

# **Agile Implementation on Department Level**

## **- A Case Study of a Large Organization**



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## **Abstract**

As established organizations are trying to combat the fast-moving and turbulent business environment and remain competitive, they are becoming aware of the importance to become more flexible and adaptive to changes. Firms have started to realize that a way to achieve this is through the implementation of agile methods. As a consequence, manufacturers of physical products operating in traditional industries have been found to implement agile methods within certain departments and throughout the organization. Current research, however, is limited in the field of how to achieve agility on a department level and the impact that contexts associated with different departments may have on an agile implementation. The aim of this thesis is thus to provide insight regarding how to foster agile initiatives on a department level in a large organization. In order to reach this aim, a qualitative study conducted from a managerial perspective with thirteen semi-structured interviews was conducted. The findings show that different levels of agile maturity as well as different prerequisites to apply agile due to the contexts within departments seem to influence what challenges and facilitators that appear when implementing agile methods. Eight main challenges were identified within departments which could be divided into sub-challenges. Further, six main facilitators were identified within departments which could also be divided into sub-facilitators. Furthermore, these did not appear to be uniform across departments but rather seemed to depend on different levels of maturity and the context of departments. Some challenges and facilitators also appeared to be connected to the larger organizational context. Hence, the study shows that there is a need to look into the specific departmental context as well as the organization at large to further foster an agile implementation on department level.

**Keywords:** Agile Project Management, Large organization, Manufacturing industry, Facilitators, Challenges, Agile implementation

## List of Abbreviations

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- **GPM2:** The traditional project management method used within the case company.
  - **PDP:** Another word for the GPM2 project management method.
  - **Lean:** The application of lean manufacturing principles, emphasizing improvements in working processes, to the practice of project management.
  - **Lego game:** An internal education initiative within the case company, focusing on creating awareness of the agile methods.
  - **PMO:** Project management office.
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# 1. Introduction

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*The first chapter of the thesis starts with a description of the background and problem discussion of the topic to be studied in this thesis. Thereafter, a description of the case to be studied as well as the purpose and research question are presented. Following, the delimitations are presented, and the chapter ends with an outline of the following chapters of the thesis.*

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## 1.1 Background

Innovative technologies, evolving customer demands and new types of competition are all contributing to a fast-moving and turbulent business environment (Appelbaum, Calla, Desautels & Hasan, 2017; Rigby, Sutherland & Noble, 2018). As established organizations are trying to combat this complexity and remain competitive, they are becoming aware of the importance to work more flexible and adaptive to respond to changes (Harraf, Wanasika, Tate & Talbott, 2015; Rigby et al., 2018). Traditional project management or the “waterfall approach” with emphasis on documentation, planning, processes and tools generally lack dynamism and tend to result in a slow-moving organization (Ahlbäck, Fahrback, Muraka & Salo, 2017; Sommer, 2019). Thus, to effectively manage the new business climate, firms need to develop new practices that add continuous value and satisfy customers (Denning, 2015). Accordingly, firms have started to realize that a way to achieve this is through the implementation of agile project management, or “agile methods” (Conforto, Salum, Amaral, Da Silva & De Almeida, 2014; Tolfo, Wazlawick, Ferreira & Forcellini, 2011; Sommer, 2019).

The origin of agile project methods dates back to the 1990s when it emerged as a way to improve project management and development processes in the software industry (Harraf et al., 2015; Serrador & Pinto, 2015; Sommer, 2019). It was first created to be applied in smaller sized projects with few team members (Paasivaara & Lassenius, 2014). In contrast to the linear and robust setup of traditional project management, the agile approach prioritizes individuals, interactions, collaboration, and iterations (Sommer, 2019). By applying agile methods, firms within the software industry have been able to respond to dynamics in the market and tailor their services and products to better meet customer demands (Jovanović, Mas, Mesquida & Lalić, 2017). Although agile methods have been frequently applied in the software development industry since their introduction (Campanelli & Parreiras, 2015; Conforto et al., 2014), they have in recent years increasingly spread to other industries (Conforto et al., 2014). One such example concerns traditional industries where large manufacturers have increasingly realized the benefits of agile methods such as increased responsiveness to change and improved quality (Sommer, 2019).

However, in order for large organizations to reach the benefits of applying agile they have realized the need to scale agility throughout the entire organization (Kalenda, Hyna & Rossi,

2018; Muduli, 2016). Furthermore, when attempting to scale agile, many organizations find themselves faced with problems, especially those already deeply embedded within their traditional methods (Hobbs & Petit, 2017; Iivari & Iivari, 2011; Nerur, Mahapatra & Mangalaraj, 2005). As an example, the American multinational conglomerate General Electric (GE) within the industrial manufacturing industry, initiated an agile transformation in 2012 (Denning, 2019). Despite huge investments and attempts to implement the agile approach throughout the organization, they failed to deliver improved business results. Instead, the complexity of the agile journey and the failure to appropriately implement an agile mindset led to loss of market shares and a fight for survival. At the same time, success stories of large organizations accomplishing an agile implementation can be found. One such example is LEGO Group who launched an agile transformation in 2018 and has recently seen a considerable improvement in flexibility and responsiveness to change (Sommer, 2019). In relation to this, it has been shown that succeeding with implementing agile requires a thorough adaptation, awareness and a willingness to change rather than solely taking the decision to become agile (Fernandez & Fernandez, 2008).

Consequently, when scaling agile in large organizations it is necessary to adapt and spread the new methods into several functions and departments, such as Product development, Marketing and Human resources (Appelbaum et al., 2017; Rigby et al., 2018; Sommer, 2019). However, as large firms have started to implement agile initiatives, differences in agile adoption have been found across departments (Sommer, 2019). Therefore, larger organizations are increasingly paying attention to what happens when agile is scaled to a department level.

## 1.2 Problem Discussion

Agile implementation processes have proven to be complex and requires much effort from all parts of the organization (Campanelli & Parreiras, 2015). It demands a willingness to change and adapt and an awareness of how to best manage a project situation within a specific environment and culture (Fernandez & Fernandez, 2008). Furthermore, implementing agile into large organizations implies greater challenges due to the inherent complexity and the need to integrate new technologies and processes with existing ones (Lindvall et al., 2004). When investigating agile transformations in such organizations, the methods have mostly been discussed in relation to individuals, teams and projects (Inayat & Salim, 2015; Jovanović et al., 2017; Paasivaara & Lassenius, 2014). Thus, the implementation of agile above the project level has not been sufficiently addressed by previous research (Hobbs & Petit, 2017; Jovanović et al., 2017).

Recently, research has increasingly been conducted on how firms can achieve agility throughout the whole organization (Rigby et al., 2018). However, in exactly what contexts and under what conditions agile methods work remains unclear (Hobbs & Petit, 2017; Lindvall et al., 2004). Paasivaara and Lassenius (2014) thus suggest that additional research is needed to understand contextual factors affecting the use of agile methods in large-scale agile implementations. Recent years have also seen an increased interest in how large organizations can scale agile to a department organizational level (Sommer, 2019). Since it is not uncommon

for different departments within a large organization to develop their own cultures and ways of working (Vinekar, Slinkman & Nerur, 2006), the impact of specific department contexts on the use of agile methods is necessary to explore further.

Furthermore, previous research has extensively examined the use of agile methods in the software industry (Conforto et al., 2014). Despite the increased interest of applying the methods in other types of industries there still seem to be insufficient empirical studies investigating this. Specifically, agile implementation in traditional manufacturing firms are yet to be further explored (Sommer 2019).

To conclude, as previous research has focused on the team level (Inayat & Salim, 2015; Jovanović et al., 2017), as well as a broader aspect of organization-wide agility seen in recent years (Rigby et al., 2018), there is a clear need for further research in the field of how to achieve agility on a department level and the contexts associated with different departments. As research of agile implementation is further lacking within manufacturing firms (Sommer, 2019), there is a clear need for further investigating this field. This creates an opportunity for investigating agile departmental implementation within the manufacturing industry.

### 1.3 The Case

The case investigated in the study is a multinational corporation with a profound background within the engineering and manufacturing industry. To adapt to the more fast-moving environment of today and to increase responsiveness, the company has started to incorporate agile initiatives. However, the implementation of agile project methods has not been performed in a uniform way across departments, but rather multiple agile initiatives have been taken. Thus, questions have been raised related to the agile adoption within departments. As a way to grasp the overall implementation within the organization, the company has requested a need for understanding the current situation, as well as the potential barriers and approaches for adopting agile within departments. This provides an opportunity for the researchers to further investigate the field of agile project methods on a department level.

### 1.4 Purpose and Research Question

The aim of this study is to explore the implementation of agile project methods on a department level in a large manufacturing organization. The study is conducted from a managerial perspective and seeks to contribute with insight regarding how agile project methods can be fostered within different departments. In order to explore the implementation and provide such an insight, a first step will be to examine what agile initiatives have been taken within three departments. This will be done to provide an insight to if differences in agile initiatives impact on how an agile implementation can be facilitated. Thereafter, each department will be investigated to uncover challenges that may prevent agile methods from developing. Last, respective department will be examined to elicit facilitators that may overcome barriers of an agile implementation. To reach the main purpose of this study, the following research question has been formulated:

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*How can a large organization foster agile initiatives on a department level?*

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The aim is to contribute with practical recommendations for managers operating within large manufacturing organizations seeking to implement agile methods on a department level. The study further aims to provide theoretical contributions by generalizing common as well as distinctive factors found within different departments that gives a holistic understanding of an agile implementation within large organizations.

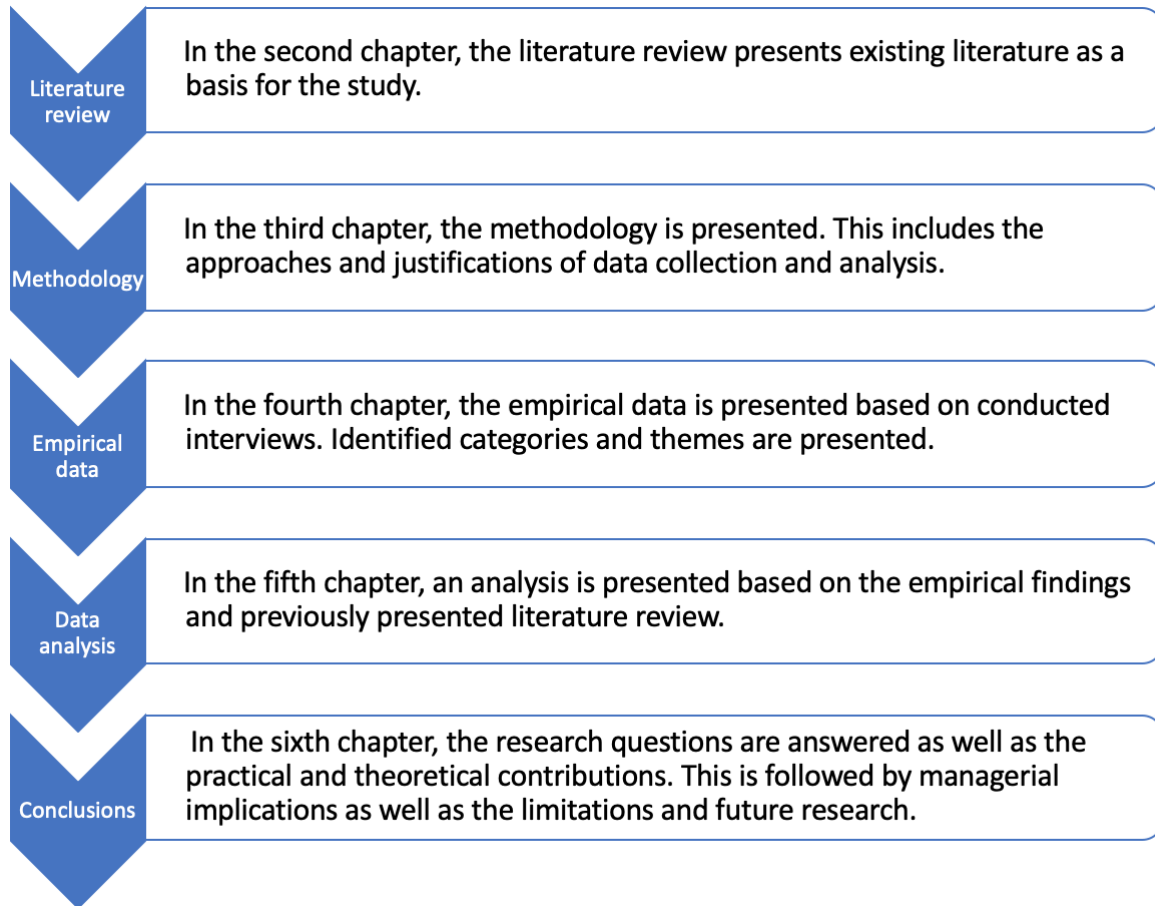
## 1.5 Delimitations

The study focuses on the agile project methods internal of an organization in the manufacturing industry and excludes the investigation of how agile methods are used by external parties and the full supply chain which in turn may have an impact on the agile project methods. Further, the study is conducted from a managerial perspective of agile project activities, application, challenges and facilitators, hence not involving the views of any of the team members, who may view these aspects somewhat differently. In addition, no limitations are made to specific nationalities of individuals and the study is not related to specific types of projects.

In addition, the study focuses on certain agile methods such as the Scrum and SAFe framework. Hence, the study does not investigate concepts or frameworks that are perceived similar to agile methods or frameworks, such as lean project management.

## 1.6 Disposition of the Study

The study constitutes of six chapters, excluding the appendix. Presented below are the upcoming five chapters.



*Figure 1. Outline of the Research Process.*



## 2. Literature Review

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*This chapter presents the literature relevant for this research. First, an overview of traditional project management, agile project management as well as a hybrid approach to project management is presented. Thereafter, the main challenges and facilitators related to the implementation of agile methods in large organizations are identified and grouped into categories.*

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### 2.1 Traditional Project Management

Traditional project management, sometimes also called the ‘waterfall approach’ can be traced back to the 1950’s and refers to the use of certain tools and techniques in a wide range of projects (Masciadra, 2017; Špundak, 2014). The underlying idea assumes projects to be relatively easy to manage and highlights detailed initial planning without the need for major changes in late stages of the project (Špundak, 2014). The approach further emphasizes clear specification of features, functions and requirements as well as having sequential phases (Bianchi, Marzi & Guerini, 2020; Fernandez & Fernandez, 2008). Preceding each phase is a gate where the decision is made to either go forward with the project or shut it down (Cooper & Sommer, 2016a). In short, the goal of the approach is to maximize efficiency by following a preset plan and to complete the project within the decided timeframe, budget, scope and to ensure good quality (Špundak, 2014).

However, over the course of time, critical voices have been raised (Collyer, Warren, Hemsley & Stevens, 2010; Serrador & Pinto, 2015; Špundak, 2014). It is argued that the dynamic and fast-moving business environment of today is leading to more complexity in projects, making the usage of traditional methods problematic (Bianchi et al., 2020; Collyer et al., 2010; Cooper, 2014; Cooper & Sommer, 2016a; Högman & Johannesson, 2013; Špundak, 2014). Under these new conditions it is difficult to determine the complete set of requirements in the beginning of the process, despite extensive initial market research (Bianchi et al., 2020). The rigorous development process can, according to Serrador and Pinto (2015), lead to a need for rework late in the process. In worst case, the firm may even discover that the product offer is already outdated once it is time to take it to the market (Bianchi et al., 2020), resulting in customer dissatisfaction (Serrador & Pinto, 2015).

Špundak (2014) argues that traditional project management is better suited for projects with certain characteristics. First, it appears better suited for projects taking place in a more predictable environment, where the requirements can be set initially without a strong need to interact with the end users. Second, traditional practices are more suitable for projects of a larger size, either in terms of team members, complexity of requirements or duration (Conforto & Amaral, 2016; Špundak, 2014). Špundak (2014) further recommends using the traditional approach in case of inexperienced team members or if there will be a variation in team members during the project life span. Third, in cases where the organization appears to hold strong

resistance towards newer project methods, the only option may be to maintain the existing approach, which most often refers to traditional project management methods.

### 2.1.1 Traditional Project Roles

First, the *project manager* is assigned the task to accomplish the project within the given scope, budget and timeframe (Fernandez & Fernandez, 2008). Thus, if something changes along the process, the project manager has to make sure that the project goals are maintained (Masciadra, 2017). Second, in place to control that the project is going according to the plan are the so-called *gatekeepers*, assessing if the requirements have been met or not in each gate (Whynacht & Duinker, 2015). Gatekeepers can consist of senior decision-makers or stakeholders such as key suppliers and customers (Whynacht & Duinker, 2015). Third, the *sponsor* is an individual who has the overall accountability for the project (Wysocki, 2014) including vision, governance, value and benefits (Project Management Institute, n.d.). Last, the *team* typically follow the project manager and the plan in place (Wysocki, 2014). One positive aspect is that traditional approaches allow for more distribution of work teams, since the requirements and framing of the project is clear during the lifespan of the project (Fernandez & Fernandez, 2008).

### 2.1.2 Traditional Project Management in Large Organizations

Generally, large organizations and manufacturers tend to lean on traditional phase-gate models as they emphasize control (Cooper & Sommer, 2016b; Špundak, 2014). This is considered important as large firms are characterized by many subunits collaborating on mutual projects (Špundak, 2014). However, some authors have found that large companies are increasingly experimenting with new approaches (Bianchi et al., 2020; Cooper & Sommer, 2016a). For example, Cooper and Sommer (2016a) found that large companies have encountered increasing pressure from customers. This in combination with internal organizational complexity has been pushing them to develop more flexible product development processes. However, Bianchi et al., (2020) found evidence that the traditional methods are still the most commonly used, despite today's dynamic environment.

## 2.2 Agile Project Management

The concept of agility has its origins in the 1990s, when it emerged as a set of methods for project management in the software development industry (Serrador & Pinto, 2015). Reasons for its origin were prevailing issues faced by managers, such as derailed projects and excessive rework as end-customers were dissatisfied with the delivered products (Lindvall et al., 2004). Thus, extensive detail in product specifications early in the project had become misleading (Kalenda et al., 2018). Accommodating this need, the agile approach emerged as a viable set of practices with emphasis on continuous adaptation to change and improved quality of projects. As a result, the Agile Manifesto was created in 2001 (Sommer, 2019), giving guidance for practitioners in terms of priorities and certain valued activities (Fernandez & Fernandez, 2008).

Agile project management focus on an iterative process with strong collaboration among employees and cross functional teams organized around products rather than functions (Špundak, 2014). One of the advantages with the approach is increased flexibility when dividing the workload into iterations. It further acknowledges adaptability to changes in customer requirements through frequent collaboration with stakeholders. Consequently, it is possible to address customer demands with improved quality and faster speed (Stare, 2014). By being able to define the project scope during the process, agile methods are argued to have favorable applicability when faced with ambiguity in the project scope, such as non-detailed contracts and absence of a project deadline (Conforto et al., 2014). It is also considered suitable within environments characterized with high complexity, as the agile approach facilitates innovativeness (Lindvall et al., 2014; Schuh, Dölle, Kantelberg, & Menges, 2018; Weiss & Brune, 2017).

Although agile methods have been frequently advocated, there are many researchers who criticize the methods (Fernandez & Fernandez, 2008; Hobbs & Petit, 2017; Dikert, Paasivaara & Lassenius, 2016). Dikert et al., (2016) argue that although agile methods are favorable in small, single team projects in the software industry context, other problems seem to emerge when studied outside this context. At the same time, Conforto et al., (2014) studied the adoption of agile methods into other environments and industries, and found apparent benefits, significantly in dynamic contexts with aspiration to respond faster to change. On a contrasting note, as seen in the study by Fernandez and Fernandez (2008), blind adherence of agile may come at the expense of being adaptable and flexible. Thus, the study indicated the importance of not simply following agile methods, but rather adapting certain suitable practices for the specific project and surrounding circumstances. The context dependency of conforming to agile methods have additionally been discussed, where Campanelli and Parreiras (2015) found that there is a need of tailoring the agile methods to correspond with the inherent culture and resources within the organization. Furthermore, researchers have pointed toward that agile application relies on experienced employees that thoroughly understand the core principles of project management, stating that individual expertise is a cornerstone in conforming to agile methods (Conforto et al., 2014; Fernandez & Fernandez, 2008).

### 2.2.1 Agile Frameworks and Methods

#### **Scrum**

Various agile methods exists, although the method of Scrum has attracted highest attention within the industrial product development (Sommer et al., 2015). It has been advocated as an efficient process for introducing agile to the team level, through giving clear coordination and responsibilities (Hobbs & Petit, 2017). However, according to Weiss and Brune (2017) the framework should not be seen as a starting point when implementing agile as employees found it complex to adapt to. Instead the authors suggest building the process step by step, allowing employees to adapt certain parts according to their context. Essentially, Scrum can be described according to certain events, that will be presented below.

**Sprints:** The division of work into shorter iterations, commonly being two to four weeks when the team is working on a certain task (Safe, n.d.).

**Sprint planning:** Strategic planning regarding what and how a certain task can be approached during the following sprint (Sommer et al., 2015).

**Product backlog:** Contains the demanded specifications from customers that may be included in the final delivery of the product, helping the team to prioritize features to be developed (Sommer et al., 2015).

**Sprint backlog:** A dynamic document including certain tasks from the product backlog, that are selected to be managed within the current sprint (Sommer et al., 2015).

**Daily standup:** A daily meeting when the team gathers to synchronize their work, communicate and assess advancements towards their target (Pardo-Calvache et al., 2019).

**Sprint review:** The event of reviewing the delivered product increment and making adjustments to the product backlog if necessary (Pardo-Calvache et al., 2019).

**Sprint retrospective:** Time taken for the team to inspect and improve plans for the following sprint (Safe, n.d.).

**Scrum board:** A tool that visualizes an overview of the project, that helps managing work in progress (Sommer et al., 2015).

**Burndown chart:** Shows the remaining iteration time as well as ongoing tasks that are to be executed according to the plan (Sommer et al., 2015).

**Kanban:** A system that may be used to show bottlenecks and improvements of the work-in-process on a Kanban board (Safe, n.d.).

## SAFe

One framework that have received high notice when scaling agile into large enterprises is SAFe (Kalenda et al., 2018). It constitutes of a hierarchical structure with a rigid set of process elements that requires the whole organization to adapt to certain events. Thus, the SAFe framework has been advocated because of its ability to support alignment of agile methods across the organization, extending the agile concept beyond the team level. Further, the guidance given from the framework has shown decreasing barriers of adopting agile to large projects, globally distributed organizations, hardware and systems engineering (Ebert & Paasivaara, 2017). This is since the scaled method is argued to ensure that an agile culture reaches all levels, thus creating a shift towards an agile mindset of every employee and enabling agile practices to become rooted. However, a scaled agile framework is perceived a complex undertaking for large organizations and requires resources as competence, leadership and empowerment of individuals to solve for dependencies of units that needs to be managed (Kalenda et al., 2018). Accordingly, following the agile scaled framework opts for a time-consuming pathway requiring continuous support and investments to follow through. Further, it should be noted that the adoption to the framework should be carefully done as it requires the organization to tailor the framework to their circumstances. A brief review of the cornerstones of SAFe will be presented below.

**Lean portfolio management:** Entails alignment of strategy, execution and funding meanwhile governing empowerment of a decentralized decision making (Safe, n.d.).

**Organizational agility:** Includes the establishment of a Lean-Agile mindset among employees (Safe, n.d.).

**Continuous learning culture:** Continuous innovation of processes, services and solutions among employees (Safe, n.d.).

**Lean-Agile leadership:** Inspiring others with a desired behavior, ensuring alignment of values and principles as well as guiding the change throughout the organization (Safe, n.d.).

**Team and technical agility:** Emphasis on high performing and cross functional agile teams (Safe, n.d.).

**Agile product delivery:** Focus on having the customer requirements in the center when pursuing projects as well as releasing products on demand (Safe, n.d.).

**Enterprise solution delivery:** The synchronization of teams and coordination of agile release trains, stretching across the full supply chain (Safe, n.d.).

### 2.2.2 Agile Project Roles

Agile implementation has an impact on the organizational roles as it introduces significant changes to the responsibilities among employees (Fernandez & Fernandez, 2008). First, the *Product owner* clarifies the features to be developed during the upcoming sprint by cultivating customer requirements. Additionally, the role entails dividing the project scope into assigned parts as well as prioritizing execution of activities in a team backlog. Second, the *Scrum master* supervises and coordinates the collaboration between the product owner and the team members. Thus, the Scrum master is carrying a central role for the teams' processes when fostering a continuous flow of high performance while eliminating impediments (Pardo-Calvache et al., 2019).

Further, the role of the *team* denotes a key role in agile management since it constitutes of self-organizing teams with individuals carrying substantial competence to define, build, test and deploy value in the iterative product development process (Hobbs & Petit, 2017). Authority is also given to the team to manage their own work, consequently nurturing a large level of responsibility on the individual that unlocks the intrinsic motivation among employees (Fernandez & Fernandez, 2008). Moreover, the SAFe framework provides additional guidance and introduction of roles. One role usually mentioned in relation to the SAFe framework is the Scrum of Scrum, that is accountable for cross-synchronizing teams and coordinating agile across the organization (Ebert & Paasivaara, 2017).

### 2.2.3 Agile Project Management in Large Organizations

Conforming to agile methods have recently extended from the original small and co-located teams to incorporate a broader degree of organizational settings (Brune & Weiss, 2017). Significantly, Brune & Weiss (2017) found indications of the suitability of agile methods within large scale organizations and heavy regulated contexts as well as distributed and large teams. Furthermore, as demonstrated in a study by Sommer (2019), companies within the manufacturing industry have increasingly adopted agile methods since indications pointed towards increased benefits such as responsiveness to change, improved quality and increased motivation among employees. Dikert et al., (2016) also found that there was a growing

acceptance of agile in large organizations as the dynamic business setting required improved project management methods to increase business value, where agile proved to be a successful method.

In turn, notion is given to the distrust in the method and Dikert et al., (2016) found evidence that agile may not be a great fit into large undertakings. Accordingly, it is demonstrated that the inherent legacy systems of larger organizations make scaling agile particularly difficult when the bureaucracy is hindering agile values and practices to be rooted, significantly because of the path dependency of well-established organizations that tends to reflect upon the inherent culture (Kalenda et al., 2018). This aspect is further discussed by Lindvall et al., (2004) who demonstrate the complexity of integrating new processes with pre-existing practices, including compliance to inherent culture. Sommer (2019) found evidence of large differences in maturity across departments at an early stage in an agile implementation. While some departments had all teams working agile in some way, others had few or no teams working agile, which was found partly to depend on department-specific factors.

## 2.3 Hybrid Approach to Project Management

In addition to purely agile ways of working, new variants combining agile and traditional project methods have emerged (Barlow et al., 2011; Conforto & Amaral, 2016; Cooper & Sommer, 2016a; Karlström & Runeson, 2005). One main reason for this development has been that agile methods are considered to be developed specifically for the use in software development companies (Conforto & Amaral, 2016). Consequently, more and more firms are realizing the potential of agile methods if customized to fit their industry and project types. By carefully combining the two approaches into a hybrid, problems associated with each respective model can be overcome (Batra, Xia, VanderMeer & Dutta, 2010; Conforto & Amaral, 2016). According to Boehm and Turner (2005), the key is to find the right balance between agility and discipline.

A hybrid approach can be developed in different ways to fit the specific organization and project (Barlow et al., 2011). However, in most cases firms choose to keep the gates from the traditional model and apply agile within certain stages in between the gates (Cooper & Sommer, 2016b). Karlström and Runeson (2005) found that companies that had incorporated agile methods in their traditional gated model were able to maintain a better control of the daily work and could plan ahead in smaller steps. The result was an increasing control over costs, product performance and delivery within the set timeframe. Furthermore Batra et al., (2011) found that the two approaches seemed to complement each other and resulted in success when applied together in large projects. Maintaining structured planning, control and coordination contributed to an organizational infrastructure that was seen as important for agile to be efficient. At the same time, the iterative processes of agile methods enabled the traditional planning and control processes to learn and adapt to changing situations.

However, there are some challenges with adopting the hybrid approach to project management (Batra et al., 2011). The underlying assumptions and principles of traditional and agile methods

are largely different and sometimes even conflicting. Therefore, organizations struggle to understand how to effectively combine the two approaches to successfully manage projects in unstable business environments. Whereas some authors argue that agile and traditional methods can only coexist within an ambidextrous organization, where cultures and methods are kept separate (Vinekar et al., 2006), Batra et al., (2011) suggest that the two methods can be combined, especially within large and distributed projects. Moreover, Cooper and Sommer (2016a) argue that the hybrid model is developed to manage more dynamic projects surrounded by uncertainty and where customer input is crucial. Thus, they argue that it may not be suitable for every project.

### 2.3.1 Roles in Hybrid Approach

Cooper and Sommer (2016a) mention the agile roles of the *Scrum master*, *Product owner* and *team members* and their importance in the hybrid model. However, they emphasize that not every organization choose to adopt all these agile roles when operating according to a hybrid model. Instead, organizations sometimes choose to keep one or more of the traditional roles, such as the project leaders and project managers. In addition, Karlström and Runeson (2005) instead mention the importance of identifying a customer representative when operating in a hybrid model, where the role functions as a point of contact for the team and the senior management.

### 2.3.2 Hybrid Approach in Large Organizations

Barlow et al., (2011) argue that for large and mature organizations, implementing a hybrid model is to prefer, as purely agile methods are generally not suited for large and complex firms. For example, Högman and Johannesson (2013) found empirical support for the tailoring of agile practices with traditional processes when investigating six hardware-oriented companies. They found that all firms used a traditional gated model but had adopted it in various ways to be able to better respond to increasing uncertainty and flexibility in product development. Moreover, Cooper and Sommer (2016a), found that for large manufacturers, agile methods were generally applied within certain stages in the traditional model. Particularly, the Scrum method was discovered to be a prominent agile feature in the context of hardware. It was also identified that manufacturing firms mainly used a hybrid version in the most technical phases, such as development and testing. Last, Cooper (2017) argue that research has shown potential for a hybrid model to bring benefits to manufacturers of goods ranging from food and toys to heavy industrial equipment.

## 2.4 Challenges when Incorporating Agile Project Methods

As organizations increasingly have worked to implement agile initiatives, several problems have been acknowledged (Iivari & Iivari, 2011), especially for those deeply embedded in their traditional methodologies (Nerur et al., 2005). According to Jovanović et al., (2017) challenges related to agility are complex and dependent on the context. Dikert et al., (2016) further argue that the introduction of agile methods gets even more complex in large organizations, partly due to a greater level of inertia delaying the organizational change. Gaining an understanding

of how the organization will be affected by the implementation of agile methods is thus of great importance to be able to plan and manage such a change (Nerur et al., 2005).

In order to better understand the challenges faced by larger organizations and their different subunits when working to implement agile methods, a literature review has been carried out to examine previous research within the topic. Altogether twenty-four challenges could be identified and were then classified into eight categories. The challenges and categories are compiled in Table 1 and are subsequently presented and discussed as per category.

Categories of Challenges	Challenge	Author(s)
<b>Coordination Challenges</b>	Difficult to coordinate between teams	Boehm & Turner, 2005; Dikert et al., 2016; Hobbs & Petit, 2017; Mahanti, 2006
	Interfacing with other organizational units	Dikert et al., 2016; Hobbs & Petit, 2017; Leffingwell, 2007
<b>Lack of Communication and Understanding</b>	Different interpretations of agile	Conboy & Carroll, 2019; Dikert et al., 2016; livari & livari, 2011
	Confusion among teams due to lack of directives	Conboy & Carroll, 2019; Dikert et al., 2016; Hobbs & Petit, 2017
	Relationship with customer	Conboy & Carroll, 2019; Hobbs & Petit, 2017; Leffingwell, 2007; Vinekar et al., 2006
<b>Changes to Roles and Responsibilities</b>	Changes to the role of the project manager	Hobbs & Petit, 2017; Nerur et al., 2005
	Lack of understanding of new roles	Dikert et al., 2016; Hobbs & Petit, 2017
	Team members lack competence in agile methods	Boehm & Turner, 2005
	Management working by traditional methods	Boehm & Turner, 2005; Dikert et al., 2016
<b>Conforming Agile to Traditional Structures and Processes</b>	Integrating old and new systems	Boehm & Turner, 2005; Conboy & Carroll, 2019; Dikert et al., 2016; Hobbs & Petit, 2017; Leffingwell, 2007; Mahanti, 2006
	Different life cycles of old and new methods	Boehm & Turner, 2005; Könnölä et al., 2016
	Lack of guidelines when applying framework	Conboy & Carroll, 2019; Leffingwell, 2007
<b>Agile Approaches in Hardware and Software</b>	Challenge of applying agile on hardware development	Boehm & Turner, 2005; Cooper & Sommer, 2018; Könnölä et al., 2016
	Collaboration between hardware and software development	Könnölä et al., 2016



<b>Lack of Investment</b>	Lack of training, coaching and support	Conboy & Carroll, 2019; Dikert et al., 2016; Gandomani et al., 2013
	Finding resources	Cooper & Sommer, 2018; Dikert et al., 2016
<b>Organizational Culture</b>	Agile methods incompatible with hierarchical culture	Hobbs & Petit, 2017; livari & livari, 2011; Vinekar et al., 2006
	Building a culture of trust	Boehm & Turner, 2005; Leffingwell, 2007; Nerur et al., 2005
	Difficult to sustain agile way of working	Conboy & Carroll, 2019; Dikert et al., 2016; Mahanti, 2006
<b>Change Resistance</b>	Employees perceive change as difficult	Boehm & Turner, 2005; Conboy & Carroll, 2019; Dikert et al., 2016; Mahanti, 2006
	Frustration with new way of working	Conboy & Carroll, 2019; Cooper & Sommer, 2016a
	Management resistance to change	Cooper & Sommer, 2016a; Dikert et al., 2016; Hobbs & Petit, 2017
	Top down directives create resistance	Conboy & Carroll, 2019; Dikert et al., 2016
	Worries about new roles and responsibilities	Leffingwell, 2007; Mahanti, 2006

**Table 1.** *Challenges of Agile Implementations.*

### 2.4.1 Coordination Challenges

One of the most prominent challenges in industrial large-scale agile transformation is described as coordinating between teams (Boehm & Turner, 2005; Dikert et al., 2016). As large organizations generally have teams distributed across a number of physical locations, this creates difficulties when interfacing with other teams (Leffingwell, 2007; Mahanti, 2006). According to Mahanti (2006) a lower cross-team communication may still work when developing independent subsystems, although an overall alignment and consistency could be hard to achieve. Since many benefits of agile come from collocation of teams with daily stand-ups, visual communication and consistent informal conversations, there is an issue with distributed teams (Leffingwell, 2007).

Another challenge was for teams when trying to collaborate with the rest of the organization (Dikert et al., 2016; Hobbs & Petit, 2017). Dikert et al., (2016) found that although one single team was perceived as more flexible, the surrounding organization was not able to respond in the same extent. Teams did not adhere to the larger context and sometimes even operated in different sprint lengths, causing the delivery to be delayed. Thus, the teams had to find a balance between their own goals and the overarching goals of the organization. Consequently,

since the agile teams still depended on several other units, managing the development was considered difficult.

#### 2.4.2 Lack of Communication and Understanding

Conboy and Carroll (2019) found that misinterpretations between large groups of teams due to unclear definitions can become very problematic as the differences grow over time. As teams develop their own ways of using the methods, friction and fragmentation is possible to emerge (Dikert et al., 2016). Moreover, Hobbs & Petit (2017) found that an absence of a clear policy regarding the use of agile and traditional methods influenced the use and understanding of agile methods. Instead the choice of methods was often influenced by the personal preferences of managers and team members.

Several researchers found that involving the customer in the process of an agile project was perceived as a challenge (Conboy & Carroll, 2019; Hobbs & Petit, 2017; Leffingwell, 2007; Vinekar et al., 2006). Conboy and Carroll (2019) identified a lacking understanding of agile frameworks and terminology among customers. As a consequence, organizations sometimes had to put extra work on adapting the framework to the individual customer, sometimes even dropping the terminology related to it. For organizations with many customers, attaining customer involvement was found to be challenging. According to Vinekar et al., (2006) customers may also be reluctant to take on the new collaborative role that agile methods require.

#### 2.4.3 Changes to Roles and Responsibilities

Understanding the new agile roles is perceived difficult in many large organizations (Dikert et al., 2016; Hobbs & Petit, 2017). According to Hobbs and Petit (2017) the implementation of agile methods is likely to impact on the role of the project manager. Among the main responsibilities of the project manager is to conduct detailed planning, which in agile methods is taken over by the Scrum Master and autonomous teams. This transition was found hard among firms as there did not seem to be any consensus on how to adjust the project manager role accordingly. In some organizations, the project manager was assigned to more strategic questions and stakeholder management, and in other organizations the role had been completely removed. In some cases, the role of the project manager and Scrum master had been merged (Dikert et al., 2016). Specifically, going from a leadership style characterized by command and control to a more servant leadership is perceived to cause tensions as the project manager may find it hard to understand this new role (Dikert et al., 2016; Hobbs & Petit, 2017; Nerur et al., 2005). Hobbs and Petit (2017) further found that one of the biggest challenges was lacking knowledge of the person undertaking the product owner role. Consequently, there was a risk of assigning a person without adequate business knowledge, authority and without sufficient time to put in the project, leading to delays in decisions. In addition, Boehm and Turner (2005) suggest that agile team members may require considerably more skills and experience to perform well, and thus a lacking competence may cause challenges when adopting new agile roles and responsibilities.

One factor further complicating the implementation of new responsibilities is the lacking understanding of managers (Boehm & Turner, 2005; Dikert et al., 2016). As many large-scale management processes have developed from a manufacturing paradigm, managers tend to view employees according to the old roles and responsibilities (Boehm & Turner, 2005). As the documentation is not delivered in the same extent when operating in Scrum teams, management can lack confidence in agile methods, and Scrum teams may be viewed as unreliable. Top level control thus risks impeding on agile teams when developing their projects according to agile methods and principles (Dikert et al., 2016).

#### 2.4.4 Conforming Agile to Traditional Structures and Processes

As organizations grow, they tend to establish infrastructure to manage and control projects, policies and procedures (Leffingwell, 2007). Several researchers noticed how challenges emerged in large organization when trying to integrate agile processes (Boehm & Turner, 2005; Conboy & Carroll, 2019; Dikert et al., 2016; Hobbs & Petit, 2017; Leffingwell, 2007; Mahanti, 2006). Boehm and Turner (2005) identified that certain traditional processes are likely to remain as agile methods are introduced. These include milestones, progress measurement and critical design reviews. However, combining such traditional processes with agile work may be next to impossible because of the large differences in structure, allowed flexibility and life cycles. According to Hobbs and Petit (2017) integrating processes internal and/or external implied organizational or technical restraints. This in turn could lead to delays in the development of a project. In addition, where integration happened, Dikert et al., (2016) found that tensions generally arose in the surrounding organization. As ongoing projects had deployed traditional methods, agile had to be arranged to make it fit in.

When it comes to implementing a large-scale framework, this has shown challenges of its own (Conboy & Carroll, 2019). Since a framework comes with its own ready-to-implement structures, routines and tools supposed to fit all, applying it into an existing organizational structure can be very difficult. In addition, when trying to tailor the framework to their own context, organizations found it hard to manage since there were no profound guidelines on how to integrate the new processes.

#### 2.4.5 Agile Approaches in Hardware and Software

Boehm and Turner (2005) point to the difference between preferred methods in software- and hardware development. As software engineering widely has started to use more iterative approaches, the hardware side has not been able to keep up. In software it is possible to show updates in the end of each iteration (Könnölä et al., 2016). However, in hardware development the cycle time is longer, and due to the often high cost of manufacturing it is generally impossible to create a new working product to show after each iteration. As it is argued that elements in the waterfall method are still required for hardware planning and production, it therefore has to be coordinated with the software cycles (Boehm & Turner, 2005). This was also noted by Cooper and Sommer (2018) stating the development of manufactured products such as a new engine or machine, cannot be easily incrementalized. Even when it was

considered possible to create a prototype at a certain stage, the time it took to physically build it could end up being very long.

Another challenge found by Könnölä et al., (2016) was that members of the team were often specialized in either hardware or software development which created barriers within the team when it came to be transparent and collaborative with each other.

#### 2.4.6 Lack of Investment

Gandomani, Zulzalil, Ghani, Sultan and Nafchi (2013) describe how moving from traditional practices characterized by rigidity and planning to agile activities requires a large amount of time, effort and investment. Dikert et al., (2016) similarly found that not investing enough in training and coaching for employees could easily cause problems for the agile transformation. This could result in lower motivation among team members and even ending the attempt of using agile methods due to bad preparation in the concerned teams. In addition, Conboy and Carroll (2019) found that although the supply of certain small-scale positions such as Scrum coaches seemed sufficient, coaching within larger frameworks appears to be lacking. Dikert et al., (2016) further discovered that teams found it hard to get hold of specialized skills needed for the project, leading to relocation of people to cover up where it was needed for the moment. This ultimately led to difficulties regarding planning within the team. This was also discovered by Cooper and Sommer (2018) who specialized their research within manufacturing firms. They found that it was difficult for the organizations to find the required resources needed to uphold the agile approach, especially dedicated project teams which was required to reach a full implementation.

#### 2.4.7 Organizational Culture

One of the main challenges for large and complex organizations when introducing agile methods is to adapt it to the existing organizational culture (Dikert et al., 2016; Hobbs & Petit, 2017; Iivari & Iivari, 2011; Nerur et al., 2005; Vinekar et al., 2006). It is not uncommon for different departments within the organization to grow their own cultures which takes hold in habits and actions of the employees (Vinekar et al., 2006). Thus, in firms with long experience of traditional and hierarchical culture, the people may find it difficult to embrace some of the agile principles such as self-organizing teams and the different decision-making procedures. In addition, Nerur et al., (2005) discuss how a varying use of agile methods in different development groups can lead to a culture of elitism which in turn can create tensions with those working in a non-agile manner. Therefore, it often requires much effort and time to develop a culture characterized by trust and respect between employees that allows for collaborative decision-making (Boehm & Turner, 2005; Nerur et al., 2005). However, changing the culture and mindsets of people is not easy, making a transition into agile methods intimidating for many organizations (Nerur et al., 2005). Moreover, sustaining new ways of working can be challenging if the organization does not work actively to support them (Conboy & Carroll, 2019; Dikert et al., 2016; Mahanti, 2006). Dikert et al., (2016) found a tendency for an agile transformation to result in people reverting to traditional working methods as they fell back in old habits and actions.

## 2.4.8 Change Resistance

One common problem is the unwillingness of people to change if they perceive the change as difficult and cannot identify immediate benefits with the approach (Boehm & Turner, 2005; Conboy & Carroll, 2019; Dikert et al., 2016). Even organizations with a flexible culture is likely to face this problem (Dikert et al., 2016). According to Mahanti (2006), employees may feel hesitant about their ability to acquire the skills needed in an agile environment which creates a fear of change. In relation to this, employees may experience a worry about new roles and responsibilities that agile might bring (Dikert et al., 2016; Leffingwell, 2007; Mahanti, 2006). In addition, Cooper & Sommer (2016a) discovered a frustration among team members when encountering the new iterative approach where they had to involve people outside of the team. As many were used to work in isolation for several months and then come out with a final product, the new approach was met with skepticism. Conboy and Carroll (2019) further noticed that frustration sometimes lead to employees refusing to adapt to the framework or remaining passive by doing the work in the same manner as they had always done.

At the same time, Conboy and Carroll (2019) found that implementing agile initiatives top-down also posed challenges on its own. Employees were found to be sceptic as they felt enforced with a framework from people not knowledgeable of the potential problems that would arise, and who did not give clear guidelines. In some cases, employees were sceptic because of dual messages from the management, as they still demanded reports and plans of the traditional approach (Dikert et al., 2016).

Furthermore, resistance has also been discovered among managers (Cooper & Sommer, 2016a; Dikert et al., 2016; Hobbs & Petit, 2017). Dikert et al., (2016) found that while the management promoted agile methods and their benefits, they still seemed to resist the implementation due to its clash with existing practices. Especially, middle managers were found reluctant to make any changes above team level when agile initiatives had emerged bottom-up. In fact, lacking support from middle managers was perceived as one of the most severe problems for the organization to become more agile.

## 2.5 Facilitators when Incorporating Agile Project Methods

Having been familiarized with the complex procedure of applying agile project management methods at large scale organizations, researchers have immensely debated the need for unraveling how it can be overcome (Conforto et al., 2014; Dikert et al., 2016; Sommer, 2019). As found in a study of Gandomani et al., (2014), remarks demonstrated that considerate compliance to certain enablers may circumvent potential barriers within agile implementation.

Following, a review of existing literature has been made to identify significant elements that have received notice in regard of fostering agile methods at large scale. The review has resulted in seventeen facilitators that have been classified into six categories. The facilitators and categories are compiled in table 2 and will be presented further in the following section.

Categories of Facilitators	Facilitators	Author(s)
<b>Agile Mindset</b>	Agile as a philosophy	Ebert & Paasivara, 2017; Kalenda et al., 2018; Tolfo et al., 2011
	Championing of agile mindset	Conforto et al., 2014; Denning, 2016; Kalenda et al., 2018; Weiss & Brune, 2017
<b>Agile Culture</b>	Alignment of values	Ebert & Paasivara, 2017; Felipe, Roldan & Leal-Rodriguez, 2016; Lindvall et al., 2014
	Agile embedded in values and culture	Tolfo et al., 2011
	Supportive agile culture	Leffingwell, 2007; Misra et al., 2009
<b>Roles and Responsibilities</b>	Integration and adaptation of roles	Ebert & Paasivara, 2017; Hobbs & Petit, 2017; Weiss & Brune; 2017
	Change agents and agile champions	Ebert & Paasivara, 2017; Gandomani et al., 2014
	Ensuring mandate of roles	Conforto et al., 2014; Sommer, 2019
<b>Knowledge and Communication</b>	Communicate and sustain change	Conforto et al., 2014; Dikert et al., 2016; Ebert & Paasivara, 2017; Gandomani et al., 2014; Sommer, 2019
	Communities of practice	Kalenda et al., 2018; Paasivara & Lassenius, 2014
	Learning organization	Conforto et al., 2014; Denning, 2019; Felipe, Roldan & Leal-Rodriguez, 2016; Misra et al., 2009

<b>Training</b>	Provide coaching and education	Conforto et al., 2014; Ebert & Paasivara, 2017; Kalenda et al., 2018; Sommer, 2019; Weiss & Brune, 2017
	Provide team member buy in and engaging employees in the process	Kalenda et al., 2018; Gandomani et al., 2014
<b>Management</b>	Ensure top down support	Denning, 2019; Ebert & Paasivara, 2017; Hobbs & Petit, 2017; Kalenda et al., 2018
	Provide clear guidance	Denning, 2019; Brune & Weise, 2017
	Management as catalyst of change	Conforto et al., 2014; Gandomani et al., 2014; Sommer, 2019; Weiss & Brune, 2017
	Allow bottom up initiatives	Denning, 2016; Dikert et al., 2016; Gandomani et al., 2014

*Table 2. Facilitators in Agile Implementations.*

### 2.5.1 Agile Mindset

Embodying an agile mindset among employees within the organization has been found vital to ensure agile implementation (Denning 2016; Fernandez & Fernandez 2008; Kalenda et al., 2018). Denning (2016) found that agile methods should be referred to as a mindset rather than a management methodology. It was found that the incorporation of an agile management methodology without having an agile mindset, resulted in minor, or none of the observed benefits. Instead, agile should be referred to as “being agile” in the way of acting and understanding the world, as opposed to merely “doing agile” and treating it as a formalized operating manual within an already existing management methodology. In addition, Kalenda et al., (2018) found that conforming to agile requires a proactive mindset, treating agile as a philosophy. Thus, by diffusing an agile mindset within the organization, Brune and Weiss (2017) found an ability to institutionalize and align agile values and principles among employees, that were perceived a crucial factor for not becoming stuck in traditional mindsets and conservative ways of working. Furthermore, there is need for championing of the agile mindset to make it spread across the organization (Conforto et al., 2014; Denning, 2016; Kalenda et al., 2018; Brune & Weiss, 2017). The championing refers to middle or upper-middle level of management that are enforcing the agile change by persuading employees of the agile mindset. Thus, this requires commitment and leadership skills.

### 2.5.2 Agile Culture

An agile approach has been argued to incorporate the establishment of an agile culture as it goes beyond the creation of a framework of practices (Felipe, Roldan & Leal-Rodriguez, 2016; Leffingwell, 2007; Lindvall et al., 2014; Misra, Kumar & Kumar, 2009). Tolfo et al., (2011) demonstrates that culture is manifested in the inherent habits and espoused values within the overall organization, that shapes the routines for delivering business value. Hence, embracing and aligning agile values as part of the organizational culture is argued to facilitate the use of agile practices (Ebert & Paasivaara, 2017). In relation to this, Kalenda et al., (2018) claim that there is need for an open-minded environment where employees may absorb the new methods, learn and develop them. Further, Misra et al., (2009) argue for the importance of having a supportive organizational environment. Leffingwell (2007) extends this thought and highlights the need for an organization to be accepting towards potential failures when trying new methods, to prevent mistrust to grow. Teams therefore must learn to trust the skills and contributions of each other to allow agile methods to emerge.

Tolfo et al., (2011) also found evidence that rooting basic assumptions within the organization nurtures an aligned agile philosophy among employees, shaping the culture within the organization. Working as a stimulus, the culture can thus foster innovation and allow proactive learning of how to ramp up agile delivery. Further, Brune & Weiss (2017) found that creating awareness and embodying knowledge in a learning culture would foster employee support and alignment across various teams and functions, which allows the new way of working to be settled into the organization.

### 2.5.3 Roles and Responsibilities

When advancing agile initiatives in large organizations, it is important to ensure proper roles and responsibilities to combat the complexity of the implementation (Ebert & Paasivaara, 2017; Gandomani et al., 2014; Hobbs & Petit 2017). First, Conforto et al., (2014) demonstrate that decentralized decision making should be ensured. This implies rearranging the responsibility of the traditional project manager to the team, nurturing the team's ability to accomplish the project scope with enhanced efficiency (Conforto et al., 2014). Second, allowing agile roles within the organization, such as the product owner and Scrum master, is perceived important since these provide the basis for being able to operate according to agile methods (Hobbs & Petit, 2017).

In addition, other roles that may facilitate the agile implementation is the *Agile coach*, *Change agent* and the *Agile champion*. First, the agile coach is perceived as an individual carrying previous experience in how to anchor agile methods across the organization (Sommer, 2019). While working collaboratively the agile coach provide guidance in processes and roles to teams and individuals (Hobbs & Petit, 2017). Second, the change agent visualizes change through pushing new initiatives forward within the organization. Involvement of a change agent allows for continuous improvement and customization of the change, so that it fits the contextual environment in the best possible way (Ebert & Paasivaara, 2017). Further, Ebert & Paasivaara



(2017) argue for increased efficiency when bringing in a change leader external to the organization. This allows for circumvention of organizational constraints as the change leader is then detached from inherent organizational structures. Moreover, ensuring coordination may also be facilitated by agile champions who are designated to self-organizing teams, where they have the potential to successfully influence individuals to embrace agile practices (Gandomani et al., 2014).

#### 2.5.4 Knowledge and Communication

An effective dissemination of knowledge regarding agile methods throughout the entire organization has proved necessary when incorporating the new methods (Conforto et al., 2014; Dikert et al., 2016; Ebert & Paasivaara, 2017; Gandomani et al., 2014; Misra et al., 2009). This is since coordinating communication and desired knowledge across the organization allows for proper anchoring of practices which enables the organization to sustain the agile change. Dikert et al., (2016) found that transparency of information, such as sharing own experiences, proof of successes and challenges when working with agile methods, fostered knowledge among employees. As a result, agile alignment among employees was created which was considered vital to extend the agile working methods across the organization. The researchers further found that another way to acquire knowledge include arranging social events emphasizing team bonding and education in agile practices.

Moreover, Paasivaara and Lassenius (2014) mention that the transfer of knowledge requires coordination in the form of established communities of practice that entails self-organized groups of individuals aspiring to exchange expertise among each other on a continuous basis. In line with this, Kalenda et al., (2018) found evidence in that communities of practice create a steady transferring and translating of best practices from different functions and teams. Consequently, this improved learning outcomes for the organization at large. However, establishing a community of practice requires an allocated budget, motivational leadership and infrastructure in order to act as a facilitator within the organization. Further, Dikert et al., (2016) found that informal cross-team communities with emphasis in communicating expertise could help establish a common agile definition across teams and functions.

Additionally, researchers found that the implementation of agile methods requires the establishment of a learning organization (Conforto et al., 2014; Denning, 2019; Felipe et al., 2016; Misra et al., 2009). Hence, the working environment should support continuous learning with diffusion of knowledge among the employees, such as providing learning through mentoring as well as having professionally guided discussions for the employees. Consequently, this would enable improved chance of success when implementing agile methods.

#### 2.5.5 Training

When going through an agile transformation, it has been found vital to ensure appropriate coaching and education within the organization (Kalenda et al., 2018; Sommer, 2019; Brune

& Weiss, 2017). This is especially important as agile working methods are complex to implement, thus invested resources and time needed for the implementation should not be underestimated (Brune & Weiss, 2017). Hence, time should be allocated for educating employees in the new agile roles, responsibilities and activities in order to establish a learning organization and learning culture. Gandomani et al., (2014) further declare that team dedication is a prerequisite for a culture of learning and for agile to take hold within an organization. Therefore, it is important to familiarize employees with the agile concepts to allow employee buy-in. Consequently, giving encouragement and incentives on a continuous basis of how to deploy the methods is argued to create a springboard towards acting agile, when establishing a mindset of continuous learning. Brune & Weiss (2017) further mention that the coaching and training gives the ability to create a common understanding of agile that is essential to nurture agility. Hence, coaching should be available from early on in the implementation in order for the practices to efficiently become rooted. In addition, it is found that learning also needs to be provided to the management, in order for them to properly understand the agile methods to facilitate the agile transformation (Dikert et al., 2016; Gandomani et al., 2014).

### 2.5.6 Steering from Management

Conforming to agile methods within a large organization is found to require sincere support and steering from the management (Conforto et al., 2014; Denning, 2019; Hobbs & Petit, 2017; Kalenda et al., 2018). It is critical for the management to provide a viable organizational structure for agile adoption, oriented around products rather than functions (Dikert et al., 2016). Further, management should encourage decentralized authority and allow the team to self-organize and make own decisions, as team autonomy is fundamental in agile.

Beyond the structural aspect, Denning (2019) found that the management guidance in terms of a proper vision and tools was vital for not ending up in stalled agile journeys. When not being properly encouraged, individuals tended to fall back into old behaviors. In line with this, it was found that management can work as catalysts of change when setting clear directives, allocating resources to agile coaching and giving motivational support from the top of the organization (Gandomani et al., 2014; Sommer, 2019; Brune & Weiss, 2017). In this way, it fosters employee commitment which is vital for agile adoption (Gandomani et al., 2014) and allows agile initiatives to not become stuck at the team level (Dikert et al., 2016). However, Denning (2019) claim that aggressive directives with rigid change in processes require careful consideration as this can cause resistance among employees.

Additionally, it is stated that the management itself require proper learning to understand the building blocks of agile, as this in turn allows them to foster a balance of governance and bottom up initiatives from self-organized teams (Dikert et al., 2016; Gandomani et al., 2014). Thus, the management need to allow bottom up initiatives as it enables anchoring of agile methods in the long term.

## 3. Methodology

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*The following chapter describes and motivates the methodology for this study. First, it describes the applied research strategy and approach as well as the case study research design and description of the case study. Thereafter, the data collection consisting mainly of semi-structured interviews, and data analysis process are discussed. The chapter ends with an elaboration on the quality of the research and ethical considerations.*

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### 3.1 Qualitative Research Strategy

Within the field of project management research there is an indication that the historically applied methods exceedingly have been quantitative (Muller, 2015). Although, with the growing interest in understanding and investigating new phenomenon within the field, and not only identifying them, researchers have found themselves in need of using other research approaches. Guercini (2014) mentions that the field of project management concerns organizational and human factors that are regarded as a dynamic field to explore. Accordingly, Mason (2002) explains that when seeking to explore a phenomenon there is suitability in applying a qualitative method when conducting research. In the light of the exploratory nature of this study, a qualitative research approach was thus chosen to fulfil the aim of investigating the agile way of working within project management in a manufacturing organization. As echoed by Bryman and Bell (2011) a qualitative method is to prefer within fields that are fairly little explored and where there is a lack of previous knowledge in the subject. In this sense the authors chose the method as it allowed for gathering more detailed evidence in a yet limited explored area. A qualitative approach is further motivated as it allows the researchers to grasp a deeper understanding of the social context where project management emerges, by probing beneath the surface appearances in the natural environment. This is seen essential for the researchers in order to explore the emergence of events that could give understanding of how and why factors unravel the way they do. As argued by Bryman and Bell (2011) the qualitative method emphasizes interpretation of how individuals perceive the reality in their environment and uncovers people's thoughts on the chosen topic through rich interviews. This is important to the authors in this sense that the qualitative approach provides the researchers with an opportunity to capture the complexity and depth in different experiences regarding agile methods within project management in a manufacturing organization and allow exploration of novel data.

Moreover, in perspective of the formulation of the study's research question Yin (2014) argues that there is an interconnection to whether it is appropriate to use a qualitative or quantitative method. When beginning the research question with the word *how*, there is an indication to explain an investigated phenomenon in a qualitative manner since it gives insights into interactions and perceptions (Bryman and Bell, 2011). In this way the qualitative method was selected in regard to the composition of the research question. According to Bryman and Bell,

(2011) the qualitative approach also allows the researchers to commence into theory-building and this coheres with the selected abductive approach presented below.

### 3.1.2 Abductive Research Approach

An abductive approach is used in the study and this is mentioned by Bryman and Bell (2011) as a method that combines an inductive and deductive approach. This allowed the researchers to investigate previous literature and theories to establish a first version of a literature review. In this way it enabled the creation of knowledge within the field of research before commencing on the collection of empirical materials. Insights from the literature gathering was then used to the creation of an interview guide for the empirical collection. Furthermore, while collecting empirical materials there was room for new concepts to emerge that provided the researchers the opportunity to critically examine the literature review. A reprocessing of the literature review was then made in cases where adjustments was found needed based on the empirical findings. Hence, approaching the study in this way provided time for reflection on the gathered literature that consequently reduced the potential risk of becoming biased by the empirical findings. In coherence with Mason (2002) the establishment of a literature review and collecting empirical material has been an iterative process when moving back and forth between data and experience. Mason (2002) further argues the benefit of creating a theoretical framework early in the research and undertake revisions during the course of research. Accordingly, Cypress (2018) mentions that the iterative process with revisioning of data and theory allows the researchers to gain data that more accurately can address the research questions, thus arguing the relevance for the abductive approach.

## 3.2 Single Case Study Research Design

According to Bryman and Bell (2011) the case study research design is well-known and widely used within business research, with prominent studies in business and management being based on this design. The aim of this thesis is to examine different departments within a large organization regarding what agile initiatives they have taken, as well as uncovering the challenges and elicit the facilitators that may overcome the barriers of an agile implementation on department level. Understanding these aspects benefited from a single case study design with a comparative perspective between different departmental contexts, which allowed the researchers to identify common and distinctive challenges, and facilitators associated with agile methods within three departments. This choice is further supported by Bryman and Bell (2011) who argue that a case study design is appropriate to examine the complexity in a certain setting, such as an organization, location or a person. It has allowed for in-depth empirical data findings regarding the use of agile methods, which has been important to reach the less obvious aspects and opinions of agile methods embedded within each investigated department (Dyer & Wilkins, 1991).

The study further examines the characteristics of a company at a single point in time, namely a few years into the introduction of agile methods. It is suggested to choose the case based on an expected opportunity to learn. Hence, in this study, a large global manufacturing company

has been chosen to be represented in the single case study as they are currently in the midst of establishing agile methods in several departments and do not intend to linger in their current state. Thus, they are providing a great opportunity to examine the phenomenon of an agile implementation. This is also seen as a way to provide insight and understanding in this increasingly popular topic by giving real world examples from a large organization rather than from literature, which can add another relevant and interesting dimension (Siggelkow, 2007).

In addition, as the purpose is to explore and explain the phenomenon of agile methods in large organizations by asking “how” a large organization can foster agile initiatives on department level, it makes it fit for a case study design (Yin, 2014). As implementing agile methods depends on a broad range of organizational factors of a firm, such as organizational culture and structure, the case study further allows the researchers to understand the phenomenon within its context and thus to provide an understanding of the real world within a large manufacturing firm.

Foremost, the external validity is often questioned in regard to generalization and its relevance to a broader population or set of cases. However, some argue that the importance instead of generalization rather lies in how well the researcher can create theory out of the findings (Bryman & Bell, 2011). Furthermore, in line with how Siggelkow (2007) describes the purpose of selecting a certain organization, the case was not chosen in order to be representative. Rather, as the case company is a large organization which has started to implement agile methods within several departments, this gives unique insights in the field of research. To conclude, the aim will not be to generalize populations, but to expand and generalize theories (Yin, 2014) and to extend the field’s knowledge base (Merriam, 1998).

### 3.2.1 Selecting the Case Study

The case was selected based on the prediction that insights could be acquired to fit the purpose of the study and to be able to answer the research question (Merriam, 1998). Another important reason for the choice was the possibility to gain sufficient access to resources within the organization which is fundamental when choosing a case study design (Yin, 2014). The case studied was a global manufacturing firm with the headquarter in Gothenburg.

The choice to study the implementation of agile methods within a large manufacturing firm was a conscious decision. Established organizations are facing increasing competition and are becoming aware of that they need to be fast-moving and adaptive to better respond to the need of their customers (Rigby et al., 2018). Thus, manufacturers of physical products have recently started to experiment with agile methods in an attempt to speed up their product development processes (Cooper & Sommer, 2018). However, the problem that many of these firms seem to face relate to the attempt to scale the agile methods within the organization (Rigby et al., 2018). Therefore, it was interesting to investigate this phase closer.

The case is further limited to three departments, since this is thought to be within the scope of the thesis. Furthermore, the three departments that have been investigated have all begun their agile journey rather recently, making them relevant to compare and analyze.

### 3.3 Research Methods

#### 3.3.1 Pre-study

To fulfill the purpose of the study and answer the research question, the authors started with conducting a pre study. This was done in order for the authors to receive knowledge within the field of research, as well as to receive a first insight into the chosen case and departments for which to study. Informal talks were held with two employees holding knowledge within project management and coming from two different departments within the case company. The two informal talks with the employees resulted in a discussion of the potential areas to investigate and further provided the authors with the choice of investigating specific departments. Thus, the choice of studied departments was decided together with the two employees where the employees' respective department as well as one additional department were chosen for further investigation. The reason for choosing these specific departments were that they had different department characteristics and seemed to have introduced varying agile initiatives. Hence, this was deemed to provide an interesting perspective when delving into the three different departments and contrasting them against each other. Furthermore, the informal talks provided the authors with contacts to relevant project managers that would be appropriate to interview when commencing the research. In addition to informal conversations, the authors were invited to a training event for project managers within one of the departments chosen to study, to observe and gain a first understanding of the project management methods used within the case company. This contributed to knowledge within the field of research that helped the authors to commence into building a literature review while identifying a phenomenon of interest for which to use as a basis for further investigation in the study. An overview of the interviewees can be seen below in *table 3*.

<b>Interviewee</b>	<b>Department</b>
Manager PMO	CT
Manager PMO	IT

*Table 3. An Overview of Interviewees from the Pre-study*

#### 3.3.2 Data Collection

As described by Bryman and Bell (2011) data collection can originate from primary sources, when gathering data to answer the research questions. Data can also originate from secondary sources, where data depicts findings composed by someone else. To fulfill the purpose of the study, primary data has been collected by the authors through thirteen semi-structured interviews to gather work-life experience from a managerial perspective within project

management. This is motivated by the aim of receiving an in-depth understanding of the field of research since this is argued to be a crucial source of empirical data when conducting research with a case study design (Yin, 2014). No secondary data collection method is used for the purpose of answering the research question, such as internal documents or annual reports, since this does not unravel the unique experience of the individuals which is the point of emergence for the study. Thus, secondary data has only been sourced in the composition of the introduction chapter, the literature review and methodology. Further, several databases have been used to ensure a reliable source of information and to provide relevant literature. The primary database used was Supersearch, which was complemented by Business Source Premier, Emerald, Sage Journals Online and Google Scholar. Key search words when compiling the secondary data refers to the ones listed in *table 4*. In the following sections the primary data collection procedure will be presented further.

Traditional project management + Project methods + Large organizations + Manufacturing industry
Agile project management + Large organizations + Manufacturing industry
Scaling agile project methods + Challenges + Facilitators

*Table 4. Key Search Words as Composed by Authors*

### 3.3.3 Sampling Strategy

Deciding upon the relevant sampling unit and the sampling levels of a qualitative study is argued important by Bryman and Bell (2011). Exploring the phenomenon of project management in this study limits the report to the perspective of managers. Thus, the sampling unit as well as level is decided to be individuals with a managerial position within the three different departments.

In line with Siggelkow (2007) the study uses a purposive method to answer the research question and fulfil the purpose of the investigation. This is motivated by the ability to generate the most relevant respondents concerned with the explored phenomenon. As described by Bryman and Bell (2011), the purposive method is a non-probability sampling in qualitative research that is beneficial in the study to strategically choose respondents and ensure substantial data collection. In addition, undertaking the purposive sampling is argued by Cohen (2011) to be nurturing the depth in the study. Hence, the sampling of the interviewed project managers in this study are based on their inherent experience within the field of study. Furthermore, when using purposive sampling Bryman and Bell (2011) argue that generalizable conclusions are not able to be drawn for a population. Again, it is of importance to take notice that this is a case study where the unique insights from individuals are valuable to the researchers. Thus, universal conclusions are not the purpose for the study.

Initially, contact was taken with a manufacturing organization that was thought to have initiated an agile way of working. The authors established contact with two managers with a relevant experience and conducted a pre-study with purpose of gathering recommendations of people

involved within the agile way of working. Hence, the initial two contacts provided additional respondents within the studied departments. In some cases, finding relevant interviewees was also done by utilizing the network of established contacts by asking for recommendations. Thus, as described by Bryman and Bell (2011) a snowball approach was utilized to identify some of the respondents.

As suggested by Mason (2002), the study ensured relevance among the sample by the compilation of two sampling criteria before commencing into the election of respondents. Included in the first criterion was individuals having a managerial position and having experience with managing projects. The second criterion was to cover respondents that were within the scope of the case company and the three investigated departments; CT, IT and BO. However, geographical distance or nationality of managers within the different departments was not limited in the sample.

Presented below in *table 5*, the respondents consist of individuals having a managerial position coming from three different departments. In terms of respondents within the different departments, the determinants for the number being interviewed refers to the availability and fulfillment of sampling criteria. In order to ensure saturation of data a sample size was set to thirteen interviews.

Interview	Position	Department	Gender	Interview disposition	Date of interview	Length of interview
1	Senior Project Manager	CT	Female	Teams	2/3-2020	50 min
2	Agile Transformation Manager	CT	Female	Face-to-face	2/3-2020	1h
3	Director of Transformation	IT	Male	Face-to-face	3/3-2020	1h
4	Manager Workplace, Web and Mobility	IT	Female	Face-to-face	4/3-2020	55 min
5	Development Manager	CT	Female	Face-to-face	5/3-2020	40 min
6	PMO Manager	BO	Male	Teams	5/3-2020	55 min
7	Head Hosting and Cloud Operations Manager	IT	Male	Face-to-face	6/3-2020	55 min
8	PMO Specialist	IT	Male	Face-to-face	9/3-2020	50 min
9	Project Manager	BO	Male	Face-to-face	10/3-2020	1h
10	Project Manager	BO	Male	Face-to-face	11/3-2020	45 min



11	Product Development Manager	CT	Male	Teams	11/3-2020	50 min
12	SPS and PMO Manager	BO	Male	Face-to-face	12/3-2020	1h
13	Department Manager	BO	Female	Face-to-face	17/3-2020	45 min

*Table 5. A Compiled Description of the Interviewees.*

### 3.3.4 The Interview Process

Initial contact was made with all the interviewees by email with a request for taking part in an interview within the scope of the study. An interview was then scheduled with all the interviewees. Thereafter, an interview guide was sent to the respondents a few days in advance. This was seen important to allow the respondents to prepare for the interview and go through the questions beforehand, to form their own opinions and be able to respond with rich answers during the interview.

Face-to-face was the preferred disposition of the interviews because since the body language combined with verbal language could increase the overall information quality of the interviews. Hence, ten interviews were conducted face-to-face and the interviews were held at the respondents' offices. Three respondents were geographically dispersed which limited the ability to meet them in person and in line with Bryman and Bell (2011) these interviews were conducted online in Teams in accordance to the suitability of remote communication.

The native language varied among the interviewees, but every respondent had proficiency in English. According to Bryman and Bell (2011), the language of the respondent, the interviewer and the chosen language during the interview are directly affecting the dynamics of the conversation being held. Hence, it was important for the authors to provide convenience and ease of answering the questions and respondents were given the choice between conducting the interview in Swedish or English. Conducting the interview in a language known to the respondent is further supported by Bryman and Bell (2011).

Before conducting the interviews, the authors ensured full anonymity to all participants and received approval from every participant of referring to the interviewees title in the study. The authors also asked each respondent for approval of audio recording the interview and this was approved by all interviewees. This allowed the researchers to better capture all information and make sure that no information was lost or misinterpreted which Bryman and Bell (2011) mention as beneficial when conducting research. Every interview was transcribed to further capture citations and certain insights. Before quoting and using the respondents' information in the study an individual transcript was sent to each interviewee for approval which is also suggested by Mason (2002). Minor adjustments were then made according to the citations of three respondents in order to provide an accurate description of the data.

Moreover, the face-to-face and the remote interviews gave indication of equal information quality. To further ensure information quality both authors of the study were present when conducting interviews since this allowed one of the authors to take notes while the other one asked the interview questions. In some cases, the authors also helped each other to fill in with further questions to probe for deeper insight. Hence, the authors complemented each other which goes in line with Mason (2002) who mentions that information can be captured to a greater extent with multiple researchers.

### 3.3.5 The Interview Design

The study uses semi-structured interviews for exploring the phenomenon of agile project methods within project management. According to Yin (2014), the semi-structured design is appropriate to use within a case study design as it provides certain level of in depth-exploration and flexibility. Correspondingly, the approach gives ability to cover certain areas of importance within the studied phenomenon and also capture deeper insights from the interviewees' perceptions of their experiences. Further, the approach enabled the authors to go off at interesting tangents and follow up interviewees' replies. Bryman and Bell (2011) further argue for the advantage of applying a semi-structured design since the researchers are more likely to perceive the respondents' world views without presuppositions and expectations. This was important to the authors since the aim of the interviews was to gain richness into underlying assumptions that could answer the research question.

An interview guide was composed in regard to the established theoretical framework and the guide can be found in Appendix one and two. Bryman and Bell (2011) state that semi-structured interviews entail an interview guide with predetermined fields where the respondents have the ability to create own answers. Accordingly, the composed interview guide enabled adaptation of responses from the respondents in order to gain richness in data meanwhile governing the interview within the scope of the studied phenomenon. This goes in line with the advantage of carrying out semi structured interviews (Bryman & Bell, 2011).

In line with semi-structured interviews and recommendations from Bryman and Bell (2011) the interview guide was designed to cover the field of study and adhere to the purpose of the study to unravel experiences and identify common patterns. Hence, the interview guide entailed open questions that would prevent steering of responses that would otherwise result in self-realization of the purpose. By creating open questions, the researchers could also collect new insights provided by the respondents which is supported by Mason (2002) who state that too specific questions do not allow for the emergence of new events. During the interviews, depending on the interviewees' answers, different follow-up questions would ensue. This is supported by the design of semi-structured interviews as they allow for generating thorough answers and allow for deeper discussions (Bryman and Bell, 2011).

## 3.4 Analysis of the Data

### 3.4.1 Pre-study

The findings from the conducted pre study was discussed by the authors in order to gain a deeper understanding of the scope of the study. Thus, by discussing the information gained from the informal talks within the case company, there was possibility of making necessary changes to the research question. Consequently, by identifying themes and areas of interest, the authors were allowed to better target the problem gap and commence into a deeper investigation.

### 3.4.2 Interviews

The authors continuously transcribed and discussed the empirical data gained from the interviews to early on start the process of analysis and the identification of themes (Bryman & Bell, 2011). In this way, it was possible to adopt an iterative analytical approach, allowing the authors to gain insights during the analysis that were used to shape the collection and content of further data. The ability to stay adaptive during the research process is an important part of the case study design as new discoveries and leads are common features (Yin, 2014). In addition, section 3.1.2 *Abductive Research Approach* described the literature review to be the foundation for different types of project management, challenges and facilitators and the interview guide that was formulated. The gathering and analysis of the data were then iterated against the literature review, which resulted in a reprocessing of the theoretical studies and the literature review. According to Bryman and Bell (2015) an iterative approach is considered suitable in such cases.

The data analysis method that was then used was a thematic approach which strived to identify themes and sub-themes within the gathered empirical data (Bryman & Bell, 2015). As the thirteen interviews resulted in a large amount of unstructured material, this approach aided in sorting out the relevant data into relevant parts by coding the material. The approach thus strived to identify and outline patterns and themes in the collected data through the use of coding. Coding is described by Bryman and Bell (2015) to as the process of breaking down a larger data set into different parts in order to more easily interpret the data and form categories that can then be used for building theory. This is in line with Yin (2014) who describe that the identification of patterns or codes, and a profound empirical thinking and interpretation is commonly used in case study research.

More specifically, as stated in section 3.2 *Single Case Study Research Design*, a comparative perspective was taken between departments. Thus, a first step in the data analysis process was to identify categories within each respective department through the use of color coding, relating to what agile initiatives had been taken, what challenges they experienced when implementing agile methods, and what facilitators they perceived to be important to successfully continue their agile implementation in the future.

When it came to the agile initiatives that had been taken, those aspects mentioned by two or more respondents within each department were brought up as a theme. Second, challenges were analyzed in respective department and aspects identified by two or more respondents were categorized into main themes. Thereafter, sub-themes were identified based on aspects mentioned by two or more respondents within each department.

Further, main facilitators identified by two or more respondents within each department were categorized into main themes. Thereafter, sub-themes were identified based on aspects mentioned by one or more respondent(s). The choice to include those sub-themes only mentioned by one respondent was based on that the authors wanted to capture details and small variations in what respondents within different departments perceived to be important for future implementation. Once the themes were identified, they were inspected and discussed between the authors to make sure that the full content of the respondents' answers was not lost, or that themes only reflected parts of the answers. In order to fully secure this, the quotes and answers were sent for approval to respondents. After the identification of themes and sub-themes within the different departments, they were compared and analyzed together to identify similarities and differences between the main themes as well as the sub-themes. Thereafter, the themes and sub-themes were used to create the empirical findings as well as the analysis of the study.

### 3.5 Quality of the Research

Evaluating the research quality in qualitative studies is suggested to be done by the use of two acknowledged criteria, *authenticity* and *trustworthiness* (Guba and Lincoln, 1994; Bryman and Bell 2011). Given this, the criteria of trustworthiness constitute of the four parts *credibility*, *dependability*, *transferability* and *confirmability*. These parts will further be presented below.

*Credibility* is corresponding to a detailed description of the process of research and how the compiled results are reflecting the real world (Lincoln and Guba, 1994). Thus, the authors have provided a detailed overview of the process for studying the field of research as well as a thorough described methodology with explained justifications. Consequently, this has enabled the authors to produce a credible study by enabling transparency, which is further seen particularly important when conducting a qualitative research in line with Bryman and Bell (2011). Additionally, the authors made sure that the reflection of the interviewees' experiences given in the transcribed quotes and data was approved by respondents.

*Dependability* is discussed as the provision of comprehensive as well as consistent data for composing the analysis and conclusions (Lincoln and Guba, 1994). Ensuring dependability has been made by transcribing the thirteen interviews as well as allowing all interviewees to give their approval of the transcribed transcripts. Further, the empirical data has been organized into categories and themes to allow for a thorough process of generating the analysis and conclusions. Additionally, to enable an extensive basis for the literature review, there are various utilized secondary sources within the field of research.

*Transferability* is discussed by Bryman and Bell (2011) and refers to the level of generalizability of the study to other contexts. When conducting a qualitative study, Lincoln and Guba (1994) argue that the findings may not be possible to generalize because of the deep insight into the certain context. However, this case study is aimed of exploring a specific company with their agile ways of working and not towards generalizing the findings to the full population. Although, by concentrating on how to foster agile project management and presenting this in a generic way, the study can indicate findings that may prove relevant to a larger set of departments and research within project management.

*Confirmability* refers to the degree of subjectivity shown in the research (Lincoln and Guba (1994). Since full objectivity is not achievable, the subjectivity should be decreased. Within this study, the authors have reduced subjective values as far as possible by critically reviewing the different parts of the study on a continuous basis. In terms of the collection of empirical data, the interview guide was composed out of open and neutral questions to reduce possible impact on the interviewees. Moreover, potential subjectivity was reduced by having both authors present while conducting the interviews. In addition to this, the authors have thoroughly transcribed the empirical data to minimize own presuppositions.

### 3.6 Ethical Considerations

During the span of the research process, ethical aspects have been taken into consideration. The first principle mentioned by Bryman and Bell (2011) concerns the issue of informed consent. Thus, in order to ensure this a few measures were taken. First, the respondents were invited to participate in the study via email where the aim of the study was presented. A few days before the interviews, the respondents were also provided with more information about the purpose and content of the research as well as the full interview guide. In addition, the interviewees were given the option to decline being recorded. Last, the parts of the interviews selected to be in the study were sent to the respondents in order for them to give feedback and give their approval. Linked to the principle of informed consent is the invasion of privacy (Bryman & Bell, 2011). As the interview guide has been designed to investigate the research topic of agile methods, questions of a private nature have not been included.

Another aspect which has been taken into account, which was stated by Bryman and Bell (2011) is to not cause harm to participants. To ensure this, the respondents have been granted anonymity and the titles used in the study have been approved by all interviewees. In addition, the name of the company as well as the three departments investigated have been anonymized. However, as the contextual aspect has been of importance to the research, thorough descriptions of the company and departments were considered necessary. However, by not presenting the names or details of respondents in addition to carefully receive approval of titles, anonymity could still be granted.

## 4. Empirical Data

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*The empirical findings from the interviews with the thirteen employees are presented in this chapter. It begins with a description of the case company as well as the three studied departments. Thereafter, the findings within each department are presented based on categories and are thus presented in a comparative way. First, the agile initiatives that have so far been introduced are presented. These include the application of agile project methods as well as the agile roles and responsibilities adopted within each department. The following section concerns the identified challenges and sub-challenges when implementing agile, where sub-challenges brought up by two or more respondents are presented. Last, the facilitators related to the agile implementation that are brought up by two or more respondents are presented, whereof the sub-facilitators brought up by one or more respondents are presented below.*

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### 4.1 Introducing the Case

#### 4.1.1 The Case Company

The case company studied in this thesis is a global manufacturing company founded in Gothenburg, Sweden in the beginning of the 20th century. The company supplies products and services globally. Currently, the company is represented in over 130 countries and 40 industries, that stretches across several business units and fields. The company further entails a focus towards three main customer segments; distributors, the original equipment manufacturing market as well as end-users.

#### 4.1.2 CT Department (CT)

The CT department is a division that entails various number of units. A few of these areas in the department are Technology Offer Implementation, Product Development hardware/firmware and Delivery, as well as Product Development Software and Apps. In addition, the department is developing customer solutions and service contracts. One of the main areas is to conduct condition monitoring of machines with emphasis on vibration measurement, including work within both hardware and embedded software. Further, monitoring the machines entails the use of application engineering and root cause analytics. This area aims of facilitating prediction of machine maintenance and these projects are mainly related to software development. Furthermore, there are varying focus areas ranging from installment of sensors, performing mechanical diagnostics as well evaluating the improvement of products.

#### 4.1.3 IT Department (IT)

The IT department is a large organizational division consisting of several different subunits. Some of the areas within the department are Transformation including Business intelligence

and data and Business process solutions, architecture, service management and security. In addition, the department conducts infrastructure projects containing aspects ranging from purchasing computers to rebuilding networks and systems, i.e. issues related to both hardware and software, although respondents expressed that they mainly worked with software. Other project types comprise application and e-commerce solutions, as well as implementing and sustaining systems. Consequently, the product portfolio is large with varying characteristics, as expressed by respondents. Furthermore, the department has extensive collaborations with external suppliers ranging in size, which deliver various products and services within software and hardware. Additionally, three of the respondents broadly described their department as a support function to the rest of the organization, offering expertise in a variety of areas such as security and integrations.

#### 4.1.4 BO Department (BO)

The BO department has the responsibility for end-to-end procurement, manufacturing and logistics within the company. More specifically, the department include a large number of factories that are globally dispersed, where products are manufactured. Furthermore, there are units working with innovation, research and development of processes and materials. There are also more supportive functions giving guidance to the factories, and formulating strategies, activities and goals. Moreover, several respondents explained that they mainly treated product development processes, with minor emphasis on software development. Rather, emphasis was on setting new standards, documenting, administrating as well as directing the factories to develop certain products for suppliers.

## 4.2 Agile Initiatives

### 4.2.1 Application of Agile Project Methods

When asked about the extent to which agile methods and traditional methods are used in projects, the responses varied to some extent between departments. Within the CT department, two respondents estimated that they were working with agile methods in 50-70 percent of the projects. In turn, traditional project methods were estimated to be applied in 30-50 percent of the projects. The respondents within the CT department further mentioned that the use of agile methods was more difficult to apply in some types of projects or some situations. As claimed by four of the respondents within the CT department, the suitability differed depending on if agile was applied in hardware or software. Applying agile methods in hardware projects were found difficult to flexibly manage, since there were requirements on pre-studies of components and large investments in machines. Thus, it was mentioned that projects involving hardware was frequently managed by a traditional approach rather than by using the agile methods. As expressed by a Development Manager (CT): *“In hardware we have long lead times, if we are ordering a certain component it takes one year to receive that component. Therefore, it is hard being agile since we have to make decisions early on due to the long processes.”* Despite the perceived suitability of agile, a majority of the respondents from the CT department still

thought it was possible to apply some agile methods in every project, such as planning their work in shorter sprints.

Within the IT department, two respondents estimated that agile methods are applied in 30-35 percent of the projects and that traditional methods were still used in 65-70 percent of the projects. Interviewees mentioned that several factors impacted on the ability to apply agile. First, as the project portfolio included projects distinguished by a high predictability and a low level of uncertainty, traditional methods were considered to be more suitable in those cases. Furthermore, the suitability of agile methods also seemed to be determined by what dependencies there were with other teams, business units or external suppliers. As an example, a Director of Transformation (IT) described how a higher level of integration with others could hamper the use of agile project management. Third, respondents described how, for instance, a lacking experience of the project manager or the team affected the possibility of using agile methods. Last, different quality and security requirements was discussed to limit the chances of applying agile in some projects.

Within the BO department the extent of an agile use was not expressed in numbers. Three respondents rather mentioned that traditional methods were still applied to a large extent and one respondent described how agile tools had been applied only in a few projects. Two main factors further seemed to impact on the ability to become agile. First, different quality and security requirements had limited the chances of applying agile methods in some projects as stated by a Project Manager (BO): *“In relation to the context we’re operating in, it has pushed us towards traditional project methods since we have a certain level of documentation and requirements to relate to.”* Second, working mainly with hardware was also raised as a major reason for not finding agile more suitable within the department, since large investments in machines were found difficult to alter in a flexible and agile manner.

All respondents in the CT and IT department mentioned that they applied Scrum tools in those cases where it was considered possible. A Senior Project Manager (CT) explained the activities incorporated when applying Scrum: *“We have meetings every day, sprint planning, sprint review, maybe less retrospectives but at least they try to make some demos demonstrating that. Some parts of the teams are working with Kanban and Microsoft tools that are available for us.”* However, in the BO department two respondents mentioned that they had tried to apply Scrum tools, but only in a few projects. Further, nine interviewees demonstrated that they were working in sprints to deliver their work, including the whole CT and IT department respectively, as well as a majority of the BO department. However, in the BO department several of the interviewees expressed that they did not see a large difference in the applied agile methods as compared to the methods used before the introduction of agile, as described by a Project Manager (BO): *“Today, the setup is a little different with sprint boards which were previously named pulse boards, and activity lists which are the surrounding tools. But the difference is not considerable.”* A SPS and PMO manager (BO) further reasoned that the incorporation of lean during a few years was, in relation to agile, initially was not fully clear.



Moreover, a particular finding during the interviews was different levels of incorporation of the SAFe framework, as it was seen emerging only in the CT department. Two interviewees described how they had already adopted the framework, whereas two were planning on adapting it within a near future. The reason for adopting the SAFe framework was explained by the Product Development Manager (CT) to receive guidance within the department when wanting to scale agile above the team level. In contrast, the majority of the respondents in the IT and BO department did not know about the framework and none expressed any plans to adapt it.

When describing the use of agile methods, all interviewees explained that a hybrid model was applied to a large extent. Respondents from all departments described how their hybrid model was based on their current project framework GPM2, with its roots in traditional project methods. Thus, adaptation of agile had been made in certain phases within the GPM2. This was exemplified by a Director of Transformation (IT): “[...] then we have a project framework called GPM2, and under that we have set up a more detailed project management model for IT with checklists, gates, milestones, quality criteria and that whole part. And within that we have adopted the agile.” When composing a hybrid model, all departments thus had to adhere to the current organizational legacy system. An additional version of the hybrid model was found within the CT department, where elements from the SAFe framework had been adopted. As expressed by a Development Manager (CT): “We are using some parts of SAFe, taking the parts that gives most value, and adjusting the PDP (GPM2) to our circumstances. Instead of having phases with concepts, gates and implementation, we are working with 3-months increments and two weeks sprints. Thus, we are not working strictly according to the PDP (GPM2), but we make sure we fulfill the purpose of the PDP (GPM2).”

### Summary of Departments

Department	Respondent	Scrum	SaFe	Hybrid Model
CT	R1	X		X
	R2	X	X	X
	R3	X	X	X
	R4	X		X
IT	R5	X		X
	R6	X		X
	R7	X		X
	R8	X		X
BO	R9	X		X
	R10			X
	R11			X
	R12			X
	R13	X		X

**Table 6.** Application of Agile Methods Expressed by Respondents.

In summarizing the application of agile methods, the empirical data pointed towards that the CT department had applied Scrum tools, although it was not purely agile but rather a hybrid method that included both a safe-agile approach as well as an agile approach combined with the GPM2. This application of agile methods was in turn estimated to be used in 50-70 percent of projects. However, it was perceived more difficult to apply agile methods in projects involving hardware.

Within the IT department, empirical data showed that Scrum tools were applied. However, a hybrid model was prominent and included incorporation of agile within the phases of the GPM2 model. The application of the agile methods was estimated to be 30-35 percent. Further, there were four factors determining the suitability of the agile methods.

A minority of the respondents within the BO department referred to Scrum tools. Instead, a hybrid model was found to be used in the sense of merging agile within the phases of the GPM2 project model. However, the traditional project methods were expressed to be the most used. The interviewees further described that they had two main factors determining the suitability of agile methods.

#### 4.2.2 Agile Roles and Responsibilities

Agile roles and responsibilities had to some extent been adapted within the CT and IT department, even though traditional roles were still the most prominent. Three interviewees, whereof two coming from the CT department and one from the IT department, indicated that agile responsibilities tended to be embraced by employees, although not having introduced the agile roles, and a Senior Project Manager (CT) mentioned: “[...] *for the moment, Scrum master and product owner, these roles have been taken by people who have another position right now and it can be a team leader or a project manager taking these roles.*” In addition, two interviewees coming from the IT department mentioned having introduced the role of the Scrum Master, product owner and the Scrum team, although in practice the use of the roles seemed to vary, as exemplified by a Director of Transformation (IT): “*If I wanted to speak according to the book, I would say that we have predefined roles for working agile. There are role descriptions of the ScrumMaster, product owner and the whole team. Sometimes it works like that, in some cases it almost works like that, and in some cases, it doesn't work like that at all.*”

Furthermore, among the seven interviewees who had not introduced agile roles and responsibilities, the reason behind this seemed to vary among the respondents. Within the CT department, one respondent expressed that they were waiting for the SAFe framework to be adopted, before introducing the roles. Moreover, as discussed by four respondents coming from the BO department, they were so far focusing on incorporating the concept of agile methods rather than the roles. This was stated by a SPS and PMO Manager (BO): “*We are not working with the concepts of ScrumMaster or similar, we have rather embraced agile methods by*

*thinking of what we need to start? Whom do we need and who needs to take the lead? Who is best suitable?”*

## Summary of Departments

Department	Respondent	No adaptation to agile roles	Some adaptation to agile roles
CT	R1		X
	R2	X	
	R3	X	
	R4		X
IT	R5		X
	R6	X	
	R7		X
	R8		X
BO	R9	X	
	R10	X	
	R11	X	
	R12	X	
	R13		X

**Table 7.** *Adaptation to Agile Roles as Expressed by Respondents.*

Summarizing the incorporation of roles and responsibilities among the departments, the CT department tended to add agile responsibilities to traditional roles, although pure agile roles had not been introduced.

Within the IT department, a majority had made some adoption to the agile roles such as the Scrum master, product owner and the Scrum team. Although, indications pointed toward not strictly adhering to the agile roles in all situations.

In terms of the BO department, there were indications that adaptation to agile roles and responsibilities had not been introduced. Signs were seen of rather incorporating an agile concept instead of the roles.

## 4.3 Challenges when Incorporating Agile Methods

### 4.3.1 Coordination Challenges

One challenge identified by nine out of the thirteen respondents, whereof four from the CT and IT department respectively, and one from the BO department, related to various coordination challenges with other teams, departments and/or external stakeholders. Three interviewees, whereof two from the CT department mentioned the difficulty of coordinating sprints between

teams, which was expressed by a Product Development Manager (CT): *“Teams may be working in different sprint lengths that have an impact on the synchronization, which has been a challenge between teams and departments.”* Two respondents from the CT department emphasized that practical reasons are behind the difficulty of aligning sprints, such as differences in calendars, time plans, meetings and different holidays. In addition, the large size of the organization and consequently having teams scattered across several locations was further seen as a barrier to coordinate effectively between teams.

Furthermore, three respondents from the IT department highlighted the challenge of having dependencies with other parts of the organization that did not necessarily operate by agile methods in the same extent. A PMO Specialist (IT) described the challenge of working according to agile principles within a waterfall environment: *“[...] You are often dependent on people outside the team. You have to wait for their feedback and then you start new tasks during that time, and when they return you have all these new tasks that you have to approach.”* A contrasting view was given by a Head Hosting and Cloud Operations Manager (IT) who argued that within the IT department they might be perceived as the more slow-moving part due to strict requirements, compared to other departments on the business side of the company. He instead argued that it was sometimes hard to keep up with those teams wanting to proceed in a fast pace.

#### 4.3.2 Lack of Communication and Understanding

Eight respondents, four from the CT, two from the IT and two from the BO department pointed to challenges originating from a lack of communication and understanding in and between different parts of the organization. Five respondents, three coming from the CT department, and two from the IT department reported cases where people had used agile terms and definitions differently, leading to confusion among teams. This was expressed by a Product Development Manager (CT): *“We use different terminology which creates a challenge to understand each other, and a lot of time is spent on misinterpretations within the CT department.”* A Senior Project Manager (CT) discussed how people had put together their own definitions rather freely and sometimes in a faulty way. This resulted in confusion when collaborating with other people holding their own definitions. Moreover, two respondents from the BO department pointed out that a lacking knowledge sharing within their department had led teams to operate in silos. As a result, people had started to adopt agile methods in different ways. One Project Manager (BO) stated: *“There should be more conversations within the PMO where we discuss how to drive projects and share knowledge among each other. But we are not doing this.”*

In addition, four respondents, two from the CT department and one from the IT and BO department respectively, emphasized a lacking understanding from top management, resulting in a rather low level of management involvement. Two interviewees from the CT department claimed that the various initiatives among employees had created an uneven spread of agile methods across the organization, due to a lacking communication and alignment from the top of the organization. An Agile Transformation Consultant (CT) expressed: *“It is really hard to*

*get the management involved.*” A lack of understanding from management during a long period of time could consequently lead to clashes in opinions and frustration among team members.

### 4.3.3 Changes to Roles and Responsibilities

The empirical data pointed to challenges regarding roles and responsibilities in the transition towards agile as it was mentioned by eight respondents, four from CT, three from BO and one from the IT department. Respondents from all departments stated that there was no general definition within the organization of what different roles mean and what their responsibilities are more specifically. An SPS and PMO Manager (BO) expressed the following: *“I believe there is a confusion when speaking of the roles within agile. I think we have done it wrong many times in using the terms more than the method.”* Respondents within the BO department reflected on the differences between agile roles and the old roles. A Department Manager (BO) expressed: *“What is the difference? If it’s called Scrum Master or project manager, I don’t know. But maybe there is a huge difference.”*

Furthermore, one role that was raised among a majority of the respondents within the CT department as a challenge was the project manager as expressed by a Development Manager (CT): *“It is always a challenge with the project manager because the transition to agile affects them the most, especially in terms of their function... In the agile way of working, the project managers do not have the mandate to take decisions on prioritization which you do have in traditional methods. The loss of the mandate makes a large difference for some and this can create a tough situation.”* The respondents thus pointed to a lack of understanding of what the responsibilities of the former project manager are in a new agile setting. As an example, two respondents from the CT department highlighted the importance of letting the team take decisions as a part of agile project management, which would then be at risk if the project manager held on to its former decision-making mandate.

Last, two respondents from the BO department raised the issue of getting the team to understand that they needed to become involved to a greater extent when adapting agile methods. Some people found the transition towards more autonomy difficult, as exemplified by a PMO Manager (BO): *“It’s a change here for a lot of people that no one tells you how to do this, you decide what is needed to be successful with the topic.”*

### 4.3.4 Conforming Agile to Traditional Structures and Processes

Six of the respondents, four from the IT department and two from the CT department, discussed constraints that the current traditional structures put on the ability to work according to agile methods. Three respondents, two from CT and one from the IT department expressed certain challenges when having adopted agile methods into the existing waterfall model, creating a hybrid model. First, a Product Development Manager (CT) stated that when running projects with waterfall and toll gates mixed with agile features, there was a risk of double administration. An Agile Transformation Consultant (CT) further questioned the existence of a hybrid model: *“I don’t believe in hybrid, hybrid does not work. It creates confusion and you do it because you think you have to use all tools and push agile into it. Agile is a framework*

*that you don't really change, but you adapt to your circumstances without making it a hybrid."* However, a PMO Specialist (IT) still saw the hybrid model as an important step in the transition towards going fully agile, although agreeing that agile should preferably be implemented everywhere for it to fully work. One specific aspect that was mentioned by two interviewees from the IT department was the limitation caused by the prevailing financial models, as expressed by a Manager for Workplace, Web and Mobility (IT): *"We are to some extent still stuck in a traditional financial model based on an approval process for each project or change."* This model was not perceived as optimal for an agile team as it was challenging to access the money needed for continuous work with a backlog. Consequently, it was difficult to build a stable agile team over time. In addition, unnecessary time had been allocated on discussing with the financial community and try to manage budget allocation.

Furthermore, two respondents from the IT department pointed to technical constraints, limiting how agile a team or department could become. This was expressed by a PMO Specialist (IT): *"There are a lot of limitations connected to the systems if wanting to become fully agile. If we mean by agile that we release each sprint to production, then it requires a completely different setup in the systems, with some exceptions where sprint releases are used today, you have an entirely different way of working with releases. There is a lot of inertia that has to be handled."*

#### 4.3.5 Agile Approaches in Hardware and Software

Challenges were also identified in terms of applying agile methods in hardware compared to software, which was mentioned by four respondents, whereof two from the CT department and two from the BO department. A Product Development Manager (CT) explained that it was hard to be agile in hardware due to long lead times where it could take up to a year to receive a certain component. Consequently, decisions had to be taken far in advance because of dragged out processes to get hold of product certificates. A Project Manager (BO) further pointed to additional challenges when working with machines, material-learning and other aspects not equal to the software side.

Moreover, two respondents from the CT department commented on the fact that the software side had come further with their agile initiatives than the hardware side, thus making synchronization between the two sides challenging. An Agile Transformation Consultant (CT) stated there had been signs of a lack of understanding between the software side and the hardware side which was needed to cooperate efficiently. She stated: *"Milestones are much longer in hardware and shorter in software. This is why in hardware, they have had a hard time seeing what is the next sprint and understand this."*

#### 4.3.6 Lack of Investment

According to three respondents within the BO department, a remaining challenge was for employees to understand what it means to work with agile methods. This was considered to be a consequence of a lack of education, as expressed by a Project Manager (BO): *"I definitely do not feel enough educated. You see agile everywhere. It almost gets embarrassing if you are to cooperate with a team sometime and you don't understand 100 percent of how it works."* The

SPS and PMO Manager (BO) further highlighted that a process of learning throughout the full organization had not yet been accomplished.

#### 4.3.7 Lack of an Agile Mindset across the Organization

Five respondents, three coming from the CT department and two coming from the IT department, emphasized that an agile mindset across the organization was currently missing and identified it as a challenge. A PMO Specialist (IT) stated: *“I think this is the biggest challenge with implementing agile, the mindset or agile value or principles. If you want to implement it everywhere then everyone needs to understand it.”* Furthermore, one respondent from the CT department explained that as it is not merely the question of changing an existing framework with its tools and processes, but an organization-wide change in the way people think, it is probably not something that can be achieved within the near future. However, if the mindset is not adopted, three respondents, two from the CT and one from the IT department, pointed to the risk of restraining the organization from receiving full benefits from working agile. A Product Development Manager (CT) stated that: *“If you are not having the agile mindset across the whole organization, you will only optimize a small part of the system that is involved with bringing a solution towards the customer.”*

#### 4.3.8 Change Resistance

Resistance towards new working methods was found in all department as it was mentioned as a challenge by eight respondents, three coming from the CT, two from the IT and three from the BO department. All of the eight interviewees pointed towards a general suspicion when introducing new working methods, as people were comfortable in their old ways of working. Within the BO department, two interviewees mentioned that agile methods had meant working in shorter sprints and have daily meetings, creating a new type of pressure on team members to deliver. This was something that not everyone had been feeling comfortable with as a Department Manager (BO) exemplified: *“If daily pulse meetings are introduced, everybody may not like it since they want to work on their own tasks. It is a challenge to get everyone onboard, since it demands that everyone shares what they are doing and does not hold onto their own tasks. That is something that not everyone is used to.”* In addition, lacking a proper understanding of the new methods was pointed out by three respondents from the IT department and one respondent from the CT department, to be a source of resistance. *“I have noticed that there is a fear and suspicion before you have understood it.”* (Manager Workplace, Web and Mobility, IT)

## Summary of Departments

Main Challenge	Sub-challenge(s)	CT	IT	BO
Coordination Challenges	Difficult to coordinate sprints between teams	X		
	Interfacing with other organizational units		X	
Lack of Communication and Understanding	Different interpretations of agile	X	X	
	Lack of knowledge sharing			X
	Confusion among teams due to a lack of directives	X		
Changes to Roles and Responsibilities	Lack of definitions of agile roles	X		X
	Lack of understanding of new roles			X
	Changes to the role of the project manager	X		
	Lacking understanding of agile team responsibilities			X
Conforming Agile to Traditional Structures and Processes	Integrating old and new systems	X		
	Challenges associated with old financial model		X	
	Technical constraints		X	
Agile Approaches in Hardware and Software	Challenge of applying agile on hardware development	X		X
	Collaboration between hardware and software development	X		
Lack of Investment	Lack of education			X
Lack of an Agile Mindset	-	X	X	
Change Resistance	Comfortable with old working methods	X	X	X
	Frustration with new way of working			X
	Lacking understanding of new methods		X	

**Table 8.** *Compiled Challenges when Incorporating Agile Methods as Expressed by Respondents.*



## 4.4 Facilitators when Incorporating Agile Methods

### 4.4.1 Agile Mindset

During the interviews it was evident that six respondents, equally scattered across the three departments, agreed on a need for improved receptivity among individuals towards using agile methods, since skepticism tended to emerge. An Agile Transformation Consultant (CT) mentioned: *“I think people just need to open their mind and be willing to investigate how it could be done, instead of saying that ‘yes, it is the PDP and we are doing like this, it is hardware and agile doesn't work.’”*

Further, five respondents, whereof two from IT, two from CT and one from the BO department, discussed the need of clarifying and spreading an appropriate agile mindset, that would foster utilization of the approach. As exemplified by a Head Hosting and Cloud Operations Manager (IT): *“[...] the mindset needs to be spread throughout the entire organization. If we talk about agile as the more nimble, easily adjustable way of working to drive changes, then I think you can start show in all kinds of ways how agile projects drive change. Then I think it will follow accordingly and I think you easily accept them.”* Two respondents in the IT department also claimed the importance of making sure that employees knew that an agile mindset entailed the aspect of failing fast, since this would make people more confident in commencing on the methods rather than being scared it wouldn't work for them. A PMO Specialist (IT) stated: *“The minimum viable mindset can emerge by having an open communication, with challenges and with fail fast, that it isn't seen as a failure if something doesn't work.”*

Furthermore, an SPS and PMO Manager from the BO department mentioned that the agile mindset would emerge naturally if only individuals could have an approach of continuous improvement, since this was assumed to be related to the agile approach. The SPS and PMO Manager (BO) further explained: *“Agile needs to emerge in a natural enhanced way of working, since this creates consistency over time. We don't need to name certain things, just create a natural mindset that grows, where we question and think about how to improve our work.”* In addition, one respondent within the CT department pointed to the need of having managers with an agile mindset, that could inspire employees for further usage and positive approach towards the methods. An Agile Transformation Consultant (CT) stated: *“Managers need to have a mindset in agile, it will otherwise only work for a while but become crushed later. Managers need to be hands on in this and learn the mindset through training. The mindset is not given to everyone and you need to learn this.”*

### 4.4.2 Agile Culture and Alignment

When speaking of the alignment in terms of agile values and principles among employees, six interviewees, whereof two from the BO, two from the CT and two from the IT department expressed that there was a need for improved synchronization and alignment of agile working methods. Two interviewees in the CT department expressed that they desired to align the agile vocabulary to not misinterpret agile words within the department. Thus, introducing more

discussions of the agile concepts as well as training was discussed as one path to decrease misunderstandings and confusion that appeared. A Senior Project Manager (CT) mentioned: *“Not everybody understands the words in the same way, because of the historical background, way of working and the culture. This can bring a need to discuss and to align the way of working in the same way.”* In relation to this, two respondents within the CT department discussed the usefulness in adhering to a scaled agile framework to receive guidance and alignment that would lead to less gaps across employees in the end. A Product Development Manager mentioned (CT): *“There is a need for frameworks like SAFe and similar scaled frameworks to receive guidance. Because sorting out the approach by yourself is time consuming and to have something as a basis to adhere to is more efficient.”*

Furthermore, two respondents from the BO department pointed to the need of incorporating agile within the broader spectrum of the organization, as this would enhance the ability of becoming increasingly agile. *“We have to have a common global understanding what is behind the agile way, what is the benefit and when should I use this way of working.”* (PMO Manager, BO)

Furthermore, as expressed by two respondents within the IT department, the agile values needed to be rooted into the philosophy of the organization, to not fall back into traditional habits. A Head Hosting and Cloud Operations Manager in the IT department elaborated on this and mentioned that the organization had a culture of accepting products with only highest quality, resulting in a need of knowing every step of the process early on. In contrast, agile methods were mentioned as rather advocating trial and error and accepting uncertainty in a different way. Thus, the inherent culture did not favor an agile philosophy.

#### 4.4.3 Roles and Responsibilities

Six interviewees, whereof three from CT and BO respectively, discussed the need of clarifying agile roles and responsibilities as they indicated that confusion arose due to a lack of general definitions. Significantly, the roles of the product owner and the project manager were mentioned by two respondents coming from the CT department to be in need of further clarification. A Development Manager from the CT department further expressed that the project manager entailed important skills that should not become lost when transforming the role in accordance to the agile way of working. She expressed: *“It is important that the project manager receives knowledge about what the new role is. It is important to use their competence as well, since they have very good coordination and communication ability which is something you need regardless of working traditional or agile.”* Furthermore, an Agile Transformation Consultant (CT) claimed that the knowledge gap in agile roles and responsibilities would need to be facilitated to be able to operate according to the agile methods.

In addition, three interviewees within the BO department discussed the important role of the project team as a cornerstone in the ability to work agile. In relation to this, two respondents within the BO department mentioned the importance of selecting suitable people in the project team when working agile and indicated that the selection process needed further improvements,

as expressed by an SPS and PMO Manager (BO): *“We should look beyond the functions and work more team oriented, and refer to a leader or Scrum master because they are best suitable for the role.”* Further, two respondents within the BO department stated that the dedication of teams as well as substantial responsibility among individuals were needed to make the agile way of working possible. As mentioned by a Project Manager (BO): *“You need dedicated teams otherwise it does not work. You need to feel responsible and accountable when being part of a team and know what is expected from you.”*

#### 4.4.4 Knowledge and Communication

The empirical data pointed toward a need for improving agile knowledge among the employees, as this was mentioned by ten interviewees scattered across the three departments. However, the facilitation of the issue was discussed in various ways among the interviewees. Described by five interviewees, whereof two from CT, two from IT and one from the BO department, there seemed to be a desire to share knowledge with colleagues to increase agile understanding, and an Agile Transformation Consultant (CT) stated: *“I want to share my journey and earlier experience. This way people can share practices and get knowledge, get coaching and bridge the gap between theory and practice. A lot of people want to go agile, but they just don't know how. For some people it comes naturally but for some people it does not.”* Further, one interviewee from the BO department outlined the valuable act of knowledge sharing between the PMO, to discuss how people drive their projects. In line with this, the aspect of *lessons learned*, such as sharing expertise regarding earlier attempts of working agile, was brought up by one interviewee in the CT department to ease understanding of how to approach the agile methods. Furthermore, a new communication framework was addressed as a desired tool by one interviewee in the IT department, to better understand what had been delivered each month within the department and to receive increased awareness of the use of agile methods. In addition, two interviewees within the CT department mentioned that increased knowledge sharing through better communication among employees was assumed to facilitate the cooperation among employees, since there were parts of the organization that were currently counteracting. A Development Manager (CT) exemplified: *“Coordination and communication is needed to improve the interface between hardware and software.”*

In addition, one respondent in each three departments, discussed that visualization of the agile approach was important in order to help employees move from theory to practice and commence on the agile initiatives, and as mentioned by a Head Hosting and Cloud Operations Manager (IT): *“Try to show and present how it actually works. Try to disseminate knowledge about what risks you can take and where you can begin working.”* In line with this, two respondents within the BO department highlighted that the only visualization within their department had been the Lego game, with the aim to introduce agile methods. However, education needed to be more substantial, as expressed by a Project Manager (BO): *“I believe we need more and other types of education. You can not only have the education presented until now and expect that people will work agile.”* In line with this, four respondents within the BO department indicated they were aspiring to understand the implications of agile, and the SPS and PMO Manager (BO) described: *“There may be a need of explaining what is new in*

*regard of what you already do, because people are wondering what agile is doing... I believe we have been working with agile but under a different name, since we have been working with the lean concept the last 5 years.”*

#### 4.4.5 Training

The aspect of training was brought up by three respondents from the CT department as having an influence on the degree that the agile methods were understood and applied. In the CT department, three respondents indicated that there was a need for improved training of the SAFe framework amongst most of the individuals, as it was assumed to solve for agile alignment and help employees prosper on the methods. As mentioned by an Agile Transformation Consultant (CT): *“We have a lot of interaction between the different centers, so it is going to be a lot more easy if we all work the same way. We decided that SAFe was going to be the agile scale framework, so we are trying to get the training for this so that we can remove the silos and work more together.”* Moreover, a Senior Project Manager from the CT department claimed that agile training was needed for the management, to get them onboard on the agile journey, and mentioned: *“Next step will be to get management on board and aware and trained.”*

#### 4.4.6 Steering from Management

Eleven of the interviewees, whereof four from CT, three from IT and four from the BO department, expressed that the guidance and level of support from the management had an influence on the agile transformation, although the perception of appropriate management steering varied among the interviewees. Five of the respondents, whereof two from CT, two from IT and one from the BO department, expressed a belief that increased utilization of agile methods would have to be coordinated from the top of the organization, such as having guidance, as it felt difficult to foster agile methods among employees from bottom up only. As described by a PMO Specialist from the IT department: *“We have done some teach and preach out in the organization, trying to create awareness and understanding both with business and IT for what this is. At the same time, this may be the best way to run the implementation, to start like this, but maybe we have reached a certain level of maturity where we should start to coordinate ourselves more.”* In addition, three respondents, whereof one coming from the IT and two from the BO department, mentioned a desire to better understand to what degree agile was supposed to be approached within the department, and a Project Manager (BO) exemplified: *“I don’t know the extent we are supposed to work with agile methods, or if we only should select the good parts of it. This is something I suppose the PMO’s managers should tell us, but we haven’t received any directives.”*

Further, it was expressed by five interviewees, whereof two from CT, two from IT and one from the BO department, that the management would need to advocate the new way of working with explicit information and give support in order for employees to get onboard in working agile. A Product Development Manager (CT) mentioned: *“There is a group put together that are going to work with the agile transformation. However, I hope we receive more support in terms of cheering and communication, where interest is shown from the top to actually drive*

*this change.*” In line with this, a Head Hosting and Cloud Operations Manager from the IT department demonstrated that support needed to become better prioritized since employees otherwise run into problems if not having support from key functions, and expressed: *“I think that because we are constantly working in some kind of operational crisis, support isn’t prioritized. I think that if we could have had time to prioritize this and actually sit down and reflect more on this, I think it will become much better. Because we will save both energy and people when we do things.”*

In contrast, four interviewees, whereof two from the CT department and two from the BO department, expressed that they felt that the support and acceptance from the top management that was currently emerging had allowed them to increase confidence in using agile methods. Thus, it was assumed that a continuous movement in this direction was appropriate to foster agile adoption among employees. In line with this an SPS and PMO Manager (BO) exemplified: *“The way it has been done, it has created curiousness of agile by showing success projects which has created a desire from the organization rather than pushing out agile. This takes longer time, but I believe it has better effect when making it your own way of working. It does not create a bottleneck.”*

### Summary of Departments

Main Facilitator	Sub-facilitator (s)	CT	IT	BO
Agile Mindset	Create openness to the agile methods among individuals	X	X	X
	Clarifying and spreading an agile mindset	X	X	X
	Ensuring an agile mindset among managers	X		
Agile Culture and Alignment	Alignment of agile vocabulary	X		
	Align agile within the whole organization			X
	Agile embedded in values and culture		X	
Roles and Responsibilities	Clarification of the product owner and the project manager	X		
	Clarification and dedication of the project team			X
Knowledge and Communication	Sharing expertise with colleagues	X	X	X
	Communicating lessons learned	X		X
	Establishing a communication framework		X	
	Visualization of the agile approach	X	X	X
	Communicating the implications of agile			X

Training	Provide coaching and education among employees	X		
	Agile training for the management	X		
Steering from Management	Provide coordination and guidance from the top	X	X	
	Provide a clear vision of the agile transformation			X
	Ensure top down support	X	X	
	Continuing in the current management direction	X		X

**Table 9.** *Compiled Facilitators when Incorporating Agile Methods as Expressed by Respondent*

## 5. Data Analysis

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*In the following chapter the empirical findings are analyzed by comparing the responses from the different departments as well as against the literature review. Similar to the previous section, the analysis is divided into three main categories. In the first step of the analysis, the agile initiatives within each department are compared and analyzed. Thereafter, the main challenges and facilitators within each department are compared and analyzed.*

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### 5.1 Agile Initiatives

#### 5.1.1 Application of Agile Project Methods

The application of agile methods varied among the three departments. First, within both the CT and IT department, all respondents explained that they used Scrum tools. The use of different Scrum tools indicates that the two departments have adopted agile on a team level, which is in line with Hobbs and Petit (2017). However, in the BO department, the majority expressed how they were working in sprints to deliver their work, at the same time as the adoption to Scrum was not prominent. As sprints are one cornerstone of the Scrum framework (Safe, n.d.) this indicates that respondents have started to adapt at least one part of the Scrum framework to the team level.

One finding within the CT department was the emerging adoption of the SAFe framework. This seems to be connected to what is argued by Kalenda et al., (2018) that the department wants to spread agile beyond the team level and align agile methods across the organization. However, as pointed to by respondents within the CT department, SAFe was applied as they wanted to scale agile also to give guidance within the department. Since the department consists of several units scattered across different countries, findings point to that the SAFe framework can be beneficial for scaling agile within the department and possibly not only across the whole organization.

One particular finding was the use of a hybrid model which was found in all three departments. The hybrid was described to be based on their traditionally oriented project framework GPM2. In addition, another version of a hybrid model was found within the CT department where elements from the SAFe framework had been adopted. As is argued by Barlow et al., (2011) implementing a hybrid model can be preferred in large and mature organizations due to the complexity inherent in large firms. Due to that all departments are part of a global manufacturing company with legacy systems favoring traditional methods, incorporating agile into a hybrid model has been necessary in order to initiate the agile implementation.

In addition to what agile methods were applied, the extent to which these methods were applied differed between departments. The CT department was found to work with the methods to the largest extent, estimating an application of 50-70 percent, whereas the IT department estimated

their use to 30-35 percent of projects. Within the BO department they rather expressed that they were working with traditional methods to a large extent. The extent to which agile methods were applied may be connected to the identified factors determining suitability that was found within all three departments. As the factors were not identical between the departments, there appear to be distinctive prerequisites in the different department contexts. The CT department solely expressed that it was harder to apply agile in projects involving hardware. The IT department instead mentioned a difficulty to apply agile in projects with high predictability, a high level of integration with others, a lacking employee experience and high quality and security requirements. The BO department in turn described that it was difficult to apply agile due to high quality and security requirements and since they mainly worked with hardware. Difficulties of applying agile in projects characterized by a high predictability, in projects with a high complexity of requirements and inexperienced team members were also discussed in literature (Conforto & Amaral, 2016; Špundak, 2014). In projects with these characteristics, traditional methods were argued to be better suited. As these factors were found within both the IT and BO department, this suggests that the prerequisites of applying agile may not be as favorable within these contexts. The factor concerning a high level of integration with others seemed to cause lower application of agile methods in the IT department, however this aspect was not found in literature to deem agile methods unsuitable. Since the IT department partly describe themselves as a support function to the rest of the organization, this department context may be an aspect that has not been encountered in previous research. This factor could thus also determine the prerequisites for applying agile within a department. In literature, applying agile was described to be easier in software (Dikert et al., 2016). Thus, as respondents from the CT and BO department agreed that it was more difficult to apply agile in hardware, these findings further seem to affect the prerequisites to apply agile within departments.

### 5.1.2 Roles and Responsibilities

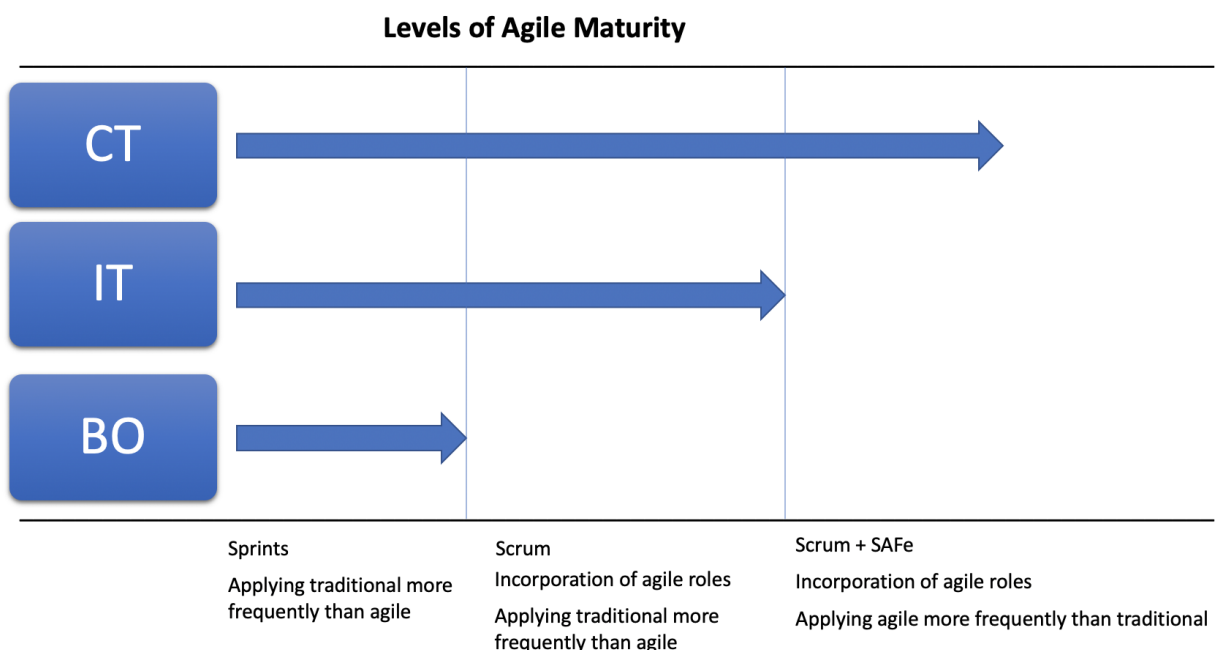
The findings pointed to differences between the departments when it came to adopt agile roles. Within the CT department, the adoption of agile roles had mainly been done by incorporating agile responsibilities within traditional roles, such as letting a team leader or project manager take on the tasks that a scrum master or product owner would do in an agile setting. Within the IT department some agile roles had been introduced such as the Scrum master, product owner and the agile team. Although, in practice the use of these roles seemed to vary, as it was mentioned that employees were not always working according to the role definitions. In turn, almost no adaptation to roles could be seen in the BO department as they mentioned how they were incorporating the concept of agile rather than the roles. This varying adoption to roles seems to be affected by a hybrid model which all departments operated by (*as stated in section 5.1.1*) where traditional and agile methods to some extent are combined. According to literature, some adoption of agile roles and responsibilities are of importance within a hybrid model (Cooper & Sommer, 2016a; Karlström & Runeson, 2005). In addition, Hobbs and Petit (2017) argue that agile roles should be in place to even be able to work in an agile way. Hence, there are indications that the varying adoption of agile roles among departments may influence the extent to which employees can work according to agile methods.



### 5.1.3 Agile Maturity within Departments

Together, the agile initiatives and the extent to which they have been applied within all three departments indicate that they have reached different levels of their agile implementation. This could be connected to what was found by Sommer (2019) that large differences in maturity across departments can exist at an early stage in an agile implementation where agile is applied to different degrees. As seen in figure 2, it appears that the CT department has a higher level of maturity compared to the IT and BO department, as the findings pointed to an adoption of agile methods on the team level as well as attempts and willingness to scale agile to the department level. The CT department also demonstrated that agile methods were more used than traditional methods and that agile responsibilities had also been incorporated into existing roles. Furthermore, the IT department seemed to demonstrate a higher level of maturity than the BO department as findings pointed to that the IT department had applied agile methods to the team level whereas the BO department rather had initiated agile introduction to the team level by working in sprints. Although both the IT department and BO department applied traditional methods more frequently than agile methods, the IT department depicted that roles and responsibilities had been introduced to some extent, whereas the BO department demonstrated that they basically had no adaptation to agile roles and responsibilities.

Furthermore, different factors (*as elaborated on in section 5.1.1*) seemed to affect the prerequisites to adapt agile within each department. This in turn seemed to affect the extent that agile methods were applied within different departments. Consequently, these may have affected the different maturity levels seen in the departments.



**Figure 2.** Levels of Agile Maturity within each Department Compiled by the Authors.

## 5.2 Challenges when Incorporating Agile Methods

### 5.2.1 Coordination Challenges

Coordination challenges were found to be a main challenge within both the CT and the IT department. This is a prominent challenge also found in literature, especially in industrial large-scale agile transformations (Boehm & Turner, 2005; Dikert et al., 2016). Within the CT department, respondents expressed a difficulty to synchronize sprints between teams, which was also identified in literature. According to previous research, the main reason behind this challenge is the distribution of teams across a number of physical locations as it makes the interfacing between teams harder (Leffingwell, 2007; Mahanti, 2006). This was also described by respondents within the CT department who stated that having teams scattered across several locations created a barrier to effective coordination. In addition, differences in holidays between teams operating in different countries were brought up as practical problems also stemming from the differences in location. Other practical reasons such as differences in calendars, time plans and meetings were further brought up, indicating that difficulties to synchronize sprints between teams are not necessarily limited to the location of teams, but can also appear in situations where teams are collocated. This could be related to what is elaborated on in *section 5.2.2*, that varying initiatives had emerged in teams which consequently may have caused issues for effective coordination.

Although findings within the IT department also pointed to coordination challenges, they were foremost mentioned to exist due to dependencies with various parts of the organization working with agile methods to different degrees. The challenge was expressed by respondents both in terms of being the fast-moving team slowed down by others as well as being the slow-moving team which was not able to work in the fast pace advocated by other teams. This is also mentioned by Dikert et al., (2016) who found that although certain teams worked with agile methods to a larger extent, parts of the surrounding organization were not always able to respond in the same flexible way. This could further be connected to the discussion in *section 5.1.1*, where dependencies with other teams or business units were expressed by respondents to affect the extent to which agile methods could be applied, where projects with a high level of interaction with others were perceived more challenging when it came to applying agile. Furthermore, the respondent who expressed himself to be part of a more slow-moving unit pointed to the adherence to strict requirements limiting the ability to move fast. Thus, having strict requirements (*as seen in section 5.1.1*) seemed to influence the coordination with teams wanting to move forward in a fast pace. It could thus be that certain department characteristics such as dependencies with others as well as strict requirements are root causes for making coordination with other organizational units difficult.

Furthermore, coordination challenges were not found to be prominent within the BO department despite literature stating that it is likely to be one of the largest challenges in a large-scale agile transformation and especially when teams are distributed across physical locations (Leffingwell, 2007; Mahanti, 2006). This is despite that the department include a large number of factories that are globally dispersed. This may thus relate back to figure 2 and the agile

maturity of the department. They could thus still be in an early phase where such coordination between agile teams have not been widely initiated.

### 5.2.2 Lack of Communication and Understanding

The overarching challenge concerning a lack of communication and understanding was identified in all departments. One aspect highlighted by respondents both within the CT and IT department pointed to that teams had put together their own definitions of agile terms which had created confusion among teams and led to misunderstandings. This is also identified by Conboy and Carroll (2019) who argue that misinterpretations between groups of teams could emerge as a consequence of unclear definitions, and eventually become problematic as differences are allowed to grow over time. Thus, it appears that the challenge is connected to a higher level of agile maturity where an agile way of working with a corresponding use of agile terms and definition have become more established. This may also explain the absence of this challenge within the BO department as agile terms and vocabularies appear to not have been introduced to the same extent.

Furthermore, findings within the BO department highlighted the difficulty of upholding sufficient communication between different teams within the department. This had caused them to operate in silos where people had adopted agile methods in different ways. This could be connected to what is stated by Dikert et al., (2016) that as teams develop their own ways of using the methods, friction and fragmentation is possible to emerge. However, in the case of the BO department, no friction between teams was yet mentioned. Rather, respondents expressed a concern that teams had begun to develop their own ways of using the methods, indicating that they are in a phase where agile methods are still emerging. Thus, the challenge is related to a lacking knowledge sharing between teams in the department, rather than dealing with confusion caused by different definitions established within teams.

An additional sub-challenge mentioned within the CT department was a lacking understanding and involvement from top management which was seen as one of the underlying reasons as to why agile initiatives now differed between teams. This seems to be connected to what is discussed by Hobbs and Petit (2017) that the absence of an agile policy influences the use and understanding of agile methods as the choice of methods is then often influenced by managers or team members. As the respondents describe that initiatives taken by employees had further created an uneven spread of agile methods across the organization, this further strengthens that there has been a lack of an agile policy. One reason to why this has come to light within the department may be due to the initiation of scaling agile beyond the team level through the incorporation of the SAFe framework (*as seen in section 5.1.1*) as the framework implies an alignment of agile methods (Kalenda et al., 2018). Thus, aligning the methods without an agile policy is perceived difficult. This could also explain why this sub-challenge was not prominent in any of the other departments.

### 5.2.3 Changes to Roles and Responsibilities

Changes to roles and responsibilities were perceived difficult in some aspects within the CT and BO department. A lack of a general definition of agile roles and responsibilities was pointed out by respondents from both the CT and BO department to create problems when working according to agile methods. This led to a confusion of what the roles and their associated responsibilities actually meant. This is line with Dikert et al., (2016) and Hobbs and Petit (2017) who state that understanding new agile roles is perceived difficult in large organizations. Although the same sub-challenge could be identified within both CT and BO department, indications point to differences as to why it has appeared. Within the BO department, there seemed to be a confusion of how the responsibilities differed between traditional and agile roles which could be connected to that they had not yet adopted any roles (*as seen in section 5.1.2*). In the CT department, the confusion rather seemed to originate from the incorporation of agile responsibilities to traditional roles (*as seen in section 5.1.2*). Regardless, both aspects were still found to originate from a lack of definition, which in turn did not necessarily seem to be connected to a specific maturity level or department characteristic.

When it came to challenges regarding specific agile roles, differences could be found between the CT and the BO department. The role of the project manager was pointed out by respondents from the CT department to be problematic when going through the agile transition as there was a lacking understanding of what the new responsibilities were going to include. This was also identified in literature as Hobbs and Petit (2017) found that there generally was no consensus on how to properly adjust the role of the project manager. For instance, respondents mentioned the risk of the project manager not letting go of its former decision-making mandate, which was further found in literature (Dikert et al., 2016; Hobbs & Petit, 2017; Nerur et al., 2005). Within the BO department the emphasis was rather put on issues related to the team. As team members were used to traditional ways with more command and control, it was difficult to get them to increasingly take their own decisions. This challenge was further highlighted by Boehm and Turner (2005) who suggested that agile team members may require more skills and experience to perform well. In relation to *section 5.1.3* regarding different levels of maturity, this may indicate that employees within the BO department who have as it seems only begun to implement agile on the team level, mainly experience challenges relating to the team. On the other hand, within the CT department, as agile had been introduced to the team level and where roles had been merged, issues arose that were more connected to the specific responsibilities of agile roles. Thus, different levels of maturity seem to impact on what roles are experienced as most challenging.

### 5.2.4 Conforming Agile to Traditional Structures and Processes

Another finding within both the CT and IT department related to constraints that current traditional structures had put on the ability to work according to agile methods. This is also a prominent finding in literature where several researchers have identified how challenges emerged when companies tried to integrate agile processes into traditional organizations. Within the CT department, the problems were described in relation to the hybrid model that

they currently operated by as a mixture of a waterfall approach with toll gates together with agile features led to the risk of double administration. This was also discovered by Boehm and Turner (2005) who argue that the combination of traditional and agile processes can be challenging to integrate as they differ in aspects such as flexibility and life cycles.

Within the IT department, the challenges were mainly apprehended as connected to the systems already in place causing inconveniences for people wanting to work in a more agile way. One example illustrating this was the financial model which created problems when managing budget allocation and in turn also led to issues when trying to build a stable agile team. This was also raised by Dikert et al., (2016) who found that agile methods often had to be arranged to fit in, and where tensions generally arose in the surrounding organization. Furthermore, respondents within the IT department also pointed to technical constraints limiting the ability to apply agile, which was also identified by Hobbs and Petit (2017).

Despite variations in how the sub-challenges are framed by the two departments, both of them experienced a difficulty in merging agile into the existing structure of the organization. The challenges of implementing agile thus appear to be partly related to the organization at large, which is connected to what is stated by Leffingwell (2007) that organizations establish infrastructure to manage and control projects, policies and procedures as they grow larger. As the findings imply that changes are foremost applied to the agile initiatives being implemented rather than the organizational structure already in place, this seems to indicate that the organizational structure currently is too robust to easily make changes to. Furthermore, this seems to affect both the IT department where agile has been initiated on a team level, as well as the CT department where agile is being scaled beyond the team level, although with small variations.

At the same time, this challenge did not appear to be a prominent within the BO department. Again, this may be connected to the lower level of maturity seen in the department where a limited number of agile initiatives clashing with the inherent structure have been introduced.

### 5.2.5 Agile Approaches in Hardware and Software

The empirical findings from both the CT and BO department pointed to difficulties in applying agile methods in projects involving hardware compared to applying it in software. Long lead times, getting hold of product certificates and working with physical machines were mentioned as some of the reasons to why agile methods were found difficult to apply. This aspect was also identified within literature, as Cooper and Sommer (2018) argue that the development of manufactured products such as an engine or machine, cannot easily be divided into sprints. Boehm and Turner (2005) further argue that long lead times of hardware often require certain elements of traditional methods such as thorough planning, to remain.

Within the CT department where employees operate in both areas, the findings implied that those working with software had come further with their agile initiatives than the ones working with hardware. This in turn impacted on the ability to cooperate between the two sides, as they

had different apprehensions of how to apply agile. This was also recognized by Könnölä et al., (2016) who found that in cases where team members were often specialized in either hardware or software development, barriers regarding transparency and collaboration could be found.

This main challenge further corresponds with findings within *section 5.1.1* regarding the application of agile project methods where both the CT and BO department identified that it was harder to apply agile within hardware, thus impacting on where it was actually applied. Thus, the sub-challenges found seem to be dependent on department characteristics and the prerequisites of applying agile in hardware.

### 5.2.6 Lack of Investment

A lack of investment was found in the BO department in terms of a lacking education in agile methods among employees and consequently, people still did not properly comprehend what it meant to work according to the new methods. This challenge is in line with Dikert et al., (2016) stating that not investing enough in training and coaching for employees could easily cause problems for the agile transformation, such as a lower motivation among employees. Signs of the latter could further be seen as one respondent expressed a slight embarrassment regarding not being more educated within the new methods as they were increasingly used. This was further elaborated on within the BO department as it was argued that a process of learning had not yet been accomplished. Hence, the lacking provision of education may further be associated with a lower level of maturity within the department.

### 5.2.7 Lack of an Agile Mindset

A lack of an agile mindset was stated as a problem by respondents both within the CT department as well as the IT department, although the findings were not limited to employees only within their own department. Rather, the mindset was described by most to be lacking throughout the entire organization. The mindset can be connected to the overarching aspect of organizational culture as Nerur et al., (2005) describe how the mindset is embedded in the organizational culture. It was further implied by respondents that a complete understanding of agile principles and values was not yet in place across the organization. This seems to be connected to what is argued by Vinekar et al., (2006) that one reason for employees finding it hard to embrace agile is due to a long experience of a traditional and hierarchical culture. Consequently, these findings may imply that the inherent culture of the case company is leaning towards a traditional culture, making it difficult to institutionalize agile values and principles within the organization. As the challenge appears to be associated with the organizational culture at large, this implies that the challenge is affecting each of the departments.

### 5.2.8 Change Resistance

Change resistance when implementing agile methods could be found to some degree within all departments. In literature, several challenges relating to change resistance could be found, although only one sub-challenge found in the empirical findings was described in the same way. One possible explanation is that resistance is deeply embedded within the mind of

individuals and thus may be difficult for respondents to pinpoint. However, the sub-challenge that did correspond to literature was expressed by respondents within the BO department and described that the new working methods had put increased pressure on team members to deliver as they had to adapt their routines and practices. This was also discovered by Cooper and Sommer (2016a) who found that employees who had previously worked in silos found the iterative approaches frustrating.

The findings within all departments further pointed to a general suspicion to the new methods as people were comfortable in their old ways of working. In addition, a lacking understanding was identified within the IT department as a source of resistance. Both of these sub-challenges could be connected to several of the challenges mentioned in literature, such as an unwillingness to change unless immediate benefits are detected (Boehm & Turner, 2005; Conboy & Carroll, 2019; Dikert et al., 2016), or a fear of change due to uncertainties about new roles and responsibilities (Dikert et al., 2016; Leffingwell, 2007; Mahanti, 2006). As change resistance could thus be found in all departments, although with small variations in how they were expressed, this challenge does not appear to be connected only to a certain level of maturity or department characteristic.

## 5.3 Facilitators when Incorporating Agile Methods

### 5.3.1 Agile Mindset

Interviewees from all three departments pointed towards a need to be more willing to investigate the agile methods as skepticism regarding their use was experienced. This implies that an agile mindset needs to be acquired among employees in order to not fall back into traditional working methods which is also in line with Kalenda et al., (2018) who argue that conforming to agile requires a proactive mindset and treating agile as a philosophy within the organization.

In relation to acquiring the agile mindset, one respondent in the BO department argued that an agile mindset would emerge naturally if individuals would have an approach of continuous improvement, as this was perceived to relate to the agile approach. This is a contrasting note to what was found in literature, as it is stated that the agile mindset requires championing and leadership commitment to enforce an appropriate mindset among employees (Conforto et al., 2014; Denning, 2016). Although, as all three departments expressed a desire for a clarification of what an appropriate mindset entailed, this implies that there may be a need for understanding the underlying assumptions of the agile implementation to actually allow emergence of the methods. This is further strengthened by the CT and IT department since they claimed that the mindset needed to be spread within the organization as this would enhance the acceptance of the methods. This implies a need for a greater commitment of diffusing knowledge of the agile values and principles. As stated by Brune and Weiss (2017), the diffusion of an agile mindset among employees creates the ability to conform to new methods and not become stuck in a conservative mindset and way of working. Thus, by spreading knowledge of agile principles and values, the risk of getting stuck in traditional habits may be overcome. Although, as the

respondents from the IT department elaborated on that increased confidence in using the methods could be traced back to a specific knowledge, such as the assumption that agile methods allowed employees to fail fast, there are indications pointing to that the knowledge diffusion needs thorough consideration for making it effectful in fostering the use of agile methods. Thus, in addition to diffusing the agile mindset, there should also be attention to what agile values are spread.

One finding was that the CT department significantly highlighted that managers would need to possess the agile mindset to not hinder the agile implementation among employees. The literature states that the management carries an important aspect in terms of commitment and leadership skills with emphasis in persuading employees of the agile mindset. As seen from the interviews in the CT department, the management point of view was further elaborated on as it was discussed that the management would need to embody the agile mindset themselves to not crush the agile way of working. This implies that the management commitment does not only include extending the agile mindset to other employees, but they also have to embrace the mindset themselves.

Brune and Weiss (2017) state that spreading an agile mindset across the organization increases the chances of an institutionalization of agile methods. This may imply that the mindset should be embodied by everyone in the organization on all levels, both employees and management, to foster the agile implementation. Further, this indicates that it is not only the managers within the CT department who need to embrace this, as it involves the full organization. Although, as the aspect of acquiring an agile mindset among managers was a prominent finding only within the CT department, this may imply that the agile mindset of managers is increasingly important in the implementation phase when scaling agile beyond the team level, as in the case of the CT department and the implementation of SAFe, as seen in *section 5.1.1*. This is also in line with Kalenda et al., (2018) who argue that leadership is needed when scaling agile through implementing the SAFe framework.

### 5.3.2 Agile Culture and Alignment

As pointed to by the interviewees in all three departments, there was a desire for improved alignment in working methods. Although, the three departments seemed to point towards different aspects in relation to this. The CT department emphasized aligning the agile terminology to prevent misinterpretation among colleagues in the department, whereas the BO department rather pointed to a desire to incorporate agile within the broader spectrum of the organization to reach a common global understanding and to know why and when to use the methods. This implies that the departments seem to aspire to reach alignment on different levels within the organization, both team level and organizational wide level. As stated in literature, the alignment of agile values across various teams and functions allows the new way of working to be settled into the organization (Ebert & Paasivaara, 2017). In addition, literature states that the alignment is connected to the culture within the organization and that embracing agile needs to be rooted in the basic assumptions of the organization. As the culture is manifested within the organization at large (Tolfo et al., 2011) this may imply that the



incorporation of agile assumptions within the broader spectrum of the organization is important in order for departments to understand and use agile methods as well as to reach an alignment. Although as the CT and BO department pointed to the importance of alignment on different levels within the organization, the findings indicate that a department within a large organization may be in need of reaching alignment among employees within the department and not only across the organization at large.

In relation to this, the CT department seemed to believe that a scaled agile framework would align the working methods, specifically mentioning the SAFe framework. This is connected to what is argued by Ebert and Paasivaara (2017) and Kalenda et al., (2018) that the SAFe framework may support alignment of methods by ensuring that an agile culture reaches all levels within the organization. However, according to Kalenda et al., (2018) the incorporation of the SAFe framework requires continuous work involving the full organization, with support and resources to follow through. This may imply that by only having the CT department aspiring to solve for alignment through the SAFe framework, complete alignment across the organization may not be achieved since this would require the full attention of the organization. This may indicate that acknowledgement of the framework would have to be done by all departments in order to ensure an organizational alignment and to be stated as a facilitator for the organization at large. At the same time, as reasoned previously in *section 5.1.1*, findings point to that the SAFe framework may be beneficial for scaling agile within the department level and not solely when being incorporated across the organization. This may point to that a large department entailing various number of units (*as seen in section 4.1.2*) may be able to adopt the SAFe framework in order to foster understanding of agile beyond the team level and allowing the department to become better aligned.

Moreover, the IT department mentioned that agile values needed to be rooted into the philosophy of the organization, as the inherent culture currently did not favor an agile philosophy. It was explained that the organization had a culture of accepting products with only the highest quality but that the agile way rather advocated a trial and error approach. This is connected to Misra et al., (2009) who state that it is important to have a supportive organizational environment for allowing agile methods to emerge. Leffingwell (2007) also argues for the importance of being accepting towards potential failures when trying new methods to prevent mistrust among employees and facilitate an emergence of agile methods. This could indicate that an accepting culture creates the necessary prerequisites for implementing agile further within the department. Hence, indications point to that the inherent values of the large organization are affecting the agile implementation, and that there is a need to establish an accepting and supportive environment to not hamper the use of agile methods within the departments.

### 5.3.3 Roles and Responsibilities

The CT and BO department pointed to the need of clarifying agile roles and responsibilities to solve for confusion that arose due to a lack of general agile definition on roles. As stated in literature, the integration and adaptation to roles is of importance in order to combat the

complexity of an agile implementation. Although, the findings between departments pointed to different needs. The CT department expressed a need of clarification regarding the roles of the project manager and the product owner. This is seen as a consequence of operating according to a hybrid model as discussed in *section 5.1.2*, as the CT department had incorporated agile responsibilities onto traditional roles. As stated in literature, when operating in a hybrid model not every organization choose to adopt all agile roles, but instead chose to keep one or more of the traditional roles. As findings still pointed to confusion when mixing traditional and agile roles, this indicates that a proper establishment of role definitions is needed regardless of working according to a hybrid or not. This is further argued by Hobbs and Petit (2017) that proper role definitions provide the basis for operating according to agile principles.

In turn, the BO department seemed to have focus on ensuring proper responsibility and dedication of the project team. This is connected to the literature stating that the team should be given increased responsibilities as well as ability of working autonomously to properly adhere to the agile methods. As seen in *section 5.1.2*, almost no adoption to roles had been done. In addition, the BO department had limited incorporation of the Scrum framework, as seen in *section 5.1.1*, which includes proper role and team approaches for operating according to agile (Fernandez & Fernandez, 2008). This may further indicate that the department has not established the foundation for incorporating and adopting agile roles yet. This implies that in an early phase of an agile implementation, such as in the case of the BO department as seen in *section 5.1.3*, there is a need of ensuring that a project team can be given proper authority as well as ensuring that the team is devoted as this may facilitate conforming to the new methods. On the other hand, as demonstrated by the CT department, departments with a higher level of maturity may instead require a focus on the clarification of specific roles, such as that of the product owner.

#### 5.3.4 Knowledge and Communication

Accelerated agile knowledge was perceived to be needed to increase the use of agile working methods in all three departments. As stated in literature, an effective dissemination of knowledge regarding agile methods across the organization is of importance to communicate and sustain change. All three departments elaborated on the dissemination of knowledge and stated that it was important to share expertise among employees to increase agile understanding. Further, it was mentioned that it would bridge the gap between theory and practice for many employees as well as foster informal coaching between colleagues to extend the use of the methods. This is also pointed to by Dikert et al., (2016) who argue that frequent informal talks between employees can establish a mutual knowledge base. This further implies that regardless of the differences in maturity levels across the different departments, there is a need for increased knowledge and communication among all three departments.

All three departments further mentioned the importance to visualize the agile approach to help employees move from theory to practice. This could be connected to Dikert et al., (2016) who suggest that transparency of information, showing potential challenges and successes, results in an alignment among employees that extends the use of agile methods. Thus, the visualization

of the agile approach may benefit from including the implications of working with agile methods to foster consensus of the methods. Although, findings from the IT department indicated that the visualization would benefit from including the instructions of where you can begin working with agile. As elaborated on by the BO department, there was a need for visualizing better educational material that could help employees understand the implications of agile methods, as they had a hard time seeing the differences between the traditional and agile way of working. This implies that the visualization of the agile approach may need to include different knowledge diffusion to different departments. This further indicates that in an early phase of an agile implementation, such as in the BO department as seen in *section 5.1.3*, there may be a need for including thorough educational understanding of the implications. Further, there needs to be considerable knowledge with guides in how to initiate the agile approach when having come further with the agile adoption as in the case of the IT department as seen in *section 5.1.3*

Moreover, the CT department mentioned a desire for sharing knowledge regarding earlier attempts of working agile, such as lessons learned, as this would ease the understanding of the methods. The BO department extended this thought when mentioning the importance of knowledge sharing between the PMOs to discuss how people drive their projects and learn from each other to better commence on using the methods. This is connected to what is argued by Kalenda et al., (2018), that communities of practices can create a transfer of best practices between functions and teams. However, as argued by Dikert et al., (2016) in order for communities of practices to work as a facilitator, an allocated budget, motivational leadership and infrastructure needs to be in place. This indicates that commitment is required in order for it to work as a facilitator. Although, as both the CT and BO department mentioned how they desired this aspect, this implies that showing earlier attempts of working agile is beneficial in a department which have come further in their agile initiatives such as the CT department as seen in *section 5.1.3* as well as in a department which has not come that far such as the BO department as seen in *section 5.1.3*. This further implies that the establishment of communities where employees share their expertise may be important regardless of the agile maturity level within a department.

Furthermore, the IT department expressed that a new communication framework was desired to align meetings and understand what had been delivered each month within the department. This could be seen as a desire to coordinate the knowledge and communication that is spread across the department, which is further seen in literature where it could be found that coordinating communication across the organization is vital for allowing proper anchoring of agile practices. This implies that when having introduced agile methods to the team level as in the case of the IT department as seen in *section 5.1.3*, there is a need to further coordinate the knowledge to allow the methods to become better understood by employees and institutionalized within the department.

### 5.3.5 Training

A prominent element raised by only the CT department was that the level of training seemed to have an influence on the degree that the agile methods were understood and applied within the department. This is in line with Brune and Weiss (2017) who state that it is necessary to provide education to employees to establish a learning organization. Gandomani et al., (2014) elaborates on the importance of training as it ensures employee buy-in which is a prerequisite for agile to take hold within the organization. Hence, the influence of training may imply that employees are commencing and are persevering on the agile approach, thus indicating an essential aspect for the agile transformation to proceed. Although, the findings pointed to that there was not only necessary to provide training among the employees, but also improving training to the management to get them onboard on the agile transition. This is echoed by literature as it is stated that the management requires proper learning to understand the agile methods and facilitate the agile transformation. This implies that learning seems to be needed on all levels within the department, to properly facilitate the use and understanding of agile methods.

Further there was a belief within the CT department that increased training within the SAFe framework would accelerate the use of agile methods. This could be connected to what is stated by Ebert and Paasivaara (2017) that guidance in the framework may ease the adoption of the methods on large projects as well as in departments also working with hardware and systems engineering. This seems to indicate that the framework itself may provide an opportunity for increased training in the methods, thus facilitating the adoption of agile methods. Although, it should be noted that the adoption to the framework should be carefully done as it requires the organization to tailor the framework to their circumstances (Kalenda et al., 2018). This may imply that there is not only a need for training in the framework itself, but also training in how to tailor it to fit into the working environment.

As the CT department were the only department expressing a desire for increased training in agile, this may be connected to the level of maturity level within the department as seen in *section 5.1.3*. As literature argue that the familiarization of the agile methods among employees creates a springboard towards acting agile and consequently fosters a mindset of continuous learning, there is reason to believe that the higher level of maturity seen in the CT department may have influenced employees towards continuous learning where the department want to get further involved into the agile approach through training. Although, as stated in literature, the training is essential for nurturing the ability to conform to agile and coaching and education should be available early on in the implementation to make the practices efficiently rooted. Accordingly, there is reason to believe that training would foster the agile approach within the IT and BO department as well, since they are argued to be in an earlier stage of maturity as seen in *section 5.1.3*. This implies that different departmental contexts within the organization, despite different levels of maturity, may benefit from increased training.

### 5.3.6 Steering from Management

All three departments pointed to that the guidance and level of support from the management had an influence on the agile implementation, although respondents discussed this in various ways. In the CT and IT department there was a belief in that increased utilization of the agile methods would have to be coordinated and advocated from the top of the organization, as interviewees perceived it difficult to foster agile methods from bottom up only, which is in line with Conforto et al., (2014). More explicitly, encouragement and interest from the top was indicated to be a need for the CT department. Meanwhile, the IT department indicated a need for better prioritization of support from the management. Furthermore, findings within the BO department pointed towards a need for clear directives regarding the extent that agile was thought to be incorporated. All these findings seem to be connected to what is argued by Denning (2019) that management guidance, vision and provision of tools are vital for not ending up in a stalled agile journey where employees fall back into their old working methods. This implies that involvement from the management may be vital for fostering employee commitment and pushing the agile transformation forward. Although, the findings point to different needs within different departmental contexts, thus implying that depending on the current state within the department, as earlier reasoned in *section 5.1.3*, there is a need to consider how to appropriately foster each department in terms of guidance, support and encouragement.

On a contrasting note, both the CT and BO department indicated that they felt that the support and acceptance from the top management given so far had allowed them to increase their confidence in using agile methods. It was expressed in the BO department that agile had not been pushed from the top but rather emerged bottom up, which was assumed to take longer time but create a better effect. This could be connected to what is stated by Denning (2019) that pushing too hard from management may prevent agile practices to become efficiently rooted. It is further found in literature that the management need to balance governance with bottom up initiatives to allow anchoring of the methods in the long term. This may imply that the extent of management involvement should be adopted to an appropriate level, which may differ between departments, in order to work as a facilitator.

## 6. Conclusion

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*This chapter concludes the findings from the analysis and answers the research question. Following the findings and theoretical contributions given by the study, managerial implications and the authors' recommendations are given. Last, limitations of the study and future research are discussed.*

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### 6.1 Findings and Theoretical Contributions

This study was conducted with the aim to explore the implementation of agile project methods on a department level in a large manufacturing organization. The study was conducted from a managerial perspective and strived to contribute with insight regarding how agile project methods can be fostered within different departments. In order to reach the main purpose of this study, the research question was formulated as following:

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*How can a large organization foster agile initiatives on a department level?*

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By investigating the agile initiatives taken within three departments, different levels of agile maturity could be identified as well as differences in prerequisites affecting the ability to implement agile. First, differences were found in whether and how agile had been adopted to the team level or beyond the team level. Second, differences in how agile roles and responsibilities had been adopted were found. Third, the extent to which agile was applied in projects differed between departments, where the departments experienced different factors which seemed to have an impact on in which projects or occasions agile was considered suitable to apply. This implies that departments within large organizations may have established different agile foundations when going through an agile transformation. Furthermore, the differences in agile maturity further seem to influence what challenges and facilitators that can be identified within the departments.

Certain main challenges seem likely to appear when a large organization is going through an agile implementation. They are the following; coordination challenges, a lack of communication and understanding, changes to roles and responsibilities, conforming agile to traditional structures and processes, different agile approaches in hardware and software, lack of investment, an agile mindset and change resistance. There appears to be both differences and similarities in what main challenges are the most prominent within different departments. However, even though departments may experience similar main challenges, it appears that different sub-challenges can be identified within specific departments. This seems to be determined by different levels of maturity, differences in department contexts and characteristics and/or the larger organizational context.

Furthermore, certain main facilitators seem to be important for departments within a large organization when going through an agile implementation. They are the following; an agile mindset, an agile culture and alignment, roles and responsibilities, knowledge and communication, training as well as steering from management. It appears that many of the above-mentioned facilitators are mutual across different departments. At the same time, several sub-facilitators are found to be more prominent in specific departments. In some occasions these seem to be affected by the different levels of agile maturity in departments and in some cases, it appears to be determined by the larger organizational context.

Thus, by gaining an understanding of the agile maturity and context within different departments by examining what agile initiatives have been incorporated, organizations can better understand what challenges may appear and what facilitators are considered important. By acquiring such insights, an organization can gain a better understanding of how an agile implementation can be fostered within departments, and consequently in the organization at large.

## 6.2 Managerial Implications

In order to provide practicality for companies as well as clarity for the reader, the above-mentioned challenges and facilitators have been grouped into a set of recommendations. These recommendations provide further depth into how an organization should approach an agile implementation on a department level. These recommendations are presented below.

### *Challenges*

#### **Coordination challenges are likely to occur between teams and organizational units**

When implementing agile on a team level as well as when attempting to scale it across an entire department or even the organization at large, it is important to approach differences in sprints, time plans, meetings calendars which are making coordination difficult. This is likely to appear when teams are scattered across different locations and countries where additional differences in holidays may exist. However, difficulties to synchronize sprints also seem to appear in cases of collocation of teams due to differences in how the use of agile methods have emerged within different teams. Furthermore, in departments with a high level of interaction with others, it is important to be aware of the restrictions faced by other organizational units when applying agile methods or sharing constraints if not being able to proceed as fast as desired by others. The latter further seems to be important in cases where certain requirements are creating barriers to apply agile.



**Lack of communication may cause differences in definitions and use of methods**

As agile methods are allowed to grow and get established within teams, it is important to be aware that different use of agile definitions and terms can create confusion between teams that are to collaborate. These differences can also become increasingly severe if they are allowed to grow over time. Furthermore, in departments or units where agile methods have not yet had the time to become as established within teams, it is important to address the challenge of teams operating in silos due to a lacking communication and knowledge sharing. Last, it is important to be aware that a lacking involvement from top management and an absence of an agile policy may increase the risk of creating an uneven spread of agile methods across the organization as employees thus have a strong influence on agile initiatives that emerge in teams. This challenge may especially show itself when attempting to scale agile across a department.

**Absence of roles descriptions creates confusion**

When incorporating agile methods within departments and teams, a common problem appears to be related to understanding and defining agile roles and responsibilities, which per se does not appear to be connected to a certain stage of the implementation. However, in departments where agile methods have recently been introduced to the team-level, getting the team to understand their responsibilities within an agile setting seems to be an initial challenge. Instead, as agile methods become more established, and when roles are introduced, challenges related to different roles, especially that of the project manager may be more prominent.

**Incorporating agile within traditional structures and processes can be time-consuming**

A general challenge for departments and teams that have started to work with agile methods to a certain extent seem to be related to the integration of agile processes into current organizational structures and processes. One risk with trying to balance a waterfall approach with an agile approach appear to be double administration. Furthermore, issues can also arise regarding the traditional systems and structures, such as difficulties in managing budget allocation due to a traditional financial model not created to support agile teams. Consequently, the challenge per se does appear to arise due to a robust structure already in place, with smaller variations in sub-challenges depending on the department context.

**Difficult to apply agile in hardware and coordinating with software**

In department contexts where hardware development or physical components are part of the work, agile methods are likely to be harder to adopt. Reasons for this include long lead times, getting hold of product certificates and working with physical machines. Thus, it cannot be as easily divided into sprints as within software. Furthermore, within departments developing both software and hardware, it is important to acknowledge if cooperation problems arise between the two sides. This may arise when the two sides have not come equally far with their agile initiatives, or when there is a high level of specialization within respective area.

**Lack of education may create lower employee motivation**

Within departments with a lower level of agile maturity, a lack of proper education in agile methods may be found. Consequences that are likely to occur are a lower motivation among employees and a halted agile implementation.



**Lack of an agile mindset is often present within traditional cultures**

A lack of an agile mindset seems to be a finding both within departments that have implemented agile within teams as well as those who attempt to scale it. However, it does not seem to be limited only to a department but appears to be a crucial challenge across an entire organization. This seems to be embedded within the organizational culture and is likely to linger especially within firms that are characterized by a traditional and hierarchical culture. Such an organizational culture can make it difficult to institutionalize agile values and principles within the organization, as well as within departments.

**Change resistance is expressed in various ways**

When implementing agile methods into any organization or department, resistance to change appears likely to emerge. This challenge seems express itself in different forms, however regardless of department characteristics or what agile initiatives have been taken. As it is embedded within the minds of individuals, it is important note the ways in which it can be express itself, such as frustration with new ways of working, a suspicion towards the new methods as well as demonstrating a lacking understanding of the new methods.

*Table 10. Challenges to be aware of when implementing agile methods within departments.*

## *Facilitators*

**Establishing an appropriate philosophy on all levels**

One of the most important parts in fostering agile methods concerns the establishment of an appropriate philosophy, referred to as the agile mindset. The mindset needs to be acquired among employees regardless of their departmental context, in order to reduce potential scepticism and not fall back into traditional working methods. The underlying assumptions of the agile implementation should thus be spread to allow emergence of the methods and this is done by having considerable commitment of knowledge diffusion. The diffusion of knowledge further requires attention to significant parts of the agile values. It is recommended to make sure that employees understand that agile methods entail assumptions such as ‘failing fast’, as this is seen to increase the confidence in using the agile methods. Further, it is recommended to ensure that the agile mindset is embraced by the management level. This is of importance as the management otherwise may be hindering the agile implementation among employees. Thus, it is essential to ensure that an appropriate agile mindset is embodied by everyone in the organization, both employees and management, to foster the agile implementation on department level.

**Creating coherency and a supportive environment**

Reaching a coherency in working methods is considered important in order for the different departments to prosper on the agile methods. Thus, a department within a large organization may be in need of reaching alignment among employees within the department and not only across the organization at large. Further, the acknowledgement of the SAFe framework may be beneficial for scaling agile and aligning agile methods within the department level as it fosters understanding regarding the agile implications beyond the team level, and thus allows the department to achieve consensus of the methods. Further, a recommendation is to ensure that the inherent values of the organization are not hampering the agile implementation. Hence, there is a need to ensure an accepting culture and environment for the employees, as this creates a prerequisite for implementing agile further within the department level.



**Establishing clear definitions of roles and responsibilities**

One essential recommendation is to make sure that departments are aware of the implications of the agile roles as well as understand what the employees holding traditional roles should do. This is especially important when operating according to a hybrid model to allow further emergence of the agile methods. Especially in an early phase of an agile implementation there is need to ensure that the agile team is having the ability to receive proper responsibility and be able to work autonomously as this may facilitate conforming to agile methods. In a department that have come further in the agile implementation, it may instead require a focus on the clarification of specific roles, such as that of the product owner.

**Ensuring awareness and apprehension of agile methods**

One recommendation is to establish awareness of the agile implications and ensure that employees are properly apprehending the agile methods in each department. Achieving this may be done through frequent informal talks between employees that consequently establishes a mutual knowledge base and provides time for informal guidance between employees. Although, different departments may require different diffusion of knowledge depending on their maturity level in regard of the agile implementation. As an example, it is important to provide thorough education of the implications of what agile methods entails in a department that are in an early phase of an agile implementation, whereof a department in a later phase of the agile implementation may need more guides in how to approach the methods. Further, recommendations are to create communities of practices where employees share their expertise in each of the departments, as this is perceived beneficial regardless of which phase in the agile implementation a department is at. In addition, establishing a communication framework in a department that have introduced agile methods to the team level may allow for better institutionalizing of the agile methods among the employees.

**Provide cultivation of the agile practices**

An essential aspect is to provide training of the agile practices among all levels within the department and ensure that both employees and management level receive training to properly facilitate the use and understanding of agile methods. The SAFe framework itself may provide an opportunity for increased training in the methods. Although training in how to tailor the framework to fit the working environment may be needed. Further, different departmental contexts within the organization may benefit from increased training regardless of how far they have come in their agile initiatives, since training in the methods may further foster the ability of conforming to agile among employees.

**Ensure appropriate management involvement**

The level of management involvement is recommended to thoroughly consider since it has a significant effect on how the agile implementation is fostered. Different departmental contexts may require different management involvement, hence implying a need for looking into the specific departmental characteristics and the level of agile maturity within the department. There is a need to consider how to appropriately foster each department in terms of guidance, support, vision and encouragement. In an early phase of the agile implementation there is need of giving a clear vision of the agile transformation from the top management. In a phase where the departments have reached a higher level of agile maturity there is need for providing support and guidance in the methods. Although, it is recommended that the extent of management involvement should be adopted to an appropriate level, which may differ between departments, in order for the management involvement to work as a facilitator. Thus, there is need of careful consideration in giving directives, since pushing rigid directives may rather hamper the use of agile methods within the department.

*Table 11. Facilitators when incorporating agile methods within departments.*

## 6.3 Limitations and Future Research

The topic of agile implementation on department level is to a high degree an unexplored field within research. In this study, the authors aimed to examine the topic by exploring how agile initiatives could be fostered within departments within a large organization. However, additional research is needed to further deepen and expand the understanding of how agile initiatives can be fostered on a department level. Therefore, the authors propose some suggestions for future research together with some limitations with the study.

First, as only four or five managers have been interviewed within each of the three large departments, a more thorough study of departments is recommended to investigate whether the challenges and facilitators are similar across an entire department. As this thesis has focused on giving a more comparative view between departments, an insight can only be given into the respective departments. Furthermore, as only three departments with different characteristics were investigated it is also suggested to look into additional departments to see whether differences or similarities can be found. This is important to gain a deeper insight into how different departments can foster agile initiatives, and thus succeed with the agile implementation in the organization at large.

In addition, challenges and facilitators have been investigated in relation to different maturity levels within a large company that have only worked to incorporate agile methods for a few years. Therefore, it is needed to investigate departments and their associated agile maturity level within firms that have also worked to incorporate agile methods for a longer period of time. In addition, more extensive research may be needed on what is characterized as different levels of agile maturity when a large company is going through an agile transformation. In relation to this, the study can only give an insight into one point of time of an agile transformation, which makes it impossible to draw conclusions over time. Thus, one suggestion is also to conduct a longitudinal study by following the development of departments over time.

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# Appendix

## Appendix 1. Interview guide - English

### ***Background:***

- How long have you worked at the company?
- What is your professional title?
- Which department do you work for?
- What is the objective of your department?
- What are your work tasks and responsibilities?
- Are you a part of one or more teams? How are the teams/s organized?
  - How many teams are there in your department?

### ***Use of Agile and Traditional methods:***

- To what extent is the traditional project methods used within your department?
- How do you define agile working methods?
  - Does the definition differ between employees within your department?
- Which agile project methods have been introduced in your department?
  - Have the methods been tailored in regard to the specific context of the department? How?
  - Are there any contrasts in how the agile initiatives have looked depending on the extent of hardware and software development? If yes, could you please explain the difference?

### ***Challenges regarding the collaboration between traditional and agile:***

- What challenges have you noticed regarding the interplay between employees working by traditional methods and those working with agile methods?
  - What initiatives have been carried out to bridge potential difficulties? What has been the effect of these initiatives?

### ***The human aspect:***

- What is your opinion towards the agile initiatives that have been implemented?
- How would you describe your colleagues' opinion regarding the agile initiatives that have been introduced?
- How do traditional roles and responsibilities coexist with agile roles and responsibilities?
  - What are the challenges?

### ***The establishment of an agile way of working:***

- Do you feel that you need to have understanding of agile methods in order to cooperate with other parts of the organization?

*or*

- In what extent does an agile mindset need to be anchored across the organization (including more traditional teams)?
- What challenges can arise when certain parts of the organization does not possess an agile knowledge?
- Do you consider that you have received support when implementing agile working methods? If yes - from who or whom?
- Do you have any previous experiences with establishing agile methods in any other company?
  - Was it the same type of challenges?
  - Which were the key factors to a successful implementation?

***The future:***

- To what extent do you foresee that agile methods will become established at your department in the future?
- To what extent do you think traditional methods will remain?

## Appendix 2. Interview guide - Swedish

Generell information innan vi börjar intervjun:

- Ge en kort överblick av vår bakgrund till uppsatsen
- Kan vi använda er jobbtitel för att referera till er i vår slutliga rapport av uppsatsen?
- Informera om att intervjupersonen kommer att vara anonym
- Kan vi spela in intervjun? Inspelningen kommer att raderas när uppsatsen är slutförd

***Bakgrund:***

- Hur länge har du arbetat inom denna organisationen?
- Vad har du för titel?
- Vilken avdelning arbetar du på?
- Vad gör din avdelning?
- Vilka är dina arbetsuppgifter?
- Jobbar du i team? Hur ser teamet/teamen ut?
  - Hur många team finns det på din avdelning?

***Användning av agila samt traditionella metoder:***

- I vilken utsträckning används en traditionell projektmetodik på er avdelning?
- Hur definierar du ett agilt arbetssätt?
  - Skiljer sig definitionen jämfört med andra anställda på din avdelning?

- Vilka agila projektmetoder har introducerats i eran avdelning?
- Varför har man valt att introducera agila metoder?
  - Hur har ni anpassat metoderna efter er specifika kontext på avdelningen?
  - Finns det kontraster i hur initiativen sett ut gällande hårdvaru- och mjukvaru utveckling? och om ja - hur har de skilt sig åt?
  - Hur matchar ni era arbetssätt till resterande delar av organisationen avseende era projekt? (om de arbetar mer agilt eller traditionellt behöver ni t.ex. anpassa er?)
    - Kan det uppstå utmaningar? på vilket sätt?

***Utmaningar med att samverka mellan traditionellt och agilt:***

- Har du märkt av några utmaningar avseende samarbetet mellan de som arbetar enligt traditionella metoder och de som arbetar med agila metoder?
- Vilka initiativ har genomförts för att överbrygga eventuella utmaningar? Vilken effekt har dessa initiativ gett?

***Den mänskliga aspekten:***

- Vad är din inställning till de agila initiativen som implementerats?
- Vilken inställning upplever du att dina kollegor haft gentemot de agila initiativ som introducerats?
- Hur samexisterar de traditionella rollerna med de agila rollerna?
  - Vilka utmaningar finns det?

***Etablering av agilt arbetssätt:***

- Känner du att förståelse för agila metoder är viktigt för att kunna samarbeta med andra delar av organisationen?  
eller
- I vilken utsträckning behöver ett agilt mindset förankras genom hela organisationen även om inte alla arbetar agilt?
- Vilka utmaningar kan uppstå när specifika delar av organisationen inte besitter kunskap inom agila metoder?
- Upplever du att ni har fått support för att implementera det agila arbetssättet? Isåfall, från vem/vilka?
- Har du tidigare erfarenheter av att etablera agila metoder i ett annat företag?
  - Var det samma typer av utmaningar?
  - Vad var nyckelfaktorerna till att lyckas med etableringen?

***Framtiden:***

- I vilken utsträckning förutspår du att agila metoder kommer att etableras på din avdelning i framtiden?

- Har ni någon plan för hur detta kommer se ut?
- Vilken roll tror du att du kommer att ha i en framtida agil implementering?
- Till vilken utsträckning tror du att traditionella metoder kommer kvarstå?