CHALMERS
UNIVERSITY OF TECHNOLOGY

Scaling Agile in a Large Automotive Organization

A case study focusing on five Agile ways of working in terms of homogeneous and heterogeneous implementation

Master's thesis in Quality and Operations Management

JOHANNA LINDÉN
HANNA SCHÉR

DEPARTMENT OF TECHNOLOGY MANAGEMENT AND ECONOMICS
DIVISION OF SERVICE MANAGEMENT AND LOGISTICS

CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2023
www.chalmers.se
Report No. E2023:026

Report No. E2023:026

Scaling Agile in a Large Automotive Organization

A case study focusing on five Agile ways of working in terms of homogeneous and heterogeneous implementation

JOHANNA LINDÉN
HANNA SCHÉR

Department of Technology Management and Economics
Division of Service Management and Logistics
Chalmers University of Technology
Gothenburg, Sweden 2023

Scaling Agile in a Large Automotive Organization
A case study focusing on five Agile ways of working in terms of homogeneous and heterogeneous implementation
JOHANNA LINDÉN
HANNA SCHÉR

Report No. E2023:026
Department of Technology Management and Economics
Chalmers University of Technology
SE-412 96 Gothenburg
Sweden
Telephone +46 (0)31-772 1000

Gothenburg, Sweden 2023

Scaling Agile in a Large Automotive Organization
A case study focusing on five Agile ways of working in terms of homogeneous and heterogeneous implementation

JOHANNA LINDÉN
HANNA SCHÉR

Department of Technology Management and Economics
Chalmers University of Technology

Abstract

The automotive industry is facing mounting pressure to increase speed and flexibility, while simultaneously grappling with the exponential growth of software's influence on their products. In response, industry players are looking towards the software industry's methods for solutions. The implementation of Agile ways of working (WoW) holds the potential to deliver benefits, but scaling such WoW poses challenges and raises the question of their requisite levels of homogeneity or heterogeneity. Homogeneity refers to an uniform approach across all teams, while heterogeneity refers to customization of Agile WoW to meet the unique needs of each team.

This thesis aims to gain insights into the organization's current approach regarding five identified Agile WoW and to aid in addressing whether the implementation of each individual Agile WoW should be characterized by a predominant state of homogeneity or heterogeneity. A case study approach was chosen, involving qualitative interviews with Team Managers of Agile teams and Change Leaders in the R&D department at Volvo Cars.

The discussion provides a comprehensive overview of the current approach with the identified Agile WoW, highlighting positive and negative effects, operational efficacy, and areas for improvement. The study also identifies four perspectives — *Purpose*, *Time (timing/cadence)*, *Method*, and *Structure* — that influence the degree of homogeneous and heterogeneous implementation in Agile WoW. Consequently, six propositions are proposed, based on both the perspectives and the unique characteristics inherent to each Agile WoW.

The study concludes that Agile WoW can exhibit varying degrees of homogeneous and heterogeneous implementation, depending on the specific Agile WoW's purpose, timing, cadence, method, and structure. The propositions derived from the analysis serve as potential frameworks for future research and offer directions for investigating homogeneity and heterogeneity within different Agile WoW contexts.

Keywords: Agile development, Scaling Agile, Backlog management, Daily stand-up, PI planning, Retrospective, Demo, Homogeneity or heterogeneity of Agile ways of working, Challenges in large-scale Agile, Success factors in large-scale Agile

Acknowledgements

We would like to express our sincere gratitude to all the individuals at Volvo Cars who generously contributed their time and expertise to support our thesis. Their insights and knowledge formed the bedrock of this report, without which our research could not have been accomplished.

Furthermore, we extend our thanks to our supervisor at Chalmers University of Technology, Petra Bosch-Sijtsema, whose deep understanding and valuable guidance were instrumental in shaping our work. We would also like to acknowledge our supervisors at Volvo Cars, Anna Sandberg and Jon Nilsson, for their invaluable contributions. Anna, we are particularly grateful for your unwavering support, invaluable guidance, and attention to detail, which greatly facilitated our journey. Jon, your insights and support were immensely helpful in getting our study underway, and your diligent responses to our inquiries during the course of the project were greatly appreciated.

Johanna Lindén & Hanna Schér, Gothenburg, May 2023

Contents

List of Figures

List of Tables

List of Acronyms

Below is the list of acronyms that have been used throughout this thesis listed in alphabetical order:

AD	Agile Development
ART	Agile Release Train
CL	Change Leader
CoP	Community of Practice
DAD	Disciplined Agile Delivery
LeSS	Large-Scale Scrum
PI	Product Increment
PM	Product Manager
PO	Product Owner
R&D	Research and Development
RTE	Release Train Engineer
SAFe	Scale Agile Framework
ScM	Scrum Master
SoS	Scrum of Scrums
STE	Solution Train Engineer
TM	Team Manager
WoW	Way(s) of Working
XP	Extreme Programming

1
Introduction

This chapter offers relevant background information to establish a comprehensive understanding of the contextual significance of the thesis's scope. Additionally, the chapter elucidates the study's aim and acknowledges its inherent limitations. Moreover, the research questions that guide the investigation will be specified, and ultimately, the structure of the thesis will be explained.

1.1 Background

Times have changed, the current era is characterized by rapid shifts in markets, intensified competition on a global scale, decreased predictability (Cooper, 2017), and rising customer expectations (Bredillet, 2013). Consequently, organizations have been compelled to reassess and redefine their approaches to product development, with a focus on incorporating flexibility and speed (Cooper, 2017). Automobile manufacturers are among those who confront the mounting demands of customers. To successfully compete within this dynamic and progressively complex competitive landscape, the automotive industry must consistently adapt their business models, development methodologies, and enhance existing technical solutions while also generating novel ones (Vetter et al., 2005). Today's customers demand new capabilities in their vehicles that go far beyond the conventional car to a smartphone-like experience (Herlt et al., 2022). Disruptive trends, including electrification, autonomous driving, diverse mobility, and connectivity, are anticipated to engender a novel and intricate automotive ecosystem. This transformative landscape will witness the entry of new technology players, shifting the focus from the traditional notion of a car to a computerized mobility platform (Beiker et al., 2016). Therefore, organizations are urged to transcend the conventional hardware-oriented, component-based waterfall process prevalent in product development. Instead, they would benefit from adopting development systems that prioritize Agile Development (AD) processes and tools. Thus, there exists a compelling necessity to fundamentally transform the landscape of next-generation Research and Development (R&D), predominantly propelled by the influence of software (Herlt et al., 2022).

AD originates from the field of software development and emerged as a response to traditional, rigid development methodologies that often included heavyweight documentation and comprehensive planning (Gustavsson, 2020). Compared to these traditional development methods, Agile methodologies encompass the utilization of short iterative cycles characterized by frequent interactions, culminating in the

production of a deliverable at the conclusion of each phase. Consequently, this approach facilitates swift adaptations in response to the prevailing paradigm of technological advancement and the heightened competitive landscape within the market (Almeida and Espinheira, 2021). Over the years, there has been a proliferation of Agile methods, with Scrum and Extreme Programming (XP) emerging as the most widely adopted methods for AD (Diebold and Dahlem, 2014). These methods are unique combinations of diverse Agile practices, wherein Agile practices refer to small and very specific components of the method that address various aspects of the development process (Diebold and Dahlem, 2014). However, there is no common literature definition of Agile practices and there are several researchers who employ labels to describe similar elements, such as "ceremonies" and "events" (Schwaber and Sutherland, 2020), "routines", "mechanisms" and "arenas" (Dingsøyr et al., 2018; Gustavsson, 2020), as well as "ways of working" (Gustavsson, 2020). These terms are sometime used interchangeably, for instance by Dingsøyr et al. (2018) and Gustavsson (2020). To ensure clarity in this study, the term Agile "ways of working" (WoW) will be adopted as a comprehensive term encompassing these different concepts.

Agile WoW have achieved remarkable success in the corporate market, especially when applied to small teams and projects. This success has prompted the adoption of Agile WoW in previously unexplored domains, with an increasing number of companies who implement these Agile WoW in large-scale projects that encompass multiple teams comprising hundreds of professionals (Almeida and Espinheira, 2021), including the automotive domain (Hohl et al., 2016). However, Hohl et al. (2016) mention several barriers to adopting Agile WoW in the automotive domain which are primarily attributed to organizational, technical, and social factors. These factors include inertia, anxiety, and contextual elements such as organizational structures or process barriers (Hohl et al., 2016). Nevertheless, adoption of scaled Agile methods is becoming more prevalent in the automotive industry as a means to address the inherent complexity associated with organizational structures and product development. Within the automotive domain, a considerable number of development teams collaborate closely to achieve the successful delivery of products. Therefore, the chosen Agile process must be capable to scale across a large number of teams and diverse engineering disciplines. Consequently, there is a prominent need to effectively manage this complexity and implement appropriate solutions that foster seamless coordination among the teams (Steghöfer et al., 2019). However, the implementation of Agile WoW in large organizational structures is frequently met with skepticism due to the challenges associated with managing autonomy across multiple teams, hierarchical structures that are rooted in non-agile models, and the challenges arising from a cultural legacy rooted in the industrial era (Almeida and Espinheira, 2021). To address the complexities of large-scale Agile adoption, various frameworks have been developed, including Scaled Agile Framework (SAFe), Large-Scale Scrum (LeSS), and Disciplined Agile Delivery (DAD), among others (Almeida and Espinheira, 2021).

A prevailing critique of these large-scale Agile frameworks, voiced by both profes-

sionals and researchers, concerns their granular and detailed prescriptions on how to operate within a large-scale Agile context (Alqudah and Razali, 2016; Gustavsson, 2020). Critics argue that there is a potential risk of blindly adhering to these frameworks without making any adjustments to suit one's own requirements, which thus contradicts the Agile principles regarding allowing autonomy. Several researchers stresses the importance of allowing autonomy to the teams and consider it as a success factor for AD (Cockburn and Highsmith, 2001; Stray et al., 2018). Also, in other industries autonomous and empowered teams have proved to be successful (Kirkman and Rosen, 1999). However, in a large-scale setting, with multiple teams collaborating towards a shared goal, new challenges emerge, including dependencies between teams and the need to align goals (Gustavsson, 2020). According to Moe et al. (2019), the collaboration of autonomous Agile teams in a large-scale project necessitates organizational control and alignment in order to collectively pursue shared objectives. Consequently, in a large-scale environment, granting complete autonomy to a single team is not feasible (Moe et al., 2019).

It is evident that there are diverse perspectives on how to scale Agile methodologies, as well as on how not to scale them. Several researchers argue in favor of team autonomy and customization of Agile WoW (Cockburn and Highsmith, 2001; Gustavsson, 2020; Kirkman and Rosen, 1999; Stray et al., 2018), while others advocate for greater control and standardization in large-scale settings (Gustavsson, 2020; Moe et al., 2019). These varying viewpoints surrounding Agile WoW give rise to intriguing inquiries regarding the applicability of a uniform approach across all teams or the customization of Agile WoW to suit individual team requirements. This prompts an examination into whether homogeneity or heterogeneity should be present in different Agile WoW. In this study homogeneity refers to a uniform approach applicable across all teams, while heterogeneity refers to the customization of Agile WoW to accommodate the unique requirements of each team. In this sense, this study intends to explore different Agile WoW and examine whether the implementation of each individual Agile WoW should be characterized by a predominant state of homogeneity or heterogeneity.

1.2 Aim

The aim of the thesis is to explore five identified Agile WoW to gain insights into the organization's current approach. Furthermore, the aim is to examine whether the implementation of each individual Agile WoW should be characterized by a predominant state of homogeneity or heterogeneity, and give reasons for its disparity.

1.3 Limitations

This study is performed as a case study, thus, the limitations stem from its exclusive focus on Volvo Cars' R&D department. Particularly, the focus has been narrowed down to Team Managers (TM:s) distributed across seven departments and Change Leaders (CL:s) working across Solutions and across R&D. While employing this ap-

proach enables a comprehensive exploration of the specific case and provides access to informed stakeholders, it also poses a limitation in terms of generalizability to a wider range of organizational contexts. Furthermore, the exclusive reliance on interviews with TM:s and CL:s may inadvertently overlook valuable perspectives and contributions from other stakeholders within the organization. It is important to note that this study specifically targets Agile WoW, thus restricting the study to exclusively involve TM:s of Agile teams, thus excluding TM:s of non-Agile teams. Additionally, despite investigating scaled Agile, the research primarily concentrated on the team level within an ART, potentially overlooking the comprehensive implementation and impact of Agile WoW. Consequently, these limitations caution against applying the study's findings beyond the specific context of Volvo Cars' R&D department and emphasize the necessity for further research in diverse organizational settings.

1.4 Specification of the Issue Being Investigated

To assess whether certain Agile WoW should exhibit a homogeneous implementation or heterogeneous implementation within Volvo Cars, it is crucial to initially obtain a comprehensive understanding of the organization's current situation. Volvo Cars has utilized a customized scaled Agile framework for an extended period of time, encompassing a large-scale setting. Therefore, it is essential to examine how the organization and the specific departments under investigation currently manage the identified Agile WoW. Hence, this results in the following research question:

- *RQ1: How does the organization currently work with the identified Agile WoW?*

It is apparent that there exists a range of diverse perspectives regarding the scaling of Agile methodologies, including both those in favor of team autonomy and customization of Agile WoW, as well as those advocating for greater control and standardization in large-scale settings. The contrasting viewpoints regarding Agile WoW present intriguing questions concerning whether a standardized approach should be implemented across all teams, or whether Agile WoW should be tailored to meet the unique requirements of individual teams. This evokes the need for a comprehensive examination to determine the appropriate degree of homogeneity or heterogeneity that ought to be incorporated into different Agile WoW. Hence, this results in the following research question:

- *RQ2: Which of the identified Agile WoW should be implemented with a predominant state of homogeneity or heterogeneity, and what is the rationale behind the disparity?*

1.5 Thesis Structure

The thesis is structured into six primary chapters, commencing with an introduction. The introduction provides background information, offering the reader a foundational understanding of the study's purpose and research questions. Subsequently, a comprehensive theory chapter is presented incorporating relevant previous research to address the research questions. The third chapter outlines the research methodology employed. The fourth chapter presents the results of the empirical data. The fifth chapter outlines the discussion of the study, culminating in six propositions. Lastly, a conclusion derived from the discussion is presented.

2
Theory

This chapter provides a solid foundation for the study by outlining relevant literature from previous research. It begins with a brief description of Agile Development (AD), including a more detailed explanation of the Scrum Agile methodology. The particular focus on Scrum stems from its prevalent utilization within the context of Volvo Cars. This is followed by a comprehensive overview of the five key Agile WoW that are central to this study, specifically backlog management, daily stand-up, PI planning, retrospective, and demo. These WoW serve as the fundamental elements for the subsequent analysis, discussion, and conclusion of the study. Additionally, an exploration of Agile in a large-scale context is presented, including a more detailed description of the Scaled Agile Framework (SAFe), as it serves as the foundation for the customized scaled Agile framework adopted by Volvo Cars. Finally, the chapter addresses various considerations when scaling Agile, including both challenges and success factors that are particularly relevant to this study.

2.1 Agile Development

AD originates from the acknowledgment that traditional approaches of managing projects are no longer sufficient in several aspects (Bredillet, 2013). Organizations nowadays have to meet higher competitive market requirements and conditions, while also delivering products and services with higher level of quality according to customers' rising expectations (Bredillet, 2013). Highsmith (2009) claims AD to enable five key business objectives: continuous innovation, product adaptability, improved time-to-market, people and process adaptability, and reliable results. AD thrives in innovative settings where speed, mobility, and quality are considered success factors. Furthermore, AD is explained as a way to balance flexibility and structure. It relies on informal collaboration, coordination, and learning (Dybå et al., 2014), where Agile teams need to align with the Agile values and principles (Highsmith, 2009). The Agile values and principles can be seen in Appendix C.

Scrum is an Agile method which facilitates collaboration and helps teams and organizations generate value by the use of adaptive solutions for complex problems and includes a set of practices and rules (Schwaber and Sutherland, 2010). Moreover, Scrum is claimed to be the most commonly used Agile method (Hron and Obwegeser, 2018; Srivastava et al., 2017). Scrum is based on multiple small teams and characterized by teams working intensively and interdependently (Cobb, 2023). Furthermore, Schwaber and Sutherland (2020) explain Scrum teams to be cross-functional and

self-managing with no hierarchies. A Scrum team consists of developers, one Scrum Master (ScM) and one Product Owner (PO) (Schwaber and Sutherland, 2020). The ScM is accountable for the effectiveness of the Scrum teams. A ScM coaches the team members, removes impediments interfering with the team's progress, and ensures that Scrum events are taking place in a productive and constructive way. The PO is accountable for effective backlog management and maximizing product value. Therefore, a PO communicates the product goal, orders backlog items, and ensures that the backlog remains transparent and understood by the team members (Schwaber and Sutherland, 2020).

Hron and Obwegeser (2018) explain Scrum to split development into iterations called sprints which last between two to four weeks. A sprint planning is held in the beginning of each sprint, where developers select tasks for the upcoming sprint from the backlog (Schwaber and Sutherland, 2020). The backlog includes prioritized requirements which reflects customers' needs and therefore, the backlog needs to be continuously updated. Furthermore, Hron and Obwegeser (2018) mention daily stand-up meetings and retrospective to be elements in the Scrum process in order to maintain quick pace of work, transparency, and learning. Hence, Schwaber and Sutherland (2020) describe a sprint to be a container for Scrum events and work necessary, e.g., sprint planning, daily Scrums (i.e., daily stand-up), sprint review, and sprint retrospective, to achieve the product goal. However, Hron and Obwegeser (2018) express that AD frameworks and methods typically need to be adapted to the specific development environment they concern.

2.1.1 Backlog management

In AD, the backlog is a prioritized list of work items utilized by teams for coordination of the work to be done (Sedano et al., 2019). The backlog items can have a wide range of implications and scope but all contribute to the product goals. A PO is responsible for controlling the backlog and keeping the prioritise accurate and updated. The PO selects items from the product backlog, decides the sprint goals based on these, and discusses this with the development team who later plans how to reach the sprint goals. The plan consists of committed tasks (i.e., user stories) which constitutes the sprint backlog (Raatikainen et al., 2008). Barraood et al. (2021) also put great emphasise on the PO, describing this role to be the one responsible to guide the development team and prioritize the user stories and furthermore, make them accessible, explicit, and transparent to all team members. Planning is considered an ongoing activity in Scrum (Alsalemi and Yeoh, 2015). Hence, backlog management consists of: expressing items in an explicit way, optimizing and prioritizing the items, and making sure the backlog is visible, transparent, and understandable for the team (Andry et al., 2019).

However, creating and managing a good backlog is an ongoing challenge (Hodgkins and Hohmann, 2007). It is claimed that the guidance given by Scrum is insufficient regarding how to structure the backlog (Akif and Majeed, 2012; Hodgkins and Hohmann, 2007). Akif and Majeed (2012) further describe that the available back-

log management tools are either too complex or too simple, hence, not providing usefulness for the teams. Furthermore, the backlog is described to be unable to depict the long-term goal just by looking at it (Hodgkins and Hohmann, 2007).

Hodgkins and Hohmann (2007) advocate for the need to encourage Agile teams to make investments in "non-backlog items" which are interpreted to be equally important for the long-term goal by the team itself. The encouragement is required since Agile teams tend to focus on backlog items that are solely associated with top-line strategies (Hodgkins and Hohmann, 2007). Gustavsson (2020) depicts the importance of putting much emphasise in the management of the backlog in order to have a high level of clarity and accuracy to be able to plan for longer time horizons. Therefore, much trust is put on the PO to have the ability to provide this clarity and transparency, showing the prioritise in a non ambiguous way (Oomen et al., 2017). In the research made by Oomen et al. (2017) backlog management is regarded as a determinant competence needed to successfully fill the role as a PO and to enhance team effectiveness. The backlog needs to be managed continuously in order to establish a good flow in the sprints (Jakobsen and Sutherland, 2009). Furthermore, Paasivaara et al. (2018) mention how differences in managing backlogs, e.g., using different backlog management tools and adopting varying approaches, and by not having one common backlog, lead to poor transparency.

2.1.2 Daily stand-up

According to Stray et al. (2016), daily stand-up meeting (or "daily Scrum" or "daily meeting") is one of the most frequently used Agile WoW, and is deemed crucial for improved communication (Ahmad et al., 2018). Stray et al. (2016) further describe it as a 15 minutes morning meeting with the purpose of sharing information relevant to the teams' progress. Moreover, the purpose of daily stand-up is that the team members should give response to three questions: *what have you done since we last met?, What are you planning to do until we meet again?* and *what, if any, impediments are you encountering that are preventing you from making forward progress?*. By sharing this information, the team members can align their actions, apply mutual adjustment, and therefore, fit the actions of others (Stray et al., 2016). Hence, daily stand-up is used to identify impediments and risks early, maintain a common understanding of progress, and increase transparency and collaboration (Dalton and Dalton, 2019*a*). Additionally it is claimed that daily stand-up fostera employee empowerment (Stray et al., 2020).

Furthermore, Dalton and Dalton (2019*a*) suggest that daily stand-up should be conducted at the same time every day to decrease complexity. Furthermore, it is explained that the ScM has an important role in facilitating the meeting and recording and removing the identified impediments and issues (Dalton and Dalton, 2019*a*). Singh and Strobel (2023) further highlight ScM to be the one responsible for maintaining discipline and structure during daily stand-ups. According to Scrum, daily stand-up should be kept brief, preferably standing up, within its time-frame, and not used for discussing solutions or problem-solving. Moreover, daily stand-up is

the only daily team-based Agile WoW for coordination (Stray et al., 2017).

Despite the rather straightforward purpose and description of how to conduct daily stand-up, the implementation is quite challenging (Stray et al., 2020). Challenges found by Stray et al. (2017) concern whether it should be daily (i.e., frequency) and standing up, not exceeding the time limit, and finding a suitable time of day. Stray et al. (2020) depict other challenges arising from identified problem areas, such as not relevant shared information due to diversity in tasks and roles, ScM using it with the purpose to receive status information primarily, and that its occurrence disturbs the productivity and workflow during the day. McHugh et al. (2010) and Singh and Strobel (2023) also describe the perception of planned meetings interfering and disturbing developers productivity. Singh and Strobel (2023) further provide indications that daily stand-up is perceived as irrelevant and a waste of time by team members. This was the case when the developers had little to no dependency in relations to other members for their individual task. Additionally, team members tend to not be attentive when they do not understand topics discussed or topics not related to their expertise area. Furthermore, Singh and Strobel (2023) depict developers appeal of solving problems during daily stand-ups since this gives them a sign of progress, and therefore, find daily stand-up as a waste of time when the meeting not allows thorough problem-solving. The authors also describe a reluctance among developers to adopt daily stand-up as prescribed in books. This is the case since every project is unique and therefore has different requirements.

Singh and Strobel (2023) emphasize the need for organizations to understand the differences in characteristic and perception of team members and provide flexibility, e.g, regarding collaborative Agile WoW such as daily stand-up. Stray et al. (2017) also conclude that the value of daily stand-up should be evaluated according to the unique team's needs. However, with an emphasize on a mutual understanding by all members to contribute jointly to the gained value, regardless of divergent individual needs. Consequently, the teams benefit from being smaller since the information shared has greater possibility to retain a higher level of relevance among all team members (Stray et al., 2017). Stray et al. (2020) also claim that teams should adapt daily stand-up according to their needs, and will thereby become more productive. The authors suggest the elimination of question one: *what have you done since we last met?*, in order to reduce status-reporting and allocating more time to discuss and solve problems. Reporting status often also result in disengaged and uncomfortable participants (Stray et al., 2016). Other suggestions mentioned is to adapt the frequency of the meeting to the teams need (Stray et al., 2016), split larger teams into smaller groups based on scope and dependency, and to conduct the daily stand-up right before lunch. The last suggestion reflects the need to reduce the potential for fragmented work, disrupting the workflow, and fit the rhythm of the members (Stray et al., 2020). Stray et al. (2016) found the issue of standing up to be important since it contributes to meetings managing the short time-frame. The notion is confirmed by the experiment conducted by Bluedorn et al. (1999), where the results showed that sit-down meetings lasted 34% longer than stand-up meetings with no deviant outcome.

2.1.3 PI planning

Product Increment (PI) planning is prescribed in the SAFe framework and is a release plan spanning over the period of eight to twelve weeks. The PI consists of iterations where the aim is for the team to deliver value and get feedback at the end of each iteration, but also understand the importance of coordination (Gustavsson, 2018). At the end of each PI a new release plan is created and involves all team members and stakeholders in order to find a mutual commitment to the plan. The release plan is constructed by the use of a two-day PI planning workshop (Gustavsson, 2018). During a PI planning, the teams have a prioritized list of epics; i.e., high-level business objectives. Each epic is later broken down to user stories with corresponding story points; i.e., the assigned value in relation to the effort required for each user story. The stories are later assigned to sprints which have given capacities demonstrating how many story points the team can manage in relation to the number of team members (Foo et al., 2020). Paasivaara (2017) describes PI planning's aim in a software development organization. The author explains the aim to be to establish a plan for a ten-week increment involving all relevant stakeholders. Further, PI planning enables prioritization of work, visibility across teams and products, and dependencies to be transparent and solved. Foo et al. (2020) also describe PI planning events as large centralized meetings to sort out dependencies and adding stories to each other's plans.

Gustavsson (2019) describes the process of PI planning as having rather low capacity of adaption, since the steps to be performed are expressed in a prescribed manner. Conboy and Carroll (2019) emphasize the risk of implementing a "one size fits all" framework as it decreases teams autonomy and flexibility, while Paasivaara et al. (2018) claim that a common framework correlates with common direction and understanding. The work by Gustavsson (2019), however, shows organizations' tendency to tailor PI planning to their own needs. The author describes that teams perceive that too much time is spent in joint meetings and that two days of planning is unnecessary long, contributing to the effect of viewing the event as a waste of time. Gustavsson (2018) also highlights a debate concerning PI plannings prescriptions. Some advocates that the time horizon of eight to twelve weeks is too long with the purpose of constructing detailed plans, while some claim the time horizon to accommodate the appropriate length since it provides a better understanding of the bigger picture (Gustavsson, 2018). Petit and Marnewick (2021) depict challenges of PI planning with regards to prioritization and over-commitment. Other challenges raised by Bajpai (2020) concern the fact that PI plans are subject to change and that local and global optimization risks being nonequivalent. Hence, the PI plan should not be treated as a fixed plan and one-time agreement limiting the ability to re-plan and re-coordinate according to sudden changes. Furthermore, the assumption of PI planning is that teams act and prioritize according to the company goals, thus yields the most effective overall PI plan based on their optimization. This may not always be the case, due to Agile teams nature of being self-managed and empowered (Bajpai, 2020).

Leffingwell (2023*a*) mentions three aspects of preparation regarding PI planning: *organizational readiness, content readiness,* and *logistics readiness*, as important to consider for the PI event to be successful. *Organizational readiness* considers making sure that the planning process is understood, that the teams are dedicated, and that business owners' priorities are agreed upon. *Content readiness* concerns being able to include briefing of business context and product and architecture vision. Lastly, *logistics readiness* concerns securing physically space for planning and be able to provide appropriate technology, tooling and other necessities in order to support planning (Leffingwell, 2023*a*). Paasivaara (2017) also expresses the importance of preparing well, especially for the first PI planning event, in order to reduce chaos and therefore have clear instructions for the participants on how to prepare and what to expect. Furthermore, Gustavsson (2020) depicts the need to constantly manage the backlog with emphasise on clarity and accuracy regarding content and prioritise, hence to be able to plan for longer time horizons which PI planning entails.

2.1.4 Retrospective

Schwaber and Sutherland (2020) define retrospective as an opportunity to plan ways to increase quality and effectiveness. Retrospectives are a fundamental part of AD and contributes to enhanced teamwork, productivity, and work satisfaction (Matthies et al., 2019). Mesquida et al. (2017) describe retrospective as an Agile WoW to maintain continuous improvement and as a creative and motivating occasion, positively impacting social behaviour and team building. Retrospective is claimed to increase team empowerment and enjoyment (Derby et al., 2006). The following topics should be addressed during a retrospective: *what went well, what problems were encountered* and *how those problems were, or were not, solved* (Schwaber and Sutherland, 2020). Hence, the team reflects, but also develops a list of action items based on the addressed issues, describing the next steps necessary (Matthies et al., 2019). Thus, retrospectives are designed with the intention of enabling frequent evaluations in order to tune and adjust the process or behavior of the team (Andriyani et al., 2017; Matthies et al., 2019).

Despite retrospective's nature of being rather intuitive, executing successful ones are challenging (Matthies et al., 2019). Problem areas identified by Matthies et al. (2019) are: *all talk - no action, too repetitive, no preparation, blame game, complain game, taking it personally, group think, not speaking up* and *focus on negatives.* Whereas *all talk - no action* describes the scenario where action is not taken despite the construction of a heavy list of improvements. *Too repetitive* and *no preparation* concern retrospectives either being too repetitive or not thoroughly prepared which lead to boredom and team members feeling lost on the purpose of the meeting. *Blame game, complain game* and *taking it personally* reflect improper behavior of team members who rather focus on blaming and complaining about the past rather than being constructive and searching for improvements. This may lead to an adversarial atmosphere. *Group think* and *not speaking up* also reflect improper behavior where critical discussions are avoided to not disrupt the harmony, and transparency regarding feelings and problems are interpreted as signs of weakness or incapabil-

ity. *Focus on negatives* depicts the tendency to lose focus on the positives gathered from the past iteration, while only focusing on the negatives, which results in loss of engagement.

There is a specific structure to follow when conducting retrospectives, described by Derby et al. (2006). The five steps are: *set the stage, gather data, generate insights, decide what to do* and *close the retrospective*. *Set the stage* involves welcoming the members and appreciating their investment of time, and also repeating the purpose and describing the goal of the retrospective session. The first step also includes getting everyone to speak and explaining the approach of the session. This due to the tendency of team members remaining silent throughout the session if they not engage verbally in the beginning of the meeting and by describing the approach, the members can be assured that the meeting will not be aimless. *Gather data* involves members sharing hard data and feelings gathered and perceived during the previous iteration of time. *Generate insights* involves considering the gathered data and identify strengths and issues, consider additional possibilities and thinking together analytically. These discussions result in a list of improvements and therefore, in guidance on how to work more efficiently. *Decide what to do* involves prioritizing the list of improvements and members committing to and taking action on a few for the upcoming iterations. Individual commitment feeds accountability which is essential in making sure that the actions are taken. *Close the retrospective* involves documenting and reflecting over the experience, and deciding how to retain the leanings from the session, for instance with the use of posters or visible charts (Derby et al., 2006).

Furthermore, Jovanović et al. (2016) emphasize the importance to tailor the retrospective meeting to the needs of the specific team's morale and environment. The authors further emphasize that the retrospective activities should be adjusted and implemented according to the specific team's group development phase (i.e., team maturity) as proposed by Tuckman (1965). Gonçalves and Linders (2015) also claim retrospective's importance since it enables a natural activity of stopping and reflecting, which would not be the case otherwise. The authors further emphasize the importance of focusing on both positive and negative aspects and that team members must feel comfortable enough to be transparent and share concerns truthfully.

2.1.5 Demo

According to the investigation performed by Kasauli et al. (2017) a demo is considered to be an efficient way of demonstrating the added and promised value to a system. The demo can be performed both internally and externally with regards to participating customer units and stakeholders (Kasauli et al., 2017). Hence, demo attracts both receiving and giving feedback, which is a fundamental purpose of conducting demos (Myklebust et al., 2017; Vijay and Ganapathy, 2014). Dalton and Dalton (2019*b*) also describe demo to be a collaborative technique enabling demonstration of the value being added for each sprint, but also enabling a forum for acceptance, interaction, communication, recognition, and validation in terms of coherence

with, and progress of, achieving the intended product. By this, teams can experience the feeling of empowerment and that they get credit for their accomplishments, while others may learn from the team's experience (Kniberg, 2015). Myklebust et al. (2017) also describe demo as a practical approach able to detect and reveal errors, diverging from the original intent, at the earliest possible time. Paasivaara et al. (2009) describe how demo increases visibility and transparency of projects, which is especially beneficial for teams being geographically dispersed. Offsite teams can by short iterations and frequent demos continuously be updated in a more efficient manner, avoiding a lot of rework based on misconception of requirements (Paasivaara et al., 2009). Furthermore, by doing demos, teams become indirectly forced and pushed to finish work, constantly demonstrating progress (Kniberg, 2015).

However, Kniberg (2015) describes the tendency of team members underestimating the value of participating in or conducting demos. The author depicts the scenario of individuals who consider their items to be "undemonstratable"; i.e., not tangible, too complex or fuzzy, or not fun to show. Another scenario is when individuals do not consider that they have the time for preparing a demo or participate in another team's demo (Kniberg, 2015). Paasivaara et al. (2009) depict a scenario where teams applied demos in a team specific way, hence, not inviting other interested parties. Vijay and Ganapathy (2014) also describe the circumstance of not attaining the proper customer or stakeholder participation, resulting in inefficient or non-existent feedback. Another addressed problem regarding demo concerns people feeling uncomfortable in front of larger audiences (Gustavsson, 2020).

In order to achieve an effective demo it is required that the correct and concerned stakeholders are present to give feedback and validation (Dalton and Dalton, 2019*b*). Paasivaara et al. (2009) depict the scenario where teams are inviting other teams, arranging the demo together, to enable more immediate feedback. It is also important that the demo-agenda is agreed upon and that the goal and purpose of the demo is acknowledged and explained in advance (Dalton and Dalton, 2019*b*). Furthermore, it is beneficial to clearly present the sprint goal, in the case of external participants attending who do not know anything about the particular product. Therefore, it is also beneficial to avoid describing technical details and instead keeping the demonstration on a business-oriented level. Hence, adapting the demo according to the audience (Kniberg, 2015). Kniberg (2015) also advocates for keeping the demos simple and concise, thus avoiding fancy presentations. Therefore, the time spent preparing could be limited.

2.2 Scaling Agile

The complexity of introducing Agile methods increases with the organization's size (Dikert et al., 2016). According to Williams and Cockburn (2003), researchers and practitioners have reported that Agile methods are most appropriate for projects involving up to 50 individuals, divided into small and co-located teams. Since Agile methods have proved to be successful in this context, they have increasingly been adopted by companies in new domains and to large-scale projects (Dingsøyr et al.,

2018). However, the adoption of Agile methods in large organizations is often questioned, considering the challenges involved in managing autonomy across multiple teams, hierarchical structures that follow non-Agile models, and the complications arising from a cultural legacy of the industrial era (Almeida and Espinheira, 2021). Dikert et al. (2016) emphasize that AD is not centered around the use of specific tools or practices, but rather on a comprehensive mindset. Thus, implementing Agile often necessitates transforming the entire organizational culture (Chandra Misra et al., 2010).

Paasivaara et al. (2018) further claim that Agile methods emphasize intra-team Agile WoW, which are effective in small organizations, but evoke challenges in terms of coordination and communication between several development teams and also between different organizational units. Intra-team refers in this case to interactions that take place among team members within one group as described by Stewart and Barrick (2000). In contrast to small organizations, larger organizations have more dependencies between projects and teams. Therefore, it may be necessary to implement practices that involve additional formal communication, which could potentially reduce agility (Lindvall et al., 2004). Moreover, development teams need to interact with other organizational units, which are often non-Agile in nature. This imply that all units affected by the Agile transformation must be informed and consulted, and the Agile process needs to be tailored to their needs (Dikert et al., 2016; Lindvall et al., 2004).

In recent years, multiple frameworks aimed at facilitating the scaling process of AD have emerged. According to Kalenda et al. (2018), the most commonly used frameworks are SAFe, Scrum of Scrums (SoS), and internally created methods, where "internally created" refers to combining several Agile WoW in new ways. Agile methods offer little guidance regarding how teams should interact with the environment, thus large organizations must adapt the methods to fit their specific needs (Paasivaara et al., 2018).

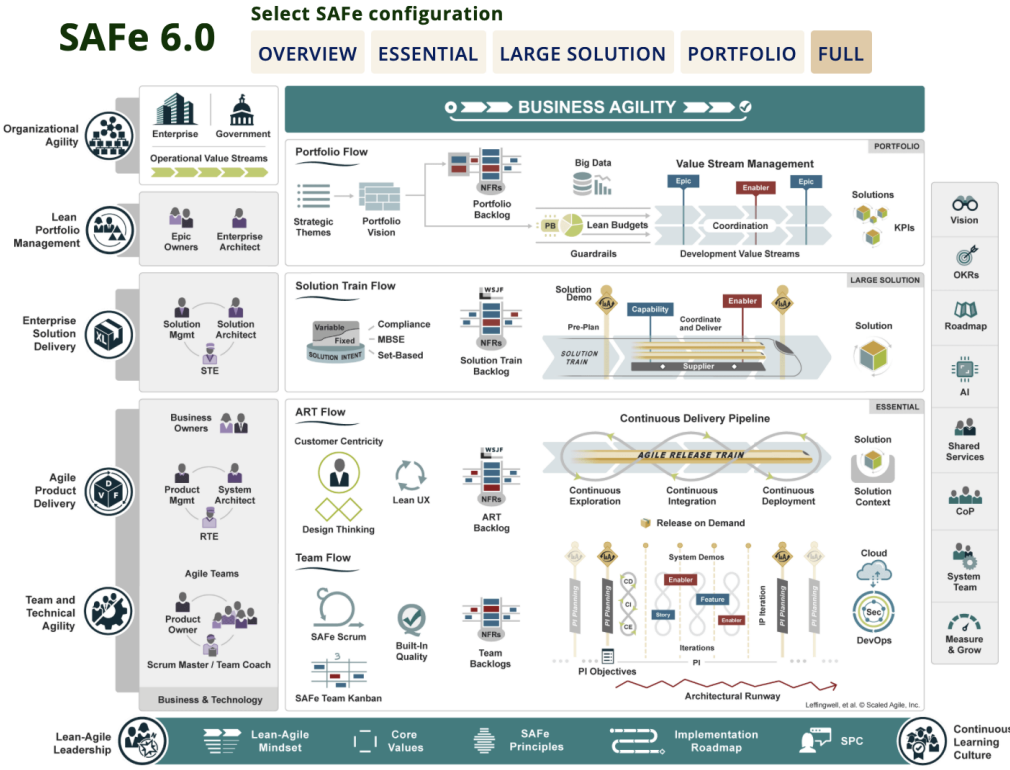
2.2.1 SAFe

The SAFe framework is a set of best practices of AD for large companies and is based on concepts from AD, lean product development and system thinking (Kalenda et al., 2018). SAFe is one of the most popular frameworks for implementing AD at a large scale, which is mainly due to its comprehensive and clear role definitions (Ebert and Paasivaara, 2017). SAFe is complex and offers a large set of templates and process elements (Alqudah and Razali, 2016; Ebert and Paasivaara, 2017). However, despite its gained popularity and widespread use, SAFe has also faced criticism. Many practitioners perceive it as to massive and complex, where several even claim it to add more bureaucracy to the organization and reducing the agility (Ebert and Paasivaara, 2017). However, with appropriate adaptions tailored to the unique requirements of a specific organization, SAFe has the potential to facilitate the adoption of AD across an entire organization (Ebert and Paasivaara, 2017). Hence, there are many companies who have adopted SAFe, and developed a customized version

according to the orgnization's needs (Dikert et al., 2016; Ebert and Paasivaara, 2017; Kalenda et al., 2018; Paasivaara et al., 2018).

Furthermore, SAFe is structured into different levels, with the three foundational levels being Team level ("Team Flow"), Program level ("ART Flow"), and Portfolio level ("Portfolio Flow"). Additionally, for larger enterprises, there is an optional Value Stream level ("Solution Train Flow" or "Large-Solution level") (Kalenda et al., 2018). The full SAFe 6.0 is illustrated in Figure 2.1, where each level are arranged in ascending order of complexity, and each subsequent level includes all of the elements from the previous level and adds additional complexity (Leffingwell, 2023*b*). The framework also provides a Foundation level that spans across all levels, offering additional components to support organizations, such as SAFe core values and principles, and the lean-Agile mindset (Kalenda et al., 2018).

Figure 2.1: Full SAFe® 6.0 provided by © Scaled Agile, Inc. (Leffingwell, 2023*b*)



The Team level and Program level create the *Essential SAFe configuration* of the SAFe framework (Leffingwell, 2018). At the Team level, it usually adopts Scrum practices, but Kanban is also an option (Ebert and Paasivaara, 2017). The Agile teams usually consist of around seven to nine people and work collaboratively to define, construct and test software in predetermined and fixed-length iterations and releases (Turetken et al., 2017). The Team and Program level establish an organizational structure known as the Agile Release Train (ART), which aligns management, Agile teams, and stakeholders to a shared mission by a vision, road-map, and product backlog (Leffingwell, 2018). Within an ART, teams work in synchronized iterations with the same start and end date and duration. An ART can be

described as a collection of five to twelve Agile teams or 50-125 individuals who are committed to the program's goals and capable of delivering business value or capability (Alqudah and Razali, 2016). To ensure effective coordination and collaboration between teams, a key activity is PI planning, which is a cadence-based face to face planning event (Leffingwell, 2018). Hence, characterized by the involvement of multiple stakeholders (Paasivaara, 2017), serving the purpose of collectively strategizing and organizing work activities for a predetermined duration, typically spanning eight to twelve weeks (Gustavsson, 2018). The Program level has a Product Manager (PM) who are responsible for the product backlog, and works closely with the PO:s and customers to understand and communicate their needs, define and prioritize features (user functionalities) using an economic approach (Leffingwell, 2018). Another key role is the Release Train Engineer (RTE) who is responsible for facilitating the program level processes and program execution, escalating impediments, managing risks, and supporting continuous improvement (Alqudah and Razali, 2016). In addition, the Program level has a System Architect who defines the overall architecture of all teams within the ART (Leffingwell, 2018).

The *Full SAFe configuration* builds on the *Essential SAFe configuration* by adding the Portfolio level and the Large-solution level. The Large-solution level supports development of large-scale and complex solutions (Dikert et al., 2016), that involves multiple of ART:s and suppliers (Leffingwell, 2018). The key mechanism for the Large-Solution level is the Solution Train, ensuring that the ART:s are aligned and working towards a common solution vision, mission and backlog (Leffingwell, 2018). Similar to the Program level, the Large-Solution has Solution Architects and Solution Train Engineers (STE) (Leffingwell, 2018), which is comparable to the System Architects and RTE:s at the Program level. The Solution Architects define the shared technical and architectural vision for the solution, while the STE:s facilitate and guide the execution by the ART:s and suppliers (Leffingwell, 2018). The Portfolio level, on the other hand, is responsible for aligning the execution of the organization's portfolio to its overall enterprise strategy by organizing AD around the flow of value streams (Leffingwell, 2018). The planning is often based on epics which are large-scale development initiatives (Dikert et al., 2016), and are managed by the Epic Owners through a Portfolio Kanban system (Leffingwell, 2018). In large companies, there might be multiple SAFe portfolios (Leffingwell, 2018).

2.3 Considerations when Scaling Agile

Any efforts to transform an organization involving a large number of individuals are likely to encounter various challenges (Paasivaara et al., 2018). A comprehensive analysis of existing literature on this topic conducted by Dikert et al. (2016) identified 35 challenges, categorized into 9 groups, as well as 29 success factors of large-scale Agile transformations that fall into 11 categories. However, given the focus of this study on the post-adoptive use of large-scale Agile, the most relevant challenge categories identified by Dikert et al. (2016) were: *Agile difficult to implement*, *Integrating non-development functions*, *Change resistance* and *Coordination challenges in multi-team environment* (Dikert et al., 2016). Further, the most rele-

vant success factors, in relation to the aforementioned challenges, that were raised by Dikert et al. (2016) were: *Choosing and customizing the Agile approach*, *Allow teams to self-organize*, *Management support*, and *Training and coaching* (Dikert et al., 2016). In addition, inter-team coordination was identified as an success factor, as it is intended to solve dependencies between teams (Moe et al., 2019). Inter-team refers in this case to teams who interact with their external surroundings, all part of a larger-scale setting (Nyrud and Stray, 2017).

2.3.1 Challenges in large-scale Agile

One of the main challenge categories identified by Dikert et al. (2016) is that Agile is difficult to implement. For instance, several cases reported issues caused by misconceptions of the Agile concepts. Specifically, individuals did not comprehend the underlying values of the Agile manifesto, and as a result, the Agile WoW were carried out without an understanding of their purpose (Kalenda et al., 2018). In one case, a misinterpretation of Agile occurred as individuals focused solely on the tools being used, rather than the rationale behind their implementation (Dikert et al., 2016). A lack of understanding of the basic assumptions of the Agile mindset can be the reason why Agile sometimes fails (Fischer, 2018). It further appears that misunderstandings of the Agile concepts were evident when Agile methods were customized poorly (Dikert et al., 2016). Several researchers emphasize the benefits of tailoring the Agile WoW to the organizations' specific needs (Cloke, 2007; Dikert et al., 2016; Paasivaara et al., 2013), however, in some cases, this entailed skipping certain Agile WoW which resulted in issues (Dikert et al., 2016). Kalenda et al. (2018) further highlight that excessive workload and pressure can serve as a contributing factor to why several Agile WoW are omitted.

Another challenge category is the integration with non-development functions when introducing other parts of the organization to the Agile WoW (Dikert et al., 2016). There are various functions that interface with development and are affected by their Agile WoW, thus the full benefits of AD could not be attained unless the entire organization has adopted it (Dikert et al., 2016). However, there may occur challenges due to Agile's emphasis on short time horizons and flexibility in prioritization as other functions might have long lead times or are in need of a holistic view (Dikert et al., 2016). Kalenda et al. (2018) also highlight that misalignment of organizational structures can lead to problems, such as non-Agile teams mistrusting Agile teams' ability to deliver on time. Several situations where Agile approaches could interface with traditional development are coordination between Agile teams and non-Agile teams, different organizational units, coordination between traditional subcontractors and Agile teams, and collaboration between traditional customers and Agile teams (Theobald and Diebold, 2018). Synchronization of dependencies and integration of products developed by multiple teams can be challenging, especially involving Agile and non-Agile teams. Agile teams require frequent and direct communication in order to function effectively. However, non-Agile business units such as marketing, sales, operations, and customer service may not meet the com-

munication needs of the Agile teams, thus slows down the process (Theobald and Diebold, 2018).

Common challenges in large-scale Agile are change resistance and attachment to previous processes (Dikert et al., 2016; Kalenda et al., 2018). It is difficult to gain a buy-in for a change, and even organizations with a flexible culture are likely to encounter resistance (Dikert et al., 2016). Resistance can occur at all levels across organizations, including development teams, middle management, and upper management (Kalenda et al., 2018). Change resistance can arise of numerous reasons, such as a deeply rooted status quo, anxiety regarding new roles and responsibilities, the feeling of surveillance, and skepticism towards the proposed changes in the Agile WoW (Dikert et al., 2016). The way in which the transformation was initiated can have a great significant for change resistance. If the change is imposed from the top down, it can be perceived as a mandate that people may be less receptive to. Conversely, if the change originates from the bottom up, management may exhibit resistance to change and impede the implementation process (Dikert et al., 2016). According to Senapathi and Srinivasan (2012), culture and mixed attitudes towards Agile might reduce the likelihood for long-term sustainability of Agile WoW. Furthermore, while differences in individual characteristics, such as attitudes and personal resilience, may not be apparent in the early stages, they tend to be more prominent as the process progress and will have an impact on full organizational assimilation (Senapathi and Srinivasan, 2012).

One of the most significant challenges involves coordination of the work of multiple teams, since the roll-out of Agile does not necessarily remove their dependencies (Dikert et al., 2016). In large-scale AD projects, there is a requirement for extensive and dynamic knowledge sharing among and within teams to address challenges and adapt to emerging trends (Hoegl et al., 2004). According to Schwaber (2007), the initial approach for scaling up AD involved utilization of multiple Scrum teams working simultaneously on different components of the same software system. Allowing autonomy to the teams have proved to be a success factor in AD (Stray et al., 2018), as it increases productivity, proactive behaviour, and team commitment (Kirkman and Rosen, 1999). However, architectural complexities often generate a network of dependencies among requirements, thus increase the challenges with coordination (Gustavsson, 2020). In large-scale AD projects, where multiple teams collaborate to achieve a shared goal, novel challenges emerge, including dependencies between activities and the need to align goals across teams (Gustavsson, 2020). Usually, a software team needs to coordinate with several teams regarding constraints of, for instance, requirements, testing and integration (Sablis et al., 2021). When self-organizing teams collaborate, they inevitably need to sacrifice a certain degree of autonomy (Bass and Haxby, 2019; Moe et al., 2019). Moe et al. (2019) claim that when autonomous Agile teams collaborate within a large-scale project, it requires organizational control and alignment for the teams to be able to pursue the common objectives. Hence, in a large-scale environment, complete autonomy can not be granted for a single team (Moe et al., 2019).

Another area of coordination challenges in scaled-Agile is when Agile teams lack a holistic perspective in the planning process and instead focus primarily on the internal team (Gustavsson, 2020). Several researchers have reported a propensity for individuals to show reluctance when it comes to sharing knowledge with others and demonstrate a preference for working individually (Wohlrab et al., 2019; Gustavsson, 2020). It appears that if a team is missing the larger picture of a large-scale project, it is difficult to relate the team's work to it (Moe et al., 2019). Moe et al. (2019) further emphasize the importance of having common goals to achieve a common direction. However, the goals are typically set by the management without involving the teams, and thus team members are not always sure on what the goals are (Moe et al., 2019). Evbota et al. (2016) further claim that it is difficult to establish a shared vision in large-scale AD as it contains numerous of stakeholders, resulting in disagreements and continued discussions regarding priorities. There is a risk of inconsistency between different backlogs and lack of transparency that pose large challenges (Evbota et al., 2016). Another challenging factor concerns the difficulty to make a long-term estimation as the product backlog usually contains many backlog items (Evbota et al., 2016). In addition, due to fast pace and large scale, many unexpected things arise, which are difficult to anticipate and affects available resources (Evbota et al., 2016).

2.3.2 Success factors in large-scale Agile

Several cases have shown that customization has been successful when implementing Agile, e.g., by letting teams tailor the Agile WoW to their individual needs (Dikert et al., 2016). In order to enable teams to innovate and achieve high performance, it is important to tailor the Agile approach in a practical manner rather than adhering strictly to a textbook interpretation (Dikert et al., 2016). Especially when applying Agile at scale it is not feasible to use the same process for all projects. However, it is of essence to remember the Agile principles when conducting customization, to avoid making contradicting adaptions to the Agile WoW (Dikert et al., 2016). Dikert et al. (2016) also emphasize that using a common language and nomenclature can benefit and facilitate an organization during an Agile transformation. The customization of the Agile WoW will also have an impact on post-adoptive Agile usage and further diffusion into the organization (Senapathi and Srinivasan, 2012). Senapathi and Srinivasan (2012) presented a case where a specific company claimed it to be beneficial to first adopt a set of prescribed Agile practices, but which evolved over a period of time based on continual adaption and change. Other studies confirms this idea of beginning with a common prescribed framework which adapts and refines over time (Cloke, 2007; Paasivaara et al., 2013).

Another success factor raised by Dikert et al. (2016) is to allow teams to self-organize. In certain cases, it was described that management initially tried to dictate how the Agile WoW should be put into action. However, it was found that only when teams were given complete autonomy the Agile WoW could be properly implemented. Allowing for self-organization among teams fosters a stronger sense of ownership and investment in the change, which in turn motivates continued use of the new prac-

tices (Dikert et al., 2016). Similarly, Senapathi and Srinivasan (2012) claim that autonomy in teams can have a positive impact on the effective use of Agile WoW as it can allow a deeper implementation of the fundamental practices with an emphasis on improving existing ones. Furthermore, self-organization in teams is also closely related to the challenge with aligning teams to a shared goal. If teams are not allowed to participate in the goal-setting it may result in a lack of understanding of the shared goals and what direction to take (Moe et al., 2019). There is also a risk that teams may develop and pursue their own goals, instead of committing to the shared ones (Moe et al., 2019). Thus, involving teams in the goal-setting can have a positive impact as it can increase motivation and make the goals less trivial for the teams (Moe et al., 2019).

One success factor, highly related to the challenge regarding change resistance, is to ensure management support (Dikert et al., 2016; Kalenda et al., 2018). Managers have a vital role in making the change stick, as they possess the authority and power to eliminate obstacles that hinder progress (Dikert et al., 2016). According to Senapathi and Srinivasan (2012), it is also crucial for the management to recognize that contemporary process innovations, including Agile WoW, entail an ongoing learning and improvement based on effective feedback mechanisms over time. When organizations lack the necessary flexibility to learn and adapt to the evolving requirements of contemporary practices, it can impede the teams' effective use of the Agile WoW and hinder further diffusion into the organization (Senapathi and Srinivasan, 2012). Furthermore, additional coaching and knowledge sharing on the Agile WoW have been raised as success factors to counteract change resistance (Dikert et al., 2016; Kalenda et al., 2018). Kalenda et al. (2018) states that the coaching has to be on both values and processes, but especially on values as it reduces pragmatism and the inability to manage new or unknown situations.

Furthermore, to sustain the balance between alignment and autonomy between teams in large-scale Agile, there have been proposed routines for inter-team coordination in the Agile community to reduce the negative impacts and to maintain the positive impacts from the Agile WoW (Gustavsson, 2020; Moe et al., 2019). Several of these prescribed inter-team coordination routines ("mechanisms" or "arenas") are proposed in the SAFe framework, such as PI planning, Scrum of Scrums (SoS), Community of Practice (CoP), and Product Backlog etc. (Leffingwell, 2018). These routines are intended to solve dependencies between teams (Moe et al., 2019), which is of essence in the large-scale context. Furthermore, Berntzen et al. (2019) claim that the PO has a vital role in facilitating the establishment of shared knowledge and goals across interfaces by assisting inter-team coordination. In the context of large-scale Agile, one approach to scaling the PO function is to form teams to collect and prioritize inter-team requirements, especially when confronted with conflicting and competing business needs (Berntzen et al., 2019).

3
Methodology

In this chapter, the methodology of the study as well as its rationales behind it are outlined. Various aspects of the methodology, including the research strategy, design, and methods, are covered and examined in terms of ethical considerations and quality.

3.1 Research Strategy

In the field of business research, the type of theory chosen for a study affects the relationship between theory and research, or the logic of inquiry, with deductive and inductive approaches being two primary options (Bell et al., 2022). Deductive reasoning starts with a general theory or hypothesis and then tests it against empirical observations, while inductive reasoning begins with empirical observations to generate theory (Bell et al., 2022). However, there has been a growing trend in business research to adopt an abductive approach (or "abductive reasoning" or "abduction") instead of solely relying on either a deductive or an inductive approach (Bell et al., 2022).

According to Thompson (2022), an abductive approach is neither solely driven by available data nor purely hypothesis-driven. Instead, it engages in a parallel and balanced manner with both empirical data and existing theoretical knowledge (Thompson, 2022). By adopting an abductive approach, gaps in theoretical knowledge can be revealed, where current frameworks are unable to explain empirical findings. To address these gaps, the researcher must employ creativity to construct theories that better explain the observed phenomena by utilizing the contextual empirical evidence available (Tavory and Timmermans, 2014). Consequently, abduction leads to the generation of new hypotheses, which subsequently necessitate the collection of additional observations for further investigation (Tavory and Timmermans, 2014). Thus, an abductive approach was chosen for this study as it allowed for a holistic examination of the research questions, considering both empirical data and existing theoretical understanding. Since this study investigated whether the implementation of Agile WoW should exhibit homogeneity or heterogeneity across teams, which is a fairly unexplored topic, an abductive approach was considered feasible. Moreover, it also allows for flexibility in the research process as it involves an iterative engagement with the social world as an empirical source and with literature (Bell et al., 2022), and thus enhanced its appropriateness for this study.

Moreover, a research strategy is the general approach to research adopted, which will reflect the the researchers' methodological assumptions (Bell et al., 2022). Bell et al. (2022) identify two main research strategies: qualitative and quantitative, distinctive by their approach to business research. Qualitative research predominantly, but not solely, emphasizes an inductive approach, meaning it aims to generate theories rather than testing them (Bell et al., 2022). Interpretivism is associated with qualitative research, which emphasizes understanding social phenomena instead of explaining them (Bell et al., 2022). In contrast to quantitative research, qualitative research often employs an unstructured approach which enhances the possibility of capturing actors' meanings and concepts emerging out of the data collection (Bell et al., 2022). With regards to the chosen abductive approach, qualitative research was adopted in this study as it allows a more in-depth exploration of these complex phenomena, allowing the researchers to gain a deeper understanding of the organizational context and the nuances of how the Agile WoW are currently implemented. Furthermore, it allows the researchers to capture the perspectives of the participants within the organization who works with the selected Agile WoW on a daily basis.

3.2 Research Design

Research design and research methods are two important concepts in the field of business research that are often used interchangeably, but it is crucial to distinguish them (Bell et al., 2022). Research design guides the researcher in conducting a study, including the selection and execution of research methods as well as the analysis of the subsequent data, while research methods are the specific techniques and procedures that are used to collect and analyze data (Bell et al., 2022). Bell et al. (2022) highlight that a case study is a research design that is often mistaken for a research method. A case study entails an in-depth exploration of a single case, such as an organization, workplace or a single person, that requires a particular research method to collect and analyze data (Bell et al., 2022).

In business research, the case study approach is a popular and commonly used research design (Eisenhardt and Graebner, 2007). Although business research has an academic purpose, much business research is conducted with the intention to make a positive impact on both organizations and their employees (Bell et al., 2022). This study was carried out on behalf of Volvo Cars, and thus the research design was chosen in consultation with the supervisors at Volvo Cars. Based on the supervisors' areas of expertise and the resources they could provide, particularly for the data collection, a case study was adopted as research design for this study. Furthermore, despite the fact that AD has been adopted by many large organizations, there is still a scarcity of literature on large-scale Agile in the field (Dikert et al., 2016; Paasivaara et al., 2018). This, combined with that automotive companies increasingly adopt scaled Agile methods to cope with their organizational and product complexity (Steghöfer et al., 2019), made the area interesting to investigate. This study examined to which degree the identified Agile WoW should be followed jointly or not between teams. Therefore, it offered an opportunity to explore a somewhat

unique area, contribute to a relatively young field of understanding, and bring value to Volvo Cars. These practical implications were also factors contributing to the choice of research design, resulting in a case study.

3.3 Research Methods

This section outlines the different data collection methods used in this study, including interviews and other empirical data. The empirical data primarily consist of information gathered from interviews, supplemented by data obtained from internal resources provided by Volvo Cars.

3.3.1 Interviews

In qualitative research, interviews - semi-standardized or unstructured interviews - is a widely used method (Bell et al., 2022; Jenner et al., 2004). It is especially the flexibility of the interview that contributes to its popularity (Bell et al., 2022), which was also the reason why interviews was chosen as the method for this study. In qualitative interviewing, the interviewee's point of view is of greater essence and the interviewers can deviate from any guide or schedule that is being used (Bell et al., 2022). In addition to its flexibility, the limited resources and time played a role in the choice of qualitative interviews as the method for this study.

Qualitative interviews can either be unstructured, where the interviewee answers a question freely, or semi-structured, where the researcher has a list of questions on fairly specific topics to be covered (Bell et al., 2022). In case study research, it is feasible to have some structure to ensure comparability in the data (Bell et al., 2022), thus semi-structured interviews was used for this study to ease the subsequent analysis of the empirical data. Bell et al. (2022) further highlight that semi-structured interviews are preferable when more than one person conduct the interviews to ensure that the data is comparable. This was the case in this study since the researchers had a shared responsibility in conducting the interviews, where they took turns in leading the interview while the other took notes or asked follow-up questions. However, as the researchers had a large sample of interviewees, the interviews also had an element of structure to facilitate the quantification of the data.

When conducting a semi-structured interview, it is beneficial to create an interview guide (Bell et al., 2022). Initially, before the researchers could create two interview guides, two informal discussions with Change Leaders (CL:s) were conducted. The aim of the informal discussions were to set the scope for this study and specify the research questions. Together with the CL:s, the researchers identified five Agile WoW that were of interest to investigate: backlog management, daily stand-up, PI planning, retrospective, and demo. The choice of the five Agile WoW was based on both their relevance to the study as well as the time aspect of the study. These identified Agile WoW became the foundation of the two interview guides, where one was tailored for Team Managers (TM:s) and the other one for CL:s. When the two interview guides were created, the researchers held two test interviews with Scrum

Masters (ScM), in order to ensure its quality in terms of content, comprehension, and length. The interview guides were iterated and the final interview guides used for the interviews are attached to this thesis, see Appendix A & Appendix B. The initial two parts of the interview guide comprised of semi-structured questions, enabling the researchers to explore the subject in more detail. However, the last part contained a structured question that required the interviewee to assess the significance of homogeneity using a 6-point scale. The purpose of using a 6-point scale was to determine whether the interviewee's perception leaned towards homogeneous implementation or heterogeneous implementation of the Agile WoW.

As a sampling technique, the researchers used purposive sampling for this study. Purposive sampling aims to selectively choose cases or participants in a strategic way to ensure that those sampled are pertinent to the study's goals (Bell et al., 2022). As this study was conducted at Volvo Cars, the interviewees were selected based on both the available resources and their relevance to the purpose of the study. The scope of this study was limited to Volvo Cars R&D department, where the researchers chose to exclusively interview TM:s responsible for Agile teams and CL:s with Agile experience. The choice of interviewing TM:s was because they often have insights into many teams, which could vary between 1-10 teams for each TM. In order for the researcher to gain comparable data, they chose to interview CL:s who have great insights into the subject. Furthermore, these choices also provided insight into whether the different roles have a shared view or if the view deviates. For an overview of the roles, and associated information, covered during the interview, see Table 3.1. In this table, pseudonyms (letters ranging from A-H) are used to represent the different departments where ScM:s and TM:s operate, while for CL:s, an indication whether they work across a solution or across the entire R&D is provided, to prevent revealing confidential information. A total of 28 interviews were conducted, where the first two were test interviews, 20 interviews were with TM:s, and 6 interviews were with CL:s. The two test interviews were not considered as part of the data collection for the study and are therefore not included in the results. All interviews conducted were recorded and transcribed.

Table 3.1: Description of the conducted interviews during the study.

Role	Department	Experience at Volvo Cars	Gender
Scrum Master	A	<5 years	Female
Scrum Master	B	<10 years	Male
Change Leader	Cross R&D	<5 years	Female
Change Leader	Cross R&D	<20 years	Male
Change Leader	Cross R&D	>20 years	Female
Team Manager	C	>20 years	Male
Team Manager	D	>20 years	Female
Team Manager	E	<20 years	Female
Change Leader	Cross Solution	<10 years	Male
Change Leader	Cross Solution	>20 years	Male
Team Manager	F	<20 years	Male
Team Manager	E	>20 years	Male
Team Manager	C	>20 years	Female
Team Manager	E	>20 years	Female
Team Manager	F	>20 years	Male
Team Manager	F	<5 years	Female
Team Manager	D	<10 years	Male
Team Manager	E	<20 years	Male
Team Manager	F	>20 years	Female
Team Manager	G	<15 years	Female
Team Manager	G	<20 years	Female
Change Leader	Cross solution	>20 years	Male
Team Manager	G	<20 years	Female
Team Manager	E	<10 years	Female
Team Manager	F	<15 years	Male
Team Manager	F	>20 years	Male
Team Manager	H	<5 years	Male
Team Manager	C	<10 years	Female

3.3.2 Other empirical data

To facilitate and support the work of the researchers, Volvo Cars made a variety of relevant resources available. These resources consisted of visuals and written documentations of VCAF, including clear descriptions of the Agile WoW and Agile roles. These resources contributed to a deeper understanding of the case in an early phase, both in terms of linguistic and contextual understanding, that provided the researchers with a basis for entering the interview phase. Even during the interview process, these resources was utilized as a support when new insights and concepts emerged.

Moreover, the study made use of ethnographic observations in the effort to triangulate and gain a better understanding of both the environment and the social life of

the organization. The majority of the study's time was spent by the researchers at Volvo Cars, where they had the opportunity to attend meetings as well as having informative discussions with their supervisors or relevant subjects to the study.

3.4 Data Analysis

With respect to the chosen qualitative research strategy, the researchers used a thematic analysis where the data was analyzed with the use of the platform Miro, to find repeating categories and patterns. Miro is an internet-based interactive whiteboard platform that offers collaborative functionality for brainstorming sessions, scheduling tasks, and managing workflows (Chan et al., 2023). According to Bell et al. (2022), repetition, in the sense of repeating subjects or topics, is a key indicator for classifying that a pattern in the data is being considered as a theme. Furthermore, it is of interest to explore similarities and differences in the interviewees' answers for a specific topic (Bell et al., 2022). These were some of the aspects the researchers took into account when analyzing and clustering the data into themes.

The analysis followed a process similar to the Affinity Interrelationship Method (AIM), which is a problem solving tool for analyzing qualitative data inspired by Professor Shoji Shiba's 19 step-by-step approach (Alänge, 2009). The AIM consists of 10 main steps, which involves identifying an initial question, collecting data, establishing a shared understanding of the collected data, and utilizing group processes to structure, categorizing, and ranking the data to arrive at a response to the original question (Alänge, 2009). However, the researchers only used the steps 4-10, regarding the analysis of the collected data, as the previous steps were already made. In addition, the researchers used content analysis, which according to Bell et al. (2022) is an approach to quantify content in terms of predetermined categories and in a systematical and replicable way. Initially, the researchers transferred the collected data into the platform Miro and went through all of the transcribed interviews to gain a shared understanding. Further, the data was coded and clustered into themes based on if the interviewees shared a similar view or opinion. Then, the researchers were able to quantify the qualitative data by counting the number of interviewees under each theme. Lastly, the researchers analyzed the different themes and interpreted what they meant in the context of the research questions and drew findings based on the patterns and insight that emerged from the data.

3.5 Research Quality

According to Bell et al. (2022), certain authors have proposed that the criteria for evaluating qualitative research should vary significantly from those applied by quantitative researchers. The two primary criteria for evaluating qualitative studies are trustworthiness and authenticity (Bell et al., 2022), where trustworthiness was chosen as a criteria to evaluate in this study. There are four criteria that make up the concept of trustworthiness: credibility, transferability, dependability, and confirma-

bility (Bell et al., 2022).

Establishing the credibility of research findings requires both adhering to proper research methodologies and standards, and presenting the research results to the participants studied to confirm that the researcher has accurately comprehended their social reality (Bell et al., 2022). To establish credibility, the researchers ensured that the interviews were conducted in a neutral and non-judgmental manner to avoid any potential bias. Furthermore, to ensure that all information was accurately captured and formulated, informed consent was acquired to record all interviews in their entirety. Additionally, the researchers maintained detailed records of the interview process, including recordings, transcriptions, and notes, to facilitate interpretation of the data.

In qualitative research, transferability refers to the extent to which the findings can be applied to other contexts (Bell et al., 2022). To increase transferability, the researchers provided a detailed description of the study's context, participant selection criteria, and the interview process. In addition, a thorough description of the analysis' approach was given to increase the transferability to other contexts.

According to Bell et al. (2022), dependability is often achieved by adopting an 'auditing' approach, which involves keeping detailed records of the research process, including data collection, sampling, analysis, and interpretation. Then peers can act as auditors, perhaps during the research process but especially in the end, to ensure that appropriate procedures are being and have been followed (Bell et al., 2022). To ensure dependability, the researchers kept a detailed documentation of the process, which was shared with both the supervisors at Volvo Cars and at Chalmers University of Technology. In addition, the researchers maintained a clear and transparent audit trail of their analysis process, which included documenting any changes made and discussing uncertainties with the supervisors.

Confirmability refers to the degree to which the researchers' values have intruded the study (Bell et al., 2022). According to Bell et al. (2022), complete objectivity is impossible to achieve in business research, but the researchers can demonstrate that they have acted with sincerity and honesty. To establish confirmability, the researchers made sure to share their analysis and findings with each other as a precautionary measure to prevent personal biases from influencing their work. Additionally, they sought input and guidance from supervisors at both Volvo Cars and Chalmers University of Technology. However, it was necessary to carefully consider the perspectives from the supervisors at the company under investigation, as they could potentially have company-specific biases.

3.6 Ethical Considerations

Ethical considerations are of great importance in any research study, and are therefore also highlighted in this study. Ethical principles in business research can be divided into four main areas: harm to participants, informed consent, invasion of

privacy, and deception (Bell et al., 2022).

Harm to participants refers to both physical and psychological harm to participants caused by the study (Bell et al., 2022). The researchers took several measures to minimize any potential harm to the participants involved in this study. This was achieved by ensuring that informed consent was obtained by all participants. The participants' confidentiality was also protected, both during and after the study, by anonymizing all data and ensuring that it was kept secure. However, there are dilemmas in qualitative research when it comes to maintaining respondent confidentiality while presenting rich, detailed data of social life (Kaiser, 2009). As the credibility is increased by presenting detailed descriptions of the participants, there is a risk of deductive disclosure; i.e., when characteristics of certain individuals or groups makes them easily recognizable or identifiable (Kaiser, 2009). With regards to deductive disclosure, the researchers kept the specific departments anonymised in Table 3.1.

Informed consent evolves around providing potential participants with enough information about the study to enable them to make a well-informed decision about their willingness to take part (Bell et al., 2022). In this study, standard ethical procedures was followed by providing all participants with a clear description of the study's purpose, the interview process, and potential risks and benefits. The participants were also informed that their participation was voluntary and that they could withdraw from the study without consequences. Furthermore, the participants were informed that all data were kept confidential and only the researchers would have access to it.

Informed consent and invasion of privacy is highly linked, as both involve respecting the autonomy and rights of research participants (Bell et al., 2022). Invasion of privacy, however, refers to breaches into the personal realm of a participant, which includes the subjective aspects of what they consider private (Bell et al., 2022). In order to ensure no invasion of privacy, all participants were treated as unique individuals and with respect. Furthermore, the researchers made clear that if any topic were considered sensitive, the participant did not have to answer.

Ensuring honesty in intentions and being transparent in the sharing of information can also prevent deception. Deception occurs when the researchers present their study in a manner that is inconsistent with its true purpose (Bell et al., 2022). Besides the actions implemented to obtain informed consent, the researchers also employed several other measures to prevent deception. When contacting the potential interviewees, a detailed description of the study's purpose, how the interview would be conducted and the interviewee's rights as a participants was included. This information was repeated at the beginning of the interview to provide an opportunity for discussion if necessary. In addition, the researchers offered to share the results with all participants.

3.7 Discussion of Methods Chosen

The chosen methods were appropriate for gathering and analysing data efficiently, given the available time and resources, and enabled the researchers to draw conclusions within the scope of this study. As qualitative interview is flexible in its nature, it was a necessary data collection method to be able to concentrate on the specific area under investigation. Nonetheless, if additional time was available, it would have been valuable to expand the range of interviewees to include more types of roles, thus gaining a broader range of perspectives on the subject.

Moreover, if additional time was assigned for each interview, it would have been possible to delve deeper into the subject matter with each interviewee. However, the majority of interviewees had only a limited amount of time available, which the researchers had to consider when scheduling the time slot. As a result, the researchers were unable to follow up on every potential side-track that touched on the topic, despite its interesting nature and relevance for this study.

During the course of the study and the more insights and knowledge the researchers gained on the subject, the research questions evolved and were adapted. As a consequence, several of the questions in the interview guides illustrated in Appendix A & Appendix B were not considered relevant for the aim of this study. Thus, some of the empirical data were not presented in the result chapter in this study.

Furthermore, the researchers considered ecological considerations when conducting the interviews. They allowed utilization of the platform Teams for remote interviews, effectively reducing the requirement for physical travel. Furthermore, when organizing the interviews, they took into account the locations of the interviewees within the organization, selecting meeting rooms accordingly. This approach aimed to minimize carbon emissions associated with transportation, aligning with sustainable practices. Moreover, it is important to be mindful of the ecological impact of the researchers' presence at the organization, such as energy consumption and waste generation. Researchers can aim to minimize their ecological footprint by practicing energy conservation, responsible waste management, and considering sustainable alternatives in their research activities.

4
Results

In this chapter, the results from the interviews conducted at Volvo Cars will be presented. After completing the analysis of the results, the data for each Agile WoW was categorized into three main themes that intend to act as a source of orientation to answer the selected research questions. Two of the main themes are categorized into several sub-themes, which have been identified to describe in more detail the meaning of the corresponding result. Consequently, results that belong to the identified themes are only presented.

4.1 Backlog Management

In this section, the results regarding backlog management are presented. Firstly, a definition of backlog management is outlined to provide a general understanding of the topic according to the interviewees. Secondly, the interviewees' opinions on backlog management are presented which cover positive and negative effects as well as operability and improvements. Lastly, perspectives raised by the interviewees concerning whether the implementation of backlog management should be characterized by a predominant state of homogeneity or heterogeneity are presented.

4.1.1 Definition

CL:s define backlog management as a way to constantly manage and evolve the backlog to keep it updated with necessary information. The backlog is managed and prioritized together with stakeholders with the product in focus and with the product maturity progress as a guideline. TM:s share the definition in all aspects. They emphasize the importance of feeding the backlog with updated content and keeping it prioritized to maintain continuous alignment. Furthermore, it enables the strategy and the long-term goal to be visible and transparent. Backlog management includes contributions from both developers and PO:s, where some of the TM:s claim that PO:s have the biggest responsibility to prioritize activities.

4.1.2 Opinion on backlog management

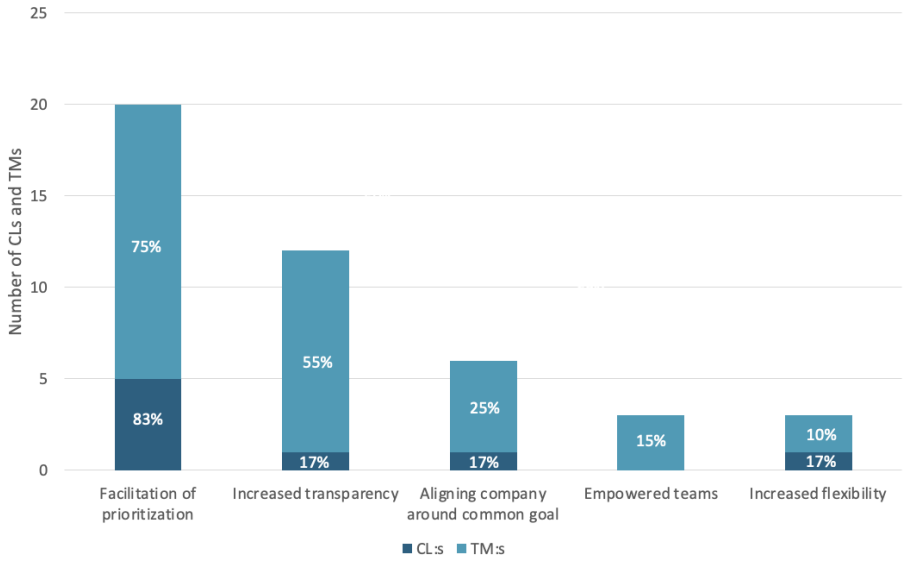
In this section, the positive and negative effects of backlog management are presented according to the interviewees' perceptions and experiences. TM:s' opinions concerning the backlog management's current degree of operability; i.e., how well backlog management is working in their given context, are also provided. Further,

the interviewees' suggestions for improvements regarding backlog management are introduced.

4.1.2.1 Positive and negative effects of backlog management

This section presents the positive and negative effects mentioned by both CL:s and TM:s regarding backlog management. The positive effects concern *facilitation of prioritization, increased transparency, aligning company around common goal, empowered teams* and *increased flexibility*, which are visualized in Figure 4.1. The negative effects concern *difficulties with prioritization, risk of over-administration* and *risk of losing the bigger picture*. Interviewees who did not consider there to be any negative effects will solely be presented in Figure 4.2 alongside the other claimed negative effects.

Figure 4.1: Positive effects of backlog management

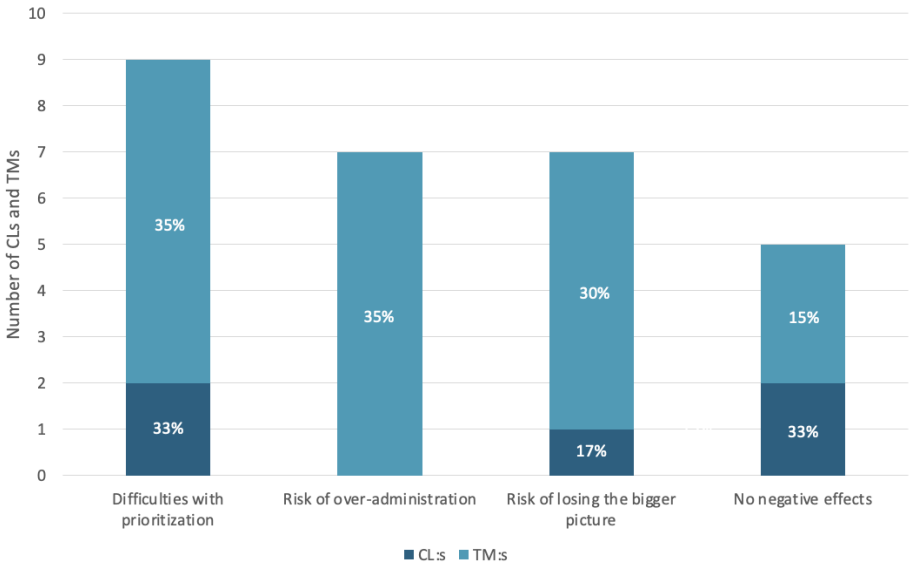


Five CL:s describe *facilitation of prioritization* as a positive effect of backlog management. Through backlog management, the involved parties can keep a dialogue and distinctness regarding activities' grade of severity with the possibility to deliver complex products. Therefore, chaos can be avoided, focus can be maintained, and collaboration can be enhanced. 15 TM:s further emphasize aspects concerning prioritization. Backlog management is explained as a tool giving the team confidence because of its perspicuity in visualizing what is prioritized but also what is not prioritized. Moreover, one CL emphasizes backlog management's ability to achieve *increased transparency*. Further, eleven TM:s claimed that backlog management's characteristic of being transparent results in an increase in teams' and stakeholders' understanding. The increased transparency causing increased understanding is applicable for both internal prioritized tasks but also dependencies with mutual deliveries. Hence, the provided and transparent overview of the work to be done induces calmness and absorbs anxiety in the teams, and allows dependencies to be further developed. Backlog management is also explained as a pointer of direction by one CL, thus allowing the team to be guided and *aligning the company around*

a common goal. Furthermore, five TM:s comply with the notion of guidance and coherency and express the positive effect of common understanding as a way to find alignment.

Three TM:s explain how backlog management evokes the sense of *empowered teams* which is regarded as a positive effect. Teams and individuals are by the use of backlog management provided an enhanced feeling of ownership of their work. They are also able to influence and formulate day-to-day work to a greater extent. As a result, confidence is built and empowerment is gained. Furthermore, backlog management enables planning which allows continuous adaption and planning which results in *increased flexibility*, in contrast to the more ordinary way to construct plans, according to one CL. Two TM:s argue for the same effect, backlog management allows urgent matters to be included and helps in capturing circumstances that have shifted in character or dependencies that have been altered along the way.

Figure 4.2: Negative effects of backlog management



Two CL:s argue that, despite its importance, prioritization is hard to execute correctly and efficiently, therefore, *difficulties with prioritization* is regarded as a negative effect. There exists an imminent risk of conducting an improper and irremediable prioritization affecting the long-term goal. The backlog sometimes needs to manage and include multiple projects and activities, e.g., innovation and development issues, as stated by one of the CL:s. This need for equilibrium, if not managed correctly, is interpreted as a negative effect. Seven TM:s support the notion of the difficulty of prioritization. It is argued that it is sometimes hard to change an order of prioritization that is already set if new activities appear, such as innovation and continuous improvement. Lack of communication, buy-in from team members, and competence in leaders are also factors mentioned contributing to difficulty to prioritize. It is also stated that teams who have no obvious interfaces with other teams create a scenario where efficient prioritization is hard to achieve. Furthermore, prioritization is made more challenging due to the constantly changing environment

that characterizes the automotive industry.

Seven TM:s claim that there exists a *risk of over-administration* connected with backlog management. Since the circumstances are constantly shifting and the backlog needs to be updated frequently there needs to be a balance between how much time and administration is spent versus how long-lived items are before they are replaced. One of the seven TM:s also explains the problem with individuals who rather solves an issue directly than spend time on administrating the issue first; i.e., view the administration as a negative effect. Moreover, the backlog tends to be managed and prioritized short-term and therefore there exists a *risk of losing the bigger picture*. Hence, it takes not account for important longer-term projects or projects yet to come, according to one CL. This statement is shared with three TM:s who then claim that some of the purposes of backlog management are lost. Three other TM:s raised another aspect which also implies a loss in the bigger picture. This aspect concerned teams who isolate themselves from their surrounding by avoiding collaboration and strictly focus on their own tasks and activities. Hence, they diverge from the overall goal and become inflexible with changing their backlog and helping dependencies with emerging impediments. One of the three TM:s claims this behavior is a result of teams being too empowered and thus using their power in an improper manner, resulting in sub-optimization.

4.1.2.2 Operability and improvements

10 of the TM:s consider backlog management to work well in their respective teams. One of them explained how Agile ceremonies are performed regularly to be able to manage and adapt the backlog continuously. Further, the interviewee emphasized how the ScM and PO take accountability and responsibility to ensure an effective workflow and to mediate the company goal. These factors, therefore, contribute to successful backlog management. Another interviewee expresses that their success is derived from the choice to diverge from the "by the book" way of conducting backlog management. Hence, adapting it according to the team's needs. Only one TM considers the backlog management to not work well. The lack of effective communication with dependencies was explained to be the reason for this. However, nine TM:s consider backlog management to work partly well in their respective teams. Lack of long-term perspective, team maturity, and poor guidance och presence from leaders were factors mentioned contributing to ineffective backlog management.

Consequently, suggestions for improvement were raised by both TM:s and CL:s on how to enhance backlog management's effectiveness. The teams need to be better at prioritizing according to their capacity and also prioritize activities important for the teams' own needs. It is emphasized that the backlog has to allow flexibility as conditions change and emerge. Other aspects raised are to align the work with deadlines and to write and administrate activities in the backlog. It is also considered important to prioritize activities with a longer-term perspective and have the outcome of the product in focus. This results in the team in advance knowing what to prepare and can be able to raise what should be their enablers for the next sprint or PI. Therefore, leadership is raised as an important factor in making sure

that the team possesses an understanding and an adequate culture to be able to prioritize and conduct suitable discussions. Furthermore, communication with dependencies and synchronization is necessary in order to deliver intended outcomes. These suggestions for improvement were shared by both TM:s and CL:s.

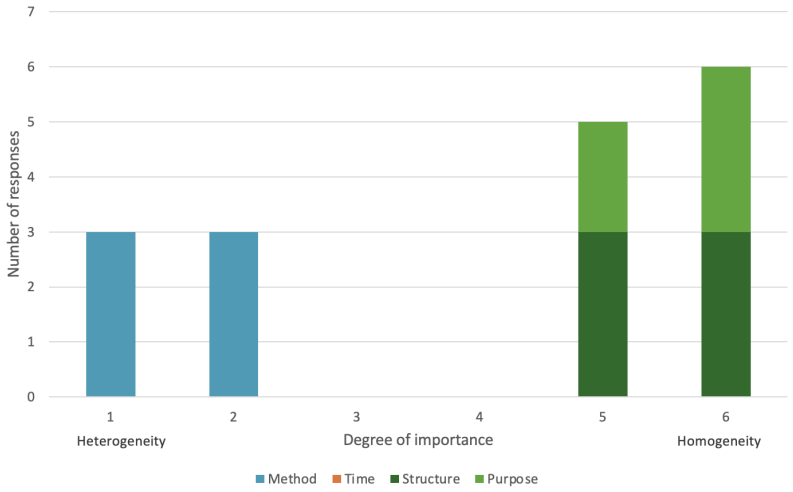
4.1.3 Homogeneous versus heterogeneous implementation for backlog management

In this section the interviewees' perceptions regarding how backlog management should be treated with respect to different perspectives on homogeneous and heterogeneous implementation; i.e., if backlog management should be followed jointly or not, is presented. The results concern responses regarding teams within an ART.

4.1.3.1 Degree of homogeneous implementation for backlog management

When the interviewees were asked to set a degree of importance for homogeneous implementation of backlog management, 17 interviewees solely assigned one grade based on a generic perception and the average degree of importance for their accumulated answers was 4 out of 6. This signifies a fairly high level of importance, given that the rating of 6 denotes a high degree of importance while a rating of 1 denotes a low degree of importance. However, several interviewees divided their answer into different perspectives as they considered it impossible to set a generic grade for the specific Agile WoW. The different perspectives raised by the interviewees and their corresponding grade of importance is illustrated in Figure 4.3. The perspectives raised regarding backlog management were: *Method, Structure*, and *Purpose*.

Figure 4.3: Perspectives' degree of importance regarding homogeneous implementation for backlog management



The figure illustrates the different perspectives raised by the interviewees according to their claimed degree of importance for homogeneous implementation. The grades vary from 1 to 6, where 6 implies that the perspectives have great importance in terms of homogeneity. Thus, 1 implies a low level of importance in terms of homogeneity and can therefore be interpreted as subjects to heterogeneity.

4.1.3.2 Perspectives on homogeneous implementation

The biggest reason explained for the need of homogeneous implementation concerns the issue of product dependencies. Since Volvo Cars consists of many teams there will also, frequently, be many dependencies that need to be visible. Therefore, the same use of nomenclature and tools for support is considered to be beneficial in order to agree upon backlog content and further utilization regarding backlog management. Hence, heterogeneity may prevent and aggravate the connection and dependence the teams have to one another. One interviewee also depicts the difficulties arising from different PO:s using alternative approaches regarding backlog management. This results in a confusion among the involved parties. Consequently, *structure* is regarded as an important perspective in terms of homogeneity. Five interviewees explain the importance of having a joint understanding of the *purpose* of backlog management and understanding of prioritization. There needs to be a joint commitment and alignment around the intended outcomes and benefits from having a backlog. By having a homogeneous understanding of the purpose of backlog management it results in a more efficient synchronization and alignment with prioritization and the possibility to keep a long-term perspective.

4.1.3.3 Perspectives on heterogeneous implementation

Some interviewees argue for backlog management to be managed with degrees of heterogeneity. However, they also claim that the overall purpose and commitment should be the same. Still, they argue for the importance of managing the backlog with the teams' different needs and prerequisites in mind (e.g, time perspectives, scope, and dependencies). Thus, the *method* of backlog management should be shaped according to the teams' needs, structure, and product. The aspect of teams' different levels of maturity is also raised as a reason for differentiation where some teams need to adapt it accordingly and with more or less input from PO:s. Some interviewees explain how teams within an ART have shifting character of delivery, therefore it would be hard for all teams to follow a generic way of execution. Thus, the level of homogeneous or heterogeneous implementation is a result of the character and constellation of the ART.

4.2 Daily Stand-up

In this section, the results regarding daily stand-up are presented. Firstly, a definition of daily stand-up is outlined in order to provide a general understanding of the topic according to the interviewees. Secondly, the interviewees' opinions on daily stand-up are presented which covers positive and negative effects as well as operability and improvements. Lastly, perspectives raised by the interviewees concerning whether the implementation of daily stand-ups should be characterized by a predominant state of homogeneity or heterogeneity are presented.

4.2.1 Definition

CL:s define daily stand-up as a short meeting with the intention to provide brief individual updates to the rest of the team and also raise identified impediments and get help and support. One of the CL:s emphasizes the importance to have it daily, otherwise the meeting changes its character and does not comply with the definition. All TM:s agree with CL:'s definition with the exception of conducting it every day, and claim it could be done less frequently. Further, TM:s define daily stand-up as a meeting providing transparency and knowledge exchange, enhancing motivation and alignment, and facilitating team building.

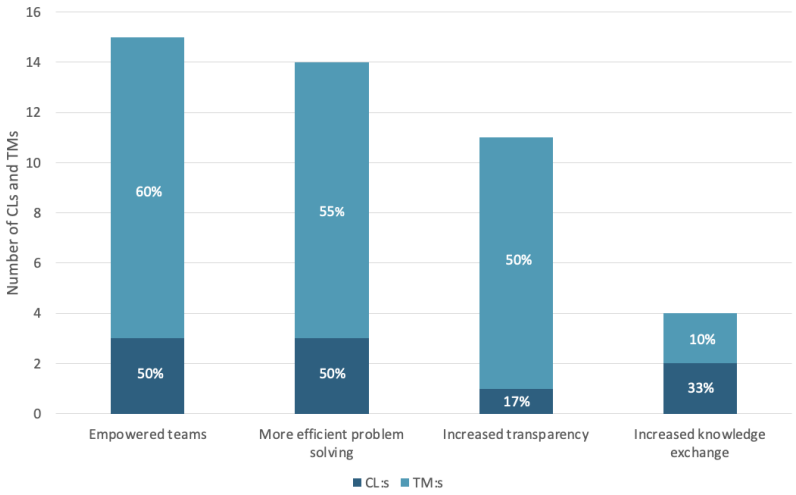
4.2.2 Opinion on daily stand-up

In this section, the positive and negative effects of daily stand-up are presented according to the interviewees' perceptions and experiences. TM:s' opinions concerning the daily stand-up's current degree of operability; i.e., how well daily stand-up is working in their given context, are also provided. Further, the interviewees' suggestions for improvements regarding daily stand-up are introduced.

4.2.2.1 Positive and negative effects of daily stand-up

This section presents the positive and negative effects mentioned by both CL:s and TM:s regarding daily stand-up. The positive effects concern *empowered teams, more efficient problem solving, increased transparency* and *increased knowledge exchange*, which are visualized in Figure 4.4. The negative effects concern *ineffective meeting, inconvenience* and *poor understanding of purpose*. Interviewees who did not consider there to be any negative effects will solely be presented in Figure 4.5 alongside the other claimed negative effects.

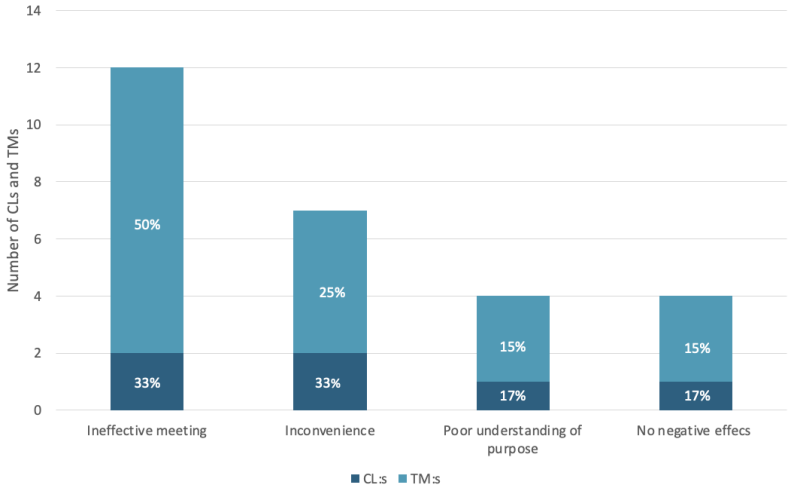
Figure 4.4: Positive effects of daily stand-up



Three CL:s describe how daily stand-up contributes to the perception of *empowered teams*, thereby the team becomes stronger, more supportive, and more effective. Twelve TM:s agree and further claim how daily stand-up strengthens the feeling

of comfortability, belonging, and security. Furthermore, it enhances engagement and trust among the team members. It is described as a way to create energy and absorb stress. Due to the mutual engagement, empowerment, and the frequency of the meeting, the team can better understand each other and discuss impediments or problems early and jointly, as mentioned by three CL:s. Hence, daily stand-up has the positive effect of *more efficient problem solving*. Further, eleven TM:s support the statements and further describe how daily stand-up is a way for the team to be proactive and flexible. Moreover, one CL and ten TM:s mention how daily stand-up contributes to *increased transparency*. The team is continuously updated, synchronized, and aware of each other's work. Two CL:s and two TM:s also emphasize daily stand-ups' ability to provide an opportunity to share knowledge within the team. Thus, contributes to *increased knowledge exchange* in the team.

Figure 4.5: Negative effects of daily stand-up



Two CL:s and ten TM:s describe how daily stand-up risks turning into an *ineffective meeting*. This is the case if the team is too big or if the meeting is not concise or focused. Hence, the teams think it is a waste of time. This is especially described as the case for teams working with slow tasks, where daily stand-ups are considered to be ineffective since the circumstances are not shifting to a larger extent from day to day. It is also mentioned how daily stand-ups tend to end up as technical problem-solving meetings where focus and attention are poorly equally distributed among the members. Hence, it prolongs the meeting and the purpose and engagement are lost.

Furthermore, another negative effect of daily stand-up is that it could be interpreted as a meeting characterized by *inconvenience* by some team members. This was lifted by two CL:s and five TM:s. It results in inconvenience if individuals find it stressful to be fully transparent or are not willing to share or expose themselves to the team. Others think it disrupts their workflow, especially if they don't see their participation as necessary. This is connected to another negative effect mentioned by one CL and three TM:s, that team members tend to lose or not understand the purpose of daily stand-up. They do not see it as valuable for their individual assignments and do

not understand that their participation and engagement can be of value to someone else. Hence, it is described that team members tend to have a *poor understanding of the purpose*.

4.2.2.2 Operability and improvements

15 of the TM:s consider daily stand-up to work well in their respective teams. Factors contributing to the success can be derived from teams adapting it to their own needs. Some describe how the team performs it without the participation of ScM, TM, or PO to attain a lower level of supervision and to only have it two to three days a week. Only one TM considers daily stand-up to not work well. However, four TM:s consider daily stand-up to work partly well. This is due to unengaged ScM, too big teams with partly overlapping areas of work, and teams feeling uncomfortable with sharing.

Consequently, similar suggestions for improvement were raised by both TM:s and CL:s on how to enhance daily stand-up's effectiveness. The most frequent action for improvement was enhancing leadership quality and accountability. There is a need for support and training in order to obtain the purpose and commitment needed for the team to capture the value and see the need for daily stand-ups. ScM is described as the most important leader in this context, who needs to possess the accurate mindset and ability to keep discipline and engagement high. To attain this, it is described that daily stand-up needs to be more adapted to the team's needs. The discussions need to be relevant and the purpose needs to be re-evaluated continuously to stay up to date with what is important for the team now. This can be attained by having daily stand-up whenever the team wants and by dividing them into subgroups based on the difference in overlap. Other suggestions for improvements concern the ability and importance of keeping the meeting short and frequent, as well as distributing the time fairly and equally among the team members. Moreover, physical attendance would enhance daily stand-up's efficiency, rather than having it partly or solely digital. Therefore, it is also mentioned that the physical possibilities, e.g., stand-up tables and creative meeting areas, could be improved.

4.2.3 Homogeneous versus heterogeneous implementation for daily stand-up

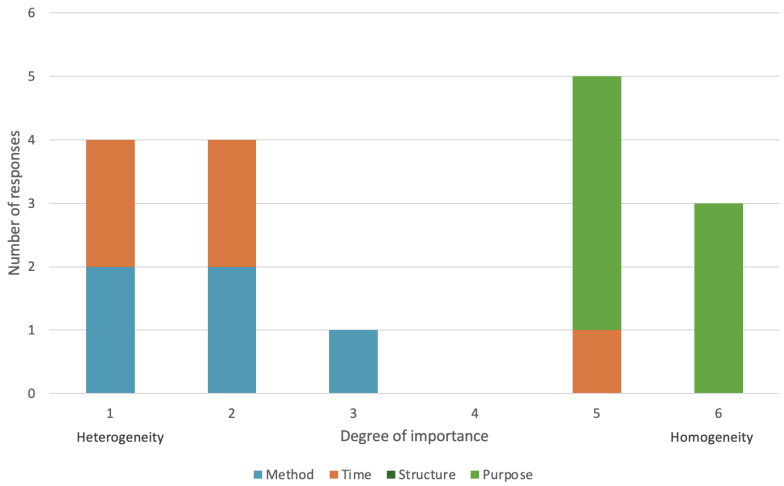
In this section the interviewees' perceptions regarding how daily stand-up should be treated with respect to different perspectives on homogeneous and heterogeneous implementation; i.e., if daily stand-up should be followed jointly or not, is presented. The results concern responses regarding teams within an ART.

4.2.3.1 Degree of homogeneous implementation for daily stand-up

When the interviewees were asked to set a degree of importance for homogeneous implementation of daily stand-up, 18 interviewees solely assigned one grade based on a generic perception and the average degree of importance for their accumulated

answers was 2 out of 6. This signifies a considerable low level of importance, given that the rating of 6 denotes a high degree of importance while a rating of 1 denotes a low degree of importance. However, several interviewees divided their answer into different perspectives as they considered it impossible to set a generic grade for the specific Agile WoW. The different perspectives raised by the interviewees and their corresponding grade of importance is illustrated in Figure 4.6. The perspectives raised regarding daily stand-ups were: *Method, Time,* and *Purpose*.

Figure 4.6: Perspectives' degree of importance regarding homogeneous implementation for daily stand-up



The figure illustrates the different perspectives raised by the interviewees according to their claimed degree of importance for homogeneous implementation. The grades vary from 1 to 6, where 6 implies that the perspectives have great importance in terms of homogeneity. Thus, 1 implies a low level of importance in terms of homogeneity and can therefore be interpreted as subjects to heterogeneity.

4.2.3.2 Perspectives on homogeneous implementation

Some of the interviewee described that it is important to make sure that teams use daily stand-up with the same *purpose* as the definition describes. The intention with the meeting and the aspects discussed during the meeting should be aligned among teams in order to get the most value out of it. It is also mentioned by one interviewee that all teams should have daily stand-up continuously every day; i.e., same frequency of *time*.

4.2.3.3 Perspectives on heterogeneous implementation

The majority of the interviewees argue for daily stand-up to be managed with degrees of heterogeneity in terms of *method* and *time*. These opinions are all based on the belief that all teams have different needs and prerequisites and therefore, cannot be managed in the same way. If the daily stand-up would have been instructed and governed in one specific way it would also have implicated a loss in motivation. Differences in team maturity are also expressed as a reason for the need for

differentiation. Immature teams need more structure, frequency, and focus on team building while mature teams can be freer, meet more seldom and focus on delivery. The delivery and tasks of the team are also recognized to be factors for heterogeneous implementation since it is claimed that different deliveries and tasks demand different frequencies of daily stand-up. Hence, more and smaller stories demand a more iterative approach, therefore daily stand-up should be performed daily. While teams with longer lead times do not need to have daily stand-up every day.

4.3 PI Planning

In this section the results regarding PI planning are presented. Firstly, a definition of PI planning is outlined in order to provide a general understanding of the topic according to the interviewees. Secondly, the interviewees' opinions on PI planning are presented which covers positive and negative effects as well as operability and improvements. Lastly, perspectives raised by the interviewees concerning whether the implementation of PI planning should be characterized by a predominant state of homogeneity or heterogeneity are presented.

4.3.1 Definition

According to the CL:s, PI planning is an occasion that occurs during a common week for the entire R&D, where the organization comes together and creates a general plan for the upcoming increment. The goal is to resolve dependencies and to ensure that plans are synchronized. The TM:s share a mutual understanding regarding PI planning, yet they also emphasize its significance in the long run. They perceive it as an opportunity to look up and examine what matters most to the stakeholders and what provides the most value for the resources invested. Furthermore, the TM:s emphasize that PI planning simplifies the process of identifying which items that needs to be removed or incorporated.

4.3.2 Opinion on PI planning

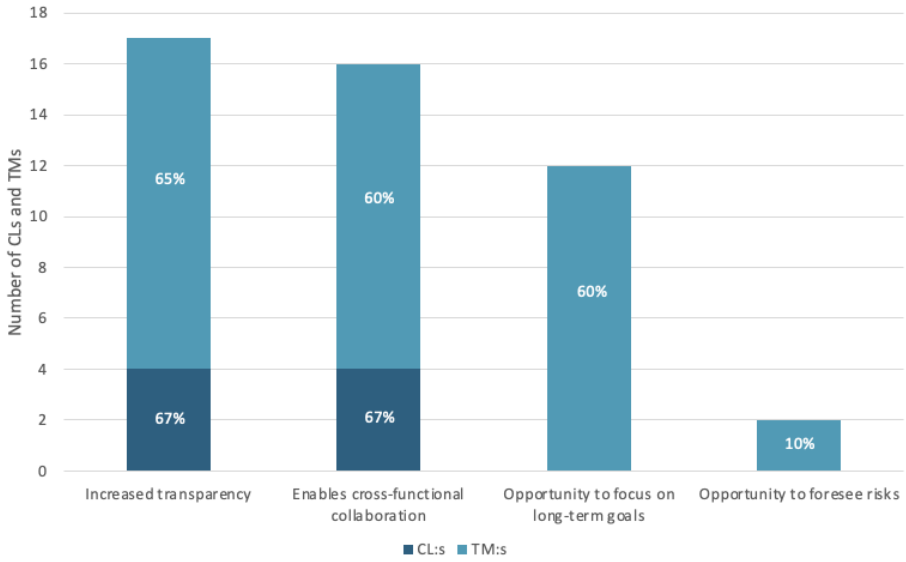
In this section, the positive and negative effects of PI planning are presented according to the interviewees' perceptions and experiences. TM:s' opinions concerning the PI planning's current degree of operability; i.e., how well PI planning is working in their given context, are also provided. Further, the interviewees' suggestions for improvements regarding PI planning are introduced.

4.3.2.1 Positive and negative effects of PI planning

This section presents the positive and negative effects mentioned by both CL:s and TM:s regarding PI planning. The positive effects concern *increased transparency, enables cross-functional collaboration, opportunity to focus on long-term goals,* and *opportunity to foresee risks*, which are visualized in Figure 4.7. The negative effects concern *Time consuming, Difficulties with long-term planning, Lack of mindset of*

changing, difficulties with managing dependencies and *obstacles during PI*. Interviewees who did not consider there to be any negative effects will solely be presented in Figure 4.8 alongside the other claimed negative effects.

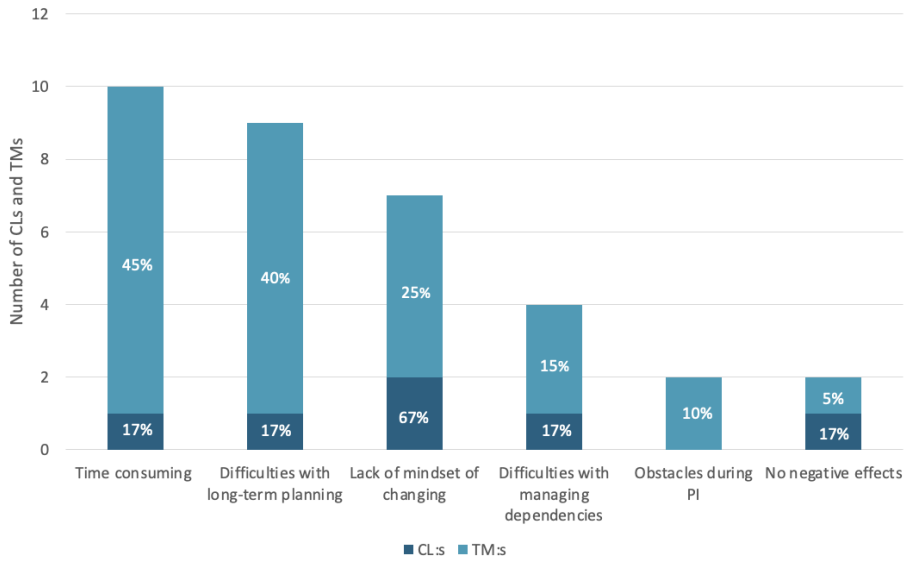
Figure 4.7: Positive effects of PI planning



The majority of interviewees raise *increased transparency* as a positive effect of PI planning. Four of the CL:s claim that the entire organization becomes transparent, facilitating the identification of the tasks that the teams can accommodate and those they cannot, and act accordingly. 13 TM:s hold a similar perspective, but further emphasize that PI planning gives an opportunity to enhance teams' understanding of the entire ART:s' deliveries. Furthermore, it also enables the management to gain a comprehensive overview of the progress and status of all teams. Closely related to transparency, four CL:s describe that PI planning *enables cross-functional collaboration* as it provides an opportunity for teams to communicate with their dependencies, e.g., if their tasks are incomplete or if they require a delivery. Twelve TM:s further highlight that PI planning ensures that teams have a common priority and consensus with those they collaborate with.

Additionally, twelve TM:s claim that PI planning is an *opportunity to focus on long-term goals*, which were not mentioned by the CL:s. They described that it offers teams an opportunity to focus on long-term goals and strategies. Two of the TM:s also mentioned PI planning as an *opportunity to foresee risks* and gain support from management or other teams.

Figure 4.8: Negative effects of PI planning



According to one of the CL:s, PI planning can be *time consuming* as it tend to become an administrative mechanism. The time aspect is also raised by nine of the TM:s, describing that it demands a considerable amount of time and could potentially be made more efficient. However, some of the TM:s highlight that it is a consequence of performing PI planning in a wrong manner. They mean that it should be a continuous process of planning and synchronizing with dependencies. A related issue raised by one CL and eight TM:s, is *difficulties with long-term planning*. They note that a twelve-week plan is a relatively long time horizon, and prerequisites will change, making it challenging to find a good balance in how detailed the plan should be. Another negative effect, according to two CL:s and five TM:s, is if teams have a *lack of mindset of changing*, and adhere too strictly to the agreements made during the PI planning. A further adverse impact is raised by one CL and three TM:s regarding *difficulties with managing dependencies*. It is mentioned that certain teams tend to focus exclusively on their internal operations and struggle to consider their dependencies. Moreover, two TM:s raised an issue regarding *obstacles during PI* due to critical deliveries which becomes an disturbance. It is described that one of the TM:s' teams has dependencies with functions that do not use PI planning, thus their deliveries often coincide with the PI planning week.

4.3.2.2 Operability and improvements

According to 15 TM:s, PI planning works well in their teams. This is due to the fact that they have succeeded in streamlining the PI planning. Several of them derive their success to their effective planning approach, where they do not plan every activity in detail as conditions may change. On the other hand, some of them attribute their success to their thorough preparations for the PI week, which allows them to focus on confirming that all teams within the ART are aligned, rather than spending excessive time on planning during the actual PI week. Furthermore, four TM:s explain that it works relatively well but that it can be further improved. This is

due to several factors related to team maturity and experience, including insufficient long-term planning, ineffective time management, and difficulties in synchronizing with dependencies. Solely one TM believes that PI planning does not work well.

Accordingly, potential improvements that were strongly related to the aforementioned factors were highlighted by both CL:s and TM:s. The majority of interviewees suggest that teams should maintain a continuous dialogue with their dependencies, rather than regarding PI planning as the sole opportunity to resolve all issues. One interviewee explain that PI planning can serve as a beneficial occasion to recognize one's dependencies, however, it is essential to allocate time for the continued dialogue. Another suggestion raised by five interviewees is to have a mature an continuously updated backlog before PI planning. It is explained that this approach can aid in reducing the time allocated for planning activities during the week. Furthermore, four interviewees highlight the important role of the individual accountable for establishing priorities, emphasizing the need for them to possess adequate expertise and courage to make informed decisions. Additionally, two interviewees stress the significance of avoiding over-administration in the PI planning, which entails attempting to plan even the activities that are uncertain.

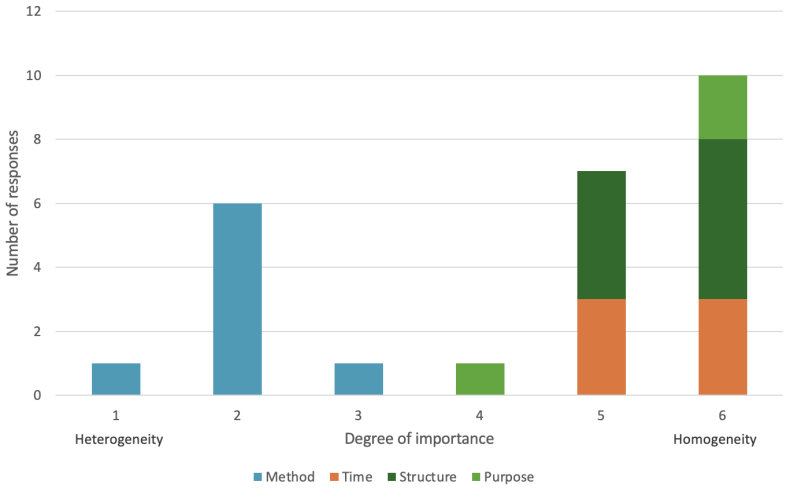
4.3.3 Homogeneous versus heterogeneous implementation for PI planning

In this section the interviewees' perceptions regarding how PI planning should be treated with respect to different perspectives on homogeneous and heterogeneous implementation; i.e., if PI planning should be followed jointly or not, is presented. The results concern responses regarding teams within an ART.

4.3.3.1 Degree of homogeneous implementation for PI planning

When the interviewees were asked to set a degree of importance for homogeneous implementation of PI planning, 11 interviewees solely assigned one grade based on a generic perception and the average degree of importance for their accumulated answers was 5 out of 6. This signifies a considerable high level of importance, given that the rating of 6 denotes a high degree of importance while a rating of 1 denotes a low degree of importance. However, several interviewees divided their answer into different perspectives as they considered it impossible to set a generic grade for the specific Agile WoW. The different perspectives raised by the interviewees and their corresponding grade of importance is illustrated in Figure 4.9. The perspectives raised regarding PI planning were: *Method, Purpose, Time*, and *Structure*.

Figure 4.9: Perspectives' degree of importance regarding homogeneous implementation for PI planning



The figure illustrates the different perspectives raised by the interviewees according to their claimed degree of importance for homogeneous implementation. The grades vary from 1 to 6, where 6 implies that the perspectives have great importance in terms of homogeneity. Thus, 1 implies a low level of importance in terms of homogeneity and can therefore be interpreted as subjects to heterogeneity.

4.3.3.2 Perspectives on homogeneous implementation

The majority of interviewees believe that it is beneficial for PI planning to be more homogeneous for teams within an ART in terms of *purpose*, *structure* and *time*. They emphasize that PI planning is a joint event for an ART which involves many teams, thus requires a common understanding of the planning of their dependencies and language to facilitate the synchronization. Several interviewees explain that the purpose of PI planning is for teams to identify and synchronize with their dependencies, which would benefit from being homogeneous. Furthermore, many interviewees highlight that the general structure of PI planning; i.e., that teams synchronize, resolve conflicts, and present a cohesive plan, should be jointly followed. Many interviewees also express that the presentation of the results should be aligned and fairly homogeneous to make it comparable. In addition, the time perspective was raised by 10 interviewees, where all of them consider that PI should occur in the same week for all teams. It is described that this would ensure that everyone is available and open for mutual discussions. Nonetheless, four of the interviewees also deem that the days during the week should be consistent for all teams, otherwise coordination becomes difficult. One interviewee clarifies that when several teams have arranged a certain day for planning and prepare questions for further discussion, but other teams have their planning scheduled on an other day, it leads to a synchronization issue.

4.3.3.3 Perspectives on heterogeneous implementation

Nearly all of the interviewees state that the *method* utilized by the teams during PI planning could be tailored to the individual teams within an ART. They believe that the operational process of the team during PI, such as writing stories, managing their breakouts, and their set-up, should be tailored to fit the team's needs. It is further described that the content for each team within an ART is not necessarily important to understand for the other teams thus the method should be more heterogeneous. It is also mentioned that teams' deliveries can vary a lot within an ART, which will have an impact on how the teams perform the PI planning.

4.4 Retrospective

In this section, the results regarding retrospective are presented. Firstly, a definition of retrospective is outlined in order to provide a general understanding of the topic according to the interviewees. Secondly, the interviewees' opinions on retrospective are presented which covers positive and negative effects as well as operability and improvements. Lastly, perspectives raised by the interviewees concerning whether the implementation of retrospective should be characterized by a predominant state of homogeneity or heterogeneity are presented.

4.4.1 Definition

Both CL:s and TM:s define retrospective as an opportunity to reflect over the completed work, what the outcome was, learn and discuss how to improve. Retrospective provides the possibility for teams to exchange feedback, both giving and receiving,and to establish and implement actions for the next period of time to maintain continuous improvement.

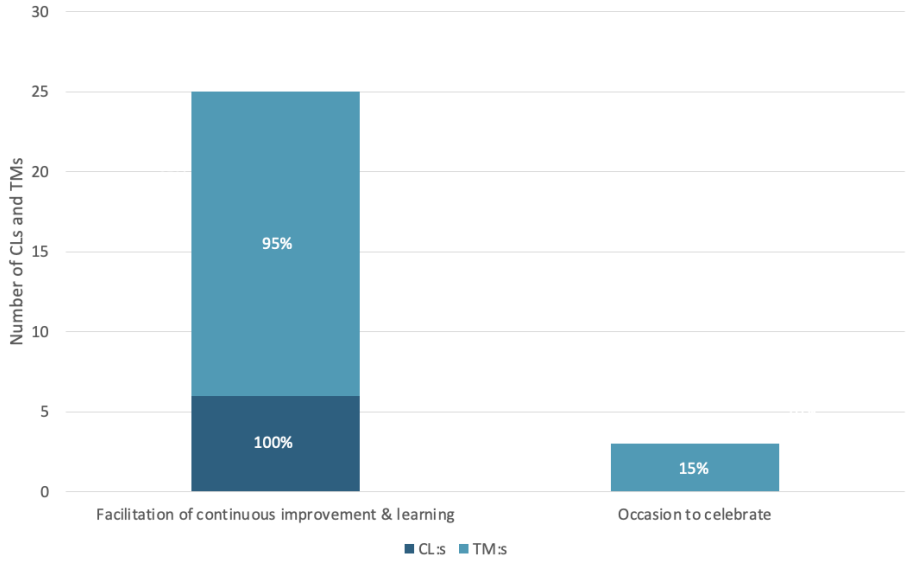
4.4.2 Opinion on retrospective

In this section, the positive and negative effects of retrospective are presented according to the interviewees' perceptions and experiences. TM:s' opinions concerning retrospective's current degree of operability; i.e., how well retrospective is working in their given context, are also provided. Further, the interviewees' suggestions for improvements regarding retrospective are introduced.

4.4.2.1 Positive and negative effects of retrospective

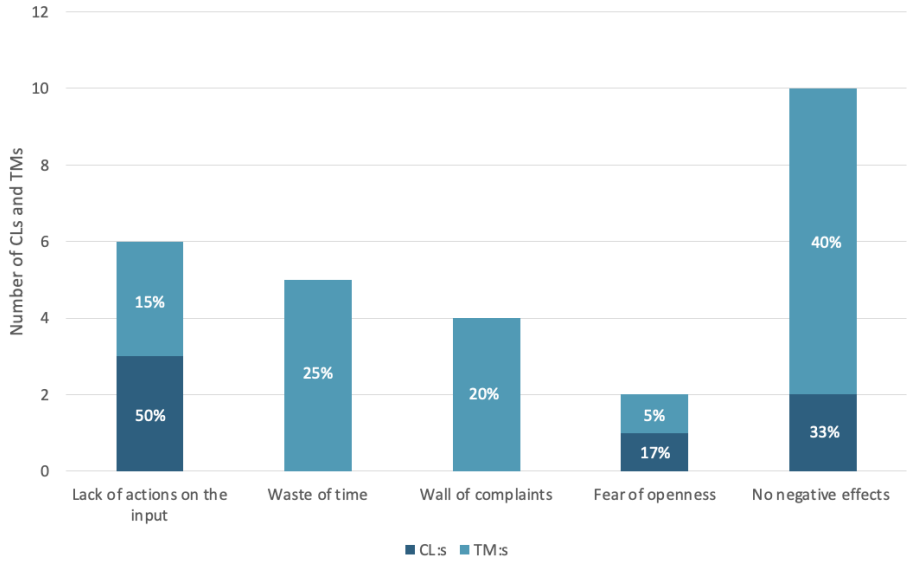
This section presents the positive and negative effects mentioned by both CL:s and TM:s regarding retrospective. The positive effects concern *facilitation of continuous improvement and learning* and *occasion to celebrate*, which are visualized in Figure 4.10. The negative effects concern *lack of actions on the input, waste of time, wall of complaints* and *fear of openness*. Interviewees who did not consider there to be any negative effects will solely be presented in Figure 4.11 alongside the other claimed negative effects.

Figure 4.10: Positive effects of retrospective



The most prominent positive effect of retrospective among both CL:s and TM:s is that it enables *facilitation of continuous improvement and learning*. All CL:s and 19 TM:s assert this viewpoint and emphasize how retrospective contributes to the creation of a feedback culture. It is described by one interviewee as an absolute necessity, because without retrospective there would be no feedback. Retrospective is described to offer a valuable opportunity to identify weaknesses and to create counteractive actions. During a retrospective, the team has all their competences gathered, and thus provides a opportunity for joint and effective discussions and to share valuable knowledge. Retrospective also creates an *occasion to celebrate* according to three TM:s. Celebration has a positive effect through mutual appreciation and recognition of progress or satisfying outcomes.

Figure 4.11: Negative effects of retrospective



One negative effect, shared by three CL:s and three TM:s, concerns the disadvantageous consequence resulting from *lack of actions on the input* gathered from a retrospective. If no actions are taken, there exists a prominent risk of eliminating the enthusiasm and engagement in the team, potentially leading to a loss of faith in the retrospective's productivity and purpose. If the retrospective is not delivering its intended purposes and is not applied in the right way, individuals tend to see it as a *waste of time* according to five TM:s. This can also be the case if the team members do not possess the right mindset and rather interpret the discussions as too stressful and sensitive; i.e., more improvements can be stressful in an already stressful environment, and individuals do not feel comfortable with sharing feelings and thoughts. Furthermore, four TM:s describe how retrospective tends to be regarded as a *wall of complaints*. Hence, to solely be a session for complaints which affects the morale in a negative way. One CL and one TM also describe how these consequences may result in a *fear of openness* if it is regarded as too sensitive or is not received in a positive way.

4.4.2.2 Operability and improvements

Twelve of the TM:s consider retrospectives to work well in their respective teams. Some of the interviewees mention how they have succeeded in applying retrospectives in a way for it to become a continuous activity in the workflow. Retrospectives was at first forced in, in order for the team to evidently capture and understand the purpose and was later adapted to fit their specific context. One interviewee also mentions how reflection and communication corresponds to the specific teams' nature and therefore aligns with the teams' characteristic. One interviewee further mentions that the teams experience many positive effects extracted from retrospectives and thus demand its frequent occurrence themselves.

Only two TM:s considers retrospectives to not work well. One interviewee claim that the teams conduct it in a completely wrong way and the other one explains that retrospectives are not even happening. However, six TM:s consider retrospectives to work partly well. The interviewees describe that it is hard to find the time for retrospective and that it is hard to reflect and have the confidence to discuss tough questions. One interviewee depicts the problem of teams that only focuses on complaints and therefore not acting in a constructive way. Another interviewee claims that the ScM lacks the appropriate support to be able to manage retrospective in a fruitful way.

Consequently, suggestions for improvement were raised by both TM:s and CL:s on how to enhance retrospective's effectiveness. Four CL:s and five TM:s share the notion of creating a psychological safety and openness for the teams to operate in. Hence, a speak-up culture needs to be established in order for the teams to be comfortable enough to share without being negatively affected by it. The teams themselves need to be committed and comprehend that there exist a mutual responsibility in solving problems together. The teams also need engaged leaders who have to be given the right support in order to assist and manage the teams in a suitable way.

Furthermore, four CL:s and four TM:s describe follow-up on inputs and action taken as areas of improvement. Thus, there needs to be an evaluation to determine which actions should be taken, and an increased level of endurance regarding following up on both the actions taken but also the feedback that was not addressed or acted upon. One interviewee also suggests to have fewer retrospectives and therefore allocate more time for solving the problems highlighted. In accordance to the last suggestion, five TM:s raise the possibility to change the cadence of the meeting according to the teams need. Either to have it more seldom or more frequent, or cancel it if there is no need. Four TM:s also emphasize the need to make it fun and encourage new ways of conducting retrospective to boost creativeness and engagement.

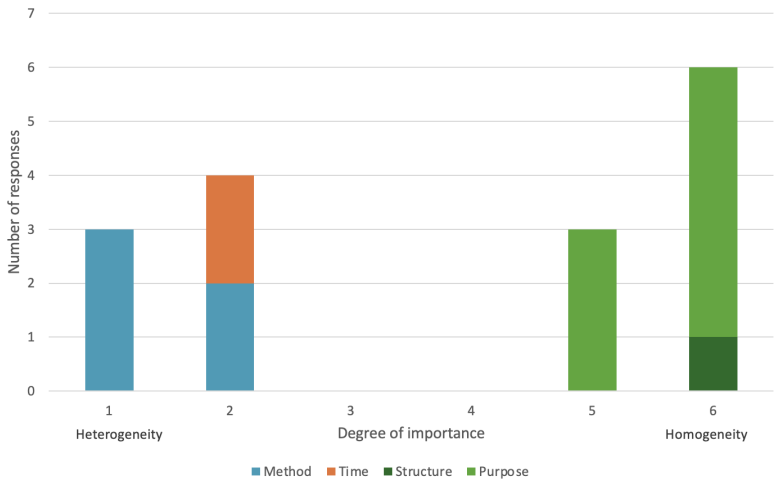
4.4.3 Homogeneous versus heterogeneous implementation for retrospective

In this section the interviewees' perceptions regarding how retrospective should be treated with respect to different perspectives on homogeneous and heterogeneous implementation; i.e., if retrospective should be followed jointly or not, is presented. The results concern responses regarding teams within an ART.

4.4.3.1 Degree of homogeneous implementation for retrospective

When the interviewees were asked to set a degree of importance for homogeneous implementation of retrospective, 14 interviewees solely assigned one grade based on a generic perception and the average degree of importance for their accumulated answers was 3 out of 6. This signifies a fairly low level of importance, given that the rating of 6 denotes a high degree of importance while a rating of 1 denotes a low degree of importance. However, several interviewees divided their answer into different perspectives as they considered it impossible to set a generic grade for the specific Agile WoW. The different perspectives raised by the interviewees and their corresponding grade of importance is illustrated in Figure 4.12. The perspectives raised regarding retrospective were: *Method*, *Time*, *Purpose*, and *Structure*.

Figure 4.12: Perspectives' degree of importance regarding homogeneous implementation for retrospective



The figure illustrates the different perspectives raised by the interviewees according to their claimed degree of importance for homogeneous implementation. The grades vary from 1 to 6, where 6 implies that the perspectives have great importance in terms of homogeneity. Thus, 1 implies a low level of importance in terms of homogeneity and can therefore be interpreted as subjects to heterogeneity.

4.4.3.2 Perspectives on homogeneous implementation

The perspectives contributing to the need for homogeneous implementation concern the importance of understanding the *purpose* of retrospective and to include the accurate content enabling reflection and improvement. In order to achieve this, retrospectives need to be performed continuously in the entire organization. One interviewee also emphasizes that the *structure* of retrospective; i.e., how to communicate and give feedback, and how the inputs from the session are managed and acted upon, would benefit from being homogeneous.

4.4.3.3 Perspectives on heterogeneous implementation

The majority of the interviewees argue for retrospective to be managed with degrees of heterogeneity. However, according to all the interviewees, it is of great importance that each team conducts retrospectives with a clear understanding of their purpose, emphasizing the importance of having retrospectives in every team. Nevertheless, the internal *method* for conducting retrospectives is deemed unimportant and should instead be based on the teams own need. The interviewees describe that there has to be a creative freedom for the team, allowing for flexibility in the adaption of retrospectives according to the team's needs. A retrospective should be fun in order to boost engagement. Also, according to two interviewees, teams should be allowed to adapt the *time*; i.e., frequency and timing of retrospective with flexibility. Further, the team's needs reflect the level of team maturity which should be a determinant on how to perform retrospective in the most suitable way.

4.5 Demo

In this section, the results regarding demo are presented. Firstly, a definition of demo is outlined in order to provide a general understanding of the topic according to the interviewees. Secondly, the interviewees' opinions on demo are presented which covers positive and negative effects as well as operability and improvements. Lastly, perspectives raised by the interviewees concerning whether the implementation of demo should be characterized by a predominant state of homogeneity or heterogeneity are presented.

4.5.1 Definition

Both CL:s and TM:s define demo in a similar way. It is an opportunity to gather the team, dependencies, or/and stakeholders and, in an easy way, demonstrate delivery or status of delivery with the purpose of receiving feedback. The demo is also defined as a way to be transparent, learn from each other, and/or spread information. It is also an opportunity to reflect over the progress or celebrate and be proud of the delivery or the tasks that have been made.

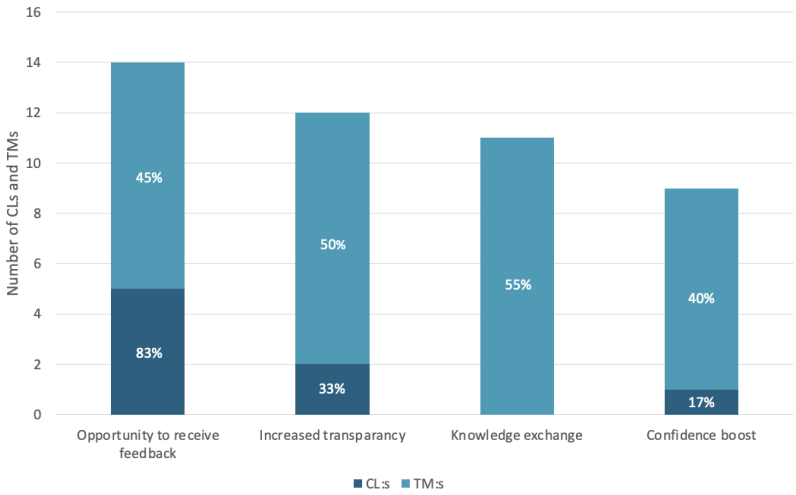
4.5.2 Opinion on demo

In this section, the positive and negative effects of demo are presented according to the interviewees' perceptions and experiences. TM:s' opinions concerning demo's current degree of operability; i.e., how well demo is working in their given context, are also provided. Further, the interviewees' suggestions for improvements regarding demo are introduced.

4.5.2.1 Positive and negative effects of demo

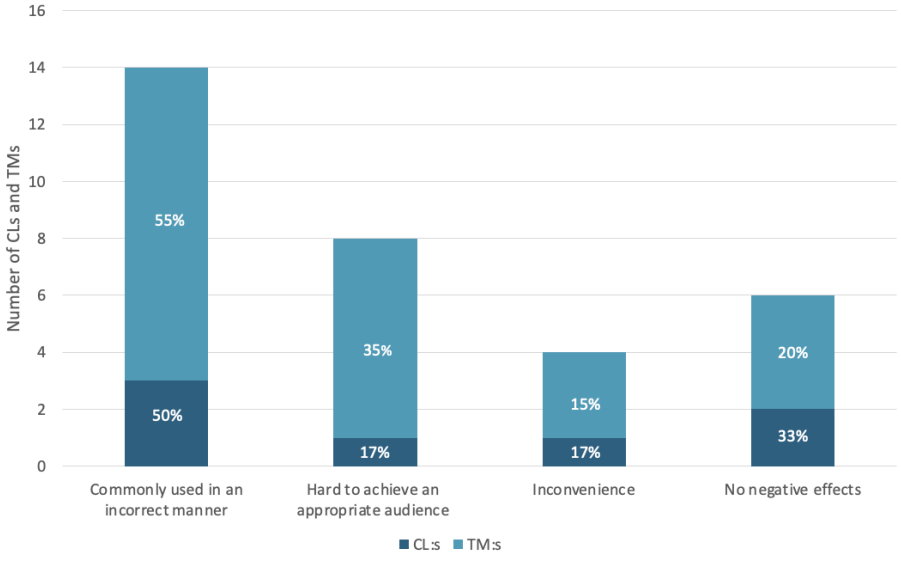
This section presents the positive and negative effects mentioned by both CL:s and TM:s regarding demo. The positive effects concern *opportunity to receive feedback, increased transparency, knowledge exchange* and *confidence boost*, which are visualized in Figure 4.13. The negative effects concern *commonly used in an incorrect manner, hard to achieve an appropriate audience* and *inconvenience*. Interviewees who did not consider there to be any negative effects will solely be presented in Figure 4.14 alongside the other claimed negative effects.

Figure 4.13: Positive effects of demo



Five CL:s and nine TM:s describe demo as an *opportunity to receive feedback* in an early, frequent, and efficient way. Stakeholders or concerned parties can be informed or help guide the teams processes by giving inputs or suggestions for improvements. Through demos, indications are given to the team on whether they are going in the right direction or not. Furthermore, demo provides an *increased transparency*, according to two CL:s and ten TM:s. Demo is regarded as a visual WoW, showing PO, stakeholders, and the team itself what they are able to deliver and what they are actually doing in the team. Therefore, the progress becomes transparent and acts as an incentive to constantly push forward. *Knowledge exchange* is also a positive effect mentioned by eleven TM:s. Demo is considered a way to share knowledge and information among the teams. Furthermore, one CL and eight TM:s depict how demos can give a *confidence boost* to the team. Demo is described as an opportunity to celebrate and be proud, and also to get acknowledgment and confirmation of the accomplishments.

Figure 4.14: Negative effects of demo



Despite demo's positive effects, three CL:s and eleven TM:s describe how it is *commonly used in an incorrect manner*. This could be the case if the team interpret it as an occasion for reporting-out and to be held accountable, rather than viewing it as an occasion for constructive feedback. It is also described how the teams tend to build up improper expectations regarding the execution of the demonstration. Which results in too advanced presentation with too much time spent preparing. Thus, the purpose of conducting demonstrations tends to be vaguely understood. This results in uncommitted participants who consider demo as a waste of time rather than something valuable. Furthermore, one CL and seven TM:s explain the fact that it is *hard to achieve an appropriate audience*; i.e., align the content of the demo with the attending audience. The interviewees explain that they experience a decline in interest and engagement in the audience if the demo not corresponds to the audience's context, expertise, or understanding. Further, it is mentioned that there exists a misunderstanding regarding demos' time of occurrence, which is claimed to be at Fridays in the end of the sprint. This makes it hard for individuals to attend all the demos of interest. Moreover, one CL and three TM:s bring up the aspect of *inconvenience* as a negative effect. Some people perceive demo as a stressful and anxious occasion in terms of standing in front of an audience and be transparent.

4.5.2.2 Operability and improvements

Eight TM:s consider demo to work well in their respective teams. One of them describes important success factors to be explicit explaining of the purpose of the demo, clarifying the expected outcome of the demo, and inviting everyone interested in the demo. However, it is acknowledged by the interviewees that the high level of operability has required much effort. Five TM:s consider demo to not work well. Three of them describe that they experience that demos occur seldom or sometimes not at all. This is due to the fact that team feels that there is a lack of interest in their deliveries or that it is harder for some teams to demonstrate than others due to differences in scope. Another reason is the frequent shift in objectives which confuses what it is that they should demonstrate. Two of them describe that demos is used in an incorrect way, where some teams are not engaged and do not see the potential, while some never or seldom invite stakeholders.

However, seven TM:s consider demo to work partly well. They mention the struggles with inviting audience, gaining the feedback loop, personalities disliking talking in front of others, tendency of demo solely being a status-report, time constraints, and demonstrating a non-physical thing, as subjects to a hindered effectiveness.

Accordingly, potential improvements that were strongly related to the aforementioned factors were highlighted by both CL:s and TM:s. Three CL:s and six TM:s express the importance of emphasizing the understanding, purpose, and potential demos entail and to constantly remind the teams about it. The teams also need to be encouraged and engaged in order to be able to be fully transparent regarding both positive and negative progress. Furthermore, the majority of the interviewees described how demos' adaption to the audience and making sure to invite the "right"

audience are subjects of improvement. To increase interest and enhancing the feedback loop, teams should demonstrate such things that are more concrete, technical understandable, and according to the specific audience interest. One interviewee suggests an option to divide teams into sub-groups to accomplish a more efficient demo set-up, partly based on the ability to be more time-efficient but also based on joint interest. Another interviewee suggests the option to promote and visualize demos by the use of a common channel or platform targeting the audience of interest. Another interviewee claims that management higher in the hierarchy should demand demos or participate more actively by themselves, instead of waiting to be invited. Moreover, two CL:s and two TM:s emphasize the improvement of focusing more on delivery and actually showing the product, and avoiding PowerPoint presentations and solely sharing of information. Furthermore, three TM:s raised the improvement of accomplishing more relaxed demos, lowering the threshold, and focusing on the purpose. Therefore, minimize time for preparations and too fancy presentations.

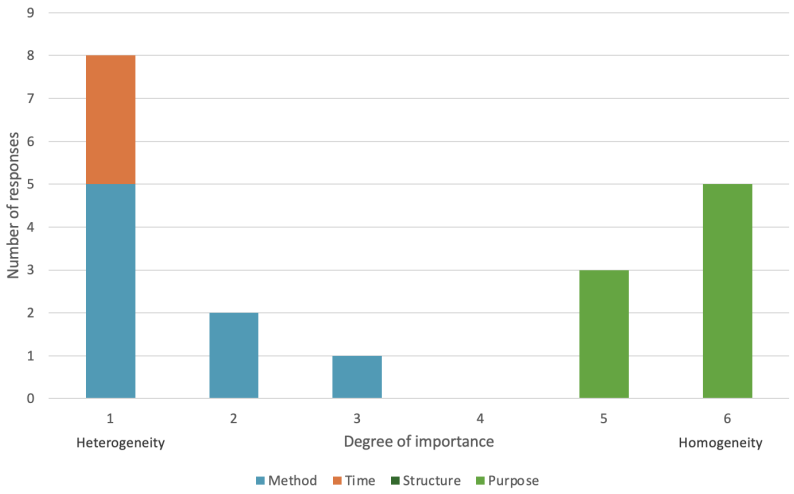
4.5.3 Homogeneous versus heterogeneous implementation for demo

In this section the interviewees' perceptions regarding how demo should be treated with respect to different perspectives on homogeneous and heterogeneous implementation; i.e., if demo should be followed jointly or not, is presented. The results concern responses regarding teams within an ART.

4.5.3.1 Degree of homogeneous implementation for demo

When the interviewees were asked to set a degree of importance for homogeneous implementation of demo, 16 interviewees solely assigned one grade based on a generic perception and the average degree of importance for their accumulated answers was 4 out of 6. This signifies a fairly high level of importance, given that the rating of 6 denotes a high degree of importance while a rating of 1 denotes a low degree of importance. However, several interviewees divided their answer into different perspectives as they considered it impossible to set a generic grade for the specific Agile WoW. The different perspectives raised by the interviewees and their corresponding grade of importance is illustrated in Figure 4.15. The perspectives raised regarding demo were: *Method*, *Time*, and *Purpose*.

Figure 4.15: Perspectives' degree of importance regarding homogeneous implementation for demo



The figure illustrates the different perspectives raised by the interviewees according to their claimed degree of importance for homogeneous implementation. The grades vary from 1 to 6, where 6 implies that the perspectives have great importance in terms of homogeneity. Thus, 1 implies a low level of importance in terms of homogeneity and can therefore be interpreted as subjects to heterogeneity.

4.5.3.2 Perspectives on homogeneous implementation

Several of the interviewees emphasized that the *purpose* of demo should be shared and understood in an equal manner among all teams. Hence, all teams should perform demos with the same purpose and include appropriate content enabling feedback, understanding, and discussion. Furthermore, it is expressed that demo should be performed by all teams with the intention of inviting stakeholders, since it creates an arena for collaboration and transparency. It is further described that by treating demo in a homogeneous way the resistance and inconvenience regarding presentations and being center of attention can decrease among team members. Moreover, it would be beneficial to be homogeneous regarding set-up and titles in the demonstrations; i.e., using the same structure of presentations, in order to facilitate the audience' understanding.

4.5.3.3 Perspectives on heterogeneous implementation

The majority of the interviewees explain the need to manage demos with degrees of heterogeneity in terms of *method* of execution. Given that the purpose of demo is aligned, teams would benefit from adapting the demonstration according to the teams' need. The interviewees claim this due to teams' different scope and delivery. Furthermore, adaptation in execution is deemed necessary in order to boost engagement and creativity. Moreover, the *time* perspective is expressed to be a subject to heterogeneity. The teams' different areas require different frequency in demonstration. Furthermore, it is beneficial to place demos at different time-slots since it creates the possibility of allowing easier accessibility for audience to attend.

5
Discussion

This study intends to explore the identified Agile WoW and examine whether the implementation of each individual Agile WoW should be characterized by a predominant state of homogeneity or heterogeneity. Thus, this chapter outlines the discussion for each of the research questions of the study based on the analysis of the empirical data and relevant literature. The aim of the first section is to answer RQ1, by providing a comprehensive overview of how Volvo Cars currently work with the identified Agile WoW. Furthermore, the aim of the second section is to address RQ2, by presenting the result of the analysis combined with literature regarding the relevance for homogeneous or heterogeneous implementation of each Agile WoW.

5.1 Current Approach for Agile Ways of Working

The answer to the initial RQ aims to provide a comprehensive overview of the current approach with the five Agile WoW at Volvo Cars. The discussion encompasses various aspects, including the definition, perceptions of positive and negative effects, assessment of the current operability, and potential areas for improvement. The discussion endeavors to present a nuanced yet focused depiction of the subject matter, incorporating insights from prior research.

5.1.1 Backlog management

The interviewees, including both CL:s and TM:s, generally share a common understanding of backlog management as a continuous process of managing and evolving the backlog to ensure it remains updated and aligned with the product's goals and maturity progress. They also emphasize the importance of prioritization, collaboration, and transparency in backlog management. This view is aligned with the conceptualization provided by Andry et al. (2019), who define backlog management as the process of clearly articulating items explicitly, optimizing and prioritizing them, and ensuring that the backlog is visible, transparent, and comprehensible to the team.

The TM:s opinions on backlog management within their teams were divided fairly evenly between those who believed it worked well and those who considered it to be functioning reasonably well. According to the TM:s who experienced it to work well, the regular performance of Agile WoW was highlighted as a key factor in managing and adapting the backlog continuously. Additionally, they mentioned the account-

ability and responsibility of the ScM and PO in ensuring an efficient workflow and aligning it with the company's overall goals, as a key factor. This observation aligns with the findings of Oomen et al. (2017), who recognized backlog management as a critical skill required for the successful fulfillment of the PO role and for enhancing team effectiveness. Contrary, factors inhibiting effective backlog management included a lack of long-term perspective, team maturity, and inadequate guidance and presence from leaders.

An interesting discovery emerged, revealing a strong connection between the most frequently mentioned positive effect and the most frequently mentioned negative effect, both of which revolved around the concept of priorities. It appeared that backlog management can act as a facilitator of prioritization by enhancing transparency and providing a clear view of what activities are prioritized and what activities are not prioritized. However, it was also observed that managing priorities can be extremely challenging due to the potential risk of making an incorrect and irreversible prioritization decision that could negatively impact the long-term objective. This indicates that backlog management per se is not inherently negative. However, if it is not executed properly, it can indirectly result in negative consequences. In other words, the negative effect associated with backlog management are more likely to arise from the way it is managed rather than from the practice itself. Hence, this finding strengthens the earlier observation that proficient backlog management is a crucial skill necessary for the effective execution of the PO and for improving the overall effectiveness of the team.

Consequently, several improvements were raised by both TM:s and CL:s considering improved prioritization. These suggestions included to prioritize according to the teams' capacity and activities important for their own needs, allowing flexibility in the backlog to accommodate changing conditions, and to prioritize activities with a longer-term perspective. This pertains to the assertion of Hodgkins and Hohmann (2007), that Agile teams should be motivated to allocate resources towards "non-backlog items" which the team considers significant for the long-term objective. Furthermore, the significance of leadership in fostering comprehension, cultivating an appropriate culture that enables prioritization, and facilitating relevant discussions was emphasized. Dikert et al. (2016); Kalenda et al. (2018) and Senapathi and Srinivasan (2012) also underscore the vital role of managers in effectively implementing Agile WoW, for instance by removing impediments and promoting a culture of continuous learning and improvement. Culture and attitude are cited by Senapathi and Srinivasan (2012) as significant considerations to be taken into consideration in order to enhance the probability of establishing and sustaining long-term and favorable Agile WoW.

5.1.2 Daily stand-up

It is evident that the interviewees values the daily stand-up meeting and its benefits to the team as it is described to provide transparency and knowledge exchange, enhance motivation and alignment, and facilitate team building. Stray et al. (2016)

further describe daily stand-up to be one of the most frequently used Agile WoW. Dalton and Dalton (2019*a*) also describe daily stand-up to be used to maintain a common understanding and increase transparency and collaboration. Hence, the definition acknowledged by both interviewees and previous research are considered to be in agreement.

The majority of the TM:s consider daily stand-up to work well in their respective teams, where the success is explained to be derived from adapting the meeting to their own needs. Singh and Strobel (2023) also describe the tendency of adaption, since there is a reluctance among developers to adopt daily stand-up as prescribed in the books. Stray et al. (2020) comply with the ambition to adapt the meeting according to the specific needs since this is described to result in enhanced productivity. Despite this, the implementation can be quite challenging as acknowledged by Stray et al. (2020). Both interviewees and previous research comply with the same reasoning causing disturbance and inefficiency in the meeting in some extent. For instance, Stray et al. (2020) explain the challenge regarding the relevance of shared information due to task diversity and role differences. This corresponds with the findings by Singh and Strobel (2023) who provide the indication of developers that perceive daily stand-up meetings as irrelevant and a waste of time when they have little dependency to other team members for their tasks or when the discussion is not related to their area of expertise. McHugh et al. (2010) also found that planned meetings, including daily stand-ups, could interfere and disturb developers' productivity, which is aligned with findings by Stray et al. (2020) and Singh and Strobel (2023). These challenges corresponds to the negative effects *poor understanding of purpose* and *inconvenience*, gathered from the empirical data. Thus, there is little discrepancy between previous research and interviewees' experiences.

It is evident that daily stand-up is of great significance when tailored to serve the specific team, since the occasion is the only daily team-based mechanism for coordination, as described by Stray et al. (2017). However, high quality in leaders, especially the ScM, is needed to obtain the purpose and team commitment to capture the value of daily stand-up and keep discipline and engagement high. Furthermore, too big teams or not overlapping areas of work can be managed by dividing the teams into subgroups which corresponds to the believes highlighted by Stray et al. (2017) and Stray et al. (2016). In conclusion, every team is unique and requires different approaches. Therefore, teams' needs and project requirements should be considered while implementing daily stand-up.

5.1.3 PI planning

In the light of the empirical data, PI planning is considered a crucial event for the entire R&D organization, bringing teams together to create a comprehensive plan for the upcoming increment. The main objectives of PI planning are to address dependencies and ensure synchronization of plans. Interviewees also acknowledge its usefulness in identifying backlog items that should be added or removed. According

to Gustavsson (2018), the PI is a series of iterations in which the team strives to provide value and obtain feedback after each iteration, while also recognizing the value of coordination. At the conclusion of each PI, a new release plan is created that includes all team members and stakeholders, resulting in a shared commitment to the plan. Foo et al. (2020) also describe PI planning events as significant centralized gatherings aimed at resolving dependencies and incorporating stories into each other's plans. Therefore, there is consensus among the interviewees and previous research regarding the definition of PI planning.

The majority of TM:s express that PI planning works well in their teams. Their success can be attributed to effective planning approaches, such as not planning every activity in detail due to potential changes in conditions, or thorough preparations before the PI week to focus on alignment rather than excessive planning during the event. These strategies can be seen as the teams adapting and tailoring their planning method according to their specific requirements, with the aim of improving efficiency. This observation aligns with the findings of Gustavsson (2019), which highlight the inclination of organizations to customize PI planning according to their own needs as teams perceive that too much time is spent in joint meetings. These notions serve as a way to address and alleviate the commonly mentioned negative effect of PI planning being *time-consuming*. This also indicates that the negative effect of PI planning being time-consuming is not inherent to the process itself, but rather a result of how the PI planning is conducted or managed.

It appears that the top three commonly cited positive effects of PI planning are closely interconnected, which are *increased transparency*, *enables cross-functional collaboration*, and *opportunity to focus on long-term goals*. Increased transparency enables teams to better understand the entire ART's deliveries, provides a comprehensive overview of progress to management, and facilitates cross-functional collaboration. It also helps teams establish common priorities and consensus with collaborators, and thus provides the opportunity for teams to focus on long-term goals. However, two related negative effects are also raised which are *difficulties with long-term planning* and *difficulties with managing dependencies*. The challenge of long-term planning refers to the notion that a twelve-week plan can be difficult to manage due to changing prerequisites and the need to strike a balance between detail and flexibility. This notion align with the concerns raised by Petit and Marnewick (2021) regarding challenges in prioritization and avoiding over-commitment during PI planning. The issue regarding managing dependencies concerns that certain teams tend to prioritize their internal operations and neglect considering their dependencies, causing issues in coordination. This is a notable challenge in the field of coordination literature regarding scaled Agile. Several researchers have shown that people tend to be hesitant to share knowledge and prefer to work independently in this context (Gustavsson, 2020; Wohlrab et al., 2019).

Based on the previous discussion, it is evident that PI planning can serve as a valuable tool for promoting coordination and collaboration in a large-scale setting, provided that it is executed properly. However, it is clear that when multiple teams

and dependencies are involved, PI planning becomes a complex system that requires careful management. If executed inefficiently or incorrectly, it can result in unintended negative effects. To address these unintended negative effects, the interviewees raised several suggestions of improvements. They recommended to maintain ongoing dialogue with dependencies, establish a mature and updated backlog before PI planning, have knowledgeable individuals accountable for establishing priorities, and avoid excessive administration and planning of uncertain activities during PI planning. These suggestions aim to streamline the process, reduce allocation, and ensure informed decision-making.

5.1.4 Retrospective

Overall, both previous research and the empirical data share the view that retrospective is a fundamental part of AD and aim to maintain continuous improvement (Matthies et al., 2019; Mesquida et al., 2017). The empirical data revealed that the definition of retrospective and the perceived positive effect were consistent among the interviewees, indicating that the Agile WoW serves as a beneficial purpose. Consequently, the majority of interviewees concurred that feedback and continuous improvement were common factors of retrospectives. According to Gonçalves and Linders (2015), the retrospective holds significant value as it is the sole activity that allows for a pause and thoughtful examination of work processes, which is confirmed by the interviewees.

However, retrospective, while inherently intuitive, presents significant challenges in achieving successful outcomes and efficient meetings, as described by Matthies et al. (2019) and interviewees. Similar to daily stand-up, retrospectives require careful execution to be effective. Among the 9 identified problem areas stated by Matthies et al. (2019), all of them relate to the negative effects explained by the interviewees in some way. Nevertheless, retrospective was identified as the Agile WoW where the highest number of interviewees reported no negative effects. Furthermore, these negative effects are no direct negative effects solely extracted from retrospective per se, but rather indirect effects derived from human factors influencing the course of event and overall effectiveness of the meeting, leading to a perception of negativity.

It is apparent that the purpose of retrospective is to serve the team which also has to be facilitated by the team itself. Thus, the team is not only the recipient of the value gained from retrospectives, but also responsible for creating the conditions necessary to achieve that value. Where these conditions have been met, the retrospective process has also effectively fulfilled its intended purpose, which was the case for the majority of the TM:s. This dynamic, coupled with the need for open and honest communication, places significant pressure on the prevalence of various factors. Psychological safety, speak-up culture, mutual commitment, and engaged leaders are such factors mentioned by interviewees. Engaged leaders, when appropriately supported, can act as a catalyst in establishing the three aforementioned critical factors. Furthermore, Derby et al. (2006) present a five-step structure to follow which may provide the conditions necessary for effectiveness and counteract

the perceptions of negative effects.

Based on the discussion, retrospective is considered to be an intra-team specific WoW, providing benefits that cannot be obtained through other means. As such, it is crucial to allocate sufficient time and support to create the necessary conditions for successful implementation, while also considering the team's specific needs and level of maturity.

5.1.5 Demo

The empirical evidence reveals that both TM:s and CL:s share a common view regarding the purpose of demos. They perceive demo as a valuable occasion for bringing together the team, dependencies, and stakeholders to demonstrate the progress or status of the project and obtain valuable feedback. This view is in line with the opinions of researchers such as Kasauli et al. (2017), Myklebust et al. (2017), and Vijay and Ganapathy (2014). Demo is also perceived by the interviewees as a means of transparency, knowledge sharing, reflection on progress, and celebration of accomplishments. This aligns with the idea of Kniberg (2015), that demos can contribute to a sense of empowerment and recognition for teams' accomplishments, while others can learn from their experiences.

While eight TM:s find demos to work well in their teams, the majority of TM:s express that demos work partly well or do not work well for various reasons. For instance, several teams experience infrequent or nonexistent demos due to perceived lack of interest in their deliveries or difficulties in demonstrating their work. Kniberg (2015) also supports this viewpoint and adds that time constraints can further enhance the mentioned reason. Additional challenges revolved around the negative effects that it is *hard to achieve an appropriate audience* and *inconvenience* in terms of personal discomfort with public speaking. Vijay and Ganapathy (2014) also highlight the issue of not attaining the proper customer or stakeholder participation, leading to ineffective or absent feedback. In addition, Gustavsson (2020) points out that a problem is that individuals feel uncomfortable when presenting in front of a larger audience. This indicates that the challenges perceived by the interviewees are commonly encountered.

However, the interviewees agreed that demo is a valuable tool and highlighted several positive effects of demos, including *opportunity to receive feedback*, *increased transparency*, *knowledge exchange*, and *confidence boost*. These positive effects aligns well with the purpose of demos both perceived by the interviewees and previous research. Despite these positive effects of demos, the majority of interviewees note that demos are *commonly used in an incorrect manner*. They may be perceived as reporting-out sessions rather than opportunities for constructive feedback. Improper expectations and a lack of clarity regarding the purpose of demos may lead to uncommitted participants and a perception of demos as a waste of time. Thus, this implies that the demo itself does not inherently produce negative effects, but rather the way it

is conducted and the attitude and perception of individuals can result in indirect negative effects.

The empirical data indicate that demo can be a valuable tool for visualization and feedback within the company if utilized effectively. However, in order to address the raised challenges of demos, potential improvements were suggested. These include emphasizing the purpose and potential benefits of demos, adapting demos to the audience and ensuring the right audience is invited to improve the feedback loop, and creating a more relaxed demo environment with less time spent on preparations. According to Dalton and Dalton (2019*b*), it is essential to have the appropriate stakeholders present who are directly involved and interested in providing feedback and validation. The author further claim it is important that the demo-agenda is agreed upon to ensure that the goal and purpose of the demo are clearly communicated and understood in advance. Furthermore Kniberg (2015) advocates avoiding fancy presentations. Hence, the empirical data and research are consistent. By addressing these factors, the company can enhance the effectiveness of demos.

5.2 Relevance for Homogeneous or Heterogeneous Implementation of Agile Ways of Working

From the analysis of empirical data, it has become evident that it is not feasible to establish a definitive boundary regarding whether an Agile WoW should be either homogeneous or heterogeneous implemented. Prior research has also indicated the challenging nature of providing a definitive response to this binary inquiry (Bass and Haxby, 2019; Moe et al., 2019), as the complexity to answer this question typically arises from the interconnections established among dependencies (Dikert et al., 2016). Collaboration call for alignment for teams to pursue common objectives, thus complete team autonomy cannot be granted according to Moe et al. (2019), which advocates for a homogeneous approach. However, allowing complete autonomy and customization of Agile WoW have also been shown to be beneficial in several cases (Cloke, 2007; Dikert et al., 2016; Kirkman and Rosen, 1999; Paasivaara et al., 2013; Stray et al., 2018), which advocates for a heterogeneous approach. Some scholars advocate the concept of initially adopting a standardized and homogeneous approach to Agile WoW, which can subsequently be customized and refined over time (Cloke, 2007; Paasivaara et al., 2013; Senapathi and Srinivasan, 2012). Rather, Agile WoW can be implemented with varying degrees of both homogeneity and heterogeneity, encompassing different elements of each. Several recurring perspectives emerged during the interviews, shedding light on the aspects of the particular Agile WoW that could be performed in a homogeneous or heterogeneous way. The four perspectives that emerged were: *Purpose*, *Time (timing/cadence)*, *Method*, and *Structure*, illustrated in Figure 5.1.

The purpose perspective was associated with the underlying purpose of the specific Agile WoW. In terms of the time perspective, it can be divided into two perspectives: micro and macro perspectives. The micro perspective involves considerations

of timing, such as when and for how long the specific Agile WoW should be. On the other hand, the macro perspective revolves around the cadence, determining the frequency or recurrence of the specific Agile WoW. The method perspective focuses on how the teams should carry out the work with the specific Agile WoW. In contrast, the structure perspective concerns the overall elements that should be incorporated in the specific Agile WoW. These four perspectives contribute and serve as a basis to the subsequent discussion, resulting in six propositions.

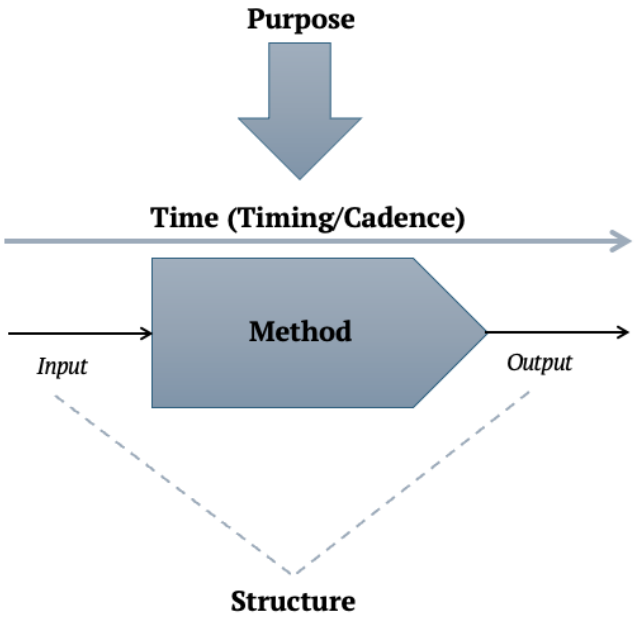


Figure 5.1: Illustration of the four different perspectives that emerged during the interviews regarding homogeneous and heterogeneous implementation of the Agile WoW.

Six propositions were derived from the analysis of the empirical data pertaining the concept of homogeneity and heterogeneity within the context of the concerned Agile WoW, as well as their associations with the four different perspectives that were identified. The initial three propositions are derived with a focus on the characteristics and nature of the Agile WoW. While the subsequent three propositions are derived by placing emphasis on the identified perspectives related to the Agile WoW. These propositions will be outlined and explained in the subsequent discussion.

5.2.1 Importance of homogeneous implementation in managing multiple product dependencies

Lindvall et al. (2004) highlight the fact that larger organizations entail more dependencies between projects and teams, which is consistent with Volvo Cars particular narrative. The Agile WoW mostly concerned with the issue of product dependencies are backlog management and PI planning. These Agile WoW rely on inter-team

synchronization, coordination, and continuous alignment in order to attain the intended purpose and the long-term goal of the company as a whole. Moe et al. (2019) explain that when this kind of collaboration and alignment is needed in order to pursue common goals teams have to sacrifice a certain degree of autonomy. Hence, applying a more homogeneous approach.

Interviewees depict the scenario of backlog management where teams are using their autonomy and empowerment in an improper manner, avoiding collaboration, resulting in sub-optimization. This scenario aligns with the challenge brought up by Moe et al. (2019), where self-organization risks induce a behavior where teams develop and purse their own goals instead of aligning with the shared ones. Gustavsson (2020) and Wohlrab et al. (2019) further confirm the notion of Agile teams primarily focusing on the internal team with the preference of working individually. Consequently, it enhances the indication of treating backlog management in a homogeneous way when it comes to the issue of dependencies' need for alignment and understanding. Furthermore, the majority of the interviewees claimed backlog management to increase transparency, which facilitates the coordination and collaboration among dependencies. Additionally, Paasivaara et al. (2018) claim that poor transparency could be a result from managing backlog in a heterogeneous way. This relates to the perceptions gathered from the empirical data concerning PO:s approaches of conducting backlog management, where heterogeneity in approach confuses the concerned parties. Berntzen et al. (2019) highlight the PO as having a vital role in establishing and assuring coordination across interfaces in order to meet shared goals. This notion contributes to the proposal that dependencies evoke a need to be aligned, have a common direction, and a common approach established by both team members and PO:s.

As mentioned by Gustavsson (2020) dependencies imply a challenge in large-scale AD projects where multiple teams have to collaborate to achieve a shared goal. Moe et al. (2019) further emphasize the importance of aligning and having common goals to achieve common direction. These statements especially relates to PI planning where the goal is to resolve dependencies and to ensure that plans are synchronized. Due to these reasons, the majority of the interviewees believe that it is beneficial for PI planning to be more homogeneous. Based on the empirical data, a common use of nomenclature and language would also be beneficial to facilitate synchronization and collaboration with dependencies. Dikert et al. (2016) emphasize that using a common language and nomenclature can benefit an organization during an Agile transformation. Hence, this can be interpreted to be equally important in the case of PI planning. If teams are missing the larger picture of a large-scale project, it can also be difficult to relate the team's work to it according to Moe et al. (2019). Moreover, one interviewee describes the challenge when teams have dependencies with functions that do not use PI planning, which therefore hinders the efficiency during the PI planning. This matter is also emphasized by Theobald and Diebold (2018) who explain that synchronization of dependencies involving Agile and non-Agile teams becomes challenging and slows down the process.

However, for both backlog management and PI planning, the perspectives raised by the interviewees favoring heterogeneity argue for that the method utilized by the teams during the respective WoW can be tailored to the individual team's need. Team maturity and shifting character of delivery is raised as reasons for differentiation regarding backlog management. For PI planning, writing stories and how they manage their breakouts are aspects that are subject to heterogeneity. Due to these reasons it would be hard for all teams to follow a generic way of execution.

Consequently, one of the most significant challenges involves coordination of the work of multiple teams and their corresponding dependencies. These dependencies are most prominent in backlog management and PI planning. Based on the discussion above, these WoW cannot be granted complete autonomy, hence rather induce a need to be treated with a greater level of homogeneous implementation. Thus, this results in the following proposition:

P1. *Multiple product dependencies call for homogeneous implementation in the Agile WoW (backlog management & PI planning) to facilitate synchronization and collaboration.*

5.2.2 Importance of heterogeneous implementation for the team-specific Agile ways of working

Based on the empirical data, it appears that the Agile WoW intended for intra-team coordination and collaboration can be more heterogeneous in its nature. Particularly daily stand-up and retrospective are notable in this sense as they are described to be team-specific, and based on the belief that all teams have different needs and prerequisites, they necessitate being tailored rather than adopting a one-size-fits all approach. This aligns well with the viewpoint of Stray et al. (2020), who suggest that teams should adapt daily stand-up according to their needs. Similarly, Jovanović et al. (2016) emphasize the importance of tailoring retrospectives to the team's morale and environment. These perspectives enhances the notion that daily stand-up and retrospective can allow for more adaptability and flexibility to suit the unique characteristics and requirements of individual teams.

According to several interviewees, several factors such as team maturity, delivery and tasks, and motivation played a role in determining the degree of heterogeneity required for daily stand-up. They claimed that immature teams may need more structure and focus on team building, while mature teams can be more flexible and focus on delivery. Furthermore, the interviewees claim that if daily stand-ups would have been instructed and controlled, it would also result in a loss in motivation. This is consistent with the viewpoint of Stray et al. (2018) and Kirkman and Rosen (1999), meaning that by allowing autonomy to teams it increases productivity, proactive behaviour, and team commitment. Additionally, the nature of the team's tasks and deliveries may influence the frequency of daily stand-ups, which is also confirmed by Stray et al. (2016). Smaller stories demands a more iterative

WoW which may require daily stand-ups to be performed daily, while teams with longer lead times may not need the same frequency. These perspectives highlight the importance of adapting daily stand-ups to the specific needs of each team.

Similarly, the perspectives of the interviewees supporting heterogeneity in retrospectives emphasize the need for creative freedom and flexibility in how they are conducted. Teams should be allowed to adapt the method and timing of retrospectives based on their own needs and maturity level. This is consistent with the view of Jovanović et al. (2016), that retrospectives should be tailored to the needs of the specific needs and be adapted to their group development phase (i.e., team maturity) as suggested by (Tuckman, 1965). This flexibility allows teams to find the most suitable approach to reflection and improvement, boosting engagement and ownership of the process, which is aligned with the claim that retrospective enhances team empowerment and enjoyment (Derby et al., 2006).

However, for both daily stand-ups and retrospectives, the perspective raised by the interviewees favoring homogeneity argue for a common understanding and purpose of the specific WoW across teams. Considering daily stand-up, they emphasize the importance of aligning the intention and aspects discussed during the meeting to maximize the value of the meeting. Consistency in the implementation and continuous use of daily stand-ups are also seen as important for facilitating communication and collaboration. Similarly, the interviewees generally agreed that every team should have retrospectives and with the right purpose in mind. This is somewhat related to the challenge raised by Kalenda et al. (2018) regarding misconceptions of the Agile concepts, meaning that if teams do not understand the underlying values of the Agile concepts, the Agile WoW will be conducted without an understanding of their purpose.

Although it was emphasized to uphold the purpose of daily stand-ups and retrospectives, the majority of the interviewees agreed that the other perspectives raised could predominantly exhibit heterogeneity and be adapted to the unique needs of the teams and their maturity level. Thus, this results in the following proposition:

P2. *Unique team needs and team maturity level call for heterogeneous implementation in the Agile WoW (daily stand-up & retrospective) to enhance team empowerment.*

5.2.3 Importance of flexibility in balancing homogeneous and heterogeneous implementation for demos

Highly related to the initial notion that it is not feasible to determining whether an Agile WoW should lean towards homogeneity or heterogeneity exclusively, applies particularly for demos as revealed by the empirical data. Demo serve as an opportunity to demonstrate the added value to a system, both externally and internally (Kniberg, 2015), creating a forum to receive and give feedback (Vijay and Ganapa-

thy, 2014). Through demos, teams can gain a sense of empowerment as they receive recognition for their achievements (Kniberg, 2015). To accomplish these outcomes through demos, it has become evident that a combination of varying degrees of homogeneity and heterogeneity is essential. However, the specific balance between the two may vary depending on the nature of the product-related deliverables the teams are working on.

Based on the empirical data, it becomes evident that preserving several degrees of homogeneity in demos holds significance. It is emphasized that the purpose of demos should be shared and understood across all teams, enabling effective feedback, understanding and discussion. In addition, it is reinforced that demos should be conducted with the shared intention of involving key stakeholders, as it creates an arena for collaboration and transparency. This is also confirmed by Dalton and Dalton (2019*b*) who asserts that the key to achieving an effective demo is by ensuring the presence of the relevant and concerned stakeholders to give feedback and validation. Furthermore, by treating the demo in a homogeneous manner can help alleviate resistance and discomfort regarding presentation among team members, counteracting the addressed problem by Gustavsson (2018) that demos concern individuals feeling uncomfortable when addressing larger audiences. According to the interviewees, homogeneity in the structure of the presentation, such as the set-up and titles, can be beneficial to further enhance the audience comprehension.

On the other hand, it appears that maintaining various degrees of heterogeneity in demos is equally significant. The majority of interviewees agreed that demos can be managed with various degrees of heterogeneity in terms of method of execution. According to the interviewees, different teams may have varying scopes and deliveries, necessitating adaptability in the execution to boost engagement and creativity. According to Dalton and Dalton (2019*b*), a demo is an effective way to showcase the added and promised value to a system. Furthermore, in the context of large-scale Agile, multiple teams work simultaneously on different components of the same system (Schwaber, 2007), and may also interface with various functions (Dikert et al., 2016). These two statements can be understood as indicating that different teams have distinct scopes and deliveries that should be demonstrated to add value to the system, and thus reinforce the viewpoint of the interviewees. From the empirical data, it also appears that the demo needs to be adapted to the audience to enhance their comprehension, which is confirmed by Kniberg (2015). Moreover, it appears in the empirical data that the teams' different areas also have an impact on the frequency of demos. It is further described that it is beneficial to place demos in different time-slots to enable easier accessibility for audience to attend. This approach could help address the issue raised by Vijay and Ganapathy (2014) regarding the circumstance of not attaining the appropriate customer or stakeholder participation, leading to ineffective or non-existing feedback.

From the preceding discussion, it becomes apparent that there exists a somewhat blurred distinction between heterogeneity and homogeneity in the context of demos. It can be advantageous to embrace heterogeneity to tailor the demo according to the

team's unique deliverables and accommodate the audience's needs. Simultaneously, homogeneity can be beneficial in fostering comprehension of the demo's purpose and enhancing the audience's understanding. This indicates that demos necessitate a higher level of flexibility in determining the balance between homogeneity and heterogeneity, considering the diverse product-related deliveries of the teams. Thus, this results in the following proposition:

P3. *Different type of product related deliveries call for a greater flexibility in balancing homogeneous and heterogeneous implementation for demos to achieve higher effectiveness.*

5.2.4 Homogeneous implementation of purpose and structure enhance effectiveness and shared understanding

Dikert et al. (2016) explain that AD is not centered around the use of specific tools or practices, but rather on a comprehensive mindset. Furthermore, Highsmith (2009) emphasizes that Agile teams need to align with the Agile values and principles. Kalenda et al. (2018) describe how these values, principles, and mindset are expressed in the SAFe framework in order to support organizations. Furthermore, Kalenda et al. (2018) describe the recurring issue of individuals not comprehending the underlying values of Agile and therefore Agile WoW are carried out without an understanding of their purpose. Fischer (2018) depicts this scenario to be a reason why Agile fails. Hence, it becomes evident that the Agile understanding constitutes a required foundation in order to successfully manage and practice Agile WoW. The statement aligns well with the empirical data, where the purpose perspective had a degree of importance for homogeneity ranging from the grade of 4 to 6 concerning all WoW. Thus, the interviewees considered that it was of high importance that the understanding of values and purpose should be equally shared and desired, and therefore be subject to homogeneity, regardless of the WoW. If a homogeneous understanding of purpose is established all teams will have the same possibility in extracting the intended value of the WoW, thus contributing to the accumulated value gained.

By having a homogeneous understanding of the purpose of backlog management and PI planning, synchronization and alignment with prioritizations are enabled according to the empirical data. Furthermore, the interviewees explain that by understanding the purpose of daily stand-up and retrospective, accurate discussions are being held with the right intentions. However, Stray et al. (2020) acknowledge difficulties with aligning teams around the intended purpose of daily stand-up resulting in diverse efficiencies of the meeting. Which also aligns with one negative effect perceived by four interviewees. This strengthens the proposal of having a joint understanding of the purpose. Moreover, Derby et al. (2006) emphasize the importance of repeating the purpose of the retrospective session to ensure alignment, understanding, and engagement. Furthermore, by having a homogeneous understanding of the purpose of demo, appropriate content and audience will be included,

enabling feedback, collaboration and transparency. This is especially important due to the interviewees perception that demo is frequently used in an incorrect manner. Dalton and Dalton (2019*b*) confirm the indication of being explicit and homogeneous about explaining the purpose of the demo.

Additionally Dybå et al. (2014) explain AD as a way to balance flexibility and structure. Consequently, structure was one of the perspectives raised by the interviewees in relation with the Agile WoW in terms of homogeneity and heterogeneity. Based on the empirical data, the structure perspective had a degree of importance for homogeneity ranging from the grade of 5 to 6 concerning backlog management, PI planning, and retrospective. Thus, the interviewees considered that it was of high importance that structure should be equally shared and followed, and therefore be subject to homogeneity. Structure in the case of backlog management concerns nomenclature, tools for support, and PO:s' approach. Treating these subjects in a homogeneous way between teams will imply a facilitation of agreeing upon backlog content and alignment among the involved parties connected to the backlog. Structure in the case of PI planning concern language used and included content (e.g, synchronizing, solving conflicts, and presenting the plan). Treating these subjects in a homogeneous way between teams will imply a common understanding among dependencies and an assurance that the necessary elements are included to be as effective as possible. Furthermore, structure in the case of retrospective concerns how to communicate and counteractive actions on input. Treating these subjects in a homogeneous way between teams will imply a likelihood of becoming better at giving and receiving feedback and develop more trust in the process. Inspiration on how to attain this could be taken from Derby et al. (2006) who suggest a five-step structure of conducting retrospective, including elements which contributes to the wanted effects.

Hence, based on the discussions above, multiple aspects all indicate on the proposal of being homogeneous regarding sharing the same understanding of the purpose related to all Agile WoW. Additionally, aspects concerning elements of procedure, content, nomenclature, and approach all indicated on the proposal of also being homogeneous regarding following and including the same elements of structure in the cases of backlog management, PI planning, and retrospective. Thus, this results in the following proposition:

P4. *Having a homogeneous structure and purpose is effective and creates common understanding.*

5.2.5 Shared purpose enables heterogeneous implementation of method for all Agile ways of working

Contrary to the previous discussion, the empirical data indicates that while the purpose of the Agile WoW should adhere to homogeneity for all identified Agile WoW, the execution method employed should be subject to heterogeneity for all

identified Agile WoW. According to (Dikert et al., 2016), customization has been proven effective in Agile implementation, allowing teams to tailor the Agile WoW to their specific requirements. This practical adaption, rather than rigidly adhering to textbook interpretation, facilitates team innovation and enhances performance (Dikert et al., 2016). Especially in the context of large-scale Agile, it is not feasible to employ the same method across all teams. Nevertheless, it is crucial to keep the Agile principles in mind during customization to prevent contradictory adaptations to the Agile WoW (Dikert et al., 2016). The statement is consistent with the empirical data, where the method perspective had a degree of importance for homogeneity ranging from the grade of 1 to 3 concerning all WoW. This suggests a relatively low significance of homogeneity and can thus be interpreted as allowing for heterogeneity.

As previously highlighted, it is emphasized that the team-specific Agile WoW such as daily stand-up and retrospective should allow heterogeneity in their method of execution. This is confirmed by Jovanović et al. (2016) and Stray et al. (2020). However, the empirical data revealed that a notable preference for homogeneity in the method of execution also applied to the other Agile WoW; i.e., demo, backlog management, and PI planning. Considering demo, teams' diverse scope and deliverables, along with the audience involved, are factors contributing to heterogeneity in the execution of demo. Moreover, factors such as team maturity and the changing character of delivery are cited as reasons for allowing differences of execution in backlog management. In addition, the execution of writing user stories and managing breakout sessions are highlighted as aspects subjects to heterogeneity during PI planning.

However, the interviewees underscore the importance of having a shared and unified purpose of the respective Agile WoW among teams. Without this alignment, the introduction of heterogeneity in execution may lead to undesirable consequences and negative effects. For instance, certain interviewees claimed that a significant purpose of backlog management is to consider long-term projects and upcoming initiatives. This statement is in line with the view of Gustavsson (2020), meaning it is important to give backlog management significant attention for achieving a high level of precision and comprehensibility to facilitate planning for long-term horizons. However, the interviewees express concern that this aspect is occasionally overlooked or misunderstood, leading to a tendency to primarily manage and prioritize short-term items in the backlog. In the context of demo, the most frequently mentioned negative effect is that demo is *commonly used in an incorrect manner*, which can be interpreted as an indication that the team may lack a clear understanding of the purpose of the demo. The interviewees describe that this could be the case if the team perceive the demo as a session for reporting-out and to be held accountable, instead of a constructive feedback session. Considering PI planning, one of the top three negative effects was that teams may have a *lack of mindset of changing* and adhere too rigidly to the agreements established during the PI planning. This can be understood as a consequence of misunderstanding or misconceptions regarding the purpose of PI planning. This observation is supported by Bajpai (2020), who points out that PI plan should not be treated as a static plan and one-time agree-

ment limiting the ability to re-plan and re-coordinate in response to changes and evolving circumstances.

Therefore, considering the aforementioned discussion, several factors point towards advocating heterogeneity in the method of execution across all of the identified Agile WoW. However, it is crucial to note that this assumption relies on the prerequisite that all teams possess a shared and unified comprehension of the underlying purpose of them. Failure to meet this requirement may result in negative consequences. Thus, this results in the following proposition:

P5. *Once purpose is jointly owned, methods can be heterogeneous to enhance team empowerment across all Agile WoW.*

5.2.6 Time (cadence/timing) necessitate varying degrees of homogeneous and heterogeneous implementation

Hron and Obwegeser (2018) describe that AD frameworks and methods typically need to be adapted to fit the needs of the specific development environment. What has been noticed, is that an adaption also is relevant in the case of the time perspective in the setting of different Agile WoW. Hence, the time perspective has no fixed state, belonging to neither homogeneity nor heterogeneity for each Agile WoW, which has been the case for the other identified perspectives. Thus, time is affected by different factors prominent in the specific context which thus gives a fragmented result in its character. The time perspective had a degree of importance for homogeneity ranging from the grade of 1 to 6 concerning all Agile WoW except for backlog management. This suggests that cadence and timing for respective Agile WoW is a prominent perspective as well as a scattered perspective for degree of homogeneity, strengthening the discussion above.

Time in the case of daily stand-up, had a grade of importance for homogeneity of 1, 2, and 5, thus indicating a diverse perception among the interviewees. Grade 1 and 2 indicates that the time perspective should be treated in a heterogeneous way. Based on the empirical data, team maturity and team delivery and task, are factors mentioned affecting the time perspective. Immature teams and many and small stories indicate a need for higher frequency of the meetings, while mature teams with fewer and bigger stories indicate the opposite. Stray et al. (2016) strengthens this perceptions and suggest that the frequency of the meeting should be adapted to the team's need. However, grade 5 indicates on the same aspect (i.e., frequency) to be treated in a homogeneous way. This viewpoint concerns the emphasis that all teams, despite their characteristics, should have daily stand-up continuously every day.

Time in the case of PI planning, had a grade of importance for homogeneity of 5 and 6 thus indicating a more unified perception among the interviewees. Hence, the time perspective should be treated in a homogeneous way. Based on the empirical data,

interviewees emphasized the importance of PI planning's occurrence which should be consistent for all teams. Thus, claiming that PI planning should occur in the same week and some claiming that it should occur during the same days of the week to facilitate coordination with dependencies. However, the duration of the event seems to be a heated debate. Gustavsson (2019) explains the tendency of teams perceiving that two days of planning is unnecessary long. Hence, the perception evokes the feeling of viewing the event as a waste of time with the aspiration of tailoring it to the team's own need. Conboy and Carroll (2019) also describe the risk of implementing a "one size fits all" framework, which PI planning in its rather prescribed nature entails, since it decreases team's flexibility. Closely related, the most prominent negative effect presented in the empirical data concerns this issue. Interviewees describe the potential of PI planning to become more time efficient.

Time in the case of retrospective and demo, had a grade of importance for homogeneity of 2 and 1 respectively, thus also indicating a more unified perception among the interviewees. Hence, the time perspective should be treated in a heterogeneous way for both Agile WoW. Based on the empirical data the team's need is the factor mentioned affecting the time perspective for retrospective. The interviewees mean that the frequency of the meeting should be adapted to the specific team's need and thereby allocating more time for solving the identified problems. This adaption would also act as a candidate in solving the most prominent negative effect described by the interviewees concerning lack of actions on the input. Additionally, Jovanović et al. (2016) agree with the fact that retrospective should be tailored to fit the team's moral and environment which could be guided according to the team maturity. Furthermore, team delivery, and accessibility are factors mentioned affecting the time perspective for demo. According to the empirical data, different deliveries demand different frequency in demonstration and placing the demos at different time-slots allows for easier audience participation. Hence, if the timing would allow for being heterogeneous among teams, it would also possibly to some degree counteract the negative effect concerning the difficulty of achieving an appropriate audience. However, Kniberg (2015) describe the tendency of individuals underestimating the value of participating in demos.

Hence, time, in terms of timing and cadence, is affected by different factors prominent in the specific context the Agile WoW entails. Thus, resulting in a diverse result in its character with regards of degree of homogeneity. Time in the aspect of cadence is predominantly having a degree of importance for homogeneity ranging from the grade of 1 to 2 for daily stand-up, retrospective, and demo. Based on the discussion above, time in terms of cadence is related to teams' needs in terms of maturity, delivery, and task. Thus, it can be interpreted that cadence is subject to heterogeneity in more team-specific Agile WoW. Additionally, time in the aspect of timing is also a subject to heterogeneity for demo, since it is described to facilitate collaboration. However, based on the aforementioned discussion, in the case of collaboration and coordination among dependencies the importance of homogeneity increases for both cadence and timing, ranging from the grade of 5 to 6 for PI planning. Thus, this results in the following propositions:

P6.1 *Homogeneous implementation in terms of both cadence and timing is strongly related to the needs of managing product dependencies.*

P6.2 *Heterogeneous implementation in terms of cadence is strongly related to team-specific Agile WoW.*

5.2.7 Summary of relevance for homogeneous or heterogeneous implementation of Agile ways of working

This section provides a concise summary and explanation of the six propositions that have emerged throughout the discussion regarding homogeneity and heterogeneity. In Table 5.1, an overview of the perspectives that either call for a homogeneous or heterogeneous implementation for each specific Agile WoW is illustrated. Subsequently, in Table 5.2, a clear overview of the six propositions is presented, providing a brief description of each proposition along with the corresponding Agile WoW it pertains to.

Considering the initial three propositions (*P1-P3*), a notable distinction can be observed between the Agile WoW that focus on managing product dependencies and those that have a stronger emphasis on team dynamics. This distinction is closely associated with the coordination and collaboration required within and between teams, contributing to the differentiation of homogeneity and heterogeneity in the implementation of the Agile WoW. The proposition related to product dependencies highlights the necessity for coordination and collaboration among different teams; i.e., *inter-team coordination*, indicating a greater degree of homogeneous implementation in these scenarios. On the other hand, the proposition addressing team-specific Agile WoW emphasize the importance of team empowerment and collaboration within teams; i.e., *intra-team coordination*, pointing towards a higher level of heterogeneous implementation. However, it is important to acknowledge an exception, particularly in the third proposition, where a blurred distinction between heterogeneity and homogeneity arises within the context of demos. Due to the diverse product-related deliveries of the teams, demo call for a higher level of flexibility in determining the appropriate balance between homogeneous and heterogeneous implementation.

The subsequent three propositions (*P4-P6*) were based on the analysis of the emergent perspectives concerning the different Agile WoW. Notably, it was possible to distinguish between purpose and method. It was deemed preferable for the purpose to be implemented homogeneous, while allowing for heterogeneity in the implementation of the method, provided that the purpose was shared. Similar to the purpose perspective, the structure perspective was also deemed significant in terms of homogeneity, particularly in the context of daily stand-up, PI planning, and retrospective. However, the discussions regarding the structure perspective in relation to backlog management and demos were absent, leaving uncertainty about the extent to which

a homogeneous implementation applies to these particular Agile WoW. Among the various perspectives considered, the time perspective, encompassing both cadence and timing, emerged as particularly noteworthy due to its diverse appearances with respect to the degree of homogeneous implementation. However, it was revealed that a homogeneous implementation, in terms of both cadence and timing, was rated highly important for PI planning, primarily because of the need for collaboration and coordination with other teams. While a homogeneous implementation, in terms of cadence, was rated low for team-specific Agile WoW, and thus indicating cadence as a subject to heterogeneity. These notion formed the foundation of the final two sub-propositions (*P6.1, P6.2*). Nonetheless, the time perspective concerning backlog management was not explicitly addressed, which somewhat diminishes the proposal's strength.

Table 5.1: Overview of which perspectives that either call for homogeneous or heterogeneous implementation for the respective Agile WoW.

Agile WoW	Homogeneity	Heterogeneity
Backlog Management	Structure, Purpose	Method
Daily stand-up	Purpose	Method, Time (cadence)
PI planning	Purpose, Structure, Time (cadence & timing)	Method
Retrospective	Purpose, Structure	Method, Time (cadence)
Demo	Purpose	Method, Time (cadence & timing)

Table 5.2: Summation of the six propositions derived from the analysis of empirical data, delineating their associations with specific Agile WoW.

Proposition	Description of proposition	Concerned Agile WoW
P1: *Multiple product dependencies call for homogeneous implementation in the Agile WoW (backlog management & PI planning) to facilitate synchronization and collaboration.*	One key challenge in Agile WoW is coordination of multiple teams and managing their dependencies. Thus, these aspects require a higher level of homogeneous implementation and cannot operate in complete autonomy.	Backlog management, PI planning
P2: *Unique team needs and team maturity level call for heterogeneous implementation in the Agile WoW (daily stand-up & retrospective) to enhance team empowerment.*	While purpose should be maintained, it is acknowledged that the other perspective can predominantly exhibit heterogeneous implementation and be adapted to the teams' needs and maturity level.	Daily stand-up, Retrospective
P3: *Different type of product related deliveries call for a greater flexibility in balancing homogeneous and heterogeneous implementation for demos to achieve higher effectiveness.*	The context of demos reveals a blurred distinction between homogeneous and heterogeneous implementation. Different type of product related deliveries may require different degrees of homogeneity and heterogeneity to be beneficial.	Demo
P4: *Having a homogeneous structure and purpose is effective and creates common understanding.*	It is evident that purpose is a subject to homogeneity across all Agile WoW. Structure, particularly in daily stand-up, PI planning, and retrospective, is considered significant for homogeneity, but were absent for the other Agile WoW.	All Agile WoW*
P5: *Once purpose is jointly owned, methods can be heterogeneous to enhance team empowerment across all Agile WoW.*	All Agile WoW exhibit a preference for heterogeneity in the method, provided that the purpose is homogeneous. Failing to meet this requirement may lead to adverse outcomes.	All Agile WoW
P6.1: *Homogeneous implementation in terms of both cadence and timing is strongly related to the needs of managing product dependencies.*	In the case of collaboration and coordination of dependencies the importance of a homogeneous implementation increases for both cadence and timing.	PI planning
P6.2: *Heterogeneous implementation in terms of cadence is strongly related to team-specific Agile WoW.*	In the case of team-specific Agile WoW, a heterogeneous implementation, in terms of cadence, is beneficial to allow adaptability to the teams' needs and maturity level.	Daily stand-up, Retrospective, Demo

All Agile WoW for the **purpose perspective, but the **structure perspective** in relation to backlog management and demo were absent*

6
Conclusion

The diverse perspectives surrounding Agile WoW within a large-scale context evoke compelling inquiries pertaining to the feasibility of adopting a standardized approach across all teams, versus tailoring the Agile WoW to accommodate specific team requirements. Consequently, this prompts an investigation into Volvo Cars' existing approach concerning the five identified Agile WoW, and the prevalence of homogeneity or heterogeneity that ought to be implemented within different Agile WoW. The study utilizes previous research and a case study concentrated in the R&D department to address the research questions and to achieve the determinant purpose. In particular, the scope of the case study encompassed 26 interviews. The research addressed two main questions: *how does the organization currently work with the identified Agile WoW? (RQ1)* and *which of the identified Agile WoW should be implemented with a predominant state of homogeneity or heterogeneity, and what is the rationale behind the disparity? (RQ2).*

6.1 RQ1

It can be concluded that little to no discrepancy exist between the interpretations of the Agile WoW in terms of their definition, as defined by both interviewees and previous research. Furthermore, multiple positive and negative effects have been raised which to a great extent can be confirmed by findings in previous research. Thus, indicating that the experiences of the interviewees are not unique in the contexts the Agile WoW constitute. However, it can be deduced that the negative effects raised by the interviewees associated with the different Agile WoW are more likely to arise from the way they are managed rather than from the practice itself. This implies that the success of the Agile WoW is contingent upon both the practitioner and those responsible for establishing the necessary prerequisites. Hence, this finding entails significant challenges and effort. Despite this, the findings demonstrate that at least half of the TM:s perceive the Agile WoW as effective in their teams, with the exception for demo. The observed success can be attributed to the persistent utilization of the working methodology and the continuous comprehension of its significance. Simultaneously, the success is further enhanced by adapting the methodology to align with the unique requirements and preferences of the team. However, five reported dissatisfaction with demo. Notably, demo emerged as the most noteworthy Agile WoW. This arises due to instances where the demo is omitted entirely, and where the underlying purpose of the Agile WoW is either not comprehended or perceived as irrelevant within diverse team contexts.

Although the effectiveness and functionality of the Agile WoW are not demonstrated at their fullest extent, various suggestions for improvement are identified. These suggestions predominantly emphasize joint responsibility and adaptations to ensure that dependencies and team needs are addressed. This highlights the challenges that Volvo Cars has experienced and continues to face, but it also underscores the organization's commitment and determination to resolve them.

6.2 RQ2

The findings have revealed that establishing a definitive boundary to determine whether an Agile WoW should exhibit exclusively homogeneous or heterogeneous implementation is not practical. Prior research has acknowledged the inherent complexity in providing a definitive response to this inquiry. Instead, Agile WoW implementation can manifest diverse degrees of both homogeneity and heterogeneity, incorporating distinct elements from each paradigm. Through interviews conducted for this research endeavor, four perspectives emerged — *Purpose*, *Time (timing/-cadence)*, *Method*, and *Structure* — shedding light on the aspects of Agile WoW that can be implemented with varying degrees of homogeneity or heterogeneity. These perspectives provide a foundation for the development of six propositions, which offer insights into the rationale behind the disparity observed in Agile WoW implementation. The derived propositions from the analysis underline the significance of coordination, collaboration, and team dynamics in determining the level of homogeneity or heterogeneity in Agile WoW implementation. Specifically, Agile WoW aimed at managing product dependencies exhibited a greater inclination toward homogeneity, emphasizing the necessity of inter-team coordination. Conversely, Agile WoW emphasizing team dynamics and empowerment demonstrated a higher propensity for heterogeneity, emphasizing intra-team coordination.

The analysis further highlighted that the purpose perspective and the structure perspective advocate for a homogeneous implementation, while allowing for heterogeneity in the method perspective. The time perspective, encompassing cadence and timing, emerged as a significant factor influencing the degree of homogeneity in Agile WoW implementation. However, the time perspective is affected by different factors prominent in specific context which thus results in a fragmented result in its character, explicitly belonging to neither homogeneity nor heterogeneity. However, certain perspectives were not fully addressed for each Agile WoW. Specifically, the time perspective in backlog management and the structure perspective in daily stand-up and demo, which somewhat diminishes the findings strength.

6.3 Future Research

This study has made a significant contribution to the understanding of homogeneous and heterogeneous implementations in Agile WoW by identifying four perspectives and developing six propositions through analysis. These identified perspectives and

propositions provide valuable insights into the rationale behind the observed disparities in homogeneous and heterogeneous implementation. However, it is important to note that these insights do not represent absolute truths, but rather serve as indicators for further investigation. Therefore, similar studies within other companies are encouraged to validate or challenge this outcome for advancing knowledge in scaling Agile.

To challenge these propositions, future research can employ various methodologies and approaches. Qualitative studies, such as in-depth interviews or ethnographic research, can provide rich insights into the experiences and perspectives of Agile practitioners. These studies can explore the nuances of Agile WoW implementation and uncover additional factors that may influence the degree of homogeneity or heterogeneity.

Secondly, additional research can delve deeper into the specific Agile WoW identified in this study, particularly focusing on the perspectives that were not explicitly addressed for each Agile WoW. Understanding the factors that influence the level of homogeneity or heterogeneity in these Agile WoW would contribute to a more comprehensive understanding of their implementation and the rationale behind any disparities.

Finally, future research can consider conducting comparative studies across different organizations or industries. By examining Agile WoW implementation in diverse contexts, researchers can identify contextual factors that may impact the level of homogeneous or heterogeneous implementation. This comparative approach can offer insights into the generalizability of the propositions and provide a broader understanding of Agile WoW practices beyond a single case study.

References

Ahmad, M. O., Lenarduzzi, V., Oivo, M. and Taibi, D. (2018), Lessons learned on communication channels and practices in agile software development, *in* '2018 Federated Conference on Computer Science and Information Systems (FedCSIS)', IEEE, pp. 929–938.

Akif, R. and Majeed, H. (2012), 'Issues and challenges in scrum implementation', *International Journal of Scientific & Engineering Research* **3**(8), 1–4.

Alänge, S. (2009), 'The affinity-interrelationship method aim', *A Problem Solving Tool for Analysing Qualitative Data Inspired by the Shiba "Step by Step" Approach* .

Almeida, F. and Espinheira, E. (2021), 'Large-scale agile frameworks: a comparative review', *Journal of Applied Sciences, Management and Engineering Technology* **2**(1), 16–29.

Alqudah, M. and Razali, R. (2016), 'A review of scaling agile methods in large software development', *International Journal on Advanced Science, Engineering and Information Technology* **6**(6), 828–837.

Alsalemi, A. M. and Yeoh, E.-T. (2015), A survey on product backlog change management and requirement traceability in agile (scrum), *in* '2015 9th Malaysian Software Engineering Conference (MySEC)', IEEE, pp. 189–194.

Andriyani, Y., Hoda, R. and Amor, R. (2017), Reflection in agile retrospectives, *in* 'Agile Processes in Software Engineering and Extreme Programming: 18th International Conference, XP 2017, Cologne, Germany, May 22-26, 2017, Proceedings 18', Springer International Publishing, pp. 3–19.

Andry, J. F., Riwanto, R. E., Wijaya, R. L., Prawoto, A. A. and Prayogo, T. (2019), 'Development point of sales using scrum framework.', *Journal of Systems Integration (1804-2724)* **10**(1).

Bajpai, S. (2020), Planning large-scale agile development using a dependency structure mapping model, PhD thesis, Massachusetts Institute of Technology.

Barraood, S. O., Mohd, H. and Baharom, F. (2021), A comparison study of software testing activities in agile methods, *in* 'Knowledge Management International Conference (KMICe)', Vol. 2021.

Bass, J. M. and Haxby, A. (2019), 'Tailoring product ownership in large-scale agile projects: managing scale, distance, and governance', *IEEE Software* **36**(2), 58–63.

Beck, K., Beedle, M., van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., Grenning, J., Highsmith, J., Hunt, A., Jeffries, R., Kern, J., Marick, B., C. Martin, R., Mellor, S., Schwaber, K., Sutherland, J. and Thomas, D. (2001), 'Manifesto for agile software development'.
URL: *http://agilemanifesto.org/iso/en/manifesto.html*

Beiker, S., Hansson, F., Suneson, A. and Uhl, M. (2016), 'How the convergence of automotive and tech will create a new ecosystem', *McKinsey & Company, Automotive & Assembly* .

Bell, E., Bryman, A. and Harley, B. (2022), *Business research methods*, Oxford university press.

Berntzen, M., Moe, N. B. and Stray, V. (2019), The product owner in large-scale agile: an empirical study through the lens of relational coordination theory, *in* 'Agile Processes in Software Engineering and Extreme Programming: 20th International Conference, XP 2019, Montréal, QC, Canada, May 21–25, 2019, Proceedings 20', Springer, pp. 121–136.

Bluedorn, A. C., Turban, D. B. and Love, M. S. (1999), 'The effects of stand-up and sit-down meeting formats on meeting outcomes.', *Journal of applied psychology* **84**(2), 277.

Bredillet, C. (2013), 'Agile project management: Essentials from the project management journal'.

Chan, T. A. C. H., Ho, J. M.-B. and Tom, M. (2023), 'Miro: Promoting collaboration through online whiteboard interaction', *RELC Journal* p. 00336882231165061.

Chandra Misra, S., Kumar, V. and Kumar, U. (2010), 'Identifying some critical changes required in adopting agile practices in traditional software development projects', *International Journal of Quality & Reliability Management* **27**(4), 451–474.

Cloke, G. (2007), Get your agile freak on! agile adoption at yahoo! music, *in* 'Agile 2007 (AGILE 2007)', IEEE, pp. 240–248.

Cobb, C. G. (2023), *The project manager's guide to mastering Agile: Principles and practices for an adaptive approach*, John Wiley & Sons.

Cockburn, A. and Highsmith, J. (2001), 'Agile software development, the people factor', *Computer* **34**(11), 131–133.

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

Cooper, R. G. (2017), 'Idea-to-launch gating systems: Better, faster, and more agile: Leading firms are rethinking and reinventing their idea-to-launch gating systems, adding elements of agile to traditional stage-gate structures to add flexibility and speed while retaining structure.', *Research-Technology Management* **60**(1), 48–52.

Dalton, J. and Dalton, J. (2019*a*), 'Daily stand-up', *Great Big Agile: An OS for Agile Leaders* pp. 155–157.

Dalton, J. and Dalton, J. (2019*b*), 'Sprint demo', *Great Big Agile: An OS for Agile Leaders* pp. 239–240.

Derby, E., Larsen, D. and Schwaber, K. (2006), *Agile retrospectives: Making good teams great*, Pragmatic Bookshelf.

Diebold, P. and Dahlem, M. (2014), Agile practices in practice: a mapping study, *in* 'Proceedings of the 18th International Conference on Evaluation and Assessment in Software Engineering', pp. 1–10.

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

Dingsøyr, T., Moe, N. B., Fægri, T. E. and Seim, E. A. (2018), 'Exploring software development at the very large-scale: a revelatory case study and research agenda for agile method adaptation', *Empirical Software Engineering* **23**, 490–520.

Dybå, T., Dingsøyr, T. and Moe, N. B. (2014), 'Agile project management', *Software project management in a changing world* pp. 277–300.

Ebert, C. and Paasivaara, M. (2017), 'Scaling agile', *Ieee Software* **34**(6), 98–103.

Eisenhardt, K. M. and Graebner, M. E. (2007), 'Theory building from cases: Opportunities and challenges', *Academy of management journal* **50**(1), 25–32.

Evbota, F., Knauss, E. and Sandberg, A. (2016), Scaling up the planning game: Collaboration challenges in large-scale agile product development, *in* 'Agile Processes, in Software Engineering, and Extreme Programming: 17th International Conference, XP 2016, Edinburgh, UK, May 24-27, 2016, Proceedings 17', Springer International Publishing, pp. 28–38.

Fischer, L. H. (2018), The real real agile mindset: Understanding that doing agile goes hand in hand with being agile, *in* 'The Human in the Project', Dansk Projektledelse, pp. 105–114.

Foo, D., Cruz, J. D., Sekar, S. and Sharma, A. (2020), Automating continuous planning in safe, *in* 'Proceedings of the IEEE/ACM 42nd International Conference on Software Engineering Workshops', pp. 504–504.

Gonçalves, L. and Linders, B. (2015), *Getting value out of agile retrospectives: a toolbox of retrospective exercises*, Ben Linders Publishing.

Gustavsson, T. (2018), 'Practices for vertical and horizontal coordination in the scaled agile framework'.

Gustavsson, T. (2019), Changes over time in a planned inter-team coordination routine, *in* 'Agile Processes in Software Engineering and Extreme Programming–Workshops: XP 2019 Workshops, Montréal, QC, Canada, May 21–25, 2019, Proceedings 20', Springer, pp. 105–111.

Gustavsson, T. (2020), Inter-team coordination in large-scale agile software development projects, PhD thesis, Karlstads universitet.

Herlt, A., Jana, P., Kellner, M., Küchler, S. and Rochlitz, H. (2022), 'Smartphones on wheels: New rules for automotive-product development', *McKinsey & Company* .
URL: *https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/smartphones-on-wheels-new-rules-for-automotive-product-development*

Highsmith, J. (2009), *Agile project management: creating innovative products*, Pearson education.

Hodgkins, P. and Hohmann, L. (2007), Agile program management: Lessons learned from the verisign managed security services team, *in* 'Agile 2007 (AGILE 2007)', IEEE, pp. 194–199.

Hoegl, M., Weinkauf, K. and Gemuenden, H. G. (2004), 'Interteam coordination, project commitment, and teamwork in multiteam r&d projects: A longitudinal study', *Organization science* **15**(1), 38–55.

Hohl, P., Münch, J., Schneider, K. and Stupperich, M. (2016), Forces that prevent agile adoption in the automotive domain, *in* 'Product-Focused Software Process Improvement: 17th International Conference, PROFES 2016, Trondheim, Norway, November 22-24, 2016, Proceedings 17', Springer, pp. 468–476.

Hron, M. and Obwegeser, N. (2018), 'Scrum in practice: an overview of scrum adaptations'.

Jakobsen, C. R. and Sutherland, J. (2009), Scrum and cmmi going from good to great, *in* '2009 Agile Conference', IEEE, pp. 333–337.

Jenner, B., Flick, U., von Kardoff, E. and Steinke, I. (2004), *A companion to qualitative research*, Sage.

Jovanović, M., Mesquida, A.-L., Radaković, N. and Mas, A. (2016), 'Agile retrospective games for different team development phases', *Journal of Universal Computer Science* **22**(12), 1489–1508.

Kaiser, K. (2009), 'Protecting respondent confidentiality in qualitative research', *Qualitative health research* **19**(11), 1632–1641.

Kalenda, M., Hyna, P. and Rossi, B. (2018), 'Scaling agile in large organizations: Practices, challenges, and success factors', *Journal of Software: Evolution and Process* **30**(10), e1954.

Kasauli, R., Knauss, E., Nilsson, A. and Klug, S. (2017), Adding value every sprint: A case study on large-scale continuous requirements engineering., *in* 'REFSQ Workshops'.

Kirkman, B. L. and Rosen, B. (1999), 'Beyond self-management: Antecedents and consequences of team empowerment', *Academy of Management journal* **42**(1), 58–74.

Kniberg, H. (2015), *Scrum and XP from the Trenches*, Lulu. com.

Leffingwell, D. (2018), *SAFe 4.5 reference guide: scaled agile framework for lean enterprises*, Addison-Wesley Professional.

Leffingwell, D. (2023*a*), 'Pi planning'. Accessed: 2023-05-03.
URL: *https://scaledagileframework.com/pi-planning/*

Leffingwell, D. (2023*b*), 'Safe 6.0 framework'. Accessed: 2023-05-02.
URL: *https://scaledagileframework.com/*

Lindvall, M., Muthig, D., Dagnino, A., Wallin, C., Stupperich, M., Kiefer, D., May, J. and Kahkonen, T. (2004), 'Agile software development in large organizations', *Computer* **37**(12), 26–34.

Matthies, C., Dobrigkeit, F. and Ernst, A. (2019), Counteracting agile retrospective problems with retrospective activities, *in* 'Systems, Software and Services Process Improvement: 26th European Conference, EuroSPI 2019, Edinburgh, UK, September 18–20, 2019, Proceedings 26', Springer, pp. 532–545.

McHugh, O., Conboy, K. and Lang, M. (2010), 'Motivating agile teams: A case study of teams in ireland and sweden'.

Mesquida, A.-L., Karać, J., Jovanović, M. and Mas, A. (2017), A game toolbox for process improvement in agile teams, *in* 'Systems, Software and Services Process Improvement: 24th European Conference, EuroSPI 2017, Ostrava, Czech Republic, September 6–8, 2017, Proceedings 24', Springer, pp. 302–309.

Moe, N. B., Dahl, B. H., Stray, V., Karlsen, L. S. and Schjødt-Osmo, S. (2019), Team autonomy in large-scale agile, *in* 'Proceedings of the Annual Hawaii International Conference on System Sciences (HICSS)', AIS Electronic Library, pp. 6997–7006.

Myklebust, T., Stålhane, T., Baines, R. and Hanssen, G. (2017), 'The agile hazard log approach', *ESREL, Portoroz Slovenia* .

Nyrud, H. and Stray, V. (2017), Inter-team coordination mechanisms in large-scale agile, *in* 'Proceedings of the XP2017 scientific workshops', pp. 1–6.

Oomen, S., De Waal, B., Albertin, A. and Ravesteyn, P. (2017), 'How can scrum be succesful? competences of the scrum product owner'.

Paasivaara, M. (2017), Adopting safe to scale agile in a globally distributed organization, *in* '2017 IEEE 12th International Conference on Global Software Engineering (ICGSE)', IEEE, pp. 36–40.

Paasivaara, M., Behm, B., Lassenius, C. and Hallikainen, M. (2018), 'Large-scale agile transformation at ericsson: a case study', *Empirical Software Engineering* **23**, 2550–2596.

Paasivaara, M., Durasiewicz, S. and Lassenius, C. (2009), Using scrum in distributed agile development: A multiple case study, *in* '2009 Fourth IEEE International Conference on Global Software Engineering', IEEE, pp. 195–204.

Paasivaara, M., Lassenius, C., Heikkilä, V. T., Dikert, K. and Engblom, C. (2013), Integrating global sites into the lean and agile transformation at ericsson, *in*

'2013 IEEE 8th International Conference on Global Software Engineering', IEEE, pp. 134–143.

Petit, Y. and Marnewick, C. (2021), 'Strategic alignment of information technology initiatives in a scaled agile environment', *The Journal of Modern Project Management* **8**(3).

Raatikainen, M., Rautiainen, K., Myllärniemi, V. and Männistö, T. (2008), Integrating product family modeling with development management in agile methods, *in* 'Proceedings of the 1st international workshop on Software development governance', pp. 17–20.

Sablis, A., Smite, D. and Moe, N. (2021), 'Team-external coordination in large-scale software development projects', *Journal of Software: Evolution and Process* **33**(3), e2297.

Schwaber, K. (2007), *The enterprise and Scrum*, Microsoft press.

Schwaber, K. and Sutherland, J. (2010), 'Scrum', *URL: http://www. scrumalliance. org/system/resource/file/275/whatIsScrum. pdf,[Sta nd: 03.03. 2008]* .

Schwaber, K. and Sutherland, J. (2020), 'The 2020 scrum guidetm'.
URL: *https://scrumguides.org/scrum-guide.htmlscrum-team*

Sedano, T., Ralph, P. and Péraire, C. (2019), The product backlog, *in* '2019 IEEE/ACM 41st International Conference on Software Engineering (ICSE)', IEEE, pp. 200–211.

Senapathi, M. and Srinivasan, A. (2012), 'Understanding post-adoptive agile usage: An exploratory cross-case analysis', *Journal of Systems and Software* **85**(6), 1255–1268.

Singh, K. and Strobel, J. (2023), 'Exploring lived experiences of agile developers with daily stand-up meetings: a phenomenological study', *Behaviour & Information Technology* **42**(4), 403–423.

Srivastava, A., Bhardwaj, S. and Saraswat, S. (2017), Scrum model for agile methodology, *in* '2017 International Conference on Computing, Communication and Automation (ICCCA)', pp. 864–869.

Steghöfer, J.-P., Knauss, E., Horkoff, J. and Wohlrab, R. (2019), Challenges of scaled agile for safety-critical systems, *in* 'Product-Focused Software Process Improvement: 20th International Conference, PROFES 2019, Barcelona, Spain, November 27–29, 2019, Proceedings 20', Springer, pp. 350–366.

Stewart, G. L. and Barrick, M. R. (2000), 'Team structure and performance: Assessing the mediating role of intrateam process and the moderating role of task type', *Academy of management Journal* **43**(2), 135–148.

Stray, V., Moe, N. B. and Bergersen, G. R. (2017), Are daily stand-up meetings valuable? a survey of developers in software teams, *in* 'Agile Processes in Software Engineering and Extreme Programming: 18th International Conference, XP 2017, Cologne, Germany, May 22-26, 2017, Proceedings 18', Springer, pp. 274–281.

Stray, V., Moe, N. B. and Hoda, R. (2018), Autonomous agile teams: challenges and future directions for research, *in* 'Proceedings of the 19th international conference on agile software development: companion', pp. 1–5.

Stray, V., Moe, N. B. and Sjoberg, D. I. (2020), 'Daily stand-up meetings: Start breaking the rules', *IEEE Software* **37**(3), 70–77.

Stray, V., Sjøberg, D. I. and Dybå, T. (2016), 'The daily stand-up meeting: A grounded theory study', *Journal of Systems and Software* **114**, 101–124.

Tavory, I. and Timmermans, S. (2014), *Abductive analysis: Theorizing qualitative research*, University of Chicago Press.

Theobald, S. and Diebold, P. (2018), Interface problems of agile in a non-agile environment, *in* 'Agile Processes in Software Engineering and Extreme Programming: 19th International Conference, XP 2018, Porto, Portugal, May 21–25, 2018, Proceedings 19', Springer, pp. 123–130.

Thompson, J. (2022), 'A guide to abductive thematic analysis', *The Qualitative Report* **27**(5), 1410–1421.

Tuckman, B. W. (1965), 'Developmental sequence in small groups.', *Psychological bulletin* **63**(6), 384.

Turetken, O., Stojanov, I. and Trienekens, J. J. (2017), 'Assessing the adoption level of scaled agile development: a maturity model for scaled agile framework', *Journal of Software: Evolution and process* **29**(6), e1796.

Vetter, J., Barbezat, G., Crummenauer, J. and Avissar, J. (2005), 'Surface treatment selections for automotive applications', *Surface and Coatings Technology* **200**(5-6), 1962–1968.

Vijay, D. and Ganapathy, G. (2014), 'Guidelines to minimize cost of software quality in agile scrum process', *arXiv preprint arXiv:1406.5731* .

Williams, L. and Cockburn, A. (2003), 'Agile software development: It's about feedback and change', *Computer* **36**(6), 39–43.

Wohlrab, R., Pelliccione, P., Knauss, E. and Larsson, M. (2019), 'Boundary objects and their use in agile systems engineering', *Journal of Software: Evolution and Process* **31**(5), e2166.

A

Appendix A - Interview Guide Change Leader

Our Master's Thesis concerns 'scaled agile' where we have chosen to focus on five agile ways of working, to see which of these that can be managed individually by the teams, or if they should be jointly followed between the teams. The five different agile ways of working are: Backlog Management, Daily stand-up, PI Planning, Retrospective and Demo. All five agile ways of working will be treated in turn, where the layout of the questions will be the same for each agile way of working. The aim is to spend approximately 8 minutes per way of working as the interview is limited to one hour. If there are a question that you consider as sensitive or are unable to answer, you have the right to skip it.

As a clarification, some questions will touch on similarity, where the terms *same* or *different* will be used. With similar we refer to that teams use a common recipe for the agile way of working, and with different we refer to that teams can tailor the agile way of working to their own team.

Finally, we would like to ask for your approval for recording this interview to ensure all details being captured and prevent any misunderstandings during the interview process. While the study is ongoing, all recordings will be stored in compliance with regulations and Volvo policies, and will be deleted once the study is concluded.

Description of role

- How long have you worked at Volvo Cars?

Backlog Management

- Give a brief definition of what Backlog Management is to you? (2-3 sentences)

Definition to determine if the view is shared between interviewee and interviewers: Backlog management is the process through which Backlog Owners add, adjust, and prioritize the backlog to make sure the most valued features are shipped to users.

Opinion of Backlog Management

- What positive effects do you see with Backlog Management?

- Do you see any possible negative effects with Backlog Management?
- What is important to consider to have a well-functioning and effective Backlog Management?

Similarity

- Do you think that you should work with Backlog Management in the same way in all teams within an ART (teams within Solution & teams within R&D)?
  - Why?
- Do you consider that you currently have the right prerequisites to work in this way with Backlog Management?

Scale

- How different/similar do you think you work with Backlog Management today between teams within an ART (team within Solution & team within R&D)? *(1 very different – 6 very similar)*
- How unimportant/important do you think it is that you work in the same way with Backlog Management within an ART (team within Solution & team within R&D)? *(1 very unimportant – 6 very important)*

Daily Stand-up

- Give a brief definition of what Daily Stand-up are to you? *(2-3 sentences)*

Definition to determine if the view is shared between interviewee and interviewers: Daily Stand-ups are short meetings held at the same time each day to quickly connect and align on completed and upcoming work.

Opinion of Daily Stand-up

- What positive effects do you see with Daily Stand-up?
- Do you see any possible negative effects with Daily Stand-up?
- What is important to consider to have a well-functioning and effective Daily stand-up?

Similarity

- Do you think that you should work with Daily Stand-up in the same way in all teams within an ART (team within Solution & team within R&D)?
  - Why?
- Do you consider that you currently have the right prerequisites to work in this way with Daily Stand-up?

Scale

- How different/similar do you think you work with Daily Stand-up today between teams within an ART (team within Solution & team within R&D)? *(1 very different – 6 very similar)*
- How unimportant/important do you think it is that you work in the same way with Daily Stand-up within an ART (team within Solution & team within R&D)? *(1 very unimportant – 6 very important)*

PI Planning

- Give a brief definition of what PI Planning is to you? *(2-3 sentences)*

Definition to determine if the view is shared between interviewee and interviewers: PI Planning is a cadence-based event where all teams within the same Agile Release Train (ART) meet to align to a shared vision, plan the roadmap, deliberate on features and identify cross-team dependencies.

Opinion of PI Planning

- What positive effects do you see with PI Planning?
- Do you see any possible negative effects with PI Planning?
- What is important to consider to have a well-functioning and effective PI Planning?

Similarity

- Do you think that you should work with PI Planning in the same way in all teams within an ART (team within Solution & team within R&D)?
  - Why?
- Do you consider that you currently have the right prerequisites to work in this way with PI Planning?

Scale

- How different/similar do you think you work with PI Planning today between teams within an ART (team within Solution & team within R&D)? *(1 very different – 6 very similar)*
- How unimportant/important do you think it is that you work equally with PI Planning within an ART (team within Solution & team within R&D)? *(1 very unimportant – 6 very important)*

Retrospective

- Give a brief definition of what Retrospective are to you? *(2-3 sentences)*

Definition to determine if the view is shared between interviewee and interviewers: The retrospective is an opportunity for the whole agile team to inspect itself on the

execution of the previous iteration and create a plan for improvements to be implemented during the next iteration.

Opinion of Retrospective

- What positive effects do you see with Retrospective?
- Do you see any possible negative effects with Retrospective?
- What is important to consider to have a well-functioning and effective Retrospective?

Similarity

- Do you think that you should work with Retrospective in the same way in all teams within an ART (team within Solution & team within R&D)?
  - Why?
- Do you consider that you currently have the right prerequisites to work in this way with Retrospective?

Scale

- How different/similar do you think you work with Retrospective today between teams within an ART (team within Solution & team within R&D)? *(1 very different – 6 very similar)*
- How unimportant/important do you think it is that you work in the same way with Retrospective within an ART (team within Solution & team within R&D)? *(1 very unimportant – 6 very important)*

Demo

- Give a brief definition of what Demo is to you? *(2–3 sentences)*

Definition to determine if the view is shared between interviewee and interviewers: A demo is where results of development efforts are shown to relevant stakeholders and groups. The demo is an opportunity for evaluation, in-depth conversations, adaptation of backlog, feedback and celebration of the accomplishments.

Opinion of Demo

- What positive effects do you see with Demo?
- Do you see any possible negative effects with Demo?
- What is important to consider to have a well-functioning and effective Demo?

Similarity

- Do you think that you should work with Demo in the same way in all teams within an ART (team within Solution & team within R&D)?

  - Why?
- Do you consider that you currently have the right prerequisites to work in this way with Demo?

Scale

- How different/similar do you think you work with Demo today between teams within an ART (team within Solution & team within R&D)? *(1 very different – 6 very similar)*
- How unimportant/important do you think it is that you work equally with Demo within an ART (team within Solution & team within R&D)? *(1 very unimportant – 6 very important)*

B

Appendix B - Interview Guide Team Manager

Our Master's Thesis concerns 'scaled agile' where we have chosen to focus on five agile ways of working, to see which of these that can be managed individually by the teams, or if they should be jointly followed between the teams. The five different agile ways of working are: Backlog Management, Daily stand-up, PI Planning, Retrospective and Demo. All five agile ways of working will be treated in turn, where the layout of the questions will be the same for each agile way of working. The aim is to spend approximately 8 minutes per way of working as the interview is limited to one hour. If there are a question that you consider as sensitive or are unable to answer, you have the right to skip it.

As a clarification, some questions will touch on similarity, where the terms *same* or *different* will be used. With similar we refer to that teams use a common recipe for the agile way of working, and with different we refer to that teams can tailor the agile way of working to their own team.

Finally, we would like to ask for your approval for recording this interview to ensure all details being captured and prevent any misunderstandings during the interview process. While the study is ongoing, all recordings will be stored in compliance with regulations and Volvo policies, and will be deleted once the study is concluded.

Description of role

- How long have you worked at Volvo Cars?
- How many teams do you currently have?

Backlog Management

- Give a brief definition of what Backlog Management is to you? (2-3 sentences)

Definition to determine if the view is shared between interviewee and interviewers: Backlog management is the process through which Backlog Owners add, adjust, and prioritize the backlog to make sure the most valued features are shipped to users.

Opinion of Backlog Management

- What positive effects do you see with Backlog Management?
- Do you see any possible negative effects with Backlog Management?
- Do you think Backlog Management is working well in your team(s)?
- Do you have any potential suggestions of improvements in how you use Backlog Management in your team(s)? *(ask for an example if difficult to answer)*

Similarity

- Do you think that you should work with Backlog Management in the same way in all teams within an ART (teams within Solution & teams within R&D)?
  - Why?
- Do you consider that you currently have the right prerequisites to work in this way with Backlog Management?

Scale

- How different/similar do you think you work with Backlog Management today between teams within an ART (team within Solution & team within R&D)? *(1 very different – 6 very similar)*
- How unimportant/important do you think it is that you work in the same way with Backlog Management within an ART (team within Solution & team within R&D)? *(1 very unimportant – 6 very important)*

Daily Stand-ups

- Give a brief definition of what Daily Stand-up are to you? *(2-3 sentences)*

Definition to determine if the view is shared between interviewee and interviewers: Daily Stand-ups are short meetings held at the same time each day to quickly connect and align on completed and upcoming work.

Opinion of Daily Stand-up

- What positive effects do you see with Daily Stand-up?
- Do you see any possible negative effects with Daily Stand-up?
- Do you think Daily Stand-up work well in your team(s)?
- Do you have any potential suggestions of improvements in how you use Daily Stand-up in your team(s)? *(ask for an example if difficult to answer)*

Similarity

- Do you think that you should work with Daily Stand-up in the same way in all teams within an ART (team within Solution & team within R&D)?
  - Why?
- Do you consider that you currently have the right prerequisites to work in this way with Daily Stand-up?

Scale

- How different/similar do you think you work with Daily Stand-up today between teams within an ART (team within Solution & team within R&D)? *(1 very different – 6 very similar)*
- How unimportant/important do you think it is that you work in the same way with Daily Stand-up within an ART (team within Solution & team within R&D)? *(1 very unimportant – 6 very important)*

PI Planning

- Give a brief definition of what PI Planning is to you? *(2-3 sentences)*

Definition to determine if the view is shared between interviewee and interviewers: PI Planning is a cadence-based event where all teams within the same Agile Release Train (ART) meet to align to a shared vision, plan the roadmap, deliberate on features and identify cross-team dependencies.

Opinion of PI Planning

- What positive effects do you see with PI Planning?
- Do you see any possible negative effects with PI Planning?
- Do you think PI Planning works well in your team(s)?
- Do you have any potential suggestions of improvements in how you use PI Planning in your team(s)? *(ask for an example if difficult to answer)*

Similarity

- Do you think that you should work with PI Planning in the same way in all teams within an ART (team within Solution & team within R&D)?
  - Why?
- Do you consider that you currently have the right prerequisites to work in this way with PI Planning?

Scale

- How different/similar do you think you work with PI Planning today between teams within an ART (team within Solution & team within R&D)? *(1 very different – 6 very similar)*
- How unimportant/important do you think it is that you work equally with PI Planning within an ART (team within Solution & team within R&D)? *(1 very unimportant – 6 very important)*

Retrospective

- Give a brief definition of what Retrospective are to you? *(2-3 sentences)*

Definition to determine if the view is shared between interviewee and interviewers: The retrospective is an opportunity for the whole agile team to inspect itself on the execution of the previous iteration and create a plan for improvements to be implemented during the next iteration.

Opinion of Retrospective

- What positive effects do you see with Retrospective?
- Do you see any possible negative effects with Retrospective?
- Do you think Retrospective work well in your team(s)?
- Do you have any potential suggestions of improvement in how you use Retrospective in your team(s)? *(ask for an example if difficult to answer)*

Similarity

- Do you think that you should work with Retrospective in the same way in all teams within an ART (team within Solution & team within R&D)?
  - Why?
- Do you consider that you currently have the right prerequisites to work in this way with Retrospective?

Scale

- How different/similar do you think you work with Retrospective today between teams within an ART (team within Solution team within RD)? *(1 very different – 6 very similar)*
- How unimportant/important do you think it is that you work in the same way with Retrospective within an ART (team within Solution & team within R&D)? *(1 very unimportant – 6 very important)*

Demo

- Give a brief definition of what Demo is to you? *(2–3 sentences)*

Definition to determine if the view is shared between interviewee and interviewers: A demo is where results of development efforts are shown to relevant stakeholders and groups. The demo is an opportunity for evaluation, in-depth conversations, adaptation of backlog, feedback and celebration of the accomplishments.

Opinion of Demo

- What positive effects do you see with Demo?
- Do you see any possible negative effects with Demo?
- Do you think Demo works well in your team(s)?

- Do you have any potential suggestions of improvements in how you use Demo in your team(s)? *(ask for an example if difficult to answer)*

Similarity

- Do you think that you should work with Demo in the same way in all teams within an ART (team within Solution & team within R&D)?
  - Why?
- Do you consider that you currently have the right prerequisites to work in this way with Demo?

Scale

- How different/similar do you think you work with Demo today between teams within an ART (team within Solution & team within R&D)? *(1 very different – 6 very similar)*
- How unimportant/important do you think it is that you work equally with Demo within an ART (team within Solution & team within R&D)? *(1 very unimportant – 6 very important)*

C

Appendix C - Manifesto for Agile Software Development

"We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:" (Beck et al., 2001)

Individuals and interactions *over processes and tools*
Working software *over comprehensive documentation*
Customer collaboration *over contract negotiation*
Responding to change *over following a plan*
"That is, while there is value in the items on the right, we value the items on the left more." (Beck et al., 2001)

Beck et al. (2001) also present the twelve agile principles that were founded for the Agile Manifesto, which are quoted below:

- *Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.*
- *Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.*
- *Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.*
- *Business people and developers must work together daily throughout the project.*
- *Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.*
- *The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.*
- *Working software is the primary measure of progress.*
- *Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.*
- *Continuous attention to technical excellence and good design enhances agility.*
- *Simplicity-the art of maximizing the amount of work not done-is essential.*
- *The best architectures, requirements, and designs emerge from self-organizing teams.*
- *At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behaviour accordingly.*

DEPARTMENT OF TECHNOLOGY MANAGEMENT AND ECONOMICS
DIVISION OF SERVICE MANAGEMENT AND LOGISTICS
CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden
www.chalmers.se

CHALMERS
UNIVERSITY OF TECHNOLOGY