top management of the department expressed surprise, doubt, and ultimately fright at the scale of required changes.

In addition, the department's thought that individual team members could simultaneously work in agile and non-agile teams suggests that agile was thought to be a light process. The department did not realize the necessity of cross-functional teams and applied agile over existing team structures.

The department had limited large-scale agile awareness and capabilities, which likely led to these misunderstandings. The unit and management were

not trained in agile, and top management was far removed from the agile pilot, with no direct line of sight into it. Agile was already in use at other departments within the company, which appears to have fueled the misconception that agile could be practiced in silos without requiring changes to other functions, since such an approach was reportedly in use at these departments.

Because the true scale of an agile transformation was not understood, the studied pilot was not initially treated as an agile pilot, but rather as the first step to the full-scale roll-out of the new method. Hence, the pilot was not constructed to provide information to tailor the methodology and approach before expansion, as will be discussed in detail in chapter 5.2.8 Small-scale transformation strategy.

When I brought significant issues to the attention of the transformation unit, these were reported further to the top management, who explicitly stated that the expansion of agile was to be continued indefinitely. Thus, no changes were made to surrounding structures despite the identification of impediments. The pilot lacked a duration, one of the key elements of an agile pilot (Gandomani et al., 2013b).

The resulting rapid roll-out risked expanding agile practices unsustainably, causing issues particularly with the training and coaching of the teams, as had been reported from other quickly expanding agile transformations (Benefield, 2008). Organizational issues faced by the agile pilot were not addressed, which led to the teams self-organizing in sub-optimal ways to overcome the acute challenges and adapt to the surrounding non-agile environment.

This posed further risks for the transformation as the teams' self-organization alleviated their experienced issues, which caused the teams to cease complaining. This in turns perpetuated a false image that all was well and that no changes were necessary. Furthermore, as the pilot was widely known in the department, rumors about its difficulties spread. Such negative rumors could potentially undermine the on-going transformation (Richardson & Denton, 1996).

Preventing this domain factor appears to be unexpectedly difficult. Since the decision-makers possessed limited agile knowledge, they were unable to diagnose shortcomings in their own agile knowledge, and misunderstandings went undetected. Furthermore, the external consultancy hired to help with the early stages of planning the transformation appears to have been unable to provide appropriate aid.

The consultancy was held in high regard at the company, and key actors of the transformation trusted their approach despite discussing its shortcomings. Since the department lacked strong scaled agile knowledge and skills, it fully relied on this external source. Since the consultancy did not specialize in agile transformations, it may not have been prepared to act as the sole

source of information for a change of this scale. The combination of these factors appears to have led to the emergence of this domain factor.

5.1.2 Atypical Scrum application domain

The type of work, the composition of the team, and its working practices were atypical for Scrum. Scrum was created for software development and is based on prioritization, incremental work, and inspection and adjusting (Schwaber & Sutherland, 2020a, p. 3), which is difficult to adapt and often poorly suited to maintenance operations (Svensson & Host, 2005; Heeager & Rose, 2015). This is particularly concerning as the suitability of agile methods can be a barrier to agile transformation (Fuchs & Hess, 2018).

The studied teams could rarely break their work into iterations and increments. Maintenance of IT infrastructure, such as updating databases, is difficult to break down to components. The other side of the work, unexpected issues, cannot be scheduled into sprints and must be completed fully and swiftly to avoid serious consequences.

Difficulties also arose in the overall applicability of broader agile, as several of the 12 agile principles (Beck et al., 2001b) could not be applied due to their software-centricity. As the teams were not creating anything new but rather maintaining what already existed, such principles were difficult to adapt and follow.

Furthermore, the principles advocate for face-to-face meetings, which could not be organized with remote teams during the pandemic. Dikert et al. (2016) recognize the difficulties of reorganizing physical spaces as a challenge in agile transformations, and Sidky et al. (2007) call for frequent face-to-face meetings for a team to reach the third, “effective” level of agility. Of the three studied teams, only one was able to meet face-to-face during a short period of laxed restrictions.

Combined with the fundamental misunderstandings about agile, the atypical domain led to heavily altered Scrum, which was forced to fit into pre-existing organizational processes and structures. Creating Scrum teams for clients within strict silos and heavy hierarchy caused the teams to be lacking in self-organizational capabilities and cross-functionality. This issue was further exasperated by safety and security -critical compliance requirements.

However, despite being atypical for Scrum, the agile application domain of the teams was not unique. In his survey of 190 agile teams, Ambler (2017) found that 71% of agile teams are geographically co-located to some extent, 96% are not fully cross-functional, and 67% are restricted by compliance factors. Agile transformations have been carried out at companies facing similar difficulties, such as a pharmaceutical company (Lilja et al., 2021).

While introducing agile to maintenance operations has been found difficult (Svensson & Host, 2005), it should be possible with careful tailoring

(Heeager & Rose, 2015). Therefore, the atypical domain is not wrong by itself, though it caused challenges and problems.

5.1.3 Previous culture incompatible with agile

Agile culture differs significantly from traditional organizational culture, (Tolfo et al., 2011) and shifting mindsets to it is a considerable difficulty in agile transformations (Gandomani & Nafchi, 2016). De Smet et al. (2018) argue it to be the greatest barrier to a successful transformation. The difficulty is not only in learning a new methodology and its associated mindset, but also letting go of the past ones (Koutsikouri et al., 2020).

The studied company had previously had a strictly hierarchical culture, and the hierarchy was remained prominent at the service delivery department. Employees noted the hierarchical culture as one of the main difficulties of the transformation. Combined with the atypical domain for Scrum, it led to an unfavorable environment for agile, in which decisions and communication followed a chain of command.

The great difference between the traditional culture and agile values appeared to be a source of change resistance. Employees compared and contrasted between the old and the new and criticized shortcomings and difficulties of agile, and on occasion questioned the need of changing what was already working. Many employees had worked in the same traditionally managed way for several decades.

This change resistance was made worse by the lack of top management engagement. In part due to mistaking agile for only a management process, management remained in the traditional model. Top management, while reportedly verbally stating support for the agile pilot, did not role model the cultural change. Employees expressed uncertainty about the true level of support for agile values, and they feared they would be personally blamed for potential poor performance of their teams.

In addition, team members could not entirely let go of the previous mindset and transition to fully agile working since they were also part of several other, non-agile teams. Koutsikouri et al. (2020) describe employees' agile transformation as a three-stage process. The studied pilot teams could not reach the final stage of "letting go of legacy" and were seemingly stuck on the second stage, "practicing with peers". Even the first pilot team had not reached the stage of letting go of legacy, though they exhibited signs of what the authors call "the employees' desire for the change to be 'over'".

Sidky et al. (2007) view lack of top management engagement as a discontinuing factor; a reason to cease attempting an agile transformation. While incompatible company culture and the resulting non-agile mindset in management form a significant barrier to agile transformation (Dikert et al., 2016; Fuchs & Hess, 2018), I argue that companies with incompatbile

cultures ought not view the culture as an unscalable obstacle, lest they never attempt change.

The department had previously attempted a change to lean culture, and the decision-makers of the department were generally eager to take action to change the persistent culture. Criticism of the hierarchical structure was well-received by the transformation unit, and the company as a whole sought to bring in new talent and thoughts to engage in positive change; members across the local company expressed delight at my involvement.

Therefore, I advocate for viewing the lack of pre-existing agile culture and activism not as a challenge or problem, but as a domain factor. It causes issues down the line, but in itself it is an unchangeable fact of life. Agile culture cannot be made to pre-exist before the current point in time, but it can be created in the present for the future.

5.2 Challenges

Challenges are children of domain factors and parents of problems. They are intended to be company-level issues, which would require notable effort and/or resources to overcome. They are not necessarily wrong by themselves but are what made the transformation difficult—or indeed challenging.

For example, the challenge of the small-scale transformation strategy applied at the department caused several problems but changing it would require creating a new, wider strategy at company level and granting the department additional funds. Its child problems, however, could be alleviated at department level by, for example, re-directing existing funds. This, in essence, is the distinction between challenges and problems.

In this sub-chapter, I present the nine challenges I identified to be the cause of departmental problems. Each challenge is discussed in relation to its parent domain factor(s) and child problems. I use diagrams generated with the qualitative analysis software ATLAS.ti to visualize these causations. In each diagram, the discussed challenge is orange in the middle of the image, with its parent domain factor(s) above it in yellow, and child problems below it in red.

5.2.1 Agile values difficult to adopt

If the agile values described earlier in chapter 3.1. Agile methodologies are not an existing part of the company culture, they are notoriously difficult to adopt not only because new values must be learned, but because old ones must be let go of (Gandomani & Nafchi, 2016; Koutsikouri et al., 2020).

Tolfo et al. (2011) argue that organizational culture consists of both formal and visible aspects, and invisible and informal ones. The authors find that a disconnection between the surface level artifacts and the deeper, underlying

assumptions of culture poses challenges to agile transformation, and if the cultural values differ greatly, agile culture may be rejected.

The values of the studied department greatly differed from agile values. The culture was strongly managerial and hierarchical and focused on controlled processes. Though the organization as a whole stated trust and innovation among its values, these were not typically exhibited at the studied department. Rather, focus was on customer-centricity and stability, which rendered employees reluctant to try new things that might pose risks to reliable delivery.

Though the acceptance of agile values generally poses difficulties, in the case of the studied department, the experienced difficulties were heightened by the contrast between new agile culture and the pre-existing one. Hence, the source of this challenge was the previous culture, as shown in Figure 2.

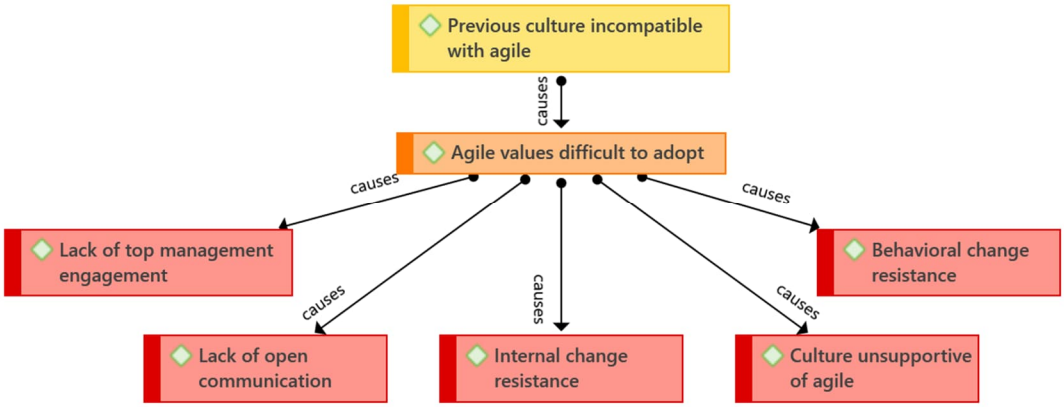

Figure 2: Causation graph of the challenge "Agile values difficult to adopt".

The challenge of adopting agile values led to problems with behavioral change resistance, and internal change resistance as individuals rejected the changes. In addition, the difficulty of introducing these new ideas resulted in the culture remaining unsupportive of agile. It also resulted in the lack of open communication and top management engagement which are fundamental to agile and organizational change in general, as established earlier.

Addressing this challenge would require company-level effort and resources as it could involve top executive engagement or investing in the creation of and adherence to new values. Therefore, from the perspective of a single department, the difficulty of adopting agile values remains a challenge.

5.2.2 Challenges adjusting to incremental delivery pace

Maintenance operations are not naturally incremental, and thus pose challenges for the application of increment-centered methods such as Scrum (Heeager & Rose, 2015). This challenge is named after the one described by

Dikert et al. (2016), who explained how incremental delivery of software caused challenges for designers.

The studied department faced several difficulties with the move to incremental delivery. Since the organizational structures had not been changed, agile was being used by traditional maintenance teams. In such teams, cross-functionality is often limited and members complete tasks individually with little cooperation (Heeager & Rose, 2015). Thus, the source of the challenge was both the fundamental misunderstanding about agile, and the atypical domain, as shown in Figure 3.

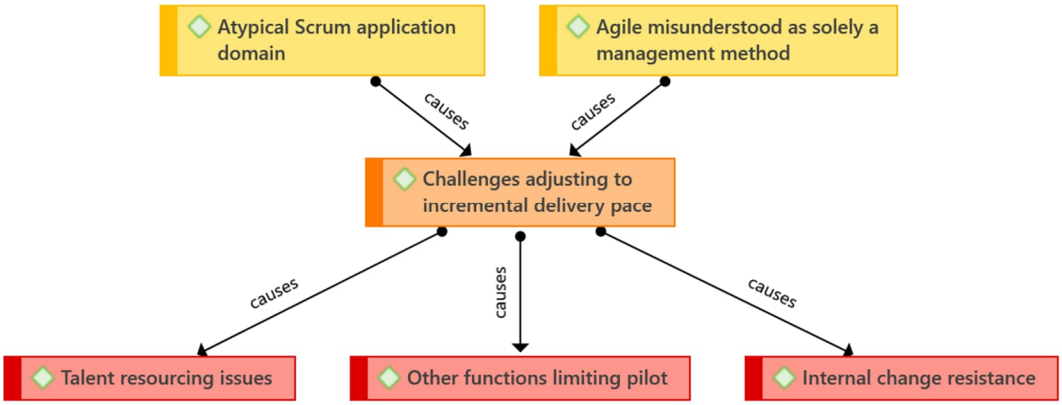

Figure 3: Causation graph of the challenge "Challenges adjusting to incremental delivery pace".

The challenges adjusting to incremental delivery pace caused team members to be involved in numerous teams at once, since they did work for several clients at once but agile teams were made client-specific. This restricted the teams' access to required talent, since they on occasion required support from colleagues outside the agile teams. This, combined with requiring updated documentation, led to other functions limiting the pilot.

This challenge and its child problems were the most common source of internal change resistance voiced by the SMEs. They were highly doubtful of the fit of incremental methods and directly stated this at team retrospectives. Similarly, non-agile client representatives found it difficult to adjust to the new incremental pace, which created skepticism in some of them.

5.2.3 Change resistance

Change resistance is a common issue in large-scale agile transformations (Dikert et al., 2016). Resistance to organizational change is a complex phenomenon and should not be dismissed, as resistant reactions may stem from true issues (Piderit, 2000). The acceptance of agile methodologies in particular has been found to depend on a host of other factors linked to, for example, sufficiency of training (Chan & Thong, 2009).

With change resistance, I mean individuals' reluctance to change the ways they work, their mindset, or their organization. In some cases, this showed as a passive resistance where employees were not receptive of proposed changes, and in others as actively protesting against the changes.

Piderit (2000) argues for considering the intentions behind resistance to change, stressing that blaming the resistant individual ignores the true source of the resistance. This is why I view change resistance as a challenge rather than a problem; it is natural to be averse of things you believe would cause negative outcomes. Since the previous culture at the department viewed change with caution, change resistance should be expected. This is shown in Figure 4.

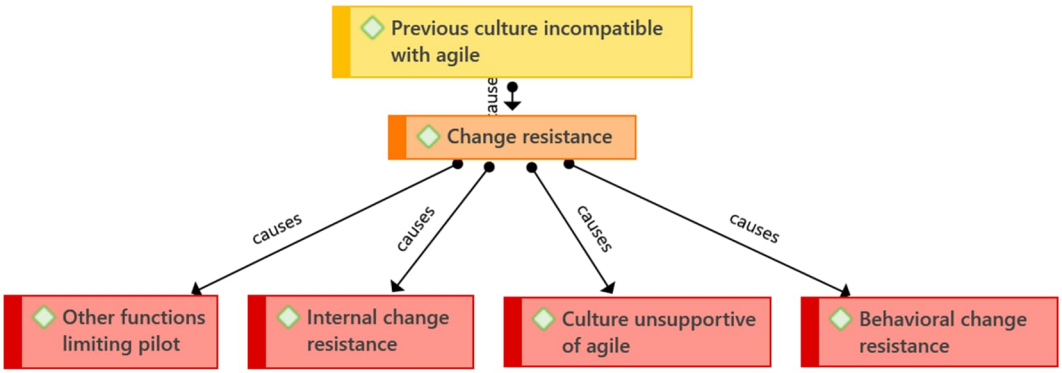

Figure 4: Causation graph of the challenge "Change resistance".

However, natural change resistance caused problems with manifested symptoms. While general caution is not a problem, its severe forms can become problematic. Piderit (2000) divides change resistance into three dimensions: emotional, cognitive, and intentional.

Similarly, I view behavioral change resistance as a separate issue from internal resistance, as their implication are different at departmental level. Behavioral change resistance may manifest in individuals actively defying management, whereas the other forms of resistance may be dealt with professionally as disagreements.

Likely due to some form of change resistance, other functions surrounding the agile pilot, such as sales or resource handling, were reluctant to change and caused hindrance on the agile pilot. Though organizational restructuring had not been planned and other functions had not been expected to require changes, I argue that without change resistance, these other functions would have willingly attempted changes once issues began to emerge in their integration with the agile teams. This will be explored later.

5.2.4 Concerns of critical requirements

High level requirements engineering can be challenging in agile methodologies, which are light on planning (Dikert et al., 2016). Furthermore, Scrum advocates for only light documentation (Schwaber & Sutherland, 2020a), which often conflict with the traditional approach to maintenance operations (Heeager & Rose, 2015). In fields where bureaucracy is mandated, the adoption of agile methodologies poses additional challenges for teams (Hajjdiab & Taleb, 2011).

The clients of all three studied teams were in safety and security -critical fields and thus had several critical requirements. All team members underwent security clearance by the home company and had to be individually accepted by the client organization.

Difficulties arose when Scrum was applied in this environment. Scrum was misunderstood to ban long-term planning and documentation entirely, which led to team members and managers voicing concerns over the fulfillment of critical requirements and adherence to laws and regulations. The atypical domain for Scrum appeared to have been at the foundation of this difficulty.

In addition, the strongly command-and-control managerial style applied under traditional culture appeared to cause management to be hesitant to trust agile teams with critical requirements. These domain factors are shown in Figure 5.

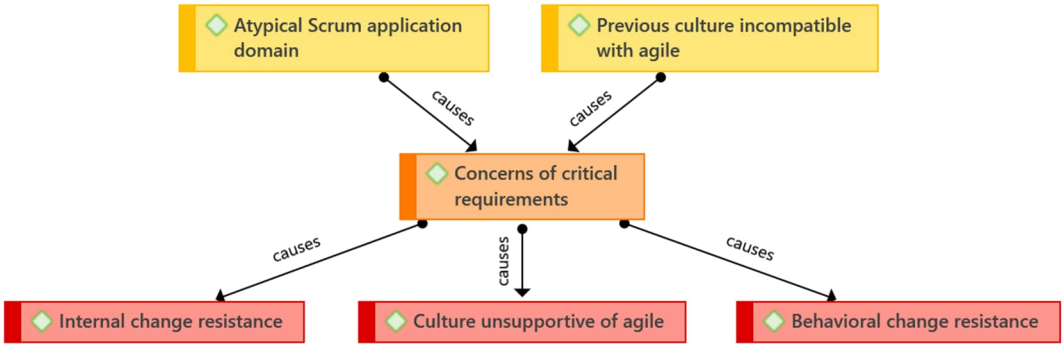

Figure 5: Causation graph of the challenge "Concerns of critical requirements".

When teams were not convinced agile practices could replace traditional methods, they continued to follow old ways by, for example, producing unnecessary documentation. This was a form of change resistance when the teams refused to explore other possibilities.

Moreover, the same mandates naturally limited team autonomy, which in itself was not a problem. However, managers, whose job it was to ensure the mandates were followed, often expressed skepticism about the fulfillment of

the requirements in agile methods and were reluctant to trust team members to fulfill them without supervision.

This internal resistance caused behavioral change resistance in the form of managers restricting team autonomy despite stating they were aware they ought not do so according to Scrum. Team autonomy is a vital aspect of agile, and the lack of it was a way in which the culture was unsupportive of agile.

Through these links, concerns of critical requirements caused other functions to limit the pilot. Creating documentation tied up time from team members. Ultimately, managers of the department were hesitant to alter organizational structures out of concerns for the meeting of critical requirements; each client had to have access to specialized talent in case of emergencies. This in turn led to talent resourcing issues.

5.2.5 Difficulties finding the right people

This challenge is named after a barrier discovered by Fuchs and Hess (2018), who discovered that "Difficult selection of the right people" could become a barrier to agile transformation.

The engagement of change leaders and people already supportive of agile is recognized as a success factor in agile transformations (Dikert et al., 2016), and studies report the importance of quality coaching (Benefield, 2008; Gandomani et al., 2013a), Product Owner engagement (Gandomani et al., 2013a; Fry & Greene, 2007; Jovanović et al., 2017), and cross-functional teams (Fry & Greene, 2007; Gandomani et al. 2013b).

The difficulties of finding the right people manifested as filling roles with people who were not optimally suited for them. This meant, for example, the inclusion of individuals championing their own agenda, and being unable to fill teams with members who would be eager to try the new method.

Because the scale of agile transformation had not been fully understood, the importance of finding the right people had not been realized. The transformation unit had initially attempted to select the right people to be involved with the transformation, but since the scale was underestimated, this selection was not done as carefully. The unit realized this when the negative effects of sub-optimal people selection were becoming evident and began corrective maneuvers.

Further difficulties for the selection were caused by internal silos and the hierarchical company culture. The transformation unit had low visibility across departments, which hindered the engagement of agile talent from other departments. In addition, the culture made it difficult to involve potentially suitable people, since internal developmental work was not seen as a high priority and the addition of human resources required acceptance from line managers. In this way, the difficulty of finding the right people was caused by the misunderstanding about agile and the previous culture, as shown in Figure 6.

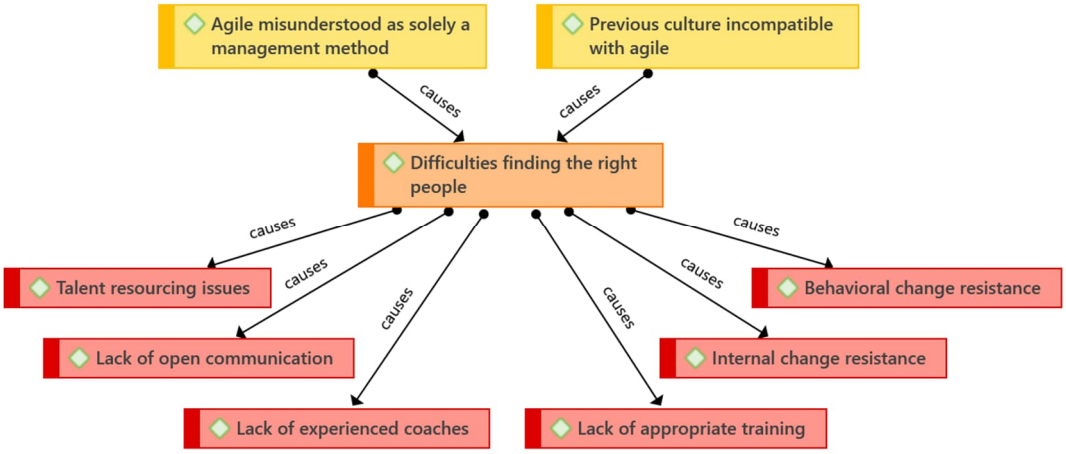

Figure 6: Causation graph of the challenge "Difficulties finding the right people".

This challenge caused a myriad of problems. For a lack of options, coaches for pilot teams were selected from a pool of eager but inexperienced coaches. Similarly, the inability to find an experienced trainer internally led to the lack of appropriate training. The inclusion of reluctant individuals in teams led to both forms of change resistance. Personal tendencies of members of the transformation unit caused or significantly contributed to the issue with lacking open communication.

SME members of the pilot teams were chosen based on their time allocation with the pilot clients, rather than personality factors or attitudes towards agile. The difficulty of finding SMEs with full or nearly full allocation with the clients resulted in talent resourcing issues.

5.2.6 Highly customized Scrum

Poor customization of agile methodologies is a challenge in agile transformations (Dikert et al., 2016; Fuchs & Hess, 2018). However, large-scale agile transformation studies and case reports simultaneously advocate for customizing agile methodologies to suit the needs of the company (Conboy & Carroll, 2019; Dikert et al., 2016; Lilja et al., 2021).

Scrum was highly customized to suit the work carried out by the teams and to conform to existing organizational structures. This high level of customization of Scrum showed for example in the addition of the Squad Lead role, which combined the responsibilities of a Scrum Master and Product Owner. In addition, though the teams adopted sprints and Scrum ceremonies, they did not divide their work into smaller, incremental deliverables.

Furthermore, one team reduced the amount of daily stand-up meetings from 5 to 3 per week. The Scrum Guide warns against leaving out ceremonies

as this could limit the benefits of Scrum or render it useless (Schwaber & Sutherland, 2020a, p. 1), and tampering with Scrum ceremonies criticized and warned against by agile practitioners (Lilja et al., 2021).

However, Pauly et al. (2015) found that some teams claim to benefit from altering the daily stand-up practice of Scrum, and though the authors remained critical of this approach, they acknowledged the contentment of the teams. Customization of agile practices has been found especially critical in maintenance operations (Svensson & Host, 2005). Therefore, it is difficult to say what amount of customization was necessary and beneficial, and what stemmed from misunderstandings and caused problems.

I view the high level of customization as a challenge since it has not been conclusively proven that the Scrum framework cannot be altered beneficially, but the observed approach caused clear problems. This customization approach was a seemingly inevitable result of mixing atypical domain and misunderstandings about agile. Scrum was a poor fit in its pure form, but when the customizations were made with limited awareness of the consequences, confusion and problems arose, as shown in Figure 7.

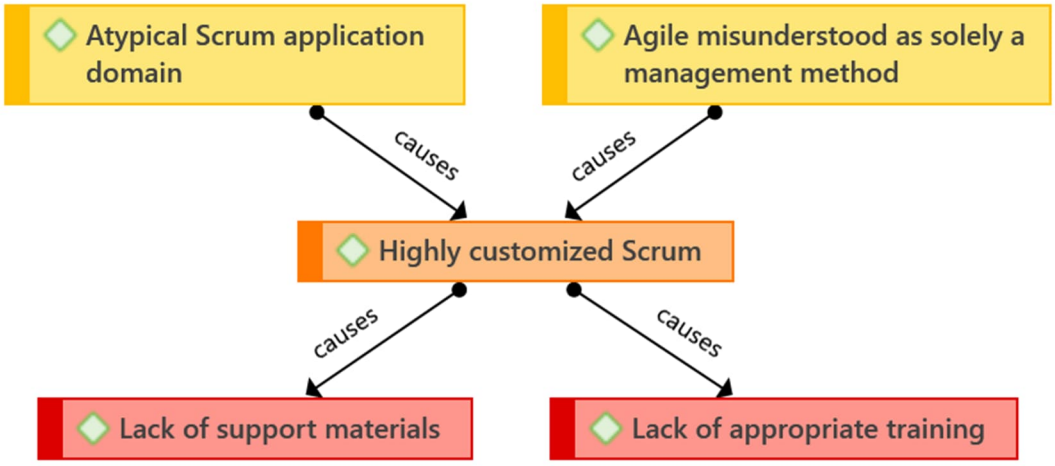

Figure 7: Causation graph of the challenge “Highly customized Scrum”.

The high customization of Scrum led to a lack of support materials. Because the adapted method no longer matched what was available in guides or training materials, the department could not rely on external materials for support. Hence, the transformation unit thought it best to have training developed in-house, which later proved to be insufficient.

5.2.7 Misunderstood agile concepts

Misunderstanding agile concepts is reported as a challenge in several studies about agile transformations. Dikert et al. (2016) describe how, for example, agile values or principles might be followed without understanding the meaning behind them, or how agile practices might be entirely misadopted.

Gandomani and Nafchi (2016) included clients' misunderstandings of agile, and the implications for the transformation itself are described by for example Benefield (2008), who describes how misunderstanding agile can cause it to be expanded unsustainably.

In the case of the department I studied, the Scrum roles and ceremonies appeared particularly difficult to understand. The creation of the Squad Lead role was an indicator of the spread of this confusion. The role was explained to be necessary because larger-scale organizational responsibilities, such as ensuring communication between the team and the client, were beyond the scope of the Scrum Master role. The Scrum Guide defines serving the larger organization as one of the Scrum Master's responsibilities (Schwaber & Sutherland, 2020a, pp. 6-7), showing this to be a misunderstanding.

Broader agile concepts also appeared difficult to understand. As discussed earlier, the self-organization and self-management of teams working in safety or security -critical fields raised concerns. Managerial figures questioned the applicability of Scrum as teams could never make all decisions about their work and seemed to apply an "all or nothing" mentality; either the teams were to be fully self-managing or not at all.

This is another misunderstanding of Scrum. Though Scrum teams must be self-managing, the methodology comes with an in-built standard compliance instrument: the Definition of Done (Schwaber & Sutherland, 2020a, p. 12). Safety and security factors could simply be included in the Definition of Done, ensuring the team complies with regulations without losing its empowerment to decide how work is completed within the given guidelines.

These misunderstandings appeared to originate from the initially misunderstood scale and scope of an agile transformation. Because of the fundamental misunderstanding, the department was not prepared for the arising concerns. In this way, the challenge is caused by the domain factor, as shown in Figure 8.

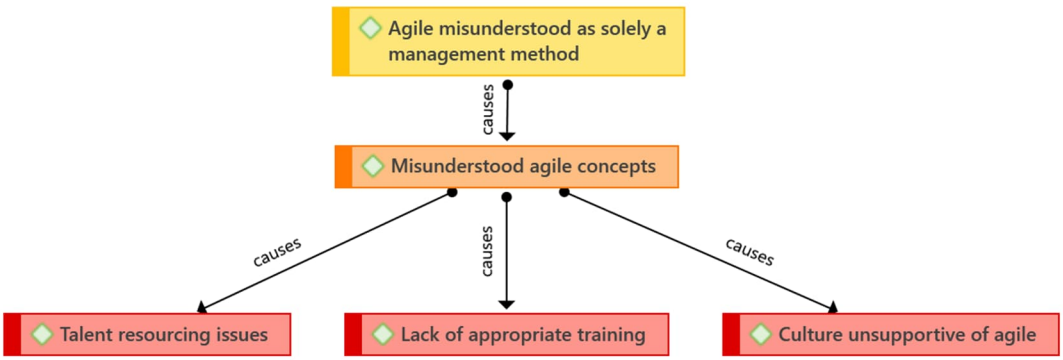

Figure 8: Causation graph of the challenge "Misunderstood agile concepts".

The managerial figures' "all or nothing" mentality about agile harmed the teams' autonomy, unnecessarily stripping them of freedom. Retaining such

control in the culture rendered the culture unsupportive of agile. Since agile was misunderstood to be a new method for managing a single team, the teams were not made cross-functional or self-organizing into multi-talent teams, which led to the teams' inabilities to access required talent.

Ultimately, spreading misunderstandings through in-house training contributed to the lack of appropriate training. Pikkarainen et al. (2012) consider misunderstandings and the lack of training to be one and the same issue. However, I find them to be separate matters, since a department cannot choose not to misunderstand agile, but it can choose to provide more appropriate training.

Misunderstanding of agile concepts is a significant issue, as Fuchs and Hess (2018) find poor suitability of agile methods to be a potential barrier to agile transformation. If the concepts are misunderstood, their suitability cannot be reliably assessed. In this case, the misunderstandings ultimately caused managerial figures of pilot teams to contemplate abandoning Scrum.

5.2.8 Small-scale transformation strategy

As discussed in the literature review, agile transformations are complex processes and are therefore recommended to be guided by a change management strategy. The studied company had not realized the need for company-wide changes, and thus had not planned for organizational changes. In addition, it did not have a clear vision for the change, and was hence also under communicating its vision.

The transformation unit had not realized the need for a roll-out plan and was creating new pilot teams separate from one another, without a roadmap for their integration. Teams were thought of as individual and separate rather than as parts of an agile whole, and the effects of this on both the system and the team members had not been fully realized.

Because agile was thought to be a simple process, the department began the agile transformation with a small-scale strategy. The problematically lacking elements of this small-scale strategy can be roughly divided into three categories, as shown in Figure 9: the lack of scaled vision, lack of investment, and lack of engagement plan.

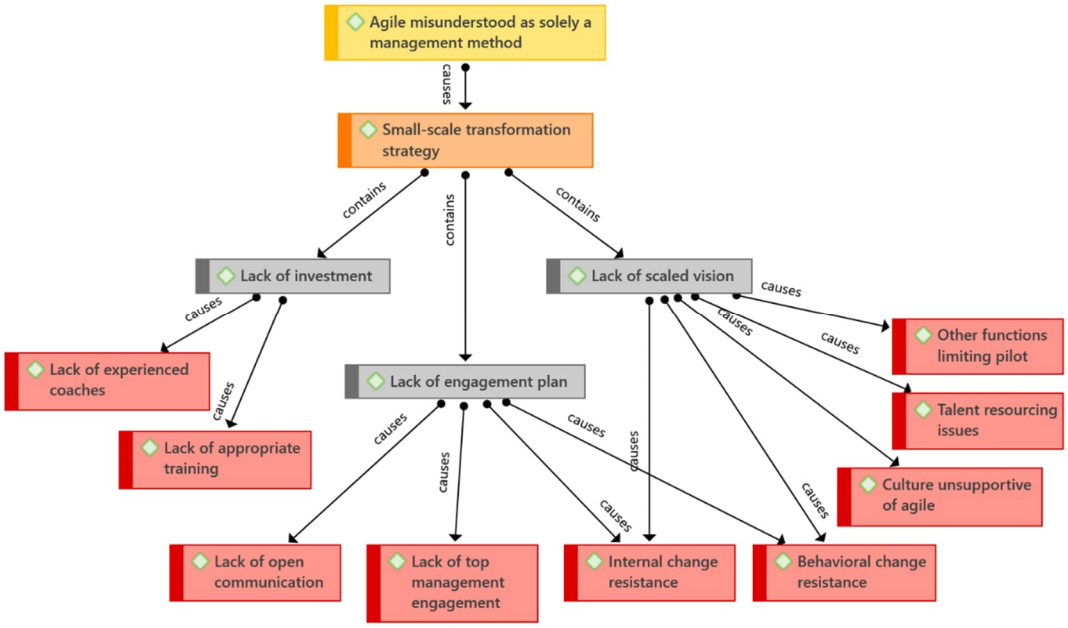

Figure 9: Causation graph of the challenge "Small-scale transformation strategy".

As Figure 9 shows, this challenge led to a particularly high number of problems. It contributed to the emergence of eight of the 10 problems.

The lack of scaled vision resulted in the lack of plans for the final scaled agile system. The final agile frameworks, team compositions, and organizational structures were not planned, which led to the problems with team autonomy, talent resourcing, and other functions limiting the pilot. The lack of plans for these also caused change resistance in team members, whose questions regarding the future went unanswered. In addition, the department lacked a vision of the new agile culture.

The lack of investment showed in the lack of appropriate training and the lack of experienced coaches, as external support could not be hired. The lack of an engagement plan resulted in the lack of top management engagement and the lack of open communication, which both contributed to the emergence of both forms of change resistance.

These sub-categories of the small-scale transformation strategy could be viewed as separate challenges, but since they originate from the same lack of strategizing, I view them as one same issue. In contrast, had the transformation unit realized the need for more investment but failed to procure a sufficient amount, the resulting lack of investment would be its own challenge.

5.2.9 Traditional organizational structures

Vinekar et al. (2006) argue that agile methodologies require either organizational structures that differ from traditional ones or strict separation from

these unsupportive structures. The authors find the cultures of these opposing approaches to be too different to coexist, with traditional structures requiring more control and formality, and agile requiring autonomy and collaboration.

The studied department had not made effective changes to its organizational structures. Team members remained involved in several teams across different clients. The same number of managers had been maintained, resulting in hierarchical agile teams with managers namely in SME roles. The team members also maintained their previous line supervisors, who were not a part of the agile pilot.

In addition, resource handling, sales, marketing, human resources, and other support functions remained using traditional methods and structures. This meant that the pilot teams had to wait for the slow, non-sprint-style processes outside the pilot to run their course when the team required SMEs with specialized skills to be involved in a sprint.

Furthermore, the unchanged traditional structures meant that every SME specialized in a niche skill and did not get involved with work outside the niche. For example, a Linux expert reportedly would not browse tickets allocated to a Windows expert working for the same client.

The reason for the emergence of this challenge is threefold, as shown in Figure 10. First, since agile was misunderstood, the department had not considered altering its structures. Second, the previous culture did not encourage team members to escalate complaints about organizational issues, and thus, the department decisionmakers did not experience urgency to implement changes.

Third, maintenance operation tasks do not typically require collaboration or cooperation (Heeager & Rose, 2015), which had played its part in the creation and maintenance of strong silos at the department. Concerns over critical requirements contributed to the existence of these silos, as work could only be discussed with those who had gone through necessary security clearances for the specific client.

In addition, many of the managers of these maintenance operation teams had been responsible for their now agile clients for years. They criticized the new method for reducing the role of the manager, who had built strong knowledge of the client company and rapport with its representatives.

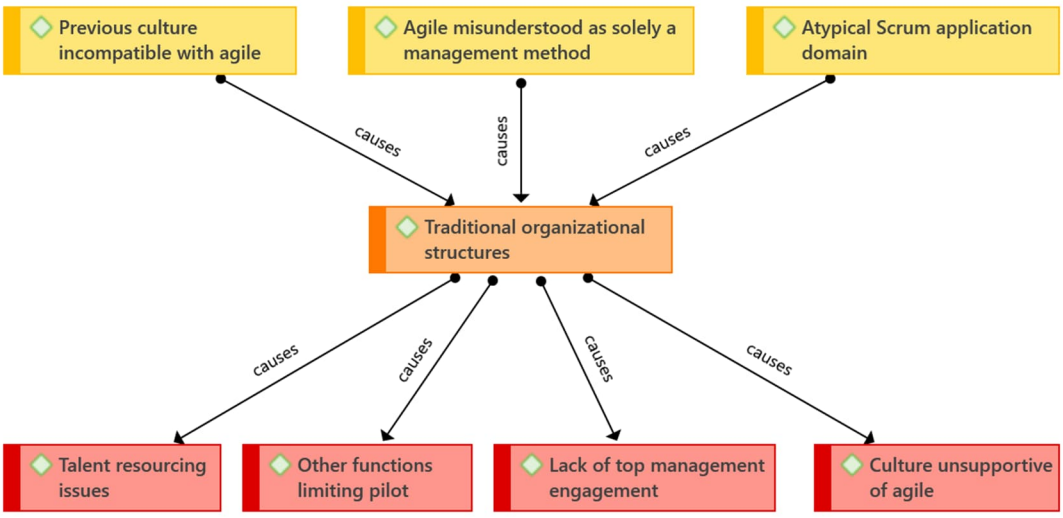

Figure 10: Causation graph of the challenge "Traditional organizational structures".

Maintaining the traditional organizational structures was the main reason other functions remained in their old form, which hindered the agile pilot. Maintaining the same management structure distanced the top management from the pilot, which contributed to the lack of top management engagement. The previous structures were unsuitable for iterative and incremental work in cross-functional teams, which contributed to the lack of team autonomy and caused the teams' inability to get talent when and where it was required.

5.3 Problems

Problems are the lowest level of issues identified through grounded theory and are issues which can be dealt with at department level. Their children are symptoms, which are generalizations of raw data. In total, I identified 10 problems in the transformation. In this sub-chapter, I introduce each problem, the parent challenges at its source, and the symptoms which led to the identification of the problem. These factors are given in a table for each problem and expanded upon in text.

5.3.1 Behavioral change resistance

This problem was identified through observations of non-agile behavior followed by statements of purposefulness. In practice, this often showed as individuals not following agile practices and giving justifications for their actions, i.e. that it had not been an accident. It caused seven symptoms identified from the actions of eight individuals.

Piderit (2000) differentiates between emotional, cognitive, and behavioral resistance, and argues that dismissing all disagreeing views as change

resistance ignores the good intentions behind the resistance. Following this view, I differentiate between unintentional, mental resistance, and active, behavioral resistance to change.

From the point of view of a transforming department, behavioral change resistance is especially problematic as it can hinder changes to a point where their positive effects cannot be seen. If individuals are merely skeptical of agile but agree to practice it regardless, they can become convinced that the methodology works.

Moreover, Eilers et al. (2020) found that following agile leadership practices increases the team's psychological empowerment, implying that if leaders agree to implement agility even if they are not acting out of agile beliefs, their team's agility increases. Therefore, behavioral change resistance is an obstacle to the adoption of agile.

As discussed earlier, change resistance is a complex process with various contributing factors. Table 5 shows the challenges which contributed to the emergence of behavioral change resistance at the studied department.

Table 5: Relations of the problem "Behavioral change resistance".

Parent challenges	Problem	Symptoms
Agile values difficult to adopt	Behavioral change resistance	Work is pushed not pulled
		Inappropriate coaching
Change resistance		Control features
Concerns of critical requirements		Lack of appropriate stakeholder engagement
Difficulties finding the right people		High workload on Scrum Masters
Small-scale transformation strategy		Teams struggling to begin practicing Scrum
		SMEs not participative at ceremonies

Behavioral change resistance manifested through seven symptoms. Some managerial figures refused to change their management style, purposefully maintaining command and control despite stating they knew they should do otherwise. The same was evidenced in some coaches, who stated correct practices for coaching yet continued to act against these practices, for

example by dictating Scrum to teams rather than coaching them. Similarly, steering groups and redundant documentation were maintained out of personal preferences though the individuals in charge of their maintenance reported knowing such practices should be discontinued.

Behavioral change resistance also contributed to the new teams struggling to begin using Scrum, as members were not taking active part in ceremonies. Similarly, the POs were reluctant to adapt their ways to agile practices when client processes were unsynchronized with the agile team. Thus, behavioral change resistance indirectly caused high workload for Scrum Masters, who had to perform the duties of unresponsive POs and attempt to motivate their teams.

Some level of change resistance should be expected and considered in change management strategy of agile transformations (Gandomani et al., 2013a). However, much of this problem was likely caused by other experienced problems, such as the lack of training and open communication. Both of these factors have been found to contribute to the acceptance of agile methodologies (Chan & Thong, 2009). It also contributed to the emergence of both these problems, which renders this a particularly complex and worrisome problem.

5.3.2 Culture unsupportive of agile

This problem was identified through observations of exchanges between individuals and was directly stated to be a problem by 15 individuals. It was the most discussed problem surrounding the agile transformation.

Agile methodologies require an informal, people-centric culture, led through leadership and collaboration (Nerur et al., 2005). The values of Scrum are commitment, focus, openness, respect, and courage (Schwaber & Sutherland, 2020a). An organization should embrace these values for its Scrum to be effective. Tolfo et al. (2011) argue that fostering such a culture requires changes to the deepest levels of culture, altering the underlying assumptions held by people. The authors assert that if the original culture greatly differs from agile culture, agile may be rejected.

The culture of the studied department remained highly hierarchical and process oriented. The prevalent management style had strong elements of command and control, and communication between levels of hierarchy was formal and infrequent.

There was a prevalent sentiment across pilot teams that top management was not truly supportive of agile culture, commented on by five individuals on separate occasions. A total of 15 individuals commented on the need to alter the culture overall; the majority left the preferred ways of improvement unstated.

One aspect of agility is team autonomy, which has been found to be difficult to adopt in transforming organizations (Dikert et al., 2016). Requiring

team autonomy in a large organization creates a paradox between the needs to allow teams to self-organize and to maintain structure in the whole, as explained by Horlach and Drechsler (2020). The authors recommend granting teams autonomy in other ways, for example through "bring your own device" initiatives.

At the studied department, teams had little autonomy outside their daily work. Planning for sprints was difficult in an environment where work was continuous, and regulations restricted the teams' decision-making. Combined with traditional resource handling and budgeting, this left the teams with limited freedom.

In addition, the insufficient training did not give teams the means to practice Scrum independently, and the prevailing managerial culture further discouraged teams from autonomously seeking answers through trial and error.

The reasons for the existence of such a clashing culture are diverse and eventually lead back to the domain factors Previous culture incompatible with agile and Agile misunderstood as solely a management method. The challenges through which these domain factors contributed to this problem are given below in Table 6.

Table 6: Relations of the problem "Culture unsupportive of agile".

Parent challenges	Problem	Symptoms
Agile values difficult to adopt	Culture unsupportive of agile	Fear of failure
		Agile seen as a small trial
		Disagreeing views brushed aside
Change resistance		Work is pushed not pulled
		Inappropriate coaching
Concerns of critical requirements		SMEs not participative at ceremonies
		High workload on Scrum Masters
Misunderstood agile concepts		Teams unable to self-correct errors
		Teams have to wait for work to progress outside agile pilot
Small-scale transformation strategy		Transformation unit not cross-functional

Traditional organizational structures		Team members worried about high workload
		Lack of appropriate stakeholder engagement

In total, this problem contributed to the emergence of 12 first-level symptoms, which caused other, deeper symptoms. The high amount of symptoms is indicative of the high prevalence and criticality of this issue.

Unsupportive management styles led to fear of failure among managerial figures of pilot teams. These individuals were concerned that adopting the new methodology as it was introduced to them would be harmful to their teams' productivity. If management were not truly supportive of agile ways, these individuals feared that any shortcomings would be blamed on them.

The non-agile culture also manifested as disagreeing views being brushed aside. This was practiced by management at all levels; I observed six individuals in management roles dismiss others' concerns as trivial, for example as the person "being difficult". At team level, the management-heavy culture manifested as work being pushed on members rather than being actively pulled by them. Unfortunately, the department's coaches were not immune to this culture either and exhibited the same command-and-control behaviors as management, hence being counted as managerial figures in this thesis.

Because of the command-and-control culture, pilot teams were unable to self-correct errors, such as mis-adopted agile practices. Significantly, when teams' complaints of impediments were ignored, the teams did not have any way to correct fundamental errors, such as the talent resourcing issues. Members complained about having to wait for tasks to progress outside the team, for example when requiring specific talent to be added to a sprint. This issue aggravated the thought that agile was a small trial of a new management process.

Had the teams been listened to, they could have notified the transformation unit of impediments that needed removing and thus indirectly self-corrected their environment. However, this culture affected teams at all levels, and the transformation unit suffered from the same lack of authority and autonomy to act on identified impediments. This was a notable constraint on the unit and rendered it non-cross-functional.

As lesser symptoms, the unsupportive culture caused team members to be worried about high workload in the future. Three individuals from the new pilot client projects discussed concerns over having to be personally in charge of balancing work for all their clients. The concern appeared to be that management would understand self-organization to mean that the SMEs would have to know which client's work to prioritize.

In addition, the departmental culture contained an element of not correcting clients, in style of the common saying "The customer is always right". This could be viewed as a form of respect, but its negative effect was that client representatives, who had not been trained in agile ways, were not corrected when they failed to perform the role of a Scrum PO. When one pilot team discussed the role of the PO and the team's concerns in its current realization, the client representatives received the constructive criticism well and were eager to participate in making improvements.

The culture likely contributed to the emergence of other problems as well. It is a value which affects the acceptance of agile methodologies (Chan & Thong, 2009), and thus likely contributed to both forms of change resistance. It may have played a part in inexperienced individuals taking roles in training and coaching, leading to suboptimal results in both, and likely was a strong contributor to the lack of top management engagement. Culture was also a key reason behind the lack of open communication, and the separation of these problems will be explained in chapter 5.3.6 Lack of open communication.

5.3.3 Internal change resistance

This problem was identified through observations of statements indicative of resistance. Such statements included, for example, expressions of doubt, uncertainty, and hesitancy; individuals expressing they were not fully convinced by agility. As the observations were conducted online without video feed, I could not assess individuals' facial expressions or body language.

In total, statements indicative of change resistance were given by 16 individuals. It was the most prevalent problem, yet it was not commented on by employees themselves. The problem appeared to be hidden.

As explained earlier, I follow the view of Piderit (2000) and make a distinction between behavioral resistance, and emotional and cognitive resistance. I combine the latter two into one problem as ascertaining the form of voiced change resistance is beyond my capabilities as an observer. This form of mental change resistance expected to emerge in all agile transformation (Gandomani & Nafchi, 2016).

Inner change resistance becomes a problem when it remains unadressed as this, like Piderit (2000) argues, ignores the good reasons behind the resistance. As Chan and Thong (2009) discovered, several factors affect the acceptance of agile methodologies, and most of them are unalterable by the resistant individual. Strong resistance may be a sign that the is lacking in some key aspect, such as training or communication.

In this case, pilot members complained about matters that fall into the categories of perceived usefulness, ease of use, result demonstrability, and compatibility and maturity. In addition, they demonstrably lacked

appropriate training and experience, and suffered from a clashing culture, all of which are also acceptance factors of agile methods (Chan & Thong, 2009).

Therefore, rather than to view this form of change resistance as a problem on its own, it should be viewed as an indicator of other problems. From the point of view of departmental transformation, it something that should be sought to be corrected. While an organization undergoing agile transformation may be able to do little about, for example, the perceived usefulness of the new methodology, it could alleviate change resistance by focusing on other acceptance factors over which it has more control, such as the amount and quality of training and communication.

The aim of viewing internal change resistance as a problem rather than a symptom is to stress its importance from the point of view of the transformation. Its high prevalence would suggest that the acceptance factors studied by Chan and Thong (2009) have not been appropriately taken into account. The likely causes and consequences of this problem are shown below in Table 7.

Table 7: Relations of the problem "Internal change resistance".

Parent challenges	**Problem**	**Symptoms**
Agile valued difficult to adopt	Internal change resistance	Chosen members not excited to practice Scrum
Challenges adjusting to incremental delivery pace		SMEs not participative at ceremonies
Change resistance		Control features
Concerns of critical requirements		Agile seen as a small trial
Difficulties finding the right people		Using old and new approaches simultaneously
		Teams worried about future interfacing and integrating
Small-scale transformation strategy		

The six symptoms of this problem are very similar in nature. Essentially, employees were skeptical of the changes or how long they would last. They did not trust agile methodologies to suit their work and environment and did not appear to see an agile future. This culminated in an often-repeated phrase: "Is there agile outside the agile [pilot]?"

The different symptoms that emerged due to this problem varied based on the resistant individual's role. Management, with more authority, established control features and maintained old practices in parallel with agile methods as they did not trust agile could be relied upon. Pilot team members of various roles expressed concerns or discontent about adopting agile. SMEs, without the power to change anything, could be withdrawn at ceremonies and when questioned state they did not believe the ceremonies were appropriate.

In total, I observed 18 individuals voice statements indicative of internal change resistance. Since my observations were heavily skewed towards management, such statements were often concerns of the consequences of trusting teams with more autonomy. For example, one manager struggled with the thought of waiting for team members to become self-organizing; when results were not immediate, they wished to cease the attempt and resume control but did not do so when instructed to wait.

As stated earlier, internal change resistance by itself was not a significant problem. Skeptical individuals, unlike their behaviorally resistant counterparts, followed agile practices as instructed despite remaining unconvinced. If the factors which caused their hesitancy towards agile methodologies had been effectively addressed, these skeptical individuals may have been convinced and ceased to be emotionally or cognitively resistant. However, when the individuals remained unconvinced, their doubts contributed to the emergence of other problems.

Skepticism was most closely related to the lack of open communication. Appropriate communication is a known acceptance factor of agile methodologies (Chan & Thong, 2009), and the lack of it led to individuals keeping their concerns to themselves. At times, these skeptical individuals would express clearly mistaken assumptions, such as the belief that agile teams would not follow client contracts and would instead complete whatever work the members themselves chose. As the culture did not allow for open discussion of fears and worries, after initially voicing their worries, individuals held onto these thoughts and remained skeptical toward the new methodology.

This internal form of change resistance is also a close relative of behavioral change resistance, as the latter could be thought to stem from the former. However, from the point of view of leading organizational change, people purposefully acting against instructions are a separate issue from individuals who remain unconvinced by the changes. Hence, I view them as separate issues.

In addition, emotional or cognitive change resistance may have been a reason for the lack of top management engagement. I did not directly observe top management and thus have no evidence to support this theory, but since the department's culture was so heavily focused on command and control, I believe top management might have been reluctant to let go of control and trust teams to self-organize.

5.3.4 Lack of appropriate training

This problem was observed from signs of clear misconceptions about basic practicalities of Scrum, which could have been expected to be clarified through training. In addition, it was observable in confusion about technology, and scaled agile frameworks, both of which could have been taught in training.

This problem was also one of the most commented-on problems surrounding the agile transformation. 13 individuals mentioned the problem by either requesting additional training, stating they wished to receive some, or noting that their training had been insufficient.

Lack of training is known to lead to lack of knowledge about agile (Hajjdiab & Taleb, 2011, Pikkarainen et al., 2012), which can lead to low collaboration, a wrong mindset, and unrealistic expectations (Gandomani & Nafchi, 2016). Training is also an acceptance factor of agile methodologies (Chan & Thong, 2009).

Though all pilot teams underwent training, the training was apparently insufficient for their needs. All interviewed members of the first pilot team mentioned that their training had been "too abstract", calling it "high-flying". Although training was improved for the later pilot teams, the struggles exhibited by the teams suggest that the training remained insufficient.

Pilot members received no training for how to act in their new agile roles. Instead, the training focused on agile values and remained largely abstract. The five-session training received an average rating of 3.84 out of 5 as an answer to how well the training met expectations. In open-form feedback, participants requested more concrete examples.

In addition, there was an apparent lack of scaled agile training, and training in new technology. All three pilot teams requested more training in using the chosen management tool. Furthermore, teams received no training to assist them in switching to the agile mindset and towards more teamwork-oriented work practices. Management received no agile training in any form.

The reasons behind the lack of appropriate training in this case were diverse, as shown in Table 8. Because training was conducted in-house, it was affected by the lack of experienced agile trainers and perpetrated seemingly company-wide misconceptions about agile.

In addition, the highly customized Scrum rendered training difficult as no support materials were available. Ultimately, the choice to conduct training in-house rather than to leverage external options was made due to budget constraints stemming from the small-scale transformation strategy.

Table 8: Relations of the problem "Lack of appropriate training".

Parent challenges	Problem	Symptoms
Difficulties finding the right people	Lack of appropriate training	Insecure coaches
		Uncertainty around Squad Lead role
Misunderstood agile concepts		Control features
		Work is pushed not pulled
		Inappropriate coaching
Highly customized Scrum		Teams entirely dependent on coaches for Scrum
		Further misunderstandings about agile
		Teams confused about tool
Small-scale transformation strategy		Teams struggling to begin practicing Scrum
		SMEs not participative at ceremonies
		Scrum begins to differ between teams

The symptoms caused by this problem were broad and varied. The lack of appropriate training appeared to affect effectively every aspect of the pilot, as agile knowledge was missing at all levels. In total, I identified 11 direct symptoms of this problem.

Similarly to what was reported by Jovanović et al. (2017), several members and figures surrounding the pilot reported they understood Scrum, yet held evident misunderstandings about the method. For example, the role of the Squad Lead was thought necessary for organizational duties when the role of Scrum Master, when done by the book, already contains these.

The symptoms caused by the lack of training are characterized by a lack of agile skills and knowledge. In essence, the teams were not functioning as agile teams, and were instead executing agile ceremonies without applying agile principles. They were also confused about the new tool and remained so

despite receiving training, though I theorize complaining about the tool may have been a socially acceptable way to express confusion over the changes altogether.

The lack of training also exasperated other problems. Training is known to reduce change resistance (Chan & Thong, 2009) and might therefore have affected two forms of change resistance. Proper training would also have given the coaches some experience. Training in team process and technical matters could have made communication easier, and providing managers with training is recommended to engage top management (Dikert et al., 2016). With proper training, teams would likely have had better chances of appropriately customizing Scrum to suit their needs, regaining some autonomy.

It could be argued that the lack of training was the source of challenges as well. For example, agile values might have seemed easier to adopt with appropriate training, and it could have alleviated concerns of critical requirements. In a way, lack of training was at the core of the difficulties faced by the department as its efforts to bring in external experts had given lackluster results.

5.3.5 Lack of experienced coaches

This problem was identified through observations of coaches' actions and the effects they caused. It was commented on by only one individual, who questioned the department's use of inexperienced coaches. Since most employees had little or no previous experience with agile, I believe they did not know how agile coaches should behave. When an external agile coach introduced internal coaches to basics of agile coaching, the coaches themselves discussed the mindset and practices as being new to them.

Benefield (2008) describes the trouble that follows an agile transformation with a lack of coaching, namely the spreading of misunderstood agility. Lilja et al. (2021) note that poor agile practices are difficult to alter once they have been firmly adopted, calling for coaches to be vigilant early on to avoid misunderstandings and malpractices. Without proper coaching, agile practices may not be taught correctly (Dikert et al., 2016, p. 96). Gandomani et al. (2013a) add to the discussion to argue that agile relies on a changed mindset and therefore calls for coaching in both social and technical aspects.

Therefore, lack of coaching is a notable issue in agile transformations. In this case, the department suffered from a lack of experienced coaches, rather than lack of coaches overall. Its agile coach community had 16 active members, and each of the three pilot teams had a designated agile coach. However, none of the coaches had been trained for the role, and none of them had any prior experience in coaching before taking on the new duties.

Thus, this problem was caused by the difficulties of finding talent internally, and the inability to hire it from external sources. This is reflected in the parent challenges shown in Table 9.

Table 9: Relations of the problem "Lack of experienced coaches".

Parent challenges	Problem	Symptoms
Small-scale transformation strategy	Lack of experienced coaches	Insecure coaches
		Inappropriate coaching
		Teams struggling to begin practicing Scrum
		SMEs not participative at ceremonies
Difficulties finding the right people		Unproductive Scrum ceremonies
		Work is pushed not pulled
		Further misunderstandings about agile
		Teams unable to self-correct errors
		Scrum begins to differ between teams

The lack of experienced coaches was a major problem and led to the emergence of nine symptoms. Combined with the lack of appropriate training, it led to the teams being underprepared for agile methods and unable to iterate and improve their processes.

The inexperienced coaches had been intended to be the sole source of additional Scrum training for the teams, which rendered the teams entirely reliant on their coaches. Since the coaches were unable to fulfill this role, lacking in training themselves, the teams retained many of their misunderstandings and generated new ones along the way. The coaches expressed a lack of confidence under this pressure.

As could be expected, the beginner coaches were not always able to remain in a coaching stance. The highly managerial culture may have played a part in their tendency to begin dictating in an effort to solve the teams' problems. They struggled to motivate SMEs to participate in ceremonies. Two of the three coaches did not notice the overly managerial stance of the teams' Squad Leads and Scrum Masters and allowed for work to be pushed rather than pulled. The third coach actively attempted to resolve this issue which Jovanović et al. (2017) aptly call "delegation instead of self-organization".

Ultimately, each coach attempted to solve their teams' problems by adapting Scrum in different ways, which resulted in the methodology beginning to differ between the teams. One team contemplated shifting to Scrumban, while another experimented with skipping Scrum ceremonies on two days of the week. Such variations could cause issues to the large-scale transformation later on, as members may need to be moved between teams (Dikert et al., 2016).

The lack of experienced coaches had ramifications similar to the lack of appropriate training (See chapter 5.3.4). As coaching was meant to be the main way for teams to learn about agile and Scrum, many of the other problems were in part caused by the lack of experienced coaches. More experienced coaches might have dared to question cultural norms and drive the large-scale transformation forward, mitigating other experienced problems.

5.3.6 Lack of open communication

This problem was identified through observations. It was directly commented on by only one individual during data collection. However, when more open communication was practiced, some of the symptoms were immediately alleviated.

Openness is one of the five Scrum values (Schwaber & Sutherland, 2020a). It is a vital part of agile transformation (Worley & Doolen, 2006), and foundational for successful organizational change overall. When performing organizational change, Richardson and Denton (1996, p. 215) recommend giving employees as much information as possible as early as possible. According to the authors, lack of communication about organizational change can lead to the spread of negative rumors, which may undermine the entire change.

In their lessons learned, Fry and Greene (2007) recommend other agile transformants to provide "radical transparency" to engage others in the transformation. Kotter (1995) has a similar stance, advocating for openness and engagement across organizational structures and hierarchies.

The studied department had a distinct lack of open communication. The transformation unit did not publish any updates on the progress of the pilot, and department employees had no direct contact with its members. As the company was not publicly sharing information about its agile transformation, members of the transformation unit feared sharing too much information, which led to the effective shut-down of communications outside the unit.

Therefore, beside the difficulty of adopting the agile value of openness, the lack of open communication was caused by the small-scale transformation strategy. This strategy did not include a communication plan. In addition, it was partly caused by the transformation unit members' personal preferences

towards selective communication. These issues are shown as the parent challenges of this problem in Table 10.

Table 10: Relations of the problem "Lack of open communication".

Parent challenges	Problem	Symptoms
Agile values difficult to adopt	Lack of open communication	Confusion between agile figures
		Teams unable to self-correct errors
Difficulties finding the right people		Unproductive Scrum ceremonies
		Top management not following agile culture
Small-scale transformation strategy		Agile seen as a small trial
		Fear of failure
		Lack of appropriate stakeholder engagement

The lack of open communication caused seven symptoms. It led to the various figures surrounding the pilot having little awareness of the actions of the other. The resulting confusion between the transformation unit and the agile coach community began to culminate into mistrust.

Since open communication is a core part of Scrum, its lacking led to unproductive Scrum ceremonies as members did not share their views openly. Unproductive retrospectives led to the teams being unable to self-correct their own errors as issues were not analyzed. When Scrum-related issues were not discussed among teams, one team had trouble correcting work coming from other client representatives, past the PO.

For the transformation as a whole, the lack of open communication posed a significant risk. Top management was not following agile values or principles or communicating their support for the change, which contributed to agile being seen as a small trial. When team managers did not know the stance of top management, they were fearful of repercussions.

The lack of open communication contributed to other problems as well. Communication is an acceptance factor of agile methodologies (Chan & Thong, 2009), so the lack of it likely contributed to the emergence of behavioral change resistance and skepticism. Ultimately, when issues were not

openly discussed, other functions did not experience appropriate pressure to change.

The lack of open communication could be viewed as a part of the problem of the culture being unsupportive of agile. However, since open communication is so fundamental to transformations as an aspect of change management strategy, I view it as a separate problem. It is the lack of both openness and communication, and hence should not be regarded as only a cultural factor.

5.3.7 Lack of support materials

This problem was identified through observations of behavior following the lack of materials, and was directly commented on by four individuals, who lamented the absence of support materials.

Dikert et al. (2016) describe the effects a lack of literature can have on agile transformations, which resemble what I observed at the case company. The customization of Scrum had led to a situation where teams no longer had a guidebook to follow and were unsure what was part of Scrum and what they could freely adapt. There were no guidebooks with the same customized roles and processes, nor any training videos or other forms of media.

In addition, basic agile concepts had been tailored to suit the traditional views of the organization, which caused uncertainties about what was safe to modify and what should be strictly maintained. When basic concepts, such as incremental work or cross-functional teams, could not be easily accomplished in the pilot teams, these were abandoned from the agile system. This rendered Scrum guides and training materials unusable as decision-makers of the department felt those were inappropriate for its version of Scrum and agile.

As mentioned earlier, Scrum comes with its own support material, the Scrum guide. The department appeared to be unaware of the existence of this guide, as many lamented the difficulty of finding Scrum materials in Finnish. A translated version of the guide exists in the local language (Schwaber & Sutherland, 2020b), and when I introduced it to a pilot team and members of the transformation unit, it was met with surprised delight.

The cause for the complete lack of support materials was straightforward, as shown in Table 11. Though difficulties finding people who would have been aware of the existence of Scrum guides might have contributed to the problem somewhat, the main cause was clearly the highly customized Scrum. It rendered existing external support materials largely inapplicable.

Table 11: Relations of the problem "Lack of support materials".

Parent challenge	Problem	Symptoms
Highly customized Scrum	Lack of support materials	Uncertainty around Squad Lead role
		High workload on Scrum Masters
		Scrum begins to differ between teams
		Spending time on documentation

This problem caused four symptoms. As described earlier, the role of the Squad Lead was particularly confusing to team members. As this role is absent from Scrum, no training material or guidebooks were available to help the teams understand the role. This confused in particular the Squad Leads themselves and the Scrum Masters working closely with them.

Without guidance, Scrum Masters of the pilot teams carried out work pertaining to both their old service delivery manager roles and the new Scrum Master duties. The managerial, hands-on take on leading a Scrum team also increased the workload of the Scrum Master as they coordinated the team's work in absence of self-organization from the SMEs.

In addition, teams invented their own ways to overcome common challenges, and Scrum began to differ between the teams. Without common materials to use as reference, each team self-organized in ways it saw best, for example by reducing the amount of meetings per week.

The unique approach to Scrum resulted in the agile coaches of the department dedicating time to the creation of unique support materials. This purpose-made documentation appeared to solidify the alterations, making it less likely that the approach would be iterated and improved in the future.

The lack of support materials also contributed to arguably more substantial problems. If the teams had known what was part of Scrum and what was its poor adoption, they might have known to demand other functions to change. Instead, the pilot teams changed themselves in suboptimal ways to cope with the hindering environment.

5.3.8 Lack of top management engagement

This problem was identified through observations and was directly commented on by four individuals. Three additional individuals expressed doubt about top management following agile values; a symptom that would likely be alleviated by top management engagement. Thus, a total of seven individuals expressed some form of need for more top management engagement.

Top management engagement is a critical success factor of agile transformations, as discussed earlier. Sidky et al. (2007) view its absence as a reason to abort an agile attempt, and its vitality is stressed by both agile practitioners (Brosseau et al., 2019) and researchers (Worley & Doolen, 2006). In general, top management engagement is a crucial success factor for organizational transformations (Kotter, 1995; Richardson & Denton, 1996).

Top management of the studied department was not actively engaged with the pilot. Though the transformation unit included two members of top management, their engagement was sporadic and removed from the teams.

Though the agile pilot had been initially brought about by the head of the service delivery department, his support for it was not visible. In my five-month engagement with the agile pilot, I did not observe the head attend any meetings or events surrounding the pilot, including the transformation unit. There was a prevailing sentiment surrounding the pilot that though top management was behind the creation of the agile pilot, it had not adopted agile values itself and would not be understanding of shortcomings.

However, despite the prevalence of this thought, top management may not have been disengaged with the pilot simply out of disinterest. The management-heavy culture likely made it difficult for management to adopt agile values, but such a singular explanation ignores the complexity of the environment surrounding top management.

Since agile transformation was attempted on such a small scale, the transformation unit had not realized the need to engage top management. Members resisted introducing agile to top management with statements that indicated management should not be bothered with matters which were “already under control”. This left management uninformed and unaware of the issues the pilot was facing.

Furthermore, the traditional organizational structures made it difficult for top management to be engaged with the pilot. Changes in top management ranks made the time window of my data collection a particularly taxing one for high-ranking members of the transformation unit. Changes in the top ranks caused work to flow down to lower levels, which increased the amount of duties under the responsibility of these members of the unit.

The head of the department took on a second top management role in addition to his current one, which presumably increased his duties as well. This, rather than absolute personal disregard, may explain the total lack of his involvement.

Whatever the ultimate reason may be, I theorize that all these aspects played a part in the lack of top management engagement. Hence, they are given as its parent challenges in Table 12.

Table 12: Relations of the problem "Lack of top management engagement".

Parent challenges	Problem	Symptoms
Agile values difficult to adopt	Lack of top management engagement	Top management not following agile culture
		Agile seen as a small trial
Traditional organizational structures		Fear of failure
		Control features
Small-scale transformation strategy		Double reporting
		Transformation unit not cross-functional

This problem caused six direct symptoms. However, due to the taboo element of criticizing management in a strongly hierarchical culture, I suspect that this number is not representative of the true prevalence of the problem. Since it contributed to the emergence of change resistance in pilot members, this problem was more significant than Table 12 would imply.

Nevertheless, the exhibited symptoms were noteworthy on their own. As the original culture of the department heavily differed from typical agile culture, not engaging the top management inevitably led to top managers acting against agile values. Old ways were upkept to meet management needs, such as having steering groups in place to control agile actors, and maintaining old bureaucracy, which led to double reporting.

When support from higher-ups was not observable, members of the pilot teams feared repercussions if their teams were to face set-backs, unsure whether agile principles and values would truly be honored. Ultimately, agile was seen as a small trial when it was not publicly discussed or championed.

Since top management was not engaged with the pilot, it did not enact the necessary large-scale changes required to overcome impediments faced by the pilot. Attempting to handle issues on its own rather than to escalate matters left the transformation without the ability to enact the necessary changes. In this way, the lack of top management engagement left the unit without cross-functionality.

This problem had a significant contribution to the emergence of other problems. When top management lacked visibility to the pilot, it refused to grant additional funding for training, contributing to the lack of both appropriate training and experienced coaches. Top management's lack of public discussion about the change probably contributed to the transformation unit's hesitancy to communicate, adding to the lack of open communication.

Kotter (1995) argues that if top executives act against proposed changes, change resistance grows among employees. It could be expected that some of

the change resistance I observed among the employees of the department would have been alleviated if top management had been more engaged with the transformation.

Finally, if top management had engaged with the pilot, the company may have realized the need to alter its organizational structures. When top management remained unchanged and distant, decisions had to be escalated up the hierarchy, which tied up already limited available effort from the members of the transformation unit and slowed down the transformation effort.

5.3.9 Other functions limiting pilot

This problem was identified through observations of organizational processes and was directly stated as a problem by nine individuals. One individual specified this to be the most significant problem affecting the pilot.

With "other functions", I mean the functions surrounding the agile transformation within the department, described in chapter 5.2.9 Traditional organizational structures. These were resource handling, marketing, human resources, sales, accounting, and management.

Vinekar et al. (2006) argue that organizations need not change to agile ways entirely and might instead adopt an ambidextrous model. In such a model, the organization would maintain its old structure as separate from its agile module, tightly integrating the two under the same management.

This approach may indeed be valid, in which case having other functions unchanged would not have been a problem. However, when the two opposing systems were not kept separate, the slowness of other functions manifested in various symptoms, as summarized in Table 13.

This issue was affected by the small scale of the transformation effort and change resistance in members of the other functions. Because of these factors, the organizational structures had not been reworked despite having been found unsupportive of agile. As a reason for maintaining the previous structure, members of the transformation unit stated that "it would take too long" to change resource handling.

Table 13: Relations of the problem "Other functions limiting pilot".

Parent challenges	Problem	Symptoms
Traditional organizational structures	Other functions limiting pilot	Transformation unit not cross-functional
		Teams have to wait for work to progress outside agile pilot
Challenges adjusting to incremental delivery pace		Team sizes too big

Small-scale transformation strategy		Teams worried about future interfacing and integrating
Change resistance		Uncertainty around Squad Lead role
		Double reporting
		Control features

This problem manifested through seven symptoms. When the functions surrounding the agile pilot had not adapted to agile ways, they slowed down the work of the pilot teams. Pilot teams had to wait for resource requests to pass through resource handling, or for broader decisions to be made by non-agile persons with decision-making authority. The same affected the transformation unit, which was rendered non-cross-functional.

Because resource handling was known to be slow, the pilot teams included members "just in case"; members whose skills they were likely to need but did not require in every sprint. In addition, the slowness of competence development and the maintenance of internal silos led to the need to reserve numerous members with different, highly specialized skills. Due to these two factors, the team sizes were unusually large for Scrum.

Internal silos and old team structures were not being actively changed, which caused team members to be worried about future interfacing and integrating. Members observed that the agile teams required considerably more involvement than their other clients. As alterations to resource allocation and team structures were not planned, members thought they would work in several Scrum teams at once, all requiring ceremonies to be held. This was commented on by four SMEs on separate occasions. The lack of these plans also contributed to the confusion around the Squad Lead role, as the transformation from the previous role to the new had not been described.

When other functions followed traditional ways, they required the same bureaucracy as before. This led to double reporting as teams recorded their work both via the agile and traditional tools. It also led to the use of unnecessarily controlling features such as steering groups and documentation.

For example, Squad Leads were expected to forecast their agile teams' sales years in advance, which two individuals discussed as "pointless guessing". Management defended the practice by stating that its purpose was to cause team leaders to plan for the future instead of focusing only on short-term gains.

Regardless of whether the practice was working, the reporting clearly occupied time from team leaders, who resorted to temporarily withdrawing from their teams. Since the Squad Leads were the loudest champions for their teams' well-being, keeping them occupied with tasks outside the pilot risked issues being missed and going unaddressed.

The slowness of other functions contributed to the emergence of other problems as well. Most notably, it led to talent resourcing issues when resource requests were not handled with appropriate speed. In addition, it likely contributed to the lack of top management engagement as management remained far removed from the grassroots-level pilot.

5.3.10 Talent resourcing issues

This problem was identified through observations of team processes and was commented on by eight individuals. It was the most commented-on problem among SMEs, gaining mentions from five individuals during my limited observations of the SME level.

Maintaining internal silos is problematic for agile teams, as it can lead to issues if specialized skills are needed across the teams (Dikert et al., 2016). In the case of the studied department, this was a significant constraint on the teams. Skills were highly specialized, and as organizational structures and processes had not been changed, all talent allocation requests were processed by resource handling which did not follow agile practices and thus did not conform to a sprint schedule.

In addition to the difficulties of getting talent where it was needed, this problem also contains the issue of team members being in numerous teams at once, reportedly working on as many as 12 client projects in parallel. This was a result of maintaining traditional organizational structures, as well as misunderstanding agile concepts. In addition, the fundamental original misunderstanding about agile led to the small-scale transformation strategy.

While table 13 shows the parent challenges I identified as the cause of this problem, it is possible that identifying the root cause of this problem would require more business and domain knowledge to fully understand. When this issue was discussed, department employees of various hierarchy levels often commented on the need to decide whether the department wished to maintain a specialized workforce or encourage generalization.

Prior literature on the topic suggests that either could work. While Scrum calls for cross-functionality of teams, Lilja et al. (2021) report successfully structuring an agile organizational model where talent can flow to work where needed. Brosseau et al. (2019) discuss a similar "flow-to-work" model, suggesting it as a valid choice for agile organizations.

Even Scrum has recently changed its requirement for cross-functional teams. The 2016 Scrum guide states that: "Cross-functional teams have all competencies needed to accomplish the work without depending on others

not part of the team" (Schwaber & Sutherland, 2016, p. 5). This definition is absent from the 2020 Scrum guide, which instead states that a cross-functional team means that "the members have all the skills necessary to create value each Sprint" (Schwaber & Sutherland, 2020a, p. 5).

Therefore, the teams' lack of multi-talent cross-functionality may not be a problem and the internal specialization silos may have been justified. However, when combined with the slowness of processing allocation requests, these internal silos caused a host of negative symptoms, as listed below in table 14.

Table 14: Relations of the problem "Talent resourcing issues".

Parent challenges	Problem	Symptoms
Challenges adjusting to incremental delivery pace	Talent resourcing issues	Agile seen as a small trial
Difficulties finding the right people		Teams have to wait for work to progress outside agile pilot
		Transformation unit not cross-functional
Misunderstood agile concepts		Team sizes too big
Small-scale transformation strategy		SMEs not participative at ceremonies
		Teams worried about future interfacing and integrating
Traditional organizational structures		Team members worried about high workload

This problem contributed to seven symptoms. When the resource handling issue was not resolved, the agile pilot was seen as a small trial. Team members and their line superiors voiced the assumption that the pilot was temporary since the process of allocating talent—a fundamental part of the functionality of the department—was not altered to suit the needs of the pilot teams. This left teams having to postpone work until the allocation requests were processed and required talent added to the sprint.

Resource allocation difficulties also affected the transformation unit, which struggled from the low time allocation of its members. The Agile Delivery Lead was the only full-time member of the unit. The low allocation of the other members caused unproductive sprints, slow progress of work, and

unattendance of pilot teams' check-ups. Some team members assumed this to be evidence that management was not placing a high priority on the pilot, which increased the worries of pilot team members, who were expecting to see changes when impediments were identified.

To overcome the slow resourcing issue, Squad Leads reserved continuous allocations from highly specialized members. This resulted in oversized agile teams which contained members who had no work to complete during an ongoing sprint but who were still attending Scrum ceremonies with the rest of the team. These individuals tended to be withdrawn and take a passive stance in the team, rarely taking active part at ceremonies.

In addition, witnessing the difficulties with resource allocation caused team members to be worried about future interfacing and integrating between the teams. This worry was first brought up by team members during training of the two new teams and continued to be discussed throughout the study. Members of the third team, which did not begin actively practicing Scrum during data collection, were the most vocal about this concern.

Furthermore, team members grew concerned about their future workload when they were involved in projects of numerous clients and did not observe restructuring which could alleviate the pressure on individual members. In total, five members across the two later pilot teams commented on what one member stated as: "*If I have to have a Daily with each of my teams, I'll be spending all my time in meetings and won't get any actual work done*."

In the verification workshop, attendees stated this issue was the most significant impediment to a full-scale agile transformation of the department. It was one likely cause of the evidenced change resistance. Finally, resourcing issues may partly explain the lack of top management engagement, as the difficulties of the transformation unit suggest.

6 Discussion

The previous chapter introduced the results to the research question *What difficulties are faced by a service delivery department during the early stages of agile transformation?* In total, I identified 10 problems caused by nine challenges, which in turn were caused by three domain factors. The problems directly caused 29 unique symptoms.

In this chapter, I first discuss the reliability of the results, then compare them to findings in other literature, discuss unexpected and unclear results, the criticality of the results, and the limitations of this study.

6.1 Reliability of results

Eight out of the 10 problems I identified were directly stated as problems by subjects during data collection. The validation workshop provided discussion for six of these, and two further were mentioned during observations. The two problems that were not seen as problems by any subject were the two forms of change resistance: Behavioral change resistance, and Internal change resistance.

Two further problems were mentioned by only one subject each: Lack of experienced coaches, and Lack of open communication. However, since the employees of the studied department had little previous experience with agile, they could not know how agile coaches were supposed to act, or what communication should be like during agile transformation. The symptoms of these problems were numerous and arose repeatedly.

The cause-consequence links between domain factors, challenges, problems, and symptoms were not commented on by internal actors and thus are based only on my own analysis and theory. Whether problems could indeed be resolved at department level and challenges at company level was not confirmed.

Because of my brief involvement with the company, I expect I do not possess full domain knowledge and understanding of the organization's business processes. Therefore, though the problems appear to be true, they may not be addressable at department level as I had intended.

6.2 Comparison of findings to other literature

My findings are comparable to findings in earlier literature. The problems, challenges, and domain factors are identifiable in other cases, although none have attempted the same style of categorization.

In addition, my findings in general support what has been previously discovered. This case appears to follow the stepwise increasing agility which Fuchs and Hess (2018) discovered to be typical for agile transformations.

This organization had attempted a lean transformation in the past and ceased the efforts after discovering barriers. In the current agile attempt, the organizational agility was higher and kept increasing until the emergence of barriers to progress.

6.2.1 Problems in other literature

Comparing and contrasting the results of this study with those of the literature review by Dikert et al. (2016) grants some insight into the broader generalizability of the findings. In Table 15, I list the 10 problems I identified and give corresponding findings and their prevalence as identified by Dikert et al. (2016).

Table 15: Comparison of findings against Dikert et al. (2016)

Problem	**Corresponding finding, prevalence**
Behavioral change resistance	Management unwilling to change, 10% Reverting to the old way of working, 19% Other functions unwilling to change, 31%
Culture unsupportive of agile	Autonomous team model challenging, 10% Excessive enthusiasm, 10% Top-down mandate creates resistance, 10% Rewarding model not teamwork centric, 14% Management in waterfall mode, 14%
Internal change resistance	General change resistance, 12% Skepticism towards the new way of working, 17%
Lack of appropriate training	Lack of training, 7% Misunderstanding agile concepts, 19%
Lack of experienced coaches	Lack of coaching, 14%
Lack of open communication	(Success factor: Communication and transparency, 17%)
Lack of support materials	Lack of guidance from literature, 21%
Lack of top management engagement	Management unwilling to change, 10% Management in waterfall mode, 14%
Other functions limiting the pilot	Keeping the old bureaucracy, 5% Challenges in adjusting to incremental delivery pace, 17% Other functions unwilling to change, 31%
Talent resourcing issues	Internal silos kept, 5% Old commitments kept, 5% Too high workload, 7%

Though the concepts are not perfectly comparable, Table 15 shows that similar issues have been identified at other organizations as well. Some of these are directly comparable, such as the lack of support materials and lack of guidance from literature. Some of the problems I identified are akin to a compilation of issues identified by Dikert et al. (2016), such as the unsupportive culture, which comprises four of the issues identified by the authors (See Table 15).

The lack of open communication was the only problem I identified which did not have a close resemblance to challenges identified by Dikert et al. (2016). However, the authors identified communication and transparency as a success factor in 17% of cases. Since communication has been found to play an important part in agile transformations (Worley & Doolen, 2006) and is considered fundamental in leading organizational change overall (Richardson & Denton, 1996), the lack of open communication could justifiably be considered a problem.

Similarly, the findings support the discontinuing factors identified by Sidky et al. (2007). The lack of top management engagement and the lack of investment were significant impediments to this transformation. As top management engagement is critical for transforming the culture (Worley & Doolen, 2006), the lack of it can be thought to significantly contribute to the unsupportive culture. It, and the lack of training, which is a form of lacking investment, were the two most complained-about problems of this transformation.

6.2.2 Challenges in other literature

Many of the challenges have been identified in previous literature. Change resistance emerged in 38% of the cases studied by Dikert et al. (2016), and the authors found that 31% had issues with investment, which in my analysis is a part of the small-scale transformation strategy. Challenges adjusting to incremental delivery pace were reported in 17% of cases.

This challenge of small-scale transformation strategy was thus simultaneously common and uncommon. While 31% of cases reportedly had issues with too low investment, fewer publications indicate the reason for the low investment. Benefield (2008) mentions budget constraints as a reason for coaching failing to be scaled as necessary, which suggests that the organization might have experienced a similar surprise at the scale of its transformation.

Fuchs and Hess (2018) view the difficulty of finding the right people as a barrier to agile transformations. As challenges, the authors give “Inappropriate agile implementation approach” and “Problematic coordination with other business units”, which correspond to my identifications of the challenges “Highly customized Scrum” and “Traditional organizational structures”.

6.2.3 Domain factors in other literature

These results indicate that while the problems which emerged in this case are unique to the combination of factors at their root, similar issues have been faced by other organizations as well. Considering that the domain factor "Previous culture incompatible with agile" is likely to affect a high number of organizations at the early state of their transformation, these similarities are expected.

Furthermore, the domain factor "Agile misunderstood as solely a management method" appears to have occurred in other organizations. A transformation case reported by Chung and Drummond (2009) appears to have been another case with this issue.

Chung and Drummond (2009), reporting on the transformation of Yahoo! a year after Benefield (2008), discuss a case of command-and-control agile found at the company. In this case, the increased visibility bought by agile was misused to micromanage the teams, and agile teams were questioned if they did not meet estimates.

I witnessed the same behavior at the department I studied. I took it to be a sign of unsupportive culture and one or both forms of change resistance, depending on whether the individual reported knowing they should be acting otherwise. In members of top management, it was also a sign that the whole scope and scale of an agile transformation had not been understood.

The domain factor "Atypical scrum application domain" can also be found in other literature. Svensson and Host (2005) found that the case environment of a software maintenance and evolution organization made the adoption of agile more difficult as it required adaptations to agile practices. The same was concluded by Heeager and Rose (2015) a decade later. My findings indicate the agile adoption in this environment remains difficult and could benefit from further research.

Agile values are notoriously difficult to adopt if not already established in the culture. Tolfo et al. (2011) note that the greater the difference between agile culture and existing culture, the likelier it is that agile culture gets rejected. This suggests the existence of the domain factor "Previous culture incompatible with agile" as a notable constraint.

6.3 Unexpected and unclear results

There were findings I did not expect to see, results I expected to see but did not, and findings where the results are unclear. Here, I discuss the unexpected emergence of complaints about unsupportive culture, the expected effects of virtual teams I did not observe, and the unclear results of the introduction of the new management tool.

6.3.1 Unexpected: Open complaints of unsupportive culture

As an example of unexpected results, the problem "Lack of open communication" appears to be in direct conflict with the high number of complaints about culture. One would expect that if the culture did not support open communication, subjects would not criticize it.

However, the majority of the direct criticism of culture emerged towards the end of my study, when I had been a daily part of the organization's life for five months. I believe that the formed rapport helped subjects trust me with such criticism. Earlier data was mostly collected in observations of situations where agile values were naturally discussed and compared to existing culture.

In addition, both the surveys in teams and the company's internal employee engagement survey showed high psychological safety. Indeed, the cultural problem is mainly one pertaining to management styles and behavior exhibited by and around managers. At SME level, I observed individuals discussing openly and sharing opinions, but the presence of a manager instantly curbed such discussion in most cases. An exception to this was the first pilot team, where SMEs continued to joke around after managerial figures joined the meeting and would even explain the nonsensical amusings to them.

6.3.2 Expected but not seen: Virtual-only teams

At the opposite end of the expected-unexpected spectrum, the virtual-only approach appeared to have little impact on teamwork though I expected it to emerge as a problem. Team members did not see it as such, though when asked, all acknowledged the potential benefits of meeting in person. I was unable to identify any issues conclusively caused by virtualness and can only speculate on its effects.

I believe the virtual-only element likely had an effect on the teams' communication. None of the teams had an online workspace, and they had a very low amount of social interaction between members, as confirmed by members in interviews. This would be expected to have negative effects on teams, as virtual teams are recommended to dedicate time and effort to relationship building to build trust (Blackburn et al., 2003; Malhotra, Majchrzak, & Rosen, 2007), and preferring face-to-face meetings is one of the agile principles (Beck et al., 2001b).

However, there was no point of comparison as the teams had never worked in-person and there were no comparable in-person teams; I could not test my speculations when the team members themselves did not report any issues. I expected that the team members would be less trusting of each other as they had never met, but the teams repeatedly rated highly retrospective questions such as "I feel like I can speak my mind" and "My opinion is heard in the team".

Perhaps this was thanks to the long time the teams had spent together. Some had been working together for the same client for over a decade, and most for several years. This longevity might compensate for the virtualness, or the members might still be benefitting from past in-person meetings. The company had typically hosted at least one company-wide gathering before winter holidays, which might have served as a relationship-building opportunity. Due to pandemic restrictions, the event was not organized in 2021, the year of this study.

Virtualness certainly had an effect on the culture of the department, though I could not ascertain its strength. Some commented on the negative habit of colleagues agreeing to attend several concurrent meetings, which resulted in meeting-hopping. A norm for managers in the department appeared to be having many short, clearly time-boxed meetings in a day. These effects are part of the problem of unsupportive culture.

6.3.3 Unclear: Problematic tool

All pilot teams complained about the new management tool, and I witnessed its usage being difficult. I had the opportunity to also try the tool myself and found it confusing and overwhelming. The interface was complex, with multiple views and unlabeled buttons. Unexpectedly, other data did not support these statements and observations.

When teams were given additional training to use the tool, they used it observably smoother and faster, making fewer errors and navigating easier. However, all teams required more than one training session in using the tool and continued to mention it as a negative in weekly check-up. As the teams did not receive any additional training in agile or Scrum, I fear that this may have emphasized the role of the tool. In addition, when the tool became the main subject of complaints at weekly check-ups with managerial figures, more significant issues may have gone unaddressed.

In literature, “doing agile” is seen as a valid way to become more agile, as simply following the practices can allow for agility to grow in the culture (Eilers et al., 2020). The tool was forcing the teams to break their work into increments and smaller tasks, and it required them to practice self-organization to configure the tool. Many of the complaints about the tool were surrounding these aspects.

Moreover, these complaints may have been directed at the tool to avoid criticizing management. Since the decision to adopt agile had come from the head of the department and the project was ran by the transformation unit, which was higher in the hierarchy, managerial figures of the teams may have felt that they could not criticize the adoption of agile itself. This theory is supported by the lack of open communication and the unsuitable management culture.

Therefore, though the teams complained profusely and the introduction of the tool had the negative effect of burying more relevant concerns, I could not confirm it to be a problem. It passed the triangulation check between methods and subjects but not analysts and theories, as literature does not support the view, and alternative theories can explain the issue.

6.4 Criticality of results

The high number of problems and challenges identified in this study call for reassessing the possibility of the transformation succeeding. Some of the issues are fundamental barriers to agile transformation, such as the lack of investment and the lack of top management engagement, which are considered reasons to discontinue agile transformation efforts (Sidky et al., 2007).

The small-scale strategy appeared to be the department's barrier to further development. When the challenge was identified and the original misunderstanding realized, the department attempted to involve higher level management to execute necessary changes. However, since the surrounding organization and deep levels of culture had not changed, these attempts were slow to proceed through hierarchy and bureaucracy and no progress was yet visible at the end of the study period.

One of the major challenges of this case is the small-scale transformation strategy, which limited the powers of the transformation unit. The resulting lack of autonomy disabled the unit from appropriately addressing problems. Kotter (1995) argues for establishing a powerful coalition to drive forward the change. Similarly, Fry and Greene (2007) recommend creating an empowered, fully cross-functional roll-out team for an agile transformation. This calls for the gathering of a new transformation team to plan and lead the change.

For such a team to succeed, it should be cross-functional. It should possess the skills, mandate, and authority to envision and enact required changes (Kotter, 1995). The current transformation was lacking a clear vision, which was a significant impediment. This vision should include the elements Brosseau et al. (2019) call for in a backbone, such as planning the governance, budgeting, performance management, and technology to be used.

In addition, the department suffered from the lack of a vision on agile frameworks. Without guidelines for what to alter and what to keep, pilot teams could not tailor agile to suit their needs. The transformation unit appeared to be paralyzed when faced with choosing between restricting autonomy and risking big-picture incompatibilities, a fundamental paradox of scaled agile (Horlach & Drechsler, 2020). When teams ultimately could not take the pressure of attempting perfect Scrum in an imperfect environment, they altered the basics of Scrum, which is heavily warned against (Lilja et al., 2021; Schwaber & Sutherland, 2020a).

In the hierarchical culture, such decisions of high-level visions required top management approval and could not be made by a transformation unit or team. Engaging others in the formation of such visions is encouraged for both organizational change (Kotter, 1995) and agile transformations in particular (Fry & Greene, 2007; Brosseau et al., 2019; Pikkarainen et al., 2012). This hints that any effective change would require a more empowering and collaborative management style than currently present at the organization.

This supports the findings by Worley and Doolen (2006), who discovered top management engagement to have broad, indirect effects on an agile transformation. Though the lack of top management engagement caused only six direct symptoms, it indirectly contributed to several other problems. One such was the unsupportive culture, which seemingly could not be altered without top management support.

The original department culture was contradictory to agile values, and without visible top management support, employees were hesitant to attempt to role model the new culture. This was evident in cases where support was the changing factor. For example, one doubtful and reluctant managerial figure was convinced to try the method when direct verbal support was given by both the PO and her own supervisor in a common meeting.

As Nerur et al. (2005) aptly state, "Culture exerts considerable influence on decision-making processes, problem-solving strategies, innovative practices, information filtering, social negotiations, relationships, and planning and control mechanisms" (p. 76). Culture affects the overall practices and processes of the organization, and its effects on the transformation should not be underestimated. Cultural change is justifiably considered the most difficult aspect of agile transformation (Gandomani & Nafchi, 2016).

On the final weeks of this study, the agile pilot enjoyed the attention of a new member of top management, whose vocal support and encouragement appeared to have an instant effect on the motivation of involved individuals. I left the company before the long-term effects of this new turn of events could be observed, but it gives hope that this problem, which the transformation team cannot overcome by itself, could be overturned.

Early stages of transformation typically meet barriers to progress (Fuchs & Hess, 2018), and thus forecasting whether this transformation would ultimately succeed or fail would be premature. If the department is able to break through its barriers, the organization may yet perform a successful agile transformation. To support this effort, I present a theoretical framework for recommended future actions in chapter 7.

6.5 Limitations

This study is limited to one department of one company, and therefore should not be considered to yield universal results. The causality connections between the identified issues stemmed from the analysis of a single

researcher and would require more rigorous validation than was possible in the current circumstances. As discussed, the study also suffered from the lack of quantitative data.

Employees of the organization should be more engaged in the validation of such an analysis since the case is their lived experience. The living organizational environment rendered this difficult. I knowingly avoided intrusive research methods to avoid disturbing individuals at work as internal metrics were targeted at measuring billable work.

Therefore, the causalities between the identified issues should be considered at best exemplifying a way to process and categorize the information. My aim with the visual representation was to explain to internal actors why targeting emerging symptoms was futile and to bring attention on the underlying causes. It appeared beneficial for this purpose.

The agile pilot of this case did not exemplify agile principles, which limits the relevancy of my findings. For example, the team sizes were significantly larger than the maximum of 10 recommended by Scrum (Schwaber & Sutherland, 2020a, p. 5), the teams were limited by contractual obligations, and all teams were distributed.

However, 48% of the teams surveyed by Ambler (2017) reported containing more than 10 members, only 29% were near-located, and 67% were limited by compliance aspects. Though these findings are from some years ago, they suggest that other agile teams are likely to suffer from similar limitations to the observed pilot.

In addition, this thesis was limited by ethical considerations. Involving the SMEs more would have provided more data on teams, but this risked consequences for the SMEs, their teams, and the department as it would have tied up valuable work hours. Due to the company emphasizing work billable from clients, I found it inappropriate to disturb the SMEs. Instead, I used minimally invasive methods to overcome the issue, observing the SMEs during meetings and reviewing data that was already collected from them.

Another limitation was the format for taking field notes. As the topic of the study was changed two months into the thesis work, the requirements for the data collection were insufficiently planned. I wrote notes by hand, which later on made data retrieval and analysis more difficult than if they had been collected digitally. Because of the breadth of data and notes collected, digitizing raw data would have taken a considerable amount of time—combined with the time constraints for the work, this made it more feasible to finish the study using the original data format.

The change of topic one third into the study did not otherwise appear to be a significant limitation. While it caused serious time constraints, most of the previous work was still applicable. My field notes proved relevant for the new study, and the low amount of prior literature research into the topic is considered a valid approach to grounded theory (Dunne, 2011).

6.5.1 The dual role of a researcher and employee

As discussed in limitations of the interview method, much of this study relied on both my abilities as a researcher and my social skills. Initially, I was careful about introducing the study to colleagues without endangering its results, and as the research question and angle formed during the study, it was difficult to describe. In grounded theory, the researcher is meant to enter the field without preconceived theory (Glaser & Strauss, 2017), but vague responses may have alienated some colleagues.

However, since it was commonly known that this was a thesis study, colleagues seemed forgiving of my shortcomings. If a similar study was conducted by an external researcher, the vague descriptions could have turned people skeptical of the foreign research. Being present daily and performing other duties alongside the study helped me build rapport.

On the other hand, colleagues' personal opinions of me may have affected their attitudes towards the research. In the hierarchical culture, being a junior employee may have limited the perceived validity of my observations, which may have impacted participance.

Furthermore, I was not immune to the company culture. My fear of causing consequences to SMEs for taking their time may have been partially unfounded, and doing so regardless of the general atmosphere may not have yielded the negative consequences I was expecting. Nevertheless, I believe it better to err on the side of caution than to risk consequences for job safety, or performance of the department.

Being an internal actor might also have limited the likelihood of SME-level employees voicing their concerns in my presence. The hierarchical culture contained an observable reluctance to criticize management, and through my work with to the transformation unit, I may have been perceived as a member of management. When I observed individuals backtracking or sugarcoating their messages, I quickly clarified my role as a temporary aide. This yielded consistent positive results.

On the positive side, my dual role enabled me to access company data to view, for example, materials sent to clients to describe the agile model. I could attend internal meetings at various levels of the hierarchy and gather data through observations. I could hear discussions about topics that the employees might not have realized to report to an external researcher. In addition, I could join informal gatherings and meet study subjects as a colleague.

Being internal to the organization made communication easier as I could access various communication channels at will, having a company email, Microsoft Teams account, and access to the intranet. In addition, having work tasks beside research brought me closer to the agile teams. For example, helping improve training granted me access to the new teams' training sessions.

6.6 Suggestions for further research

Agile transformations conducted entirely remotely could prove another interesting topic of research. In the case I studied, the teams had been working mostly remotely for up to decades before the pandemic and the mandated move to remote work. Without data for comparison, I could only speculate on the effects of this near-total remoteness.

The unclear results of introducing the tool could also be grounds for further research. Adopting the new tool forced the teams to practice agile, but it may have overshadowed bigger issues in the adoption of agile, risking the pilot. A study could investigate whether the team-level effects are worth risking the organization-level effects.

In addition, more research is needed into agile transformations at various organizations. My research suffered in particular from the lack of literature about agile practices used in environments with continuous work, highly virtual organizations, and in highly specialized fields. My findings indicate that adopting agile practices in IT infrastructure maintenance work continues to be difficult. More research could help organizations tailor agile for this environment.

7 Theoretical framework for future action

I formed a theoretical framework for recommended future action to aid the transformation unit on the journey forward. These recommendations are based on existing literature and are targeted at solving the identified issues. Applying and exploring the effects of the framework was beyond the scope of this study, but I provide it here in case it may be of use for further studies or other transformation cases. The framework is presented as a list and expanded upon in subsequent sub-chapters.

Action recommendations for the transformation unit and service delivery department:

1) Pause the transformation to assess the situation
   - Estimate readiness for agile transformation
   - Gather a cross-functional transformation team
2) Create a vision for the change
   - Engage members across the organization
3) Create a backbone for the transformation
   - Select and adapt chosen frameworks
     - Plan rules for agile customization in teams
   - Design team compositions
     - Consider career paths
   - Plan the budget and funding decision-making for the transformation
     - Consider coaching needs
     - Consider training needs
     - Consider rewarding model
   - Select metrics to measure success
     - Plan for short-term wins
   - Select tools and technology
   - Create a communication plan
4) Create a roadmap for the transformation
   - If piloting:
     - Collect data on successes and difficulties
     - Remove impediments actively
   - If revolutionizing:
     - Support everyone in their personal journey
5) Implement the roadmap
   - Stress the cultural factors
   - Engage top management
   - Scale agile sustainably
6) Iterate and improve

7.1 Pause the transformation to assess the situation

De Smet et al. (2018) encourage pausing a transformation to reassess the situation, as "pausing can create space for clear judgment, original thinking, and purposeful action" (p. 10).

During the pause, the transformation unit should cease agile expansion efforts and focus on critically assessing the realities of the situation. Addressing the challenges discovered by this study would require investment and top management effort. Without these basic building blocks, the transformation unit is limited to responding to emerging symptoms and problems, which are likely to continue to develop if the underlying root causes are not addressed.

The transformation unit should consider whether the organization is ready to support a transformation of both its culture and processes, and if so, on what scale. Should the transformation be limited to one department or rolled out company-wide? A company-wide transformation would likely require corporation-wide support. If such was available, the company could exploit this opportunity for a full-scale transformation.

7.1.1 Gather a cross-functional transformation team

Kotter (1995) argues for establishing a powerful coalition to drive forward the change. Similarly, Fry and Greene (2007) recommend creating an empowered, fully cross-functional roll-out team for an agile transformation. One of the major challenges of this case is the small-scale transformation strategy, which limited the powers of the transformation unit. The resulting lack of autonomy disabled the unit from appropriately addressing problems.

This calls for the gathering of a new transformation team to plan and lead the change. This team should be cross-functional and autonomous, i.e. possess the skills and authorization to make strategic decisions and implement them accordingly. The composition of this team could vary depending on the scale of the planned transformation; whether it would be a sole-department transformation or company-wide.

7.2 Create a vision for the change

The fully cross-functional and autonomous transformation team should rally together the department (or company, depending on the chosen scale) to create a shared vision for the change. A vision is crucial for leading change and can be used to engage others in the change (Kotter, 1995).

De Smet et al. (2018) recommend co-creating a purpose with participants across the organization. The same is echoed by Fry and Greene (2007) who call for including everyone in the change. Including members of all levels would not only engage them in the change as Kotter (1995) suggests but would also be helpful in the creation of a customized agile solution.

7.3 Create a backbone for the transformation

Brosseau et al. (2019) call for the creation of a backbone to guide the transformation. The authors recommend planning the governance, business planning and budgeting, funding decision-making, performance management, roles and career paths, risk management, workforce location and workspace, and technology to be used in the new agile system.

This backbone should be the next iteration of the intended agile system and address the issues identified in this study. It should aim to fix the child problems of the small-scale transformation strategy challenge.

7.3.1 Select and adapt chosen frameworks

The transformation team should select the team-level and scaled agile frameworks to be used, weighing carefully the pros and cons of the different approaches. Support materials for the selection are unfortunately limited, as Conboy and Carroll (2019) find, and companies can find the choice overwhelming. Fry and Greene (2007) recommend bringing in external consulting at an early stage, as consultant have aided in other transformations and can help avert common issues. An external consultant could help the transformation team make the best choices for the department/company.

Dikert et al. (2016) recommend setting rules for the adaptation of agile in the teams to ensure teams are able to tailor the framework to their needs without unnecessarily complicating the scaled system. Here, the transformation unit should be mindful of the paradox between directing the teams and allowing them autonomy, as Horlach and Drechsler (2020) describe. Higher-level decisions should be made carefully and with good justifications.

7.3.2 Design team composition

Next, the backbone should contain an initial design for team compositions. Resourcing difficulties caused significant struggles for the pilot teams and should be addressed with this design. Members of all three teams voiced concerns over working in several teams at once while practicing Scrum ceremonies. If Scrum is continued, this should be addressed in the team design.

Employees in different roles and from varying levels of the hierarchy should be included in designing the teams. Employees across the organization should make design decisions in their own areas (Dikert et al., 2016). Including employees at all levels in designing the teams would not only bring in expert knowledge of what skills are needed in different areas of work, but could also engage them in the vision, as recommended by Kotter (1995).

While designing the teams, the transformation team could take the chance to consider roles and career paths in the organization. For each role, the

transformation team should plan the transition from the old model to agile ways. One reason for the unclarity surrounding the Squad Lead role might be the sudden change from a hands-on manager role. Similarly, one pilot team Scrum Master was hesitant to accept the new role over fears of an increased workload. When planning the new team compositions, the transformation unit should take into account the former roles of the individuals.

7.3.3 Plan the budget and funding decision-making for the transformation

In addition, the planned backbone should include a budget for the transformation and a procedure to follow for future decision-making about funding. The low investment was a considerable impediment in the current approach to the transformation, as it led to the lack of training and lack of coaching.

Benefield (2009) stresses the importance of adequately funding coaching to ensure agile spreads sustainably. The author notes that the lack of available coaching led to agile being maladapted in teams, which Lilja et al. (2021) find difficult to correct once adopted. The transformation team should estimate the amount of coaches needed and acquire necessary talent.

Furthermore, the department/company could consider whether its rewarding models should be altered. The current practices rewarded individuals instead of teams, which incentivizes employees to focus on their own performance (Lawler, 2003). Lawler (2003) argues that rewards can be used to motivate employees to learn skills the company wishes to acquire, which could be leveraged to incentivize agile team members to broaden their range of skills.

For rewards to be effective, the changes should be measured. Metrics could help to guide decision-making and provide data on the successes and difficulties of the transformation. However, metrics are notoriously difficult to adapt to agile ways, as Heidenberg et al. (2013) find. The authors point out the difficulty of defining metrics that could be used in both the old and new systems with conflicting values.

7.3.4 Select metrics to measure success

In their study of maintenance operations, Heeager and Rose (2015) allowed teams to choose the metrics by defining their own understanding of a successful working environment. One approach to defining metrics could be involving stakeholders of the agile pilot to inquire how they would define their working environment as successful. The needs of these stakeholders are likely to differ, for example between the SMEs and the transformation team, yet when all are working towards the same goal of a more efficient environment, the purposes behind their metrics should be similar.

Metrics could also be used to generate short-term wins. Organizational changes take time, and the slowness of the process can be demotivating without smaller victories in the short-term (Kotter, 1995). The transformation unit can generate small victories by measuring key areas where agile is expected to bring positive changes. For example, both of the active pilot teams experienced increased client engagement and knowledge sharing between team members early on.

7.3.5 Select tools and technology

The choice of metrics might affect the choice of tools, and vice versa. Since all three teams found the new management tool confusing, the transformation team should consider whether the tool should continue to be used, and if so, with what configurations. Configuring the tool for use caused delays in the agile adoption of both new pilot teams, and a ready-made template might ease new teams' journey into agile practices.

7.3.6 Create a communication plan

Finally, the backbone should include a communication plan. The lack of clear guidelines for communication was an impediment, which originally caused the symptom of confusion between agile actors. Communication is vital for the success of organizational change (Kotter, 1995; Richardson & Denton, 1996), and Fry and Greene (2007) recommend "radically" open communication in agile transformation. Openness is one of the Scrum values. The transformation team could role model the culture change by practicing open communication across the department/company.

7.4 Create a roadmap for the transformation

After the creation of the backbone, the transformation team can plan its realization. Brosseau et al. (2019) recommend creating a roadmap to guide the organization through its transformation regardless of the approach to the roll-out.

Agile transformations are recommended to be begun with a pilot, which can provide insight into whether the planned model is suitable (Dikert et al., 2016). The transformation team could choose to continue with another pilot and follow it closely in order to actively remove impediments along the way.

A pilot can be used to inspect the system, if it is considered an appropriate representation of the environment in terms of criticality, duration, size, and resources (Gandomani et al., 2013b). The transformation team should ensure that the pilot is an accurate representation of the planned agile system, as otherwise its findings are limited to team level. If organizational structures are indeed reworked, a pilot could be used to test whether the planned

structure is appropriate, in which case the pilot should already exist in those conditions, i.e. in reworked structures.

Alternatively, the department/company could elect to revolutionize the entire organization at once, as Fry and Greene (2007) advocate. Even with such an approach, Brosseau et al. (2019) recommend creating a roadmap to help plan the transition. In addition to aiding others in the organizational changes, the transformation team should expect to have to manage emerging emotions which the changes are likely to cause (Richardson & Denton, 1996).

7.5 Implement the roadmap

Following the roadmap, the department/company can begin the new iteration of its agile transformation.

Organizational culture is a significant impediment to agile transformation (Gandomani & Nafchi, 2016), and organizations should stress the cultural aspects of the change (De Smet et al., 2018). Management should be engaged in the transformation to role model the changes to ensure their adoption (De Smet et al., 2018; Dikert et al., 2016; Richardson & Denton, 1996). Top management should be given concrete tasks to actively engage them in the change (Brosseau et al., 2019; Fry & Greene, 2007).

Benefield (2008) reminds to scale agile sustainably, keeping in mind that teams will require support, and these support functions should first be scaled. In the verification workshop, members stressed the need to ensure the provision of appropriate training for all teams.

7.6 Iterate and improve

Ultimately, the entire organizational agile system should be iterated and improved continuously (De Smet et al., 2018; Fry & Greene, 2007; Pikkarainen et al., 2012). The backbone and roadmap are unlikely to solve all problems and challenges permanently, and more iterations will be required to alter the solutions.

Fuchs and Hess (2018) find that agile transformations tend to face barriers, which require radical changes to overcome. The transformation unit should expect to be required to make radical changes in the future too, but acknowledge that each step brings increased organizational agility.

8 Summary

In this study, I investigated the challenges in the large-scale agile transformation of a service delivery department. The service produced by the teams was IT infrastructure maintenance, and the department was part of the local branch of a large global IT service provider enterprise. The agile framework was based on Scrum.

The study was based on grounded theory for the conceptualization of problems. Data collection comprised a total of 94 unique subjects in 23 hours of interviews, 82.5 hours of observations, and 2.5 hours of verification workshop. Findings were validated through triangulation of methods, subjects, theories, and analysts.

I identified three domain factors at the root of the issues, causing nine challenges, which in turn caused 10 problems. The most pervasive challenges were agile values being difficult to adopt, difficulties finding the right people, and the small-scale transformation strategy. The most critical problems were the culture being unsupportive of agile, the lack of appropriate training, and internal change resistance. All these issues were affected by the problem "Lack of top management engagement", which emphasizes its criticality and the breadth of its influence. To succeed at the transformation, the department should create a new transformation strategy targeting these issues.

These findings are in line with previous research. Similar case studies have revealed similar issues, and all the identified problems are either challenges or the absence of success factors identified by Dikert et al. (2016) of 42 cases of agile transformations. The effects of communication and top management engagement in agile transformation have been found to be significant and indirect (Worley & Doolen, 2006), as they were discovered to be in this study as well.

This study provides more insight into cases of large-scale agile transformation, which are called for by researchers comparing cases (Dikert et al., 2016; Fuchs & Hess, 2018). In addition, it explores agile and Scrum in an environment where it has not been widely adopted, contributing to the base of research. Agile has been previously found to be difficult to adopt in IT maintenance operations (Heeager & Rose, 2015; Svensson & Host, 2005), and my research confirms that the problem persists.

References

agile42. (2017, July). *The Hitchhiker's Guide to Agile Coaching*. Retrieved from agile42: https://www.agile42.com/wp-content/uploads/media/agile42-agile-coaching-guide/agile42-agile-coaching-guide.pdf

Alqudah, M., & Razali, R. (2018). An empirical study of Scrumban formation based on the selection of scrum and Kanban practices. *International Journal on Advanced Science, Engineering and Information Technology, 8*(6), 2315-2322.

Ambler, S. (2017). *2016 Agility at Scale Survey Results*. Retrieved from Ambysoft: http://www.ambysoft.com/surveys/agileAtScale2016.html

Anderson, D. J. (2010). *Kanban: successful evolutionary change for your technology business*. Blue Hole Press.

Beck, K., Beedle, M., Van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., & ... Thomas, D. (2001b). *Principles behind the Agile Manifesto*. Retrieved from Agile Manifesto: http://agilemanifesto.org/principles.html

Beck, K., Beedle, M., Van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., & ... Thomas, D. (2001a). *Manifesto for agile software development*. Retrieved from http://agilemanifesto.org/

Benefield, G. (2008). Rolling out agile in a large enterprise. *Proceedings of the 41st Annual Hawaii International Conference on System Sciences (HICSS 2008)* (pp. 461-461). IEEE.

Blackburn, R., Furst, S., & Rosen, B. (2003). Building a winning virtual team. In *Virtual teams that work: Creating conditions for virtual team effectiveness* (pp. 95-120).

Brosseau, D., Ebrahim, S., Handscomb, C., & Thaker, S. (2019). *The journey to an agile organization.* McKinsey & Company.

Chan, F. K., & Thong, J. Y. (2009). Acceptance of agile methodologies: A critical review and conceptual framework. *Decision support systems, 46*(4), 803-814.

Chung, M. W., & Drummond, B. (2009). Agile at yahoo! from the trenches. *2009 Agile Conference* (pp. 113-118). IEEE.

Conboy, K., & Carroll, N. (2019). Implementing large-scale agile frameworks: challenges and recommendations. *IEEE Software, 36*(2), 44-50.

De Smet, A., Lurie, M., & St George, A. (2018). Leading agile transformation: The new capabilities leaders need to build 21st-century organizations. McKinsey & Company.

DiCicco-Bloom, B., & Crabtree, B. F. (2006). The qualitative research interview. *Medical education, 40*(4), 314-321.

digital.ai. (2021). *15th Annual State Of Agile Report*. Retrieved from digital.ai: https://digital.ai/resource-center/analyst-reports/state-of-agile-report

Dikert, K., Paasivaara, M., & Lassenius, C. (2016). Challenges and success factors for large-scale agile transformations: A systematic literature review. *Journal of Systems and Software, 119*, 87-108.

Dingsøyr, T., Nerur, S., Balijepally, V., & Moe, N. B. (2012). A decade of agile methodologies: Towards explaining agile software development. *Journal of systems and software, 85*(6), 1213-1221.

Dunne, C. (2011). The place of the literature review in grounded theory research. *International journal of social research methodology, 14*(2), 111-124.

Eilers, K., Simmert, B., & Peters, C. (2020). Doing Agile vs. Being Agile-Understanding Their Effects to Improve Agile Work. *International Conference on Information Systems (ICIS)*, (pp. 1-17).

Fowler, M., & Highsmith, J. (2001). The agile manifesto. *Software development, 9*(8), 28-35.

Fry, C., & Greene, S. (2007). Large scale agile transformation in an on-demand world. *Agile 2007* (pp. 136-142). IEEE.

Fuchs, C., & Hess, T. (2018). Becoming agile in the digital transformation: the process of a large-scale agile transformation. *Thirty Ninth International Conference on Information Systems*. San Francisco.

Gandomani, T. J., & Nafchi, M. Z. (2016). Agile transition and adoption human-related challenges and issues. *Computers in Human Behavior, 62*(C), 257-266.

Gandomani, T. J., Zulzalil, H., Abd Ghani, A. A., Sultan, A. B., & Sharif, K. Y. (2013b). Exploring key factors of pilot projects in agile transformation process using a grounded theory study. *International Conference on Information and Software Technologies*, (pp. 146-158).

Gandomani, T. J., Zulzalil, H., Ghani, A. A., & Sultan, A. B. (2013a). Towards comprehensive and disciplined change management strategy in agile transformation process. *Research Journal of Applied Sciences, Engineering and Technology, 6*(13), 2345-2351.

Glaser, B. G., & Strauss, A. L. (2017). *The discovery of grounded theory: Strategies for qualitative research*. Routledge.

Government Communications Department, Ministry of Education and Culture, Ministry of Social Affairs and Health. (2020, March 16). *Government, in cooperation with the President of the Republic, declares a state of emergency in Finland over coronavirus outbreak*. Retrieved from Valtioneuvosto: https://valtioneuvosto.fi/-/10616/hallitus-totesi-suomen-olevan-poikkeusoloissa-koronavirustilanteen-vuoksi?languageId=en_US

Hajjdiab, H., & Taleb, A. S. (2011). Adopting agile software development: issues and challenges. *International Journal of Managing Value and Supply Chains (IJMVSC), 2*(3), 1-10.

Heeager, L. T., & Rose, J. (2015). Optimising agile development practices for the maintenance operation: nine heuristics. *Empirical Software Engineering, 20*(6), 1762-1784.

Heidenberg, J., Weijola, M., Mikkonen, K., & Porres, I. (2013). A metrics model to measure the impact of an agile transformation in large software development organizations. *International Conference on Agile Software Development* (pp. 165-179). Springer.

Horlach, B., & Drechsler, A. (2020). It's Not Easy Being Agile: Unpacking Paradoxes in Agile Environments. *International Conference on Agile Software Development* (pp. 182-189). Springer.

Jovanović, M., Mas, A., Mesquida, A. L., & Lalić, B. (2017). Transition of organizational roles in Agile transformation process: A grounded theory approach. *Journal of Systems and Software, 133*, 174-194.

Kniberg, H., & Ivarsson, A. (2012). *Scaling agile @ Spotify*. Retrieved from Agile lean house: http://www.agileleanhouse.com/lib/lib/People/HenrikKniberg/SpotifyScaling.pdf

Kotter, J. P. (1995). Leading change. *Harvers business review, 2*(1), 1-10.

Koutsikouri, D., Madsen, S., & Lindström, N. B. (2020, June). Agile Transformation: How Employees Experience and Cope with Transformative Change. *International Conference on Agile Software Development* (pp. 155-163). Cham: Springer.

Laanti, M. (2016). Piloting Lean-Agile Hardware Development. *Proceedings of the Scientific Workshop Proceedings of XP2016*, (pp. 1-6).

Laanti, M. (2017). Agile transformation model for large software development organizations. *Proceedings of the XP2017 Scientific Workshops*, (pp. 1-5).

Lawler, E. I. (2003). Pay systems for virtual teams. In *Virtual teams that work: Creating conditions for effective virtual teams* (pp. 121-144).

Lilja, S., Kailanto, J., & Saanila-Sotamaa, M. (2021). *From pyramid to communities: How pharma company reinvented themselves using Scrum*. Retrieved from Agile Alliance: https://www.agilealliance.org/resources/experience-reports/from-pyramid-to-communities-how-a-pharma-company-reinvented-themselves-using-scrum/

Longhurst, R. (2003). Semi-structured interviews and focus groups. *Key methods in geography, 3*(2), 143-156.

Malhotra, A., Majchrzak, A., & Rosen, B. (2007). Leading virtual teams. *Academy of Management perspectives*, 60-70.

Nerur, S., Mahapatra, R., & Mangalaraj, G. (2005). Challenges of migrating to agile methodologies. *Communications of the ACM, 48*(5), 72-78.

Olsen, W. (2004). Triangulation in social research: qualitative and quantitative methods can really be mixed. *Developments in sociology, 20*, 103-118.

Patton, M. Q. (1999). Enhancing the quality and credibility of qualitative analysis. *Health services research, 34*(5), 1189-1208.

Pauly, D., Michalik, B., & Basten, D. (2015). Do daily Scrums have to take place each day? A case study of customized Scrum principles at an e-commerce company. *48th Hawaii International Conference on System Sciences* (pp. 5074-5083). IEEE.

Petersen, K. (2011). Is lean agile and agile lean?: a comparison between two software development paradigms. In A. H. Dogru, & V. Biçer, *Modern software engineering concepts and practices: Advanced approaches* (pp. 19-46). IGI Global.

Piderit, S. K. (2000). Rethinking resistance and recognizing ambivalence: A multidimensional view of attitudes toward an organizational change. *Academy of management review, 25*(4), 783-794.

Pikkarainen, M., Salo, O., & Still, J. (2005). Deploying agile practices in organizations: a case study. *European Conference on Software Process Improvement* (pp. 16-27). Berlin: Springer.

Pikkarainen, M., Salo, O., Kuusela, R., & Abrahamsson, P. (2012). Strengths and barriers behind the successful agile deployment—insights from the three software intensive companies in Finland. *Empirical software engineering, 17*(6), 675-702.

Richardson, P., & Denton, D. K. (1996). Communicating change. *Human Resource Management, 35*(2), 203-216.

Rigby, D., Sutherland, J., & Noble, A. (2018). *Agile at Scale*. Retrieved from Harvard Business Review: https://hbr.org/2018/05/agile-at-scale

Scaled Agile. (2021a, June). *Solution Architect/Engineering*. Retrieved from Scaled Agile: https://www.scaledagileframework.com/solution-architect-engineering/

Scaled Agile. (2021b, December 14). *Release Train Engineer*. Retrieved from Scaled Agile: https://www.scaledagileframework.com/release-train-engineer/

Schwaber, K., & Sutherland, J. (2016). *The scrum guide, The Definitive Guide to Scrum: The Rules of the Game*. Retrieved from https://www.scrumguides.org/scrum-guide.html

Schwaber, K., & Sutherland, J. (2020a). *The Scrum Guide, The Definitive Guide to Scrum: The Rules of the Game*. Retrieved from Scrum Guides: https://scrumguides.org/docs/scrumguide/v2020/2020-Scrum-Guide-US.pdf

Schwaber, K., & Sutherland, J. (2020b). Scrum-opas, Scrumin määritelmä ja pelisäännöt. *Scrum Guides*. (L. Lekman, Trans.) Retrieved from Scrum guides:

https://scrumguides.org/docs/scrumguide/v2020/2020-Scrum-Guide-Finnish.pdf

Sidky, A., Arthur, J., & Bohner, S. (2007). A disciplined approach to adopting agile practices: the agile adoption framework. *Innovations in systems and software engineering, 3*(3), 203-216.

Svensson, H., & Host, M. (2005). Introducing an agile process in a software maintenance and evolution organization. *Ninth European Conference on Software Maintenance and Reengineering* (pp. 256-264). IEEE.

Tolfo, C., Wazlawick, R. S., Ferreira, M. G., & Forcellini, F. A. (2011). Agile methods and organizational culture: Reflections about cultural levels. *Journal of Software Maintenance and Evolution: Research and Practice, 23*(6), 423-441.

Vinekar, V., Slinkman, C. W., & Nerur, S. (2006). Can agile and traditional systems development approaches coexist? An ambidextrous view. *Information systems management, 23*(3), 31-42.

Worley, J. M., & Doolen, T. L. (2006). The role of communication and management support in a lean manufacturing implementation. *Management decision, 44*(2), 228-245.

Wysocki, R. K. (2010). *Effective software project management*. John Wiley & Sons.

Zhang, Y., & Wildemuth, B. M. (2009). Unstructured interviews. In *Applications of social research methods to questions in information and library science* (pp. 222-231).

A. Initial interview outline

Background
What is your role in this agile team?
What kind of tasks does this role involve?
How long have you been with this team?

Perception of agile and remote work
How are you feeling about agile now?
How does agile work with remote work?
What do you think of (the company)'s remote work practices overall?
Have you had some team building exercises?
Do you think meeting live would affect this team's work?

Communication
With what tools and channels does your team communicate?
What is discussion like on those channels?
Are there some people in the team with whom you do more work together?
TeamT: Could you describe the agile training your team had?
(TeamR & TeamE: What did you think of the agile trainings your team had?)
(intended but not executed)

Perception of team
How would you describe this team's spirit?
What do you think is the best thing about this team?
What are the biggest challenges with this team?
How does the team deal with successes?
How about shortcomings?
Do you have ideas for improving the remote work of your team?

B. **Simplified analysis tree**