



UNIVERSITY OF GOTHENBURG  
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Implementation and usage of an Agile Framework  
- *A Case Study of the implementation of an Agile Framework within the  
Manufacturing Industry, and the challenges which occurred.*

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VT 22  
Bachelor's thesis  
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## Acknowledgements

First and foremost, the authors would like to give thanks to both of our supervisors at Volvo Cars; Lars Holmberg and Charlotta Allnor. They have provided much knowledge, guidance, and insight throughout this study. Without their contribution, this thesis would not have been possible. Likewise, a big thank you goes out to Simon Wejerfelt, Product Owner at Volvo Cars, as well as an alumnus from the School of Business, Economics and Law at the University of Gothenburg. Furthermore, we are grateful to Volvo Cars for giving us this opportunity to deep dive into their organization. The theoretical data that Volvo Cars provided us with the access to has been of great value for our report. We are also grateful to all the employees who participated as respondents and shared their knowledge and experiences.

Finally, another thanks is dedicated to Roger Schweizer, our supervisor at the School of Business, Economics and Law at the University of Gothenburg. Thank you for all your guidance and input along the way.



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05-06-2022



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## **Abstract**

In today's turbulent digital world, a greater need for flexibility on issues regarding change has arisen for large organizations in the industrial sector. Flexibility was something that was previously lacking in the traditional management methods that many of today's large organizations used a few years ago. To adapt their organization to the changes and requests of the outside world, organizations realized the importance of moving towards a more Agile way of working, that permeates all or parts of the organization. A way of working that originates from the Software industry, and was not primarily intended for structured organizations within the manufacturing industry. At present, much research has been done regarding the Agile Frameworks and their impact on various organizations. Where the authors found a lack of research was how the Agile methods were implemented within the organizations at department level, as well as the results and challenges this have generated. This was of interest, as researchers suggest that it is only when the implementation comes down to the everyday tasks that one can study the actual results linked to the implementation.

The aim of this thesis is therefore to study how the implementation of an Agile Framework took place in a sector of an organization present in the automotive industry. As well as what concrete methods and models are used today for prioritization work. The results of our research have shown difficulties among the departments within a large organization using Agile Prioritization models. This is when shortcomings have arisen regarding the implementation of the Framework. The following challenges were identified: (1) The Implementation, (2) Large-scale organization, (3) Resistance to change, (4) Lack of Agile mindset and (5) Individualism. In order for the Agile prioritization model to operate successfully within the departments, it is recommended that organizations implement an Agile Framework at an early stage, identify these challenges, and counteract them.

## Sammanfattning

I dagens turbulenta digitala värld har ett större behov för flexibilitet kring frågor rörande förändring uppstått för stora organisationer inom industrisektorn. Flexibilitet var något som tidigare saknades inom de traditionella management metoderna, vilka många av de idag stora organisationerna använde sig av. För att kunna anpassa sin organisation till omvärldens förändringar och förfrågningar insåg företagen vikten av att implementera ett mer Agilt arbetssätt som genomsyrar hela, eller delar av organisationen. Ett arbetssätt som härstammar från mjukvaruindustrin och som i första hand inte var ämnat för strukturerade organisationer inom tillverkningsindustrin. I dagsläget har mycket forskning gjorts kring Agila ramverk och dess påverkan på olika organisationer. Det vi som författare saknade forskning kring var hur de olika Agila metoderna implementeras inom avdelningarna på organisationerna och vilka utmaningar detta skapade. Detta var av stort intresse eftersom forskare har antytt att det är först när nya ramverk praktiseras på olika avdelningar inom organisationerna som faktiska resultat kopplade till implementeringen kan studeras.

Målet med denna kandidatuppsats var således att studera den Agila transformationen hos en viss sektor, vilken bedrivs i en organisation verksam inom bilindustrin. Likaså vilka konkreta metoder och modeller som används i dagsläget relaterade till prioriteringsprocessen. Resultatet av vår forskning har påvisat svårigheter vid användningen av Agila prioriteringsmodeller bland avdelningarna inom en stor organisation. Detta när brister gällande implementationen av ramverket har uppkommit. Följande utmaningar upptäcktes: (1) Implementationen, (2) Storskalighet inom organisationen, (3) Förändringsresistans, (4) Brist på Agil medvetenhet och (5) Individualism. För att den Agila prioriteringsmodellen ska figurera framgångsrikt inom avdelningarna rekommenderas organisationer som implementerar ett Agilt ramverk i ett tidigt stadium identifiera dessa utmaningar och motarbeta dem.

## Abbreviations

<i>AM</i>	Agile Manufacturing
<i>ART</i>	Agile Release Train
<i>Backlog</i>	A priority list of functionality that a product should contain
<i>CoD</i>	Cost of Delay
<i>CoP</i>	Community of Practice
<i>DSDM</i>	Dynamic System Development Method
<i>Epic</i>	A large and long project entailing many people
<i>JIT</i>	Just-in-time
<i>Kaizen</i>	An quality approach where various activities are being constantly improved through small but many modifications
<i>Kanban</i>	A Lean method to balance demand, supply and availability.
<i>Lean</i>	Ideology that aims to maximize customer value and minimize waste of resources
<i>PI</i>	Program Increment
<i>PM</i>	Project Manager
<i>PMO</i>	Project Management Office
<i>PO</i>	Product Owner
<i>RTE</i>	Release Train Engineer
<i>R&amp;D</i>	Research and Development
<i>SAFe</i>	Scaled Agile Framework
<i>Scrum</i>	A lightweight Framework made to assist teams with complex problems
<i>SM</i>	Scrum Master
<i>TPS</i>	Toyota Production System
<i>VCAF</i>	Volvo Cars Agile Framework
<i>Waterfall method</i>	A 1950's traditional management approach
<i>WSJF</i>	Weighted Shortest Job First
<i>XP</i>	Extreme Programming
<i>4P model</i>	A Lean management model, includes Philosophy, Process, People and Partners, and Problem Solving

**Keywords:** *Manufacturing, Prioritization, Challenges, Agile, Scrum, SAFe, WSJF.*

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# 1. Introduction

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*This thesis aims to provide insight and understanding regarding the implementation of an Agile Framework adapted by the manufacturing industry, and the challenges that may occur as a result of the implementation. As an introduction, the background, problematization, purpose and question of research will be presented, followed by the method. This approach will hopefully enable the reader with an understanding of the subject and the collected data that has been provided.*

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## 1.1 Background

Aligned with the digital transformation, a greater need for flexibility has arisen in the manufacturing industry (Bunce & Gould, 1996). There are many middle- to big organizations within the industry who make their way from traditional and Lean manufacturing to Agile manufacturing (Conforto et al., 2014), a Framework derived from the Software Industry (Leffingwell, 2007). Further on, this created the ongoing Agile trend that now has been adapted into more industries as mentioned by (Gunasekeran, 1999), such as the automotive manufacturing industry. As the authors turned to already published studies within the field of Agile manufacturing, a realization was made. The research has previously focused on the overall approach (Rigby et al., 2018), such as Agile Manufacturing described by Booth (1996). As well as the Agile implementation and challenges, mostly within the software industry, such as Leffingwells (2007) research regarding Agile in relation to large enterprises.

On the other hand, not much research has been made on department level regarding the daily practices in relation to the Agile Framework and the ongoing challenges. Meaning how Agile Frameworks are being used in everyday work tasks and processes by the employees, and the challenges they face, once the Framework has been implemented. Being that, when a new Framework hits department level inside a large organization and workers incorporate them in everyday routines is, according to Paasivaara and Lassenius (2014), when the practices of the Framework first can be studied.

This was something that intrigued us as authors; What challenges occur in daily practices once the Agile Framework has been implemented? As well as the relation between the Agile implementation and organizational change theory. Questions which the authors felt were needed as a contribution to the existing Agile research. Since the present research focuses mostly on the overall approach regarding Agile, and the challenges faced with, before and during the implementation. It therefore lacks this outlook regarding daily practices and the challenges still occurring after the implementation has taken place. We then reached out to a large organization within the manufacturing industry to get a better perspective on the question. After speaking to relevant actors within the organization, an understanding formed that Agile Frameworks were being used broadly in everyday work routines, but to different extent, causing challenges for the organization.

Since prioritization is an important aspect of Agile (Leffingwell, 2007), the authors found this to be a suitable aspect to portray the daily practices of Agile, as well as its challenges. Furthermore, the established contact the authors had at the organization was a Product Owner [PO], and therefore, according to SAFe (n.d.) has prioritization as a key task in his daily work. Based on the challenges found during the research, the authors understood that the transition to Agile and the way the implementation was made affected the outcome. Making it necessary to first present the different traditional theories in order for the reader to understand the differences and significance of the implementation.

The thesis aims to study already published literature regarding the transition from traditional management to Agile, its challenges and prioritization process, while comparing theoretical knowledge with its practical usage. The authors understand that narrowing the empirical search won't provide a holistic perspective on Agile, nor its challenges. Due to the limitations of the thesis, the decision was made to compose a reasonable analysis within the restrictions provided by the University, more discussed under the chapter *Demarcation*. We would therefore like to invite further investigation and research regarding the subject in its entirety.

## **1.2 Problematization**

As described in the background, there is much previous research regarding Agile, its challenges, and the transformation as an overall approach. Therefore, the thesis aims to enlighten and contribute to the knowledge gap regarding the daily practices of the Agile Framework. Furthermore, the challenges which remain once the transformation has occurred, will be the primary focus. The analysis will be focused on the chosen organization's way of implementing the change in a critical way with Kurt Lewin's theory regarding change. This in order to see if the implementation could have been done in other ways, in order to avoid some of the challenges presented in the conclusion.

### **1.2.1 Purpose**

The thesis's main purpose is to enable a further understanding regarding how the implementation and utilization of an Agile Framework is adapted by the manufacturing industry. Particularly, to enable the readers' comprehension of how the manufacturing industry has adapted the Agile mentality and usage of certain models in daily work. Hence, the thesis aims to discuss why there are difficulties when practicing Agile methodologies in daily work.

### **1.2.2 Question of research**

*How is a recently implemented Agile Framework employed in a Manufacturing organization and what are the challenges remaining once it has been implemented?*

As mentioned previously, the thesis will mainly focus on the occurring challenges in daily practice after the Agile Framework has been implemented. In order to answer this thoroughly and create a further understanding of the subject, the first part of the question needs to be

taken into consideration as well. The first part of the question will mostly be presented through empirical findings, while the second part regarding challenges, will be the basis of the analysis and conclusions.

### 1.2.3 Demarcation

Following demarcations have been applied, the thesis will only focus on the Digital Finance sector within an automotive manufacturing organization. To portray the challenges that an Agile implementation brings on a department level and its daily practices, the prioritization process is being exemplified. Since Product Owners are the ones working daily with prioritization, their narratives have been centralized during the study. The model Weighted Shortest Job First [WSJF] has been explored to further exemplify the prioritization process, and thus portraying the occurring challenges through daily practice. These demarcations were crucial in order to answer the question of research to a reasonable and relevant extent within the established criterias set for the thesis. The analysis will be based on Kurt Lewin's theory, the authors are aware that much other research regarding organizational change could have been looked into and used, due to the limitations of the thesis, only one change theory will be used.

### 1.3 Disposition

Presented below is the disposition regarding the chapters in the thesis. With the Appendix excluded, the study consists of the following chapters.

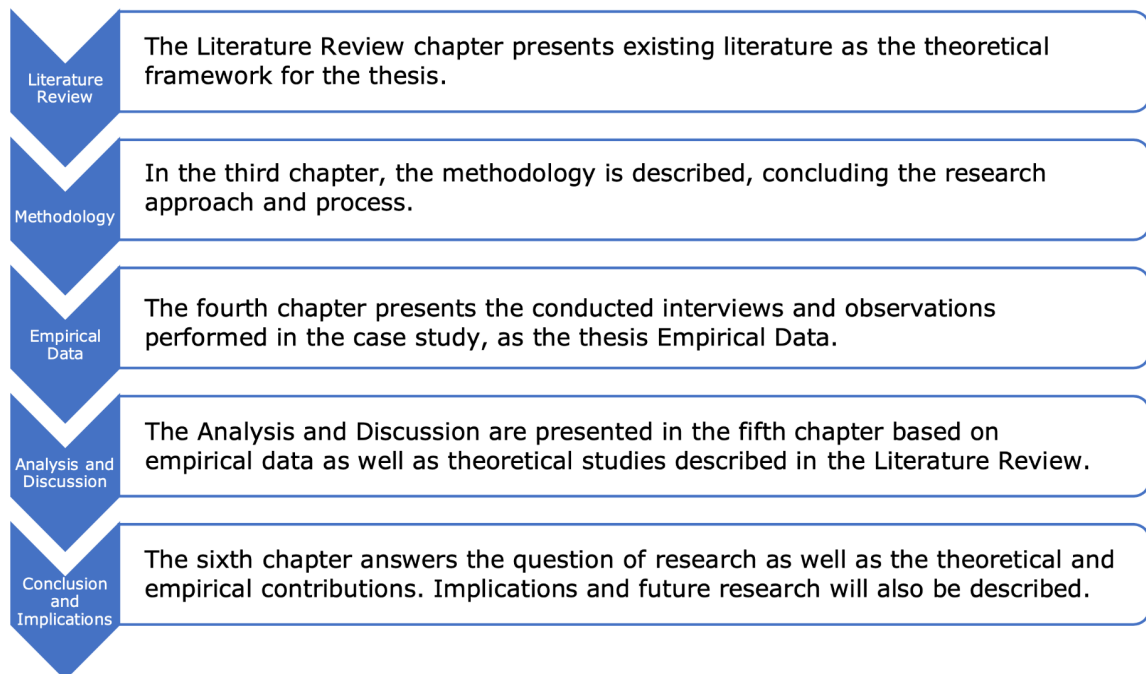


Figure 1. Outline of the disposition for the research process.

## 2. Literature review

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*The literature review chapter starts off by explaining the traditional management model, known as the waterfall model. This theory is presented to give the reader a historical overview of previous management models and therefore have a greater understanding of how and why the industry has moved towards more flexible models. Lean production emerged as a response to the traditional model and was seen as a midpoint to today's Agile management. Within Agile management, Scrum, SAFe and WSJF are presented and explained. To finish off, Lewin's change theory will be presented to then later on be used within the Analysis.*

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### 2.1 The waterfall model

The waterfall model is the common name for the traditional management approach described by Mario Špundak. The model is based on an underlying conception that day-to-day work projects are in fact easy for project managers to manage. It focused heavily on the initial detailed planning stage, with little to no regard for the later need of crucial changes due to various unpredictable factors that occur. The model was used to break down various project activities into a somewhat linear progression, making each activity dependent on its previous one (Špundak, 2014). The goal with the waterfall approach was, according to Špundak (2014), to follow a certain plan that was set out from the start without alterations, since it was a way to maximize the efficiency of the project while adhering to a specific budget and timeframe. Having this linear mindset was challenging when projects faced deviations. The choice had to be made, to either proceed with the project or stop it completely (Cooper & Summer, 2016). As the leap was made into an environment within organizations that required multiple projects to take place at the same time, the waterfall approach faced new challenges (Spalek, 2012). To further work on these new challenges, Lean management was introduced (Curlee, 2008).

### 2.2 Lean Manufacturing

The term *Lean* comes from the 1900's production industry and is, according to Liker et. al., (2009) seen as a midway step towards today's Agile management. It is the former Toyota Production System [TPS] which became Lean. TPS was constructed by Toyota's founder, Sakichi Toyoda, with the aim to make the stream more efficient and prevent defective products. The management perspective within Lean is long term; both regarding the financial sector and the future evolution of the organization. A mutual goal for the entire enterprise aligned with active development and functions which are related to value creation, are also included in Lean (Liker et. al., 2009). Liker et. al, (2009) explain further that Lean portrayed four areas: Process development, Partners, People, and Philosophy. These areas are the four P model, which include the fourteen principles of Lean. The phrase *just in time* is describing the process's main focus, which is to create and deliver value to customers when it is demanded. *Kaizen*, and *Genchi genbutsu* are terms used to describe the model and were created from the expression that there is always room for improvement. This has permeated Lean ever since, and later on also formed the basis of the Agile mindset (Liker et. al., 2009)

## 2.3 Agile management

Leffingwell (2007) describes that the movement from Lean to Agile began in the mid-1990s with leaders who worked within software development. These later on, in 2001, constructed the *Agile manifesto*, which included different Agile statements. It was created with the aim to, at a fast pace, create reliable software while unproductive overhead and waste was eliminated (AgileManifesto, 2001). Leffingwell explains that the most common methods used by software industries in the United States and Europe were Extreme Programming [XP], Scrum and Dynamic System Development Method [DSDM]. Lean Software and Feature-Driven Development underlie many Agile methodologies which formed, along with the other methods, the Agile ways of working (Leffingwell, 2007). The Agile Manifesto (2001) states that they are uncovering other, better ways, of software development through different methods and also helping others to do so as well. They established four values through their work, (1) Process and tools are not as valuable as interactions and people, (2) It is more valuable to have working software over complex documentation, (3) Customer relations and collaboration is more valuable than contract negotiations, and (4) Following a plan does not generate as much value as responding to changes.

### 2.3.1 Agile Manufacturing

Agile Manufacturing [AM] came as a response to the previously used *Lean manufacturing*, which focused heavily on two aspects: cost-cutting and eliminating waste. By only focusing on one aspect a great deal of the targeted market is lost. This combined with the rising of unique demands from customers forced organizations to be more flexible and to shorten their response time, hence the shift from prioritizing cost-cutting to prioritizing response time. One factor that is often overlooked is the immense undertaking of changing an industry's production and organization from Lean to Agile (Booth, 1996).

The manufacturing industry has, during the last few years, seen a significant shift in its way of operating within the organization. With an aim to thrive in a competitive environment, the industry has adopted an Agile concept that was previously only used within the Software industry (Gunasekeran, 1999). AM is characterized by its mission to integrate the customer with the supplier in all the organization's different processes. An Agile mindset within the manufacturing organizations strives to co-operate rather than compete with competitors. The enrichment of customers' value plays a significant role in AM (Gunasekaran & Yusuf, 2010). This, in combination with leverage of information and people, gives the organization a way to prepare and manage changes and other uncertainties in the industry. These outcomes are what many middle- to big manufacturing companies are seeing as a selling point to transition into an Agile system. This hoping to be better prepared for the demands and challenges of the 21st century consumers. Some of these demands include a high-quality product or service, for a low cost of production (Bunce & Gould, 1996). The Agile Framework supplies the industry with new ways to organize within the companies, providing them the ability to meet these demands and challenges they face currently (Gunasekeran, 1999).

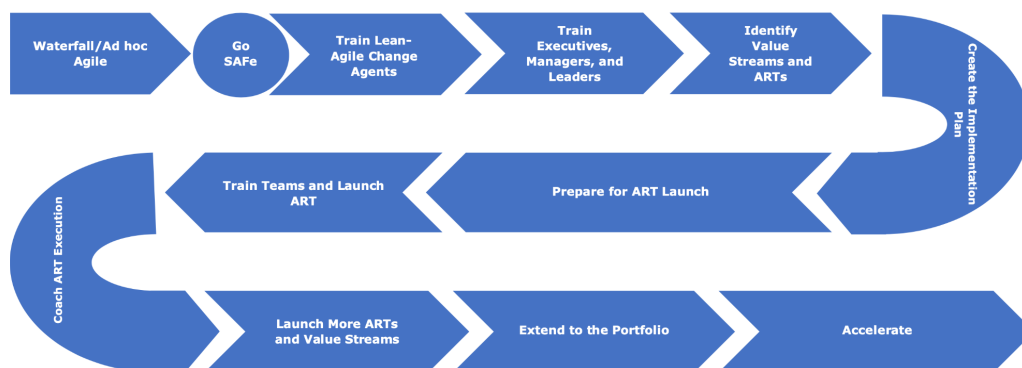
## 2.4 Transformation from Traditional models and Agile Challenges

Leffingwell (2007) describes the differences between the traditional model and Agile. Within Agile development, the management culture focuses more on collaboration and leadership, while the waterfall model is governed by control and command. Agile development builds and delivers code serially which are integrated and tested at an early stage, while the traditional methods conduct the testing at a later stage in the process. Quality assurance also differs between the methodologies, from being large-scale, planned and performing tests at the end, to having continuous quality assurance and fast testing. This is achieved through perpetual communication and rapid feedback loops (Leffingwell, 2007).

Process	Waterfall Development	Lean Development	Agile Development
Measure of Success	Conformance to plan		Respond to change, working code
Management Culture	Command and Control		Leadership/ collaborative
Requirements & Design	Big and up front		Continuous/ just-in-time
Coding & Implementation	Code all features in parallel/test later		Code and unit test deliver serially
Test & Quality Assurance	Big, planned/ test late		Continuous/concurrent test early
Planning & Scheduling	PERT/detailed estimate time and resource		Two-level plan/fix date, estimate scope

**Table 1.** The development from Waterfall to Agile.

Further on, the Agile methodologies showed through statistics that its implementation had increased productivity, quality, job satisfaction, Team morale and the time from production to the market was faster (Leffingwell, 2007). This is in relation to the companies' previously used models, such as Špundaks (2014) traditional waterfall model. To reach the desired change within the organization, authors Dan and Chip Heath (2011) discuss the importance of a leader's need to *script the critical moves*. Therefore, SAFe (2021) presented the *Implementation Roadmap* in order to ease the organizations into Agile. A Roadmap comprising twelve steps with the aim to make the implementation of the SAFe Framework successful in any enterprise. The following steps are included:



**Figure 1.** SAFe's twelve step Roadmap for implementation

### **2.4.1 Challenges with the Agile transformation**

Leffingwell (2007) discovered that the traditional Waterfall model does not work when developing and delivering software, since what is desired is not being developed. Dikert et al., (2016) describes that although Agile is beneficial in the software industry, when other industries adapt the mindset, problems can emerge. There are two major challenges that need to be addressed when adapting and benefiting from Agile, according to Leffingwell (2007). The first one being Agile itself, meaning the assumptions and fixed rule basis built into the Agile methods, which demonstrated the apparent limitations of the technology. Obstacles within the enterprise that prevent a successful implementation of the new Agile methods present the second challenge. In other words, the enterprise itself. The following two paragraphs will further explain the challenges.

#### **The first Challenge; Agile Methodology and its apparent impediments**

Many of the Agile methods, such as Scrum, advocate for eight or fewer members in the Teams (SAFe, n.d.). For large enterprises, this may not be suitable since they may have hundreds of teams to manage, hence the need for an understanding of how to implement Agile methods within the existing hierarchy. According to Leffingwell (2007), the customer should be able to participate, review, and test stories. This may not be the case for many big companies where customers are remote, nor have the time or skills to engage in such a manner. This portrays the challenge of the Team needing the customer to be integral. Agile methodology and its productivity is based on pairing and communication, such as daily stand-ups and visualization of stories and status (SAFe, n.d.). It is not as easy to fulfill this co-location within large businesses since Team members have different locations, time zones, and are based in various countries (Leffingwell, 2007).

Dikert et al., (2016) explains that challenges regarding the Agile implementation increase when not enough training or coaching is invested in. Agile mechanisms include working on several stories at a time within the Team, this works well and increases productivity for small to middle-sized companies. For the larger enterprises, this is not as simple. The story's existence, visibility for the Product Owner and their impact are then questioned. The great amount of stories in a large company raises many questions and needs reassurance that they are being fulfilled and achieves the final objective. The last challenge that Agile brings is the physical environment and culture; it is often practiced in an open environment with the managers and supervisors included. It could also be portrayed as less informal, chaotic and unsupervised in contrast to the well-organized traditional enterprise (Leffingwell, 2007).

#### **The second Challenge; impediments within the Enterprise**

Leffingwell (2007) continues by describing that in order for Agile adoption to occur successfully, many of the formalized documents and guidelines must be changed. Corporate culture in the form of poorly designed compensation systems, loyalty measured in working hours instead of productivity, and a strict control-and-command structure will also inhibit Agile.

The friction between customer proxy Teams and developer departments, created by earlier mistakes or miscalculation, leads to a misunderstanding for both parties. Aligned with the Agile manifesto (2001), customer collaboration and relations are valuable, therefore, as mentioned by Leffingwell (2007), both parties need to relearn to trust each other. In Agile, Teams are organized to make sure they have all necessary and project-dedicated resources to define, construct, test, and lastly, deliver a feature (SAFe, n.d.). This most likely requires a reorganization within large enterprises since they usually are organized along functional business lines of application, instead of an organization by product line. According to Leffingwell (2007), the latter is more suited for Agile.

According to Kalenda et al., (2018), large organizations need to implement the Framework throughout the entire organization in order to benefit from it. The larger the enterprise, the more difficulties arise when trying to collaborate teams and having product lines working together, which is crucial within Agile (Leffingwell, 2007). When Agile methodologies emerged, a need for clarification of how to work with them in daily practice arose. Hence, different Frameworks were created (Schwaber & Sutherland, 2020).

## **2.5 Agile methods and Frameworks**

### **2.5.1 Scrum Framework**

Scrum is defined by Schwaber and Sutherland (2020) as a lightweight Framework introduced to assist Teams and organizations regarding complex problems. By providing help with achieving set-out goals a greater value within the organization is created. Scrum is deliberately not a detailed Framework with detailed instructions but rather a loose guide focusing on people and Teams' various interactions and relationships (Schwaber & Sutherland, 2020). Scrum is derived from Lean thinking, meaning that knowledge is based on experience, and decision-making is based on previous observations. With a Lean mindset, the main goal is to focus on the essentials and by doing so, also reducing waste (Liker et al., 2009). According to Schwaber and Sutherland (2020), Scrum is formulated by four events that are used as a sort of inspection of the process and any adaptation needed for the containing event; *Sprint*.

### **2.5.2 SAFe Agile Framework**

According to Leffingwell (2007), the Agile approach's aim is to maximize value creation, find innovative solutions, create short feedback loops, and respond to the rapid changes that the market brings. Agile is adaptable, highly communicative and flexible, all with the customer being centralized. Scaled Agile Inc. has developed a descriptive Framework for how an organization can implement the Agile mentality and its functions, called SAFe. According to Kalenda et al., (2018) SAFe is a Framework that has received high notice within large organizations. The Framework describes how organizations and companies can implement an Agile approach and reorganize accordingly. There is a clear structure for each role and task, all of which is designed according to the Agile manner (SAFe, n.d.).

To achieve the Agile way of working, the right activities must be measured at the right time, according to SAFe (n.d.). The SAFe Framework addresses this by using three measurement tools which can be applied to various types of value chains, the tools are: *outcomes*, *flow*, and *competence*. *Results* are described as a tool to ensure that what is delivered benefits the customer and the company. *Flow* is used as a method to estimate how fast value is created and delivered, flow distribution, speed, efficiency, time, load, and predictability represent the relevant measurements. *Competence* is a tool of assessing the Business and Stakeholders regarding their progress towards true agility within the organization. The same tool also helps Teams and Trains in regards to improving their business and technical practices. The development and process towards a fully developed Agile organization is long and constantly ongoing (SAFe, n.d.).

Agile Teams have also been developed within the Framework; the Teams consist of approximately five to eleven employees. The number is relatively low in order to establish clear communication. The purpose is to define, construct and deliver artifacts of value to customers, this is done within a short time frame. A *backlog* is what the Teams emanate from; it contains assignments, projects and initiatives that have been assigned explicitly to the Team. To maximize value creation in the delivery of tasks in the backlog, they must be prioritized as truthfully as possible. It is the PO along with the Team and Stakeholders who are responsible for the prioritization. The SAFe Framework has developed measures and models to facilitate the prioritization process, one of them being WSJF, which POs use in their daily work (SAFe, n.d.) and will be presented further on.

### **Team composition within the Framework**

There are two distinctive roles within the Teams: Scrum Master [SM] and PO. The Scrum Team is not organized based on any type of hierarchy (Schwaber & Sutherland, 2020). A SMs tasks are mainly to coach the members to self-realization and to individually lead themselves. The PO prioritizes assignments and initiatives that are in the backlog, which are then directly communicated to the Team and Stakeholders. An active contribution to vision, plan and direction also obliges to the POs position. Possessing this role also means collaborating and engaging in dialogue with additional people who work closely with the team, especially the associated Release Train Engineer [RTE] (SAFe, n.d.).

Many of the Teams are part of a wide chain where they work together with Stakeholders to add value, for example through delivery or development. These chains are called the Agile Release Train [ART]. The role which is responsible for the chain and coaches the members within it is the RTE. Their main task is to maintain and ensure that meetings and processes within the ART are carried out and completed. The RTE also assists the teams in the matter of high value delivery. Furthermore, the position also means having contact with Stakeholders, overcoming obstacles, risk management and encouraging development (SAFe, n.d.). As mentioned in the previous paragraph, the POs main task is connected to prioritization and its challenges, the following model is being used as a tool in this manner.

### 2.5.3 Weighted Shortest Job First

The model Weighted Shortest Job First [WSJF] was first introduced by Donald Reinertsen (2009). This model aims to sequence jobs to maximize economic benefits. Based on its original definition, WSJF is calculated by dividing the Cost of Delay [CoD] by the Job Duration. WSJF has been adapted by Scaled Agile Inc who incorporated the model in the SAFe Framework; their adoption differs from Reinertsen's original formula. The main difference is that SAFe relies on a relative estimate when calculating the WSJF, using a modified Fibonacci sequence (SAFe, n.d.). If the WSJF score is high, it needs to be prioritized and if it is low, there is no need for a high priority but the job still needs to be done. The calculation of the WSJF score and prioritization process is all completed in the backlog (SAFe, n.d.).

### 2.5.3 Lewin's Change Theory

We are all familiar with the famous fraze *stagnation equals downfall* within dynamic organizations, this is the reason why changes happen and are necessary for many of today's organizations. Employees are, according to Kurt Lewin, unfortunately not always happy with these kinds of big changes, and the changes are often faced with resistance. To counter this resistance Lewin developed the *unfreeze-change-refreeze* model within his Change Theory (1951). A model that has become widely used within companies and organizations when it comes to big changes (Hayes, 2018). To overcome resistance, people must first let go of old habits and structures. This is often a difficult task since change more often than not leads to a disruption of a previously stable situation. Lewin (1951) states that employees, and even people in general, like to keep their surrounding situation as is, due to the fact that it is seen as predictable and safe. Lewin (1951) means that individuals can only accept change when they know what the change will contain. Lewin divides his model into the following three crucial steps:

**Unfreeze:** At the unfreeze stage, individuals start to realize that change is about to happen. This often brings on strong emotions connected to impatience, insecurity, denial or doubt. Lewin therefore presses on the organizations responsibility to fully account for the upcoming situation and explain to the employees why the processes of change are going to take effect. According to Lewin, this type of clear communications will enable the employees to be more willing to accept the upcoming changes and look past their old tariffs (Lewin, 1951).

Employees involvement in a constructive approach is crucial at this stage of the change.

**Change:** Lewin (1951) stresses the cruciality of the speed connected to the implementation of the change, meaning that it needs to be done in a short time frame. The longer the processes around the change takes, the more likely it will be for employees to relapse back into old rituals and habits. The change stage is often referred to as the *moving stage* since it causes somewhat of a ripple effect within the organization. By implementing the change quickly, employees are more likely to become aware of the weight and importance of the change (Lewin, 1951).

**Refreeze:** The final step, the *refreezing* stage, is seen as the strengthening phase of the change. Lewin describes how employees are inclined to return to their old routines and habits

after the change has been implemented. Therefore, it is crucial for organizations to monitor and carry out interim evaluations, to then make adjustments if found necessary. Only then will employees understand that the old ways are not possible to return to, making the new situations stabilized. As time passes, employees will act in accordance with the implemented changes, which will become the new norm, and the benefits of the change will be imprinted (Lewin, 1951).

## 2.6 Summary of the Literature Review

The presented theories enabled the authors to gather a greater understanding of the timeline and factors contributing to the upcoming development of Agile, thus also enabling the readers with this affirmation. Starting with the traditional Waterfall model which follows a strict time schedule that delivers the feature at the end of the process. With the need for flexibility and efficiency of the streamline, Lean emerges. Lean focuses on value-creation, cost-cutting and waste elimination with a long-term philosophy, including the delivery being *just in time*. To incorporate this mindset in the Software industry, Agile was formed with a prime focus of value creation, fast feedback loops, a fast response to change and the importance of collaboration, as well as relations. Since Agile arose from the Software industry, and had as shown through statistics great success in the field, other industries were intrigued as well. Hence, the emergence of Agile Manufacturing, an implementation of Agile combined with Lean management, as adopted by the manufacturing industry.

When implementing Agile, there are two main challenges which occur, the first one being Agile itself, and the second impediment to the transition is the organization itself. Since the Agile ways of working were seen as somewhat loose and hard to follow for employees who were previously used to the traditional, more formalized ways, Agile created light Frameworks to follow. Some of these Frameworks are Scrum and SAFe, which provide their users with clear guidelines regarding Team composition, roles, prioritization, events etc. Being that prioritization is one of the main focuses of the Frameworks, WSJF was presented as a model with the aim to conceptualize the phenomenon. Given that the calculated WSJF score sets the path for the daily prioritization work within the backlog, the authors found it to be of great relevance in order to portray daily practices and challenges. According to Lewin's theory in regards to change, organizations pass through three phases when reorganizing or changing the structure. These three phases are Unfreeze, Change, and Refreeze, they portray the realization of change, the transformation at high speed, as well as the rebuilding of the organization with the new structure.

The thesis' theoretical composition and the timeline which it portrays were combined with the empirical data, thus enabling a further comprehension. In order to be more critical towards the previously stated theories, Lewin's theory regarding change was studied. This, in order for the authors to provide both a picture of the previously as well as today's used theories within the organization, with an outside perspective of how big change should be faced with, in large organizations. This enabled the authors to discuss in a critical manner within the Analysis, the success of the implementation, and based on this, draw *Conclusions*.

### 3. Methodology

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*This chapter provides an overview and motivation for the used methodologies in the thesis. It begins with a description of the research approach and single case selection. Further on, the different research methods are presented which include collection of data and the interview structure. The authors also explain the research process, followed by the study's quality and lastly, the ethical considerations.*

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#### 3.1 Research approach

This thesis aimed to answer the question of research regarding: *How is a recently implemented Agile Framework employed in a Manufacturing organization and what are the challenges remaining once it has been implemented?* In order to conduct the study the authors gathered reliable and viable information and existing theoretical data were investigated within its real-life context. Yin (1994) explains that a study of this sort is defined as a *case study*; boundaries between phenomenon and theoretical context are not clear, hence the reason for investigation. Furthermore, Yin (2014) explains that the thesis with a question of research beginning with the word *how* should be a qualitative study.

Since the implementation of the Agile Framework is ongoing at present, the conducted study is continuous as well. According to Yin (1994), this further indicates a structure aligned with the case study. The case study approach was also chosen since the existing research seemed inadequate, there was a need for complementary context in the formation of real life experience and empirical studies. At an early stage of the study, the authors discovered a lack of knowledge regarding the practical use of the Agile Framework on department level, as well as the implementation and its challenges. Therefore, the case study approach is suitable since, according to Eisenhardt (1998), it entailed a new perspective and increased knowledge development in the later stages of the study.

#### 3.2 Case selection

In order to thoroughly answer the question of research, and thus also examine the implementation, its challenges, and usage of the Agile Framework, the authors intended to conduct the study at an organization within the manufacturing industry. Hence the reasoning as to why the thesis was structured as a *single case study*, which according to Ghauri (2004) is a useful method when explaining established theories. This approach is also suitable in order to provide useful insights regarding a revelatory case which can be studied through contextualizing phenomena in relation to daily practice (Ghauri, 2004). When the question of research was formulated, there was a need to identify which industry was suitable for the study. The car manufacturing industry has become of interest since they have adopted the Agile mindset, Merriam (1998) describes this as *typical sampling*. Furthermore, *convenience sampling*, described by Merriam (1998) as depending on time, availability, location and money, was used to find a suitable and relevant organization. This being Volvo Cars since the authors

had access to some of their employees, as well as them being a large organization within the manufacturing industry, according to Volvo Cars (2021).

The choice to focus on the Digital Finance department heritages from convenience sampling, since the established contact were positioned there, as well as *purposeful sampling*. The latter is, according to Merriam (1998) useful when the authors need to choose a sample where as much as possible can be learned. This was suitable for this study since the Digital Finance department has adapted the Agile mindset and conducted the implementation in the year of 2018. The respondents which were contacted work with the Agile Framework, and therefore utilize the model WSJF on a daily basis. The model portrayed daily routines and challenges within the Agile Framework, hence the reasoning to it being representative in the thesis.

### **3.3 Data Collection**

Data in the form of previous research through literature, regarding Agile, were collected in order to answer the question: *What do we know, or do not know, today from former research?* This also helped us find our window of research. To answer our question and to contribute with information where present research is lacking primary data was collected. The primary data, consisting of interviews and observations, in a combination with secondary data, to further strengthen our findings, were helpful in answering: *What do we need to know, and why do we need to know this?*

#### **3.3.1 Primary Data**

The primary data consists of Interviews and observations. The authors were invited to meetings in order to observe the daily work. This in order to gain further insight into how the organization works with the prioritization process in practice. According to Bryman and Nilsson (2018), it is considered of great importance that the observation periods are chosen randomly, especially in the case of observations during shorter periods. Hence the reasoning behind why observations were made in an unstructured way, to not influence or stand in the way of the daily work within the organization, all in order to get a fair representation of the working method in practice. Connections to relevant literature as well as significant theory and empirics have permeated the thesis to create greater legitimacy around the topic. Lind (2015) describes that primary data is often the most prominent in qualitative case studies, however, it is often compiled with secondary data, both to increase accuracy but also understanding. Hence, the thesis dealt with both primary and secondary data, with a focus on primary according to the structure of a case study.

#### **3.3.2 Secondary Data**

Annual reports and Power Points generated from Volvo Cars' internal database portray the secondary data, as well as a Podcast episode regarding Agile within the organization. The guests of the Podcast were both Product Owners and Scrum Masters from the R&D department at Volvo Cars. One of the first departments within the organization to implement the Agile way of working. Since it is secondary data and the guests belong to a different department, it was used with a greater level of criticality. Thus the Podcast was only used to

strengthen the findings of the primary data. This to give it more credibility resulting in a more qualitative empirical presentation.

### 3.3.3 The Interview Process

Convenience sampling has been used to find respondents as well as the snowball chain. Merriam explains how the case study grows wider through the snowball chain, which means that respondents within the case of interest know people who have further information and more interesting cases (Merriam, 1998). Both of these sampling methods were adapted when conducting the study; the authors found a suitable respondent at Volvo Cars through networking amongst contacts. This first respondent later on directed the authors to further suitable respondents, hence causing the snow-ball effect described by Merriam (1998). This structure follows the term *triangulation*, which means that different types of methods for collecting data are being used. Triangulation is used in order to increase the validity and enrichment of the research process; it is also done through including more interviewees which confirms, or brings new perspective to the research question (Patel & Davidsson, 2019). Therefore the authors decided to interview a respondent from Volvo Trucks with the purpose of enlightening the relevance of WSJF as a model and the practices of it, in a wider range. Likewise, the usage of secondary data in the form of a Podcast where Volvo Cars employees from the R&D department discussed the Agile Framework, were chosen on the same basis.

The authors chose the participants for the interviews carefully. Instead of many and short interviews with various employees where one would only be able to obtain shallow answers, a different approach was chosen. Instead the authors tried to find respondents with the most amount of experience regarding the Agile Framework, that have a passion for the subject and that were present both before, after and during the transformation. As mentioned previously, Merriam (1998) describes this as purposeful sampling. In many cases the roles of the respondents that fit within this desired description were held by Product Owners and RTEs due to the fact that many of their daily tasks regard prioritization. Many of the respondents were interviewed continuously in order to deep dive within the subject. This was found necessary to be able to pinpoint all the challenges they face after the implementation of the Framework. Therefore the five chosen respondents were in the authors opinion the optimal choices for what the question of research aims to answer. In line with Mason (2002), this way of sampling provides relevance to the chosen respondents. To ensure *saturation* of the interviews, some of the respondents were interviewed two times. Furthermore, continuous contact with the two Supervisors; PO 1 and RTE 1, occurred via Microsoft Teams and email. We also saw that the response of these five employees in a combination with the answers provided from secondary data that further strengthened the answers, showed a common thread. Therefore this led us to believe that even if more respondents were chosen, similar answers would be provided.

Patel and Davidsson (2019) explain that qualitative interviews are often semi-structured, meaning that they are structured by predetermined themes, but that the respondent is given

freedom to explore these on their own. As explained by Bryman and Bell (2011), this is preferable since the respondent is then given space for their own interpretation, further development and can be explained from a holistic perspective. Therefore the interview questions were constructed according to the semi-structured layout. The authors began the interviews with broad, open questions, while later on continuing with more in-depth formulated questions. Mason (2002) describes that questions that are too specific do not allow for the appearance of new outcomes, hence the reasoning for the open questions. Semi-structured interviews are also recommended for case studies since they, according to Yin (2014), allow flexibility and provide an in-depth investigation.

The interviews took place via Microsoft Teams, written communication and face-to-face, where both thesis authors participated in order to minimize subjectivity. When the interviews were held, questions regarding the transition the organization had made earlier on from a traditional method to an Agile Framework were asked. This to get an understanding of how the transition was presented and received by the employees. In order to answer the question of research, the respondents were also asked if there were any arising challenges when transitioning into the Agile Framework, and the remaining challenges occurring in daily practices. Furthermore, the respondents were asked how they work with prioritization processes at the present time.

Finally, the interviews were transcribed in their native language, Swedish, and the transcripts were shared with all participants, in order to maintain a high level of transparency. Since the interviews were scheduled continuously during the course of the essay, ongoing analysis also took place. Patel and Davidsson (2019) describe this as a preferable way of handling qualitative information. Then space is given for reflection and preparation for the coming opportunity, which adds a compliant common thread, both for the authors, the readers, as well as the respondent. The following table shows detailed information regarding the held interviews. Interviews 1-5 regard the questions presented in *Interview guide 1* in Appendix. While interviews 6-8 regard the questions presented in *Interview guide 2* in Appendix.

Interview	Respondents	Position	Disposition	Date	Length
1	PO 1	Product Owner	Microsoft Teams	15.02.2022	40 min
2	RTE 1	Release Train Engineer	Microsoft Teams	24.03.2022	25 min
3	DM	Delivery Manager	Face-to-face	20.04.2022	25 min
4	PO 2	Product Owner	Microsoft Teams	21.04.2022	30 min
5	RTE 2	Release Train Engineer	Microsoft Teams	21.04.2022	30 min
6	PO 2	Product Owner	Written Communication	03.05.2022	30 min
7	RTE 1	Release Train Engineer	Microsoft Teams	06.05.2022	30 min
8	PO 1	Product Owner	Microsoft Teams	06.05.2022	20 min

**Table 2.** Description of the interviews.

### 3.4 Research process

In order to understand where the Agile mindset derives its key-points, the previously used theories needed to be explained. Therefore the choice to present theories according to a timeline from traditional to Agile was made. The relevant theory then determined which empirical material was needed in order to both strengthen and test the theoretical starting point of the study. This approach follows the term *deductive* which means that conclusions regarding individual cases are derived from existing theory (Patel & Davidsson, 2019). Aligned with the deductive structure, the authors began this study by reviewing previous research regarding Agility, and the challenges with an Agile Framework. It was there discovered where the research was lacking; in regards to how the implemented Framework is employed as well as the challenges which still occur.

With this knowledge in mind, the interview questions could be formulated, as described in *Appendix*. While asking the respondents about daily practices within the Agile Framework, the model WSJF was mentioned. Therefore the model is used in the thesis to exemplify the challenges of Agile work on a daily basis. Further on, the information retrieved from the respondents was analyzed in regards to challenges, to reach conclusions and results, the deductive- was combined with the *inductive* manner, this approach is referred to as *abduction*. Abduction, which according to Bryman and Bell (2011), means that theories from individual cases will be combined to be tested on new cases, thus further theories and conclusions can be constructed.

Through abduction, it became clear that the challenges described by the respondents were linked to the implementation of the Agile Framework. The authors therefore formulated further questions, stated in the *Appendix*, for the respondents, regarding the implementation. This choice was also made in order to achieve a high level of trustworthiness, as well as dependability for the study. Lastly, the answers were received and analyzed in order to enunciate the conclusions and further implications.

### 3.5 Quality of the study

According to Guba and Lincoln (1994), when reviewing the quality of the study, the two criterias *trustworthiness* and *authenticity* are to be considered. The first criteria, trustworthiness, constitutes of *confirmability*, *credibility*, *transferability* and *dependability*.

The level of subjectivity within the research is what *confirmability* refers to (Guba & Lincoln, 1994). The authors have reduced subjectivity through neutral questions, critical reviews and having both authors present at the interviews. This was done continuously throughout the study, therefore the respondents were not impacted, nor the authors, by subjectivity. Moreover, Guba and Lincoln (1994), describes *credibility* as a detailed description of the research process as well as how the results reflect real world practices. Transparency is also of importance regarding credibility, when conducting a qualitative study (Bryman & Bell, 2011). To maintain high credibility the authors provided a thorough description of the

methodologies and research process, furthermore, the interviews were transcribed and examined by the respondents to enable transparency.

*Transferability* is explained by Bryman and Bell (2011) as the degree of relevance and generalizability of the thesis in relation to other contexts. Since this study aimed to research Agile transformation and prioritization on the basis of Volvo Cars, there are difficulties when generalizing. According to Guba and Lincoln (1994), when performing a qualitative study, the results may not be possible to generalize since the narrow insights onto certain topics. However, the study presents challenges and the transformation process with the Agile Framework in a generic way, in order to provide insights and indicate findings which are relevant to industries and further management development. *Dependability* is the provision of consistent and extensive data for compiling analysis and conclusions (Guba & Lincoln, 1994). The authors have ensured dependability through transcribing interviews, being transparent with the respondents and providing clear structure within the empirical data, as well as the analysis and discussion.

### **3.6 Ethical approach**

Furthermore, ethical problems can also arise in the form of confidentiality on the behalf of the organization. Patel and Davidsson (2019) believe that in practice there are four main requirements when it comes to research ethics. These four requirements are (1) the information requirement, (2) the consent requirement, (3) the requirement of confidentiality, and (4) the utilization requirement.

All of the requirements above were respected, both regarding Volvo Cars as an organization but also the confidentiality of the interviewees. A confidentiality contract between the authors and the organization was established on the 9th of March. Further on, if any of the correspondents felt concerned that any of these four points were disputed, the respective information was deleted from the material-based information. In case of desired confidentiality and unauthorized names, processes etc., this was anonymized, or not included at all. All interviews and other types of participation are voluntary, where the people in question can also subsequently cancel their participation and withdraw the previously shared information. All information collected will be used in this thesis only.

## 4. Empirical Data

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*The main part of the empirical data consists of the interviews held with employees at Volvo Cars. The interview results will be further strengthened with observations made by the authors during the PI and Master Planning sessions held online. Some extent of secondary data, consisting of a Podcast episode regarding Agility at Volvo Cars, will also be presented to give a greater depth to the next coming chapter.*

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The department of interest was Digital Finance at Volvo Cars. The department's main responsibilities as described by PO 1 and RTE 1 is to develop and provide capacity to manage correct and effective transactions for the organization and its customers. Furthermore, they also manage SAP platforms, ensuring the capability for planning and internal reports, as well as enabling smooth transactions amongst dealers and suppliers. RTE 1 states that there are approximately 250 people, employees and consultants, working in the sector, who all attend the planning sessions for the upcoming twelve weeks. Volvo Cars started the implementation of Agile in 2016 with the R&D department as their pilot department, then only focusing on Scrum and not SAFe as a whole Framework. 2017 was the year when the Agile mindset was introduced to its fullness for the whole R&D sector (Hultgren & Lyhammar, 2022). Digital Finance together with the rest of the departments followed shortly after and began their Agile transformation in 2018.

### 4.1 The transition to an Agile Framework

PO 2 states that the transition to Agile was done over a night. This is something discussed in the Podcast held by Hultgren and Lyhammar (2022) as well, where their guests for the episode consisted of two Scrum Masters and one PO from Volvo Cars. One of the Scrum Masters present at the podcast describes the transition as a *clean cut* for the whole R&D sector. PO 1 explained the transformation as a reorganization where the past roles within Digital Finance were reformed into the present Agile roles. He further explains that he had to apply for the new suitable Agile role; this was something the PO present at the Podcast also confirmed (Hultgren & Lyhammar, 2022). PO 2 described that he, and his co-workers, filled out a form regarding interesting Agile roles, which then were assigned to them; they did not have to reapply for their jobs as most other respondents stated.. After a few weeks, if necessary, some employees were allocated to other roles or product areas. RTE 1 describes the transition differently, she was handed a new role without applying for it. She states that she, at the time, was content with her previous role and had no intentions of changing, before the transformation took place. Some sort of reluctance was present since she had never before worked according to an Agile Framework, and therefore did not understand the new role criterias. This reluctance was something the PO within the podcast also mentioned, as she and her colleagues were thriving with their previous roles and were consequently not pleased with being somewhat forced into Agile roles (Hultgren & Lyhammar, 2022).

PO 2 also mentions that they received a list of appropriate Agile courses through an intern library. They then set a date for the first Sprint, where they worked in the product-teams according to their newfound knowledge. PO 2 further describes that the expectation set on him and his colleagues was that they should now start working exclusively according to the Agile way, and deviate from this only when absolutely necessary. Moreover, PO 1 explains that in the beginning of the transformation they had Agile coaches to support the development, and to carry out different courses regarding the new Agile activities. PO 2 states the lack of employees with previous Agile knowledge to be present at the time of the transformation, again something that was also emphasized on the Hultgren and Lydhammars podcast (2022).

Every product-team was handed a dedicated SM who was adjacent with the implementation of new concepts and ways of working, this according to PO 1. RTE 1 said that she herself took many courses during a one year period, at *the RTE Academy*, together with approximately 25 other RTEs, while at the same time sharing their knowledge in the Community of Practice [CoP]. She states: *I had to learn the Agile ways of working while, at the same time, supporting teams. An Agile coach was there to help me.* She further claims that RTE was a hard role to learn since she and her other colleagues lacked any previous Agile experience.

#### **4.1.1 Challenges with the Agile transformation**

Regarding the challenges, PO 2 explains that there were plenty, the main ones being different opinions within the group, especially in regards to *what is most Agile* but also if they could even work as an Agile Team within their field. A lot of time was wasted on discussions regarding *how* they should work from now on, instead of developing solutions for the organization. PO 1 describes initial challenges as confusion regarding formulations, unclear roles and responsibilities. Moreover, he explains the perception amongst Stakeholders that all requests were to be handled at a fast pace. *There is still a certain discrepancy between expectations from Stakeholders and what is actually delivered, and when it is delivered*, PO 1 states. When Hultgren and Lyhammar (2022) asked their guests about the challenges, the attending Volvo Cars employees answered *the transition into the new Agile roles*. They explained that their previous roles were *easy and a secure option to fall back on*, when the new Agile ways of working felt unsure or confusing.

Furthermore, PO 2 mentions the lack of Agile coaches and RTEs with earlier knowledge and experience, as some of them had only taken a few more courses than other roles in the Team. He uses the following metaphorical comparison to explain the situation; *It was like having a priest who is there to perform the ceremonies, but he himself does not believe in god.* This was in line with RTE 1s description; she described it to be challenging to learn herself while at the same time having to teach and guide others. She further explains that it is difficult when the new Agile ways of working are new for everyone, the management, individuals, Teams and Stakeholders.

PO 1 also narrates challenges in the form of employees within Digital Finance that did not appreciate daily meetings, stand-ups, and administration, *it has gotten better with time, but there is still some frustration regarding the daily routines*. This new type of administrative work was also brought to light by the PO during the Hultgren and Lyhammar Podcast (2022). She explained that many of the people involved were reluctant to work in such ways. She states that the employees were now expected to do similar work as before but to log everything differently and in new ways. PO 1 also explains that some frustration arose due to the many changes and reorganization that was supposed to happen during a short time frame. Furthermore, PO 1 also wished that the management at Digital Finance were more engaged in the transformation, primarily to have a united front when meeting Stakeholders. The organization as a whole did not adopt the Agile Framework at the same time, it was firstly only the IT department, which led to misunderstandings within the organization in regards to delivery of development, according to PO 2.

#### **4.2 Agile Prioritization Process**

As a common thread throughout all interviews, SAFe's Framework was mentioned as the Framework used exclusively by all interviewees. Some, for example PO 2, described that often a few adaptations need to be done in order to be able to make the Framework work with their current suppliers. This is according to PO 2, seen as a must to be able to match the Volvo Cars Agile way of working to the supplier's competence regarding how they are used to work with developing the products. PO 2 means that this leads to a lot of compromises having to be made. The guests of the Podcast even revealed that the R&D department at Volvo Cars have *tweaked* the SAFe Framework to fit their organization better; they call it *VCAF*, Volvo Cars Agile Framework (Hultgren and Lyhammar, 2022).

PO 1 says that he builds his prioritization process based on where the various activities end up within the Epic. The respondent means that all decisions regarding priorities are governed by the level at which the activity has ended up. PO 1 describes that considering the company's limited number of resources, people, budget, etc., means that the time available is not enough to get everything done, instead only the obvious priorities at the highest levels are the ones that get finished.

PO 1 described the prioritization process in detail, as well as how they work according to the Agile Framework. Their work is divided into first a PI which spans during a 12 week interval, and then the PI gets broken down into 6 sprints, where the first five sprints are everyday work which strives to achieve the goal, while the last sprint is a so-called innovation sprint. The innovation sprint is to evaluate their work and working methods and to question whether improvements linked to business development are possible, according to PO 1. The DM at Volvo trucks, describes the prioritization process as: *at the PI session the management described a high-level vision and the Project Manager [PM] explained the different features and their needs in more detail. The team then prioritizes activities and backlog items relating to the PMs' described features.*

When asked more specifically whether there were any specific models or methods used to bring out the different levels of prioritization, all POs mentioned the same model; Weighted Shortest Job First, a model based on Cost Of Delay. The DM agreed on this as well; their Team has also implemented Agile through SAFe and is therefore utilizing WSJF for prioritization. PO 2 uses WSJF only regarding the aspect of features approximately 1-2 weeks before the PI planning event. He participates in the Master Planning where he then invites his Team as well as relevant Stakeholders. PO 2 also points out that this means that who gets invited to the event, affects what the prioritization ranking will end up being. He works to increase the Agile maturity of the developers of the product, and therefore does not currently have the opportunity to focus on WSJF linked to other tasks. PO 2 also explains the *gut feeling* when prioritizing, he therefore means that he uses relevant, for his product, Stakeholders, instead. The reason why he focuses on Stakeholders is because he considers this to be the most important part of the prioritization, to weigh different Stakeholders against each other. PO 2 further explains that these Stakeholders, for example Epic Owners, are invited to the Master Planning.

RTE 1 and 2 have a more theoretical approach to WSJF. They facilitate Master Planning sessions and create concurrence in the Team regarding the valued variables within the model. RTE 1 explains that there are often *hybrid* variants of Agile and traditional models, due to the many teams using different methods to plan and prioritize. Since the organization operates at a global scale (Volvo Cars, 2021), Teams in various locations with different adapted methodologies are working together to create these hybrid models, the respondent further explained. She also describes the transition the organization made a few years ago, from a traditional waterfall method of project planning, to an Agile Framework, which she also explained as one of the reasons why *hybrid* models arised. Furthermore, RTE 2 explains WSJF as: *An indication for the prioritization of the features*. The model indicates a discussion within the Team, and a plan for how the different features should be prioritized in order to create value, according to RTE 2.

### **4.3 Challenges in regards to the practical daily work**

The question regarding whether there are problems revolving around WSJF currently was asked to all interviewees. PO 1 answered that one of the main difficulties was that not everyone uses the model in the same way, that there needs to be an indication on what model to use, and that everyone uses it. PO 1 further explains that many of the POs value the variables in WSJF by their *gut feeling*, rather than using, or even having access to, all necessary information. The same respondent explains; *If I say, this variable values as a 1, and another values the same as a 10, and then we end up in the same meeting. The other valuation will then have a higher representation than mine*. He continues by saying that there is a deficiency when it comes to the generalization of the model's definitions. PO 2 also noted the lack of information and definitions, especially when valuing the Risk Reduction and/or Opportunity Enablement. The Team members which PO 2 includes in the prioritization through WSJF do not have enough experience, nor information, regarding this particular variable, according to PO 1.

Furthermore, PO 1 explained that the lack of information and generalized definitions led to prioritization and decision making through a *gut feeling*. DM 1 explained the situation as: *The prioritization process, WSJF, occurs on a high level where there is not enough details or information available in order to rightfully value the variables which are included in WSJF formula*. Further on, he also declares the importance of the whole Team's presence and participation at the PI- and Master sessions. This was something that PO 1 also clarified by saying that the Team, as a whole, contributes with important input. PO 2 describes the prioritization work as difficult, as there are quite a few segments that need to be considered, where a lot of it is based on gut feeling at present time. He further explains how Volvo Cars switched to working Agile overnight, and he personally believes that it would have been better if this transition had been made more gradually.

When the authors attended a PI meeting to observe how WSJF were used in practice, we saw that there is a pre-programmed calculation where you insert the values of the different variables; User-Business Value, Time Criticality, Risk Reduction and Opportunity Enablement, and get the WSJF-value generated. The SM started the session by explaining to the Team all of the components included in WSJF and who is responsible for setting values to them. For example, the SM described that the Team should all together estimate the Time Criticality. Then she also presented the features and stories. Thereafter, the PO valued the variables based on personal experience, and he also invited the Team for further discussion regarding the valuations to give the participating members the opportunity to oppose or agree. What we observed was that no one did so, there was no further discussion. Nor did the Team value according to the SMs descriptions, it was only the PO who set numbers for the components generating the WSJF value. PO 1, who was the PO present at the PI session, described that there are many OffShore people included in the Teams and that they are seated in India.

## 5. Analysis and Discussion

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Throughout the analysis, five main reasons related to Agile transformation challenges occurred. These being; *the transition itself and the way Agile was implemented, the large scale of the organization, a resistance to change, a lack of Agile mindset, and an individualistic ideology*. Lewin's Change theory will be used to critically look into the organization's implementation, and see if any of the challenges could have been avoided or minimized if the theory was to be followed.

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### 5.1 The Implementation

Leffingwell (2007) describes one of the challenges when moving forward towards an Agile mindset to be the implementation itself. This is something PO 2 described when discussing how the organization faced the change, that it was made abruptly *overnight*, without first easing into it in any shape or form. According to the Podcast episode (Hultgren & Lyhammar, 2022), the PO described the implementation as a *clean cut*. The employees were expected to now work with Agile to full extent, this without any or little previous knowledge regarding the Framework. The fast pace transition, as described by the employees, could be explained by Lewins (1951) theory as the *moving phase*, since he states that there is a need for a transformation of high speed. Is it recommended in his theory because of the risk of falling back into old habits if the transition is done too slowly, which explains the organizations reasons for implementing agile in a short period of time.

Furthermore, RTE 1 stated that she herself had to both learn and teach others about Agile at the same time. When reading the Roadmap (SAFe, n.d.) it is clear that Agile coaches should be taught Agile before the teams, in order to be able to further disperse this knowledge. PO 2 witnessed a similar experience in regards to the lack of knowledge surrounding Agile, which he described by the metaphor of a priest not believing in god. Both these respondents' descriptions indicate an implementation of Agile, not in line with the recommended Roadmap.

The Roadmap (SAFe, n.d.) shows how this transition is supposed to proceed step by step, in order to be successful. It was described throughout interviews and observations that most of the Teams had to implement the Agile Framework from somewhere in the middle of the Roadmap, instead of the beginning as recommended. Meaning that instead of first training the leaders and managers in order for them to be role models for the rest of the employees to then later on launch the acceleration. This was done, at the department of Digital Finance at Volvo Cars, somewhat in parallel instead of taking a more step-by-step approach. This led to other challenges occurring as well, since the Roadmap was not implemented as recommended by SAFe (n.d.) or Leffingwell (2007), and therefore not successful at the beginning.

## **5.2 Being a large organization**

The next challenge the organization faced in its transition was the fact that it is a large organization, often with Teams bigger than what the Scrum and SAFe Frameworks advocate. SAFe recommends Teams with five to eleven employees (SAFe, n.d.) while the respondents stated that they are in Teams with approximately twenty participants. The challenge presented itself to the authors during an observation at a PI meeting connected to WSJF prioritization. Since the Team present at the meeting consisted of approximately twenty participants, it was observed that most of them sat quietly while allowing a few of the participants to take the lead. This was also seen as a cultural difference between the Swedish Team at Volvo Cars in Gothenburg in contrast to the Off-Shore employees in India. PO 1 described this as a common occurrence when mixing the Swedish and the Indian Teams. This can also be explained by Leffingwell (2007) as a challenge since the Agile mindset often barges into differences within the physical environment and culture.

Given that the studied company is a large organization this challenge is of relevance. A large company has many departments that are spread out, locally and globally. This is important to acknowledge since, according to Leffingwell (2007) the Agile mindset is dependent on high communication and colocation amongst colleagues and Stakeholders. PO 1 also states that he finds the resources and time to be limited and employees in the Teams often have the feeling of being spread out thin and therefore in need of prioritizing their work, leaving some tasks unattended. As described by Leffingwell (2007), the Agile implementation within large organizations often implies many unsupervised stories or features, for the reason being the many demands and tasks the enterprise acquires. Subsequently, this explains PO 1's description of not having the time, nor resources, of a thoroughly prioritization process. This was something the authors also observed at a PI planning session, where WJSF was used to prioritize the POs features. While the entire Team was supposed to participate in the valuation, it ended up being only the PO who engaged, with some support from a few of the Team members. This further indicates the lack of resources and Teams being spread out, with little knowledge regarding the model, which further contributes to a lack of Agile mindset.

## **5.3 Resistance to change**

The transition was faced with resistance from various parties. According to Leffingwell (2007), a transition of this magnitude is always challenging for an already established organization. PO 2 described how colleagues were resistant to move from the traditional waterfall approach (Špundak, 2014), to a more lightway Framework. Being that the studied company is an established organization that has been successful previously, it is understandable that employees were hesitant to change from the well known to something completely new. Lewin (1951) describes this as a common appearance when employees are facing change since the new structure does not feel as safe and predictable as the already established one. RTE 1 stated that she herself found it hard to understand what was needed from her within the new role she had been assigned to. She felt somewhat reluctant to change into this role since she felt at home with her previous role. This was something that the PO

present at Hultgren and Lyhammars (2022) podcast also explained; she was pleased with her previous role and felt somewhat confused by the new Agile role.

One of the challenges that Agile itself brings, which Leffingwell (2007) mentions, is the portrayal of informality and chaos when transitioning from the traditional models. This leads to confusion and lack of informal descriptions of the methodologies, roles and implementation plans. Then, resistance and frustration, which PO 1 explained, is a response to the previous confusion and uncertainties in regards to the Agile Framework. According to Lewin (1951) this portrays the first stage in a changing organization; the unfreeze stage, where the employees become aware of change which raises many strong emotions, such as frustration and confusion. PO 2 also describes confusion amongst coworkers and much time being consumed by the question of *how* to work, instead of finding solutions for the organization. This results in a prolonged transformation and difficulties when working proactively. The AgileManifesto (2001) describes that it is more valuable to respond to change, than following a plan. This illustrates the need for flexibility and allowance to leave the traditional, more formalized ways of working.

Moreover, the AgileManifesto (2001) states in one of their values the importance of collaboration and relations, both in regards to the employees as well as the customers. PO 2 mentions that only the IT section, and not the whole organization, implemented the Agile mindset. As suggested by Kalenda et al. (2018), it is important that the entire organization transition into the Agile ways of working in order for it to be successful. PO 2s description therefore portrays a lack of collaboration within the organization, which contributes to the confusion, frustration and resistance in regards to Agile. Leffingwell (2007) states that the organization often needs to reorganize in order to successfully adopt Agile, meaning that formalized documents, guidelines, and hierarchies also are in need of change. Since the respondents still find difficulties and frustration regarding the transition four years later, this may not have been accomplished. In order for the change to occur successfully, it is important to strengthen the implemented transformation and its new ways of working. This can be done, according to Lewins (1951) refreezing stage, through evaluation and measurement by forms and surveys. By doing this, and adapting to the surroundings, the organization can prevent employees from falling back into their old habits and roles, as well as minimizing the frustration and confusion. This could have benefited the organization in this case study, since the respondents described that the emotions from the unfreeze stage still were present.

#### **5.4 A lack of Agile mindset**

Since the Agile mindset was, for the majority of the employees, something new; knowledge and experience was lacking. The lack of knowledge led to the employees needing to use their gut feeling. When using gut feeling that is based on previous experiences, which is something that varies from employee to employee, results tend to vary as well. Even though the same mindset and models were presented to all, they were received and used to different extent. This is also an effect of the company being a large organization as Leffingwell (2007)

describes that big companies have more stories and features needing to be observed and managed. Due to the many stories and features, it is easy to overlook some of them and difficult to prioritize, which, according to SAFe (n.d.), is the POs task. Since this is the case when prioritizing with WSJF at Digital Finance, the gut feeling is a sanction to the many stories and features needing to be prioritized. As observed, the Team's lack of participation at the PI sessions, impinge on this as well, and leading to not enough knowledge when valuing the variables, hence the gut feeling.

When it comes to WSJF, it is a straightforward model (SAFe, n.d.), but each individual perceives the values needed to be entered into the equation in different ways. If everybody has a different gut feeling regarding a certain value, the outcome, or rather the WSJF result value, will differ from person to person. Making the value impossible to compare to others and therefore prioritize correctly and in the same manner throughout all projects.

Being a light Framework without any straight guidelines made this aspect even harder. Not using the same methodologies or WSJF to the same extent leads to the utilization of other variants, described by RTE 1 as hybrid models. The hybrid models function is equivalent to a compromise for a non-fully-understanding of Agile, which is created by a lack of implementation within the organization as a whole. The lack of an Agile mindset could also be explained by the need of falling back into the previous non-Agile role, as explained in Hultgren and Lyhammars (2022) Podcast and therefore not successfully adapting the assigned Agile role. This can be avoided through following Lewins (1951) stages in organizational change, since precautions need to be taken into consideration in order to prevent employees from falling back to their old and predictable habits. Further on, this indicates the challenge, which Leffingwell (2007) describes, of Agile and its need for reorganization as well as reorganizing formalized documents and guidelines.

## **5.5 Individualism**

Furthermore, a sense of individualism was noticed as a common hindrance employees were faced with. When needing to work as a Team, they often faced the fact that every individual thought and believed that their project was the most important, and should therefore be the prioritized one. By having this mindset, the values provided by these individuals throw off the calculated WSJF value. This was something PO 1 described as a problem he faces daily, the lack of understanding from the Stakeholder. PO 2 has taken a different approach to the Stakeholder issue, he has chosen to prioritize the Stakeholders and make them his priority solution. Individualism only grows stronger as the means of measurement connected to personal success is still on an individual level and not based on the Team. PO 1 touched on this briefly while explaining that personal bonuses are still connected to only your individual work and not the Team's performance as an entity.

The individualistic mindset is not to be recommended when implementing Agile methodologies. As mentioned earlier, one of the values stated by the AgileManifesto (2001) describes the importance of collaboration and relations. Leffingwell (2007) also clarifies the importance of the customer and them needing to be integral. It is also an important artifact in Lean, described by Liket et al. (2009) as people and partners, which also validates their participation. With this in mind, there is indication of further partnership between both Teams, as well as Stakeholders within Digital Finance. The large scale of the organization is the basis for these challenges; it is harder to incorporate the Stakeholders when there is not much co-location. Furthermore, Leffingwell (2007) describes that the transition and previous mistakes or miss-communication amongst Teams and Stakeholders leads to a lack of understanding. This is also portrayed in Digital Finance as described by both PO 1 and 2 when prioritizing in meetings with Stakeholders. The miss-understandings and not being able to co-locate, foster an individualistic mindset where everyone wants their feature or story prioritized highest.

### **5.6 The implementation in relation to organizational change**

Through Lewins (1951) theory, the choice made by the organization to perform the transformation at a fast pace is well-founded. Being so, the implementation still faced its challenges, which raises the question of what went wrong in relation to the organizational change? When analyzing this transformation it is important to remember that Agile is always ongoing, and its implementation is continuous with improvements always occurring (SAFe, 2021). Therefore, the refreeze stage (Lewin, 1951) should be a necessary step in the process as well. The discussed challenges in this thesis could be somewhat avoided or minimized if there would have been more evaluations of the change and its new ways of working. This would have contributed to a more broad and in-depth understanding of Agile and thus, not foster the same emotions in regards to frustration and confusion, which the Respondents described. The established Roadmap (SAFe, 2021) was not followed, nor Lewins (1951) stage unfreeze. As mentioned previously, the organization started the implementation somewhere in the middle of the Roadmap, not preparing their employees enough, which according to both Lewin (1951) and Leffingwell (2007) is crucial in order for the change to be successful. This means to inform, describe and properly prepare the employees for the transition, as well as taking full accountability for it. Here clear communication is of high importance, much like the AgileManifesto (2001) and Leffingwell (2007) also advocate for. As many respondents described confusion, that they had to learn while still learning themselves, and not having enough previous information, this indicates that the type of preparation which both Lewin (1951) and SAFe (2021) recommends, were not consistent. When not following the three stages of change, it is difficult for the change to be successfully implemented, hence causing the challenges to occur.

## 6. Conclusion and Implications

When exploring previous research regarding Agile utilization, the authors gathered an understanding that there was a lack of investigation regarding the challenges faced with, in daily work tasks, once the implementation has been executed. The aim of the thesis was therefore to conduct a study where the Agile implementation and usage occurred on a department level, as portrayed by the prioritization process through the model WSJF. This decision was made in order to narrow down the subject and exemplify the daily practices of Agile within the restrictions of the thesis. The following question of research was therefore formulated:

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*How is a recently implemented Agile Framework employed in a Manufacturing organization and what are the challenges remaining once it has been implemented?*

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The following challenges that the study concluded are described below.

Challenges	Explanation to why the challenges occurred
1. The implementation	The Roadmap was not followed. The implementation happened to sudden without any gradual introduction.
2. Being a large organization	Bigger Teams than recommended. Not enough co-location, communication or relations. Creating a need for Off-Shore Team members.
3. Resistance to change	Confusion and lack of informal descriptions of the methodologies, roles and implementation.
4. A lack of Agile mindset	Lack of knowledge amongst the employees. Light Framework lacked structural guidelines which the employees were used to having previously.
5. Individualism	Lack of an Agile understanding and communication between Team and Stakeholders led to an individualistic mindset.

**Table 3.** Description of the present challenges within Digital Finance.

As a conclusion, the authors found the way organizations implemented and used the Agile Framework to be the reason for the challenges that have arisen. Firstly, the way the implementation occurred, meaning an overnight clean cut from the previous waterfall methods, paved the way for many of the challenges within the organization, something that could be explained through Lewin's Change theory. Challenges that are still present years after the implementation's starting point. This in combination with the previous lack of knowledge regarding Agile ways of working amongst the employees only further strengthened the arising issues. A more gradual implementation might have resulted in a more successful transformation. Furthermore, the Roadmap was not followed as recommended by the Framework. The studied department began their transformation somewhere in the middle, when it should have been a step-by-step process in order to implement Agile successfully. Moreover, many of the challenges discovered in the thesis are similar to the ones described by both Lewin and Leffingwell, which are to be identified in the beginning of the Agile implementation process.

The organizational change theory also concluded that the implementation and its development were lacking in many areas. This was shown through the three stages, change, unfreeze, and refreeze which Lewin describes in change theory. It shows that a transformation of this magnitude is not easy and that there are many precautions and preparations that need to be conducted before its execution. Especially regarding agile transformation since it's a light framework that will be continuously ongoing, developing and improving. In order to have the employees onboard and in support of the transition, the communication, evaluation and follow-ups are appearances of high importance.

To illustrate connections to everyday Agile work with the challenges created by the implementation, in a more narrow and detailed manner, the prioritization model WSJF was used. It showed underlying challenges from the implementation through difficulties when valuing the different variables included in the model. The lack of knowledge, the fast pace implementation and the light Framework all together created a misunderstanding. This created the need for a personal gut feeling to be used when valuing WSJF, therefore affecting its result value.

The main factor contributing to the challenges regarding Agile prioritization is the large scale of the company. It created a need for Offshore employees within the Teams, not enough co-location and Teams that were bigger than what the Framework recommended. These are all factors which contribute to the individualistic mindset, a mindset which is not desirable within the Agile methodologies. Furthermore, Agile is dependent on collaboration, communication and relations, both in regards to the Teams and its participants, as well as the Stakeholders. When observing the usage of the prioritization model WSJF, all of the above mentioned aspects were portrayed as somewhat lacking in their practical use. Making the WSJF model a suitable model to delineate the practical use of Agile, and its challenges on a department level, and thus answering our question of research.

## **6.1 Further Implications**

It is of importance to notice that the Agile implementation is continuously ongoing and improvable. Therefore the challenges and difficulties, as well as the improvements and value-creation, which Agile contributed to, are not simple variables to measure. Moreover, the authors understand that this single case study can not be generalized, since only one organization and one department has been studied. However, we still acknowledge the relevance of the study and that organizations who implement, or have implemented, Agile can benefit from it. The single case presented in this thesis was conducted at a large global organization, which indicates the possibilities for similar results in other cases. Therefore it would have been interesting to study the same question of research within other departments or organizations, as well as how to manage the challenges. As this thesis only investigated a single case study within a small range of Agile, we invite further research on the subject of Agile in its entirety.

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## **8. Appendix**

### **8.1 Interview guide in 1 English**

- Tell us a little about yourself, what do you work with?
- What does the prioritization process look like today?
- According to which model/models do you work at the present time?
- How is this model structured theoretically?
- What problems are currently existing regarding the model?

### **8.2 Interview guide 2 in English**

- What are the Digital Finance departments main responsibilities?
- How big is the department?
- What year did the transformation take place at the DF department?
- How was the transition played out when the department of Digital Finance at Volvo Cars implemented the Agile framework?
- Were there any complications or difficulties that arose linked to the transformation?
- Do You see any alternative approach that could have generated a better result?

### **8.3 Interview guide 1 in Swedish**

- Berätta lite om dig själv, vad jobbar du med?
- Hur ser prioriteringsprocessen ut i det dagliga arbetet?
- Vilken modell/modeller arbetar du efter i dagsläget?
- Hur är modellen strukturerad rent teoretiskt?
- Finns det några brister i nuläget beträffande användandet av modellen?

### **8.4 Interview guide 2 in Swedish**

- Vad är Digital Finance huvudsakliga ansvar?
- Hur stor är sektorn?
- Vilket år tog transformeringen form på DF sektorn?
- Hur gick övergången till när sektorn Digital Finance på Volvo Cars implementerade det agila ramverket?
- Var det några komplikationer eller svårigheter som uppstod i sammanlänkning med transformationen?
- Ser Du något alternativt tillvägagångssätt som man kunde gjort övergången på för att på så vis generera ett bättre resultat?