

Connecting Agile - A study on the contradiction of freedom and control in software development

A Master's Thesis submitted for the degree of
“Master of Business Administration”

supervised by
Univ. Prof. Dr. Christian Lüthje

Dipl.-Ing. Oliver Gugenberger

00826455

Affidavit

I, **DIPL.-ING. OLIVER GUGENBERGER**, hereby declare

1. that I am the sole author of the present Master's Thesis, "CONNECTING AGILE - A STUDY ON THE CONTRADICTION OF FREEDOM AND CONTROL IN SOFTWARE DEVELOPMENT", 79 pages, bound, and that I have not used any source or tool other than those referenced or any other illicit aid or tool, and
2. that I have not prior to this date submitted the topic of this Master's Thesis or parts of it in any form for assessment as an examination paper, either in Austria or abroad.

Vienna, 14.05.2020

Signature

Abstract

This thesis aims to evaluate the contradiction between freedom and control, when larger more traditional operating organizations implement agile concepts. The focus lies on the software development processes, but the results may also be applicable to other operational areas. The thesis describes how a connection between a larger organization and an agile operational team can be defined by evaluating areas, where interactions are required. This integration of an agile team is discussed without performing a company-wide agile transformation, which in many sources is recommended, but would often require a fundamental change for the structure of the organization. For this reason, state-of-the art literature is reviewed and key aspects are identified to provide a holistic overview of the topic and define how a connection between an operational team and a larger organization can be implemented by combining commonly used methodologies and best practices. Based on the analysis, an understanding is created of what freedom and control means in the context of software development in larger organizations. The trade-offs which must be made are worked out, and a discussion is held on how a good setup can be found and how it is possible for large organizations to manage agile teams efficiently. An empirical in-depth study with agile practitioners from ten different organizations has been performed to round off the analysis and identify gaps as well as consensuses.

This thesis contributes to the disclosure on agile process implementation by proposing a new way of combining established project management standards and agile concepts to connect agile teams to larger organizations. Important considerations and aspects are discussed and the theoretical findings are consolidated with empirical evidence. Finally, the results are summarized in a comprehensive way, in order to have a practical use as easy-to-read recommendations for larger organizations, that are interested in using agile teams for their operations.

Contents

Abstract	i
Contents	ii
List of Figures	v
List of Tables	v
List of Abbreviations	v
1 Introduction	6
1.1 Background	6
1.2 Objective of the Master Thesis	7
1.3 Research Question.....	7
1.4 Methodology and Thesis Overview.....	8
2 Literature Overview	10
2.1 Traditional Approaches for Software Development.....	10
2.2 Agile Approaches of Software Development.....	11
2.3 Reasons to work Agile.....	12
2.4 Scrum and Kanban.....	13
2.5 Scaling Agile	15
2.6 Plan-Driven versus Agile Methods.....	16
2.7 The Perspective of the Organization.....	18
2.8 Combining Agile and Traditional Concepts	19
3 Connecting Agile	21
3.1 Organization and Culture.....	21
3.1.1 Cultures in an Organization.....	21
3.1.2 Organizational Design and Strategy	22
3.1.3 Technical Integration and Governance.....	24
3.2 People and Functions.....	25
3.2.1 Roles in a Traditional Organization.....	25
3.2.2 Roles in Software Development.....	25
3.2.3 The Project Manager Role	26
3.3 Processes and Communication	27

3.3.1 Directing and Control.....	27
3.3.2 Agile Processes and Interactions.....	28
3.3.3 Communication Strategy	28
3.4 Planning and Prioritization	29
3.4.1 Operational Management	29
3.4.2 Innovation and Prioritization	30
3.5 Trust and Empowerment	31
3.5.1 Empowerment of Project Teams.....	31
3.5.2 Establishing Trust	31
3.6 Implementing an Agile Connection	33
3.6.1 The Maturity of an Organization	33
3.6.2 Connecting Agile Teams.....	34
3.7 Trade-Offs between Freedom and Control	34
3.7.1 Freedom versus Control.....	35
3.7.2 Dependencies for a good Balance	37
3.7.3 How to find a good Balance	39
3.8 Summary.....	40
3.8.1 Defining a Connection	40
3.8.2 Key Aspects of a Connection.....	41
4 Empirical Study	44
4.1 The Interviews.....	44
4.1.1 Methodic and Data Analysis	44
4.1.2 Selecting Criteria	44
4.1.3 Interview Participants.....	45
4.1.4 Interview Guideline	46
4.1.5 Reflecting on the Interviews	47
4.2 Outcome and Findings	47
4.2.1 Outcome of the Interviews	47
4.2.2 Key Aspects	50
4.2.3 Findings regarding Freedom and Control	52
4.2.4 A good Balance.....	56
4.3 Summary.....	59
5 Results	60

5.1 The Research Questions.....	60
5.1.1 How can agile software development teams be set up in larger organizations without performing an agile transformation?.....	60
5.1.2 What aspects have to be considered when an agile team is connected to a traditional organization?.....	61
5.1.3 What are the relevant trade-offs between freedom and control when agile teams are used, and how can a good balance be found?.....	62
5.2 Recommendations for Organizations.....	64
5.3 Limitations and Recommendations for Further Research	65
6 Conclusion.....	66
Bibliography	68
Appendix.....	73
A) Principles behind the Agile Manifesto	73
B) Transition from a “traditional” to the “new” paradigm	74
C) Detailed Interview Guideline	74

List of Figures

Figure 1: Overview of the structure of this thesis.	9
Figure 2: Overview of the Scrum process.	13
Figure 3: Example of a Kanban board.	14
Figure 4: Illustration of an agile vs. a waterfall process in software development.	17
Figure 5: "Traditional" vs. "new" organizational paradigm in a simplified illustration.	23
Figure 6: Illustration of a traditional organization, which implements an agile team.	24
Figure 7: Project management triangle, to illustrate the degrees of freedom.	32
Figure 8: Traditional vs. agile project management	32
Figure 9: Maturity levels of a company.	33
Figure 10: Illustration to connect an agile team to a traditional company	40

List of Tables

Table 1: Reasons to implement agile processes.	12
Table 2: Differences between a waterfall and an agile approach.	18
Table 3: Summary of the trade-offs between more freedom and more control.	37
Table 4: Summary of the main dependencies for a good balance.	38
Table 5: List of Interviewees.	46
Table 6: Findings for the contradiction between freedom and control.	53

List of Abbreviations

PMP	Project Management Professional
PMI	Project Management Institute
PMBOK	Project Management Body of Knowledge
PRINCE2	Projects in Controlled Environments
LeSS	Large Scale Scrum
SAFe	Scaled Agile Framework
DAD	Disciplined Agile Delivery

1 Introduction

In this chapter, the idea and approach of this thesis will be described. An overview on the background and the relevance of the topic will be presented and the research questions will be formulated. The last section explains the methodology used and sets out an overview of the structure of this thesis.

1.1 Background

Software development is an essential necessity for larger organizations, which include the process of designing, creating and testing required applications (Herbsleb & Moitra, 2001). The field of software development is changing rapidly and the technological environments of large companies are becoming more and more complex (Bergh & Benghiat, 2017) (Levans, 2019). Trends, standards and best practices are continuously improving, both business requirements and customer expectations can change overnight (Derksen & LaBar, 2016). For those reasons, agile software development has become increasingly popular in large organizations since an agile development often fits today's requirements (Davis, 2018). The agile way of working provides an approach, which is more flexible and adaptable compared to a classical waterfall process. Agile concepts also allow a company to start rapidly with relevant parts of an application and deliver features iteratively, to enable business areas to continuously see the status of the development and include new requirements during the implementation (Huckabee, 2015). But using self-organized teams to deliver projects also means for a company that it must give up control and empower these teams to make their own decisions to a certain extent. In the transition towards a more agile approach, the management of a company must still guide the projects and ensure that the work delivered by the team complies with the standards of the company (Taylor, 2016).

When transitioning to a more flexible approach, this contradiction between freedom and control is often not given the recognition from involved stakeholders it might need. Company processes and policies have to be adapted in order to give the teams the operational freedom they need (Srivastava & Jain, 2017). Agile frameworks such as Scrum or Kanban are designed to optimize the operational processes. Scrum for instance is designed for single teams containing 5 to 9 team members and it does not include directing structures or interactions with an organization (Dingsoeyr & Falessi, 2019). Currently, many concepts have been developed and evaluated to integrate and scale agile processes across the company (Conboy & Carroll, 2019). Most of these concepts require an agile transformation of the whole organization in order to succeed and implement agile operations successfully, while the introduction of agile methods in plan-driven environments is not well researched yet (Laux & Kranz, 2019).

1.2 Objective of the Master Thesis

This thesis intends to examine the contradicting interests between freedom and control in agile operations of larger organizations with a focus on software development processes. In theory, the introduction of agile teams often requires an agile transformation of a company and it is not discussed how the teams can be managed by the company (Taylor, 2016). In addition to this, most agile methodologies and principles focusing on the agile operations and do not address how they can be used in bigger organizations (Dingsoeyr & Falessi, 2019). For this reason, this thesis will discuss how agile teams can be connected to a traditional company that uses a more hierarchical organizational structure. It intends to examine and describe how a connection between an agile team and the rest of the organization can be defined and what aspects have to be considered. This is crucial, as the introduction of agile methods often fails in bigger companies due to being an inability to find a proper means of implementation (Ng, 2019). To provide a holistic understanding of agile concepts, this thesis will summarize and confront common principles, methods, frameworks and best practices, the information for which has been obtained from the selected literature. The description is intended to create an understanding, of what freedom and control means, in the process of agile software development. The perspective of the organization as well as the perspective of an agile operating team during the software development process should be examined and the interests of both sides should be discussed. Challenges and recommended solutions provided by relevant literature will be evaluated and necessary trade-offs when companies implement agile processes are to be identified. Further, it will be discussed, what the impact on the organization is and what an organization can do to find a good balance between having more control or giving more freedom to its operational teams. For the qualitative analysis, ten organizations will be interviewed, to discuss the theoretical outcome and identify gaps and agreements between theory and practice. With the insights gained from these organizations and the theoretical elaboration, specific findings will be highlighted and the research questions will be answered with empirical evidence. The results and recommendations for organizations should be summarized in a clear and comprehensive manner so that they can be beneficial to larger organizations which currently implement agile operations.

1.3 Research Question

The research questions can be stated as following:

How can agile software development teams be set up in larger organizations without performing an agile transformation?

If a company has a traditional, more hierarchical structure and wants to implement agile operating teams without performing an agile transformation, the question arises of how these

contradicting concepts can be combined? For this reason, it will be elaborated if and how an agile team can be connected to a larger organization with a hierarchical organizational structure and a plan-driven way of working. This means, it should be analyzed how existing theories can be combined and what the impact is for both the organization and the operational team. The findings from literature will be compared with the situation in practice at larger organizations.

What aspects have to be considered when an agile team is connected to a traditional organization?

The thesis will elaborate the key aspects that have to be considered when an agile team is connected to a company. This includes an evaluation of the areas affected by a collaboration between the team and the organization when the organizational structure does not drastically adapt to the agile operations. The challenges which occur when an agile team is connected and how possible solutions can be found will be discussed. With aspects addressed will also create an understanding of what freedom and control means in the context of agile software development at bigger companies.

What are the relevant trade-offs between freedom and control when agile teams are used, and how can a good balance be found?

Furthermore, it will be discussed and summarized, what the relevant trade-offs are that have to be made when an organization is deciding between giving teams more freedom or maintaining more control over them. What has to be considered by the company in order to find a good balance? It will be elaborated what a balanced setup could look like for a traditional organization if it plans to efficiently integrate agile teams in its structure. This includes presenting a number of suggestions for organizations from which they can benefit if they want to make use of agile teams, without performing a company-wide agile transformation.

1.4 Methodology and Thesis Overview

The goal of this thesis is to evaluate how an agile team can operate within a larger organization that works in a more plan-driven way. This will be evaluated, by combining agile concepts with more plan-driven methods to identify how a collaboration can be implemented and what adjustments have to be made on both sides. In this theoretical analysis, key aspects will be identified and developed to highlight the relevant areas which have to be considered, when an agile team is connected to a larger organization. In the empirical part, ten interviews will be conducted with practitioners from different companies which implement agile teams in their more traditional organizational structure. The interviews will be used to verify the findings from the theoretical part and identify gaps to round off the analysis. With the knowledge gained,

specific findings will be summarized and the research questions will be answered. The work is divided into following main chapters:

Chapter 2 will summarize relevant methodologies, frameworks and standards used in software development, which will later be used to connect an agile team. Agile processes will be compared to a waterfall approach and currently developed concepts for scaling agile methods across an organization will be described. **Chapter 3** will elaborate on the concepts gathered from the literature and combine agile processes with plan-driven project management standards. The agile connection will be discussed for an agile team using Scrum or Kanban and connect it to a hierarchical organization using PRINCE2 or similar standards. This theoretical part will conclude with aspects of relevance when a self-organized team is connected to an organization, and challenges as well as possible solutions will be discussed. Based on these aspects, an understanding of freedom and control will be elaborated. There will also be an evaluation of what has to be considered when these concepts are implemented in practice and what challenges and possible solutions can arise. This will be followed by a discussion of what the trade-offs between freedom and control are and how a balanced connection looks like. **Chapter 4** describes the empirical in-depth study which was performed with ten relevant interview participants. The aspects identified and the findings from the literature section will be discussed with practitioners who work in a company which is implementing agile processes. During the interviews, common approaches that are often used in practice will be discussed and the validity of the theory will be evaluated to identify gaps. The gained knowledge will also be used to describe specific findings which can help organizations when they want to implement agile operational teams. In **Chapter 5**, the results from the theoretical and empirical study will serve as answers to the research questions from this thesis. In addition, limitations and recommendations for further research to this topic will be provided and specific recommendations for organizations will be summarized.

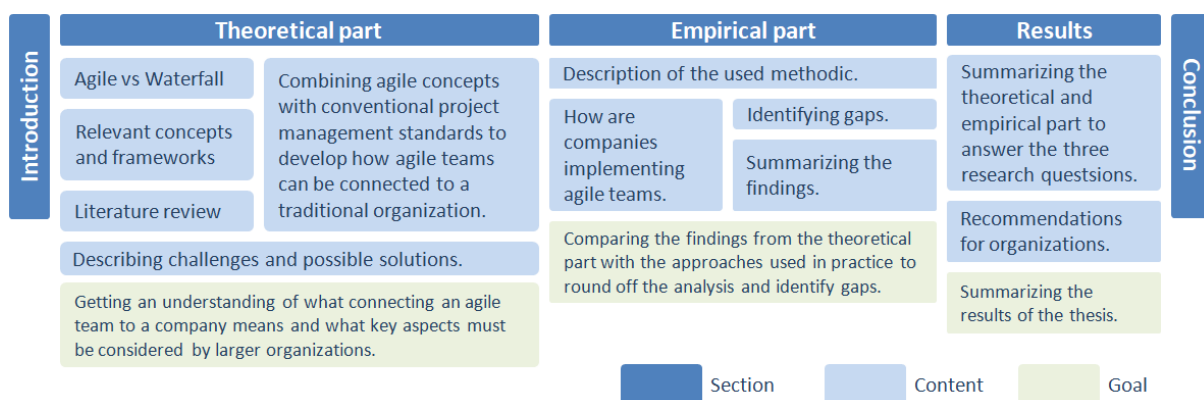


Figure 1: Overview of the structure of this thesis.

2 Literature Overview

In this chapter, an introduction to agile software development in bigger companies will be provided. Starting with an explanation of traditional approaches on software development, to help understand how a plan-driven process looks like. Then agile approaches software development will be explained by also giving an overview of the most common used frameworks. This will be followed by an overview, of which concepts are currently developed to scale agile methods across bigger organizations. Further, agile concepts will be compared to a waterfall approach and the how the contradicting concepts can be combined according to different sources will be outlined. Finally, the conclusion will entail a discussion on the relevance of governance for companies and how these companies commonly control and guide their projects in a plan-driven environment.

2.1 Traditional Approaches for Software Development

To evaluate the impact of agile operations, it first has to be understood how traditional organizations are used to handling their projects and what the current project management standards are. Traditional organizations in this context refer to organizations, who have a more hierarchical structure and who's projects are performed in an established, more plan-driven way following the PRINCE2 or PMP principles. Project management in this manner can be defined as a practice of initiating, planning, executing, controlling and closing the work to deliver a project successfully in terms of budget, time or other defined criteria (Nokes & Kelly, 2007). In order to implement a new software or software changes, many companies work according to international project management standards. Those methodologies contain a lot of principles that enforce structured workflows and represent traditional project management. The most widely performed certifications in this area are PMP certifications and PRINCE2 certifications (Florentine, 2019). While agile methodologies split the software deliverables into many little parts and are implemented continuously, Axelos as well as the PMI aim for bigger and better planned go-lives at the end of longer phases. With their definition, neither institute focuses on delivering in an agile way, but the concepts and aspects that they cover, are relevant for connecting and integrating projects successfully into a company. These principles will be used in this thesis and will be merged with agile concepts in order to integrate them into the operations of a traditional organization. For this reason, the key elements of plan-driven methods will be summarized below.

The PMP standard is administered by the Project Management Institute (PMI) and offers a broad range of certifications from entry level to expert. The standards and guidelines for PMP are summarized and developed in the PMBOK Guide (Project Management Institute, 2013). The PMBOK is a collection of processes, best practices, terminologies, and guidelines used in

the project management industry. The PMBOK Guide covers the most important areas related to projects and their interactions within a company. It offers guidelines for topics like stakeholder management, risk management or communication management. A key piece of the guideline is the role of project managers, as they are responsible for achieving the objectives of a project. The PMP gives guidance, but does not provide an exact definition of how project management should be implemented, as it is a standard and not a methodology. For instance, it is not defined which other roles beside the project manager are required and how they should be defined.

PRINCE2 on the other hand is a method that provides a clear product-based definition of effective project management and is published in the PRINCE2 Handbook (Axelos, 2017). The method was developed by Axelos and the content is structured in three main areas containing each 7 topics: (1) principles, (2) themes and (3) processes. Additionally, it defines six aspects or performance goals, which are: scope, timescale, risk, quality, benefit and cost. The seven processes define all phases required to start and finish a project. Within the seven principles it is also clearly defined which roles and responsibilities have to be defined and which documents need to be produced.

2.2 Agile Approaches of Software Development

The development of software components is very essential to many businesses and it is an important and complex field, in which projects often fail (Special Report: Managing complexity - Software development; The software-development industry, 2004). Over time, software development has changed, from being exclusively focused on the technology to include the business impact and societal changes resulting from the software as well (Campbell-Kelly, 2002). In increasingly complex environments, agile process offered a flexible and customer focused approach to cope with the challenges of ever-changing environments and customer needs. Agile software development can be described as various approaches to develop solutions through a collaborative effort of self-organized and cross-functional teams (Collier, 2011). It was popularized in 2001, when the Manifesto for Agile software Development was written and defined the core values of working in an agile way (Beedle, 2001). Those core values include (1) individuals and interactions over processes and tools, (2) working software over comprehensive documentation, (3) customer collaboration over contract negotiation, and (4) responding to change over following a plan. In addition to the core values, the manifesto also summarizes 12 core principles of agile software development, which are described in the appendix. There are many agile methodologies that define how the agile principles can be implemented from which the two most popular ones will be described in the next section.

Agile software development has gained importance over the last decades and the use of agile methodologies to deliver software applications has increased in many companies (Guerra, 2018). Agile development has the advantage to provide a process of continuous improvements, which is designed for flexibility and a strong customer focus (Sacolick, 2018). In order to stay flexible, development teams need the freedom to operate and the authority to make their own decisions. Waterfall methods have a more detailed planning in the beginning, but are often unable to adapt to changes later on time. A successful and on-time delivery is often hard to meet in a traditional plan-driven approach when the environment continues to change or the complexity of a task has been underestimated. Agile models are not only more flexible, but also increase the user and business involvement as they are part of the process and participate regularly in alignment meetings and help deliver continuous improvements. This close engagement between the project team and the business representatives in agile models is associated to the success of the project considering the success factors time, budget and quality (Kamepally & Nalamothu, 2016).

2.3 Reasons to work Agile

In the following, the main advantages of using an agile approach will be described. Among the core reasons for an organization to adapt an agile approach include the ability to renew itself, be able to change quickly, and succeed in a complex and fast changing environment (Stoica, Mircea, & Ghilic-Mico, 2013). There is also evidence that organizational units that are implementing agile processes are doing better financially than the units that don't (Denning, 2019). Studies also indicate, that self-organized teams have a better performance than plan-driven methods and also affect the motivation and innovation of software development teams positively (Kakar, 2016). A reason to use agile methods for executives and leaders is also to increase customer satisfaction by implementing more useful software and be able to deliver updates more frequently. With this approach, managers can make changes to the deliverables in very short time periods, if they think adaptations are needed. In Table 1 the reasons for executives to implement agile processes are summarized.

Summary why Companies implement Agile Processes
Increase time-to-market
Adapt faster to change
Succeed in a complex environment
Develop what customers actually want
Save costs
Deliver software increments on a regular basis

Table 1: Reasons to implement agile processes.

2.4 Scrum and Kanban

The most widely used implementations of agile principles are Scrum and Kanban. In the following an overview will be given, how they are used in software development.

Scrum

Scrum is the most popular agile methodology (Reifer, 2017) and offers a relatively specific description of how it should be implemented. The product development is performed by the scrum team, which consists of following roles. The Scrum Master is responsible for explaining the rules of Scrum to the team and ensures everyone is as productive as possible. Another important task of the Scrum Master is to protect the team from barriers and get rid of any kind of impediments to the progress. The key role of the team is the Product Owner, who often represents the business area and the customers. This role is responsible for guiding the product development in the correct direction and sets the prioritization. Further, there is the development team, which is responsible for delivering the increments and participates in the regular meetings. An important term is the product backlog, which is the summary of all features a product has. Those increments should be able to be delivered continuously in the so-called sprints. One Sprint is the time period between the Sprint meetings, which are usually held around every two to four weeks. Other relevant meetings are the Daily Stand-up Meetings, Sprint Review Meetings and Sprint Retrospectives which are used to reflect on the performance and identify areas that need to be improved (Schwaber, Ken, 2004). Figure 2 gives an overview of the Scrum process. The illustration shows that the product backlog is defined in the beginning of a project and every feature component is selected in each sprint and planned in more detail. Within the sprints, the daily sprints are conducted and at the end of the sprint deliverable component features are finished until the whole product is finally completed.

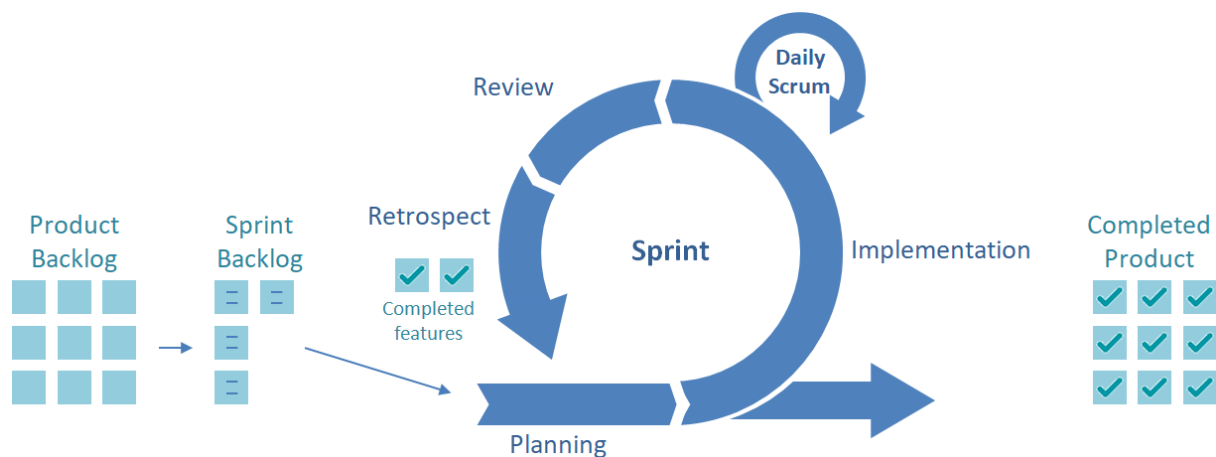


Figure 2: Overview of the Scrum process.

Kanban

Kanban is a lean method used for managing the creation of products and for improving the work process. There are four core principles which can be summarized: (1) Visualize the workflow (2) Limit the work in progress (3) Focus on workflow and (4) Continuous improvement. With these principles, Kanban does not prescribe a certain procedure or define specific roles that have to be followed. It rather acknowledges that there may be value in the existing processes, roles and responsibilities and suggests to continuously improve what you have. The goal is to move the work efficiently from the start point till it is finished with as little waste and lag as possible (Anderson, 2010). With this lean approach, Kanban has become very popular in software development even if it originated from other industries. An example of a Kanban board is given in Figure 3, where items are first put as a backlog, then moved through the different stages until they are marked as done.

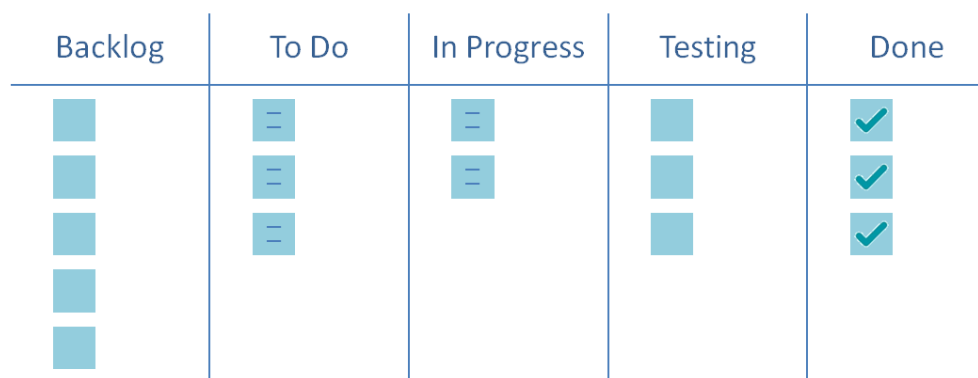


Figure 3: Example of a Kanban board.

Due to the different aspects of Scrum and Kanban, it is possible to combine the two concepts to form a new framework. This hybrid variant has known as Scrumban and was originally designed as a transition from Scrum to Kanban. Today it is often used when teams like to work according to the Scrum rules but use the Kanban method to view, understand and improve how they work (Ladas, 2008). Additionally, to those methods, there are other agile frameworks like Extreme Programming, Agile Modeling, Dynamic Systems Development Method or Feature-Driven Development, which can be suitable in certain situations and combined with each other. All those popular agile frameworks focus on the operational aspects of Agile and do not include techniques, how they can be connected to a bigger company. In this thesis, there will be a focus on the interactions between a team that applies Scrum or Kanban and an organization, as these concepts represent the agile principles in a very clear and comprehensive manner.

2.5 Scaling Agile

The question of how an organizational design can appear, in order to support Agile, can to a certain degree be answered by scaled agile frameworks. Those frameworks are currently in development by many communities and associations. In this section, some of the principles will be described that make suggestions on how agile teams can align their day-to-day responsibilities with the organization of tasks and be able to integrate their developed components into the environment of a larger enterprise. In the following the most popular frameworks, will shortly be summarized.

A framework with a focus on the organizational design is call LeSS, which stands for Large Scale Scrum. The framework provides a couple of elements, which are aiming to direct the attention of all the teams onto the whole product. It considers the global and “end-to-end” focus as the dominant problems to solve in scaling. It is divided into two forms, of which one is made for up to eight teams with eight members each while the second part is meant for more teams. The framework aims to connect the teams to each other and adapts the Scrum methodology to be usable across teams in a bigger organization (Larman & Vodde, 2019).

The most widely used framework and probably the most comprehensive one is SAFe which stands for Scaled Agile Framework. It was developed by the Scaled Agile, Inc. and the version 4.6 has been released in 2018 (SAFe, 2019). SAFe is structured into three hierarchical levels the Team, the Program and the Portfolio. The Scrum teams operate in the team sector, which is connected to the program sector via regular meetings. In the program sector, there are roles similar to those of a Scrum team, but with superior responsibilities. For instance, there is a defined Product Manager, a System Architect and a Release Train Engineer. The program sector is connected to the portfolio section, which contains the roles of an enterprise architect and an epic owner. Across all sectors, concepts from Kanban are applied and there is a focus on the value stream. The backlog is continuously reviewed and adapted using the Agile Release Train, which is used for delivering in the program sector. The SAFe is based on lean and agile principles, but it can get complex when all concepts and processes are implemented within a bigger company.

Another interesting concept on scaling the agile approach across a company, is called the Disciplined Agile framework. It is structured into four hierarchically linked processes, which are the Disciplined Agile Delivery (DAD), the Disciplined DevOps, the Disciplined Agile IT and the Disciplined Agile Enterprise. It also has a set of defined principles and roles that are required for a people-first, learning-oriented hybrid approach to deliver IT solutions. The DA framework is designed as a hybrid of other agile methods like Scrum, Kanban or Extreme Programming. The DAD provides the mortar for all the methods to fit effectively together (Ambler & Lines, 2019).

The frameworks described above, provide interesting concepts for how agile teams might be connected to an enterprise, using different hierarchical layers and specific roles. Scaling agile development across a whole organization is still a frequently discussed topic in literature, and there is no established solution in place yet for how agile operational teams can be connected to an organization. Relevant factors for scale agile across a company are to trust and empower people, to facilitate cultural change, and to provide the means for collaboration (Den Haan, 2018). In the next section, those factors will be evaluated in more detail.

2.6 Plan-Driven versus Agile Methods

In software development, the choice of a suitable methodology is crucial to the success of a project. In the early days of software development, the waterfall method became a standard plan-driven approach for many companies especially for bigger software systems (Mitsuyuki, Hiekata, Goto, & Moser, 2017). Software requirements needed to be analyzed, designed, implemented, tested and deployed in the life-cycle of a project (Winston, 1970). Those phases, which were already defined in 1970, have been proven to cover the most important aspects of implementing new software components. In the digital age, the usage and importance of software to companies has increased tremendously, and the software industry faces new challenges. Those challenges include, that requirements from the business and technology sectors changes more regularly and the environments in which software has to be integrated are becoming increasingly complex (Bergh & Benghiat, 2017) (Levans, 2019). Those factors make it increasingly difficult for requirements engineers, to understand everything in the beginning, when specifications have to be written and the planning is done. The in-depth planning of a project takes a long time, and when the software is finally developed, the customers' requirements might have already changed or it might turn out that the situation is more complex than originally assumed. So, in order to stay more flexible, and to be able to adapt to new discoveries and changing conditions, agile methods have become more popular. Many companies are now trying to be adaptive, and deliver software iteratively in smaller increments (Guerra, 2018).

The Manifesto for Agile Software Development has been developed and it summarizes not only the agile core values, but also describes the trade-offs that have to be made. For instance, software documentation and contract negotiations are considered less important for agile methods, which in certain situations can be a disadvantage, like when the project goals or quality standards are not met. In agile processes, time & material contracts are more common, in which people are paid for their efforts and not for the result. This can make it difficult for managers to insist on specific features at specific dates, as the priority of the development can change during the process (Stoica, Mircea, & Ghilic-Micu, 2013). A big issue in the waterfall approach has often been that there are certain phases that follow each other, and many

aspects have to be considered from early on. In the beginning of a project, the business sector specifies what they are planning to achieving and afterwards, the developers try to deliver those requirements. However, in the end, the product often does not meet the expectations of the business areas, as not much alignment is done within the phases. This issue is improved by the agile principle, as the agile principle has the goal to bring business and development closer together by regular alignments throughout the whole project (Masur & Schaffner, 2016). In Figure 4 it is illustrated, how the relevant phases in software development are handled in waterfall and agile projects.

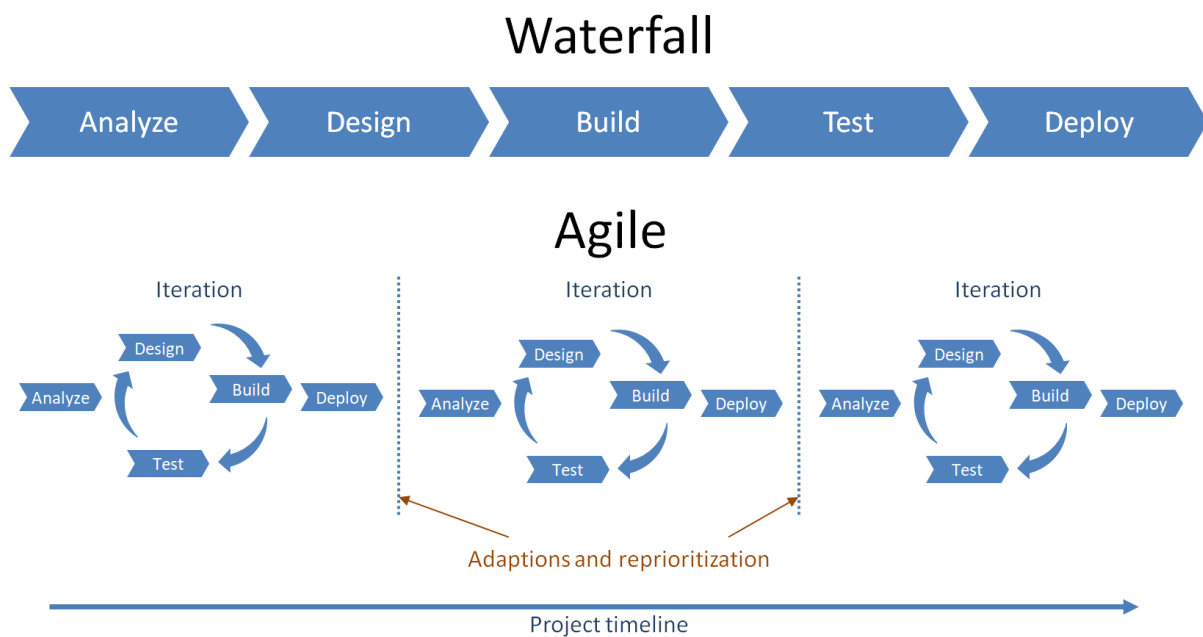


Figure 4: Illustration of an agile vs. a waterfall process in software development.

When comparing agile methods to the waterfall approach, there are certain facts that can generally be stated. One of the most important differences is the iterative process of agile methods, which in a way contains similar phases to those of a waterfall approach, but occurring in smaller steps. While the waterfall approach has long and detailed phases between the first analysis and the deployment of a project, ending with a big go-live. Agile methods try to break down the scope in smaller increments, and deliver them iteratively (Sufi, 2018). A big bang is often considered very risky, and it makes it more difficult to adapt to changing requirements or situations. The phases in agile methodologies have to be performed in shorter time periods, as shown in Figure 4. The product owner is usually responsible for reprioritizing features, or making adaptations to the product during the iterations, in case new barriers or opportunities have been identified. An important aspect of an agile development is the focus on communication between the people involved and the continuous improvement of the ongoing processes. In the waterfall approach, work has to be planned and executed with as much detail as possible, while agile approaches allow adaptations. It is important to always reflect on the

work that has been performed, to detect the areas that could be improved in order to work more efficiently. With those differences, a different mind-set is required, for people who are working agile (Saboe, 2017). An overview of the differences between a waterfall and an agile approach are shown in Table 2.

Waterfall Approach	Agile Approach
Sequential	Incremental
Bigger deliverables	Smaller deliverables
Rigid (changes are difficult)	Flexible (requirements can change)
Plan-driven	Purpose-driven
Better for more predictable projects	Better for handling uncertainty
Testing comes after implementation	Testing is performed during implementation
Project management is essential	Teams are self-organized
Bigger team sizes	Usually smaller team sizes

Table 2: Differences between a waterfall and an agile approach.

2.7 The Perspective of the Organization

In the previous section the issue that agile frameworks only describe operational processes, and do not cover how the interests of an organization can be included in the process was touched. In the following sequence, the company perspective and its requirements for the operations will be discussed. For most agile framework, the focus lies on customer satisfaction and on delivering the business requirements as efficiently as possible. Though customer satisfaction is also in the interest of the company, many companies have additional requirements that have to be considered, when software components are developed. Companies usually have a defined vision and a strategic direction that they want to move in. This strategy must also be followed by the operational teams, and especially the prioritization of work items must always be in alignment with those goals. Many companies have guidelines for processes, policies and core values, which are important to them. Self-organized teams have to align with the company regulations, which might affect their way of working. These among others are still open challenges in the effective implement of an autonomous team into a company (Stray, Moe, & Hoda, 2018).

Another important aspect, specifically for software development projects, is the integrity of the deliverables to the technical enterprise architecture. Certain guidelines and company-wide standards for software development are defined by an organization, and the management of a company will expect the development to follow those requirements. For developed components to be able to fit into the architecture of the company, available systems and communication in the environment can be used. In agile projects, the compliance is often not

verified, and the developers do not have as much alignment with the architects from the enterprise. This can lead to applications that are more complex, hard to maintain and have a lower overall quality (Barow, 2017). Development projects that are not aligned and grow arbitrarily in their own direction are a huge threat to a company. It might even happen that similar projects are developed parallel to each other, or teams and their projects do not meet the business requirements of the organization (Elliott, Fons, & Randell, 2015).

In order to find a comprehensive solution for the integration of agile and lean methods into an enterprise, and to balance different dimensions from an architectural point of view, communities like the Architectural Thinking Association try to find and publish suitable solutions. This association has the goal to spread information about architectural thinking, by using its core values of being lean, collaborative and business oriented. The developed architectural thinking framework summarizes three relevant levels of architecture: Enterprise, Top-level capability and the solution layer. These levels cover the processes for strategy, governance and development, to ensure that the solutions fit together, and support the business' vision of the enterprise. The framework suggests using a set of small maps that cover areas of alignment. Additional maps can help direct a project, and enable informed decisions across all levels of an organization (Göbl & Schwarzer, kein Datum). It is also discussed that a paradigm shift has to take place towards organizations as living organisms, instead of organizations as machines, in order to cope effectively with agile operations (Aghina, De Smet, Lackey, Lurie, & Murarka, 2018). This will be discussed in more detail in Section 3.1.2.

2.8 Combining Agile and Traditional Concepts

When companies begin to implement agile methods, it must be noted that most agile methodologies are purely operational concepts. They are designed for smaller teams, and do not give advice on how they could be integrated into a larger organization. There are no comprehensive frameworks in place yet, that would help guide a company in the integration of agile teams into their existing structures. So, the question has to be asked: "Is it possible to combine agile ways with a traditional company with a hierarchical structure?" This question seems to be an open discussion in many communities but some studies indicate that though a coexistence of plan-driven and agile methods is possible, it can cause tensions between the interacting teams (Laux & Kranz, 2019). It might be required for the company to make adaptations to their existing standards and concepts within the team and the organization itself. The PMI, who publishes the PMBOK, has published a study that states that organizations increasingly embracing agile as a technique for managing projects. In the 9th Global Project Management survey, it was found, that 71% of the more than 3200 professionals are already using agile principles (Success Rates Rise - Transforming the high cost of low performance,

2017). The study also mentions that around 25% rely solely on Agile, while 56% use a combination of existing methodologies. This means that a majority of existing organizations pursue their own way of combining existing methodologies and adapt their own structures to enable agile operations. Other studies confirm that more and more companies are implementing agile principles in their operations (Guerra, 2018). This trend cannot only be detected in new digital companies, also traditional organizations are already implementing Agile. Still, there is no defined approach yet, on how traditional and agile methods can be combined, and how traditional companies can adopt agile concepts into their organizational design. This means that the question is not “if” it is possible to combine agile and traditional concepts, but “how” those contradicting principles can be combined efficiently in larger organizations. Therefore, this thesis will examine in more detail, how existing concepts from both agile and traditional frameworks can be combined effectively.

3 Connecting Agile

This chapter will examine the merging of agile concepts and traditional principles and how this combination can often contain contradictions. This will be done by an evaluation how traditional companies are used to managing teams. Based on those paradigms a discussed will follow on what adoptions have to be made by, when setting up agile working teams. Organizational aspects will be covered, followed a guide of relevant roles and functions. The process and the relevant interactions between the organization and the team will additionally be presented as well as how planning and prioritization can sequence. The importance of the trust and empowerment between the stakeholder and the company will be described. This will be followed by an evaluation on what has to be considered when such a connection is implemented in an organization, and what the expected trade-offs between freedom and control will be. Finally, the findings from the literature used for this chapter will be summarized and the setup for a connection will be explained by additionally summarizing the identified key aspects.

3.1 Organization and Culture

3.1.1 Cultures in an Organization

To connect agile teams to an organization, one of the first concepts that has to be understood, is the existence of different cultures within a company. A culture can be described as a group of people with shared values and assumptions that guide their behavior. Three of the fundamentally different cultures that can be found in most traditional companies are the operational culture, the engineering culture and the executive culture (Schein, 1996). These three cultures are known to have difficulties understanding each other often, as their work is guided by different assumptions and goals and they often use similar expressions for different things, making translation barriers a frequent problem.

The operational culture or the business side of a company refers to the individual culture, which is developed based on a company's operational success. This success of the organization depends on the people's knowledge, skills, learning ability, and commitment. Employees must have the ability of applying their skillsets as well as be able to learn, adapt and deal with possible surprises. In agile methods, the communities mentioned are often represented by the product owner, who is the owner of business requirements and members of the business departments. The engineering culture consists of the designers and developers, who drive the core technologies, through their various functions. Assumptions that are often shared of those communities are that they often prefer a simple cause-and-effect, linear and quantitative thinking. They often have more focus on the technical implementation of a project and prefer elegantly designed and harmonic solutions that are more resilient to faults. In agile

development methods, those with engineer cultures would be suited as software developers and engineers, who help implement and maintain the software. The third culture, known as the executive community or the leadership is responsible for the goals and operations. These positions are usually particularly focused on financial terms and hierarchical structures. This community is not directly represented in most agile methodologies, as the leadership is directed towards the team. The three cultures described are often found in many companies can serve in to making a simplified illustration of the different communities and mindsets that have to be able to work together in larger organizations. Especially when introducing agile methods to more traditional organizational structures, the different cultures will often run into issues understanding each other, so companies face the challenge in finding efficient ways of working together, in order to prevent miscommunications.

Agile methodologies focus on the continuous interactions between the business section and the engineers, to bring them closer together. However, agile principles focus on the product and on serving customers, while the interests of the organization are often not well represented. The executives and the management of a company set the strategy as well as the goals for the operations and can enable projects, as they provide the financing and resources. Scaling agile frameworks try to include the management and leadership sectors in more agile ways, making sure to cover their own interests in the process. Nevertheless, many challenges remain and transitioning towards a leaner structure is difficult in practice. For agile working teams, one of the main challenges continues to be the overcoming cultural differences and establishing a more efficient and collaborative approach. In the following section, additional details will be discussed that need to be considered when executing an operation without neglecting the interests of the organization.

3.1.2 Organizational Design and Strategy

As discussed in Section 2.8, there is currently a shift in the paradigm of many companies towards more agile organizational structures in order to help companies cope with the challenges triggered by the “digital revolution”. The advantage of transitioning to a more agile structure not only provides the possibility for a company to strengthen the relationships between its various communities, but also redefines the purpose of the top management and leadership community. Traditional organizational designs are built up in a more hierarchical structure and often have the goal of functioning like a machine. This strengthens bureaucracy, can lead to silo building of certain communities, and makes it increasingly difficult to navigate and react to a rapidly-changing world. Newer organizational designs aim for more diversity, cross-functional cooperation and a strong customer focus. This agile way of working can increase the time to market, lower the costs and support a more engaged workforce (Aghina,

De Smet, Lackey, Lurie, & Murarka, 2018). The transition from a traditional machine-like company, towards a more agile organization is illustrated in Figure 5.

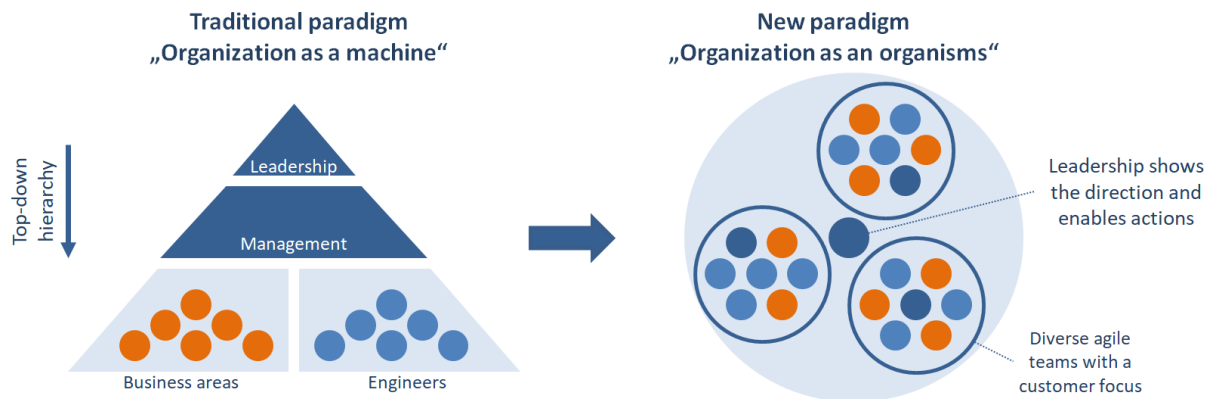


Figure 5: “Traditional” vs. “new” organizational paradigm in a simplified illustration.

Traditional organizations make use of a very hierarchical way of communication, starting with higher ranked workforces, who exchange information with management, after which management is expected to translate this information into a strategy that will then be passed on to the operating teams. Problems and barriers on the other hand work their way up the hierarchical structure. In the new paradigm on the other side, customer focused teams are empowered to operate in self-organized teams and managements relevance can be reduced, as the management responsibilities are delegated more to the teams. The leadership team is then ideally only left with two major responsibilities: (1) develop and communicate the strategy of the company, and (2) serve as an enabler. Self-organized teams need to report to the leadership to align on issues when it is required. The transition from the “traditional” to the “new” paradigm is illustrated and explained in the appendix. Both models and all variants in between, rely on a connection between the leadership and the operating teams, ensuring an alignment of relevant topics and issues. Agile teams in early stages need a connection to the company, while in the “organism” paradigm the agile teams are an integrated part of the whole design. An illustration of a traditional company which implements agile teams is shown in Figure 6..

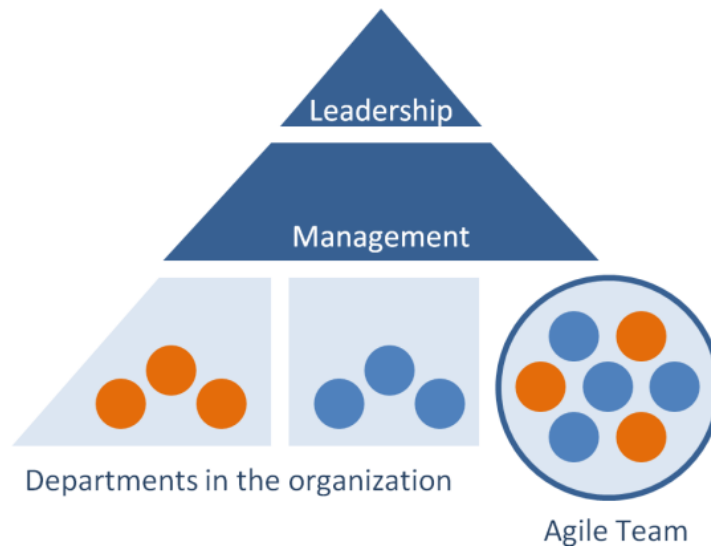


Figure 6: Illustration of a traditional organization, which implements an agile team.

An organization faces the challenge of combining traditional departments with more or less self-organized teams. This means, the company needs to find a way, how those teams can be connected efficiently. The different colors of the circles in the figure, illustrate the different cultures that are combined in an agile team. In the following, this connection and required interactions will be discussed for companies that have a more hierarchical structure and are beginning to use agile teams for their operations..

3.1.3 Technical Integration and Governance

As discussed in Section 2.7 and Section 2.8, there are certain interests of a company that need to be covered by agile teams, in order for the teams to be properly integrated. One of the challenges is that new developments must be added to the architectural landscape of the company and it must be ensured that the work delivered is compliant with the company's quality and documentational standards. This can be realized by using the right roles like an architectural owner as a guide for technical decisions, as suggested by the DaD framework. Another important aspect for companies is that the operating teams have to follow company established values and policies. This can hinder or slow down self-organized teams as it means additional effort and the loss of time. This is a crucial issue where a good trade-off has to be found, in which the teams are given enough freedom, while also ensuring that the crucial requirements for the company are met. The more an organization governs an agile Team and expects to follow the bureaucratic processes, the more it hinders the teams' flexibility and increases the time to market. A possible solution is to weaken managements role in the company and start to empower the teams more (Rigby, Sutherland, & Noble, 2018). On the other side, if the operational team can make use of existing tools and knowledge the company has, this could increase the efficiency of the team, so a suitable way of exchange must be

found. For instance, if the company uses standardized systems, it could harm the working conditions of the agile team. It must therefore be ensured, that important assets of the organization are aligned and communicated. For this reason it is crucial for the executives of an organization, to set up the right working environment for the agile teams, in which it is possible for them to work efficiently and benefit from the capabilities of the organization (Bossert, Kretzberg, & Laartz, 2018).

3.2 People and Functions

3.2.1 Roles in a Traditional Organization

Traditional organizations often use roles and responsibilities from existing frameworks like PRINCE2 or follow the PMP standards, when projects are realized. Here the PMP standard suggests many different roles with different responsibilities, mainly to ensure an organized delivery of the project. Some companies use roles and responsibilities from PRINCE2, as those cover the most crucial perspectives in a simple and clear manner. PRINCE2 defines three roles to direct a project, which is the role of the executive or sponsor, the representative of the user or business side and the representative of the supplier. In an agile cooperation, the traditional roles that form a steering committee to control the operations might have to be adapted. The leadership and management should serve more as an advisor and an enabler for the team. The functionalities of business and supplier representatives and other governance tasks might need to be transferred to certain team members instead of forcing a sector of control over them (Barretta, 2009). For the technical integration, the DAD and the SAFe framework suggest the usage of an architectural owner, who is responsible for making technical decisions and ensuring that the architecture of the new software complies with the requirements of the enterprise. This role can also be found in traditional organizations, as they also have a strong focus on technical integrity. The required roles within the enterprise get more complex and depend strongly on the interests and culture of the company. A steering committee or a big control layer of managers, as it is used in more traditional approaches, hinders the agile teams as they need flexibility (Shealy, 2019). Therefore, new roles for directing and cooperating on the project have to be found by the company in order to guide a team throughout the project. Also, in agile environments, a change in the company mind-set is required, to achieve more flexible roles, to work together in a team towards a common purpose, and not to expect everybody to have defined tasks from the beginning (Aghina, De Smet, Lackey, Lurie, & Murarka, 2018).

3.2.2 Roles in Software Development

Most frameworks and methods related to software development that can be gathered from the literature review, suggest certain roles and responsibilities. In agile development teams, Scrum

has certain defined roles that are meant to be used in the process, and are already widely applied. In Kanban roles are less important, but it is still suggested having them defined, when the concept is implemented. It is often important to have defined roles even though they might change, as the roles can provide clarity, when projects are implemented, and they can help all the people involved understand, who is responsible for which deliverables (Hoda, Noble, & Marshall, 2013). As existing frameworks and standards already have defined roles and responsibilities, it might be recommendable to make use of those definitions in the implementation. For agile software development, the roles included in Scrum might often be the most suitable, as the roles are broadly known and accepted (Srivastava & Jain, A leadership framework for distributed self-organized scrum teams, 2017). The main roles in Scrum are the Scrum Master, the Product Owner and the Team Members. The Scrum Master is responsible for guiding the team, and for ensuring that everyone is working efficiently. From the business side, the most crucial role is usually the Product Owner. This role is responsible for ensuring that the development is going in the right direction and it represents the users' perspective. One of the Product Owner's responsibilities is also, to set the prioritizations for the team in the iterative sprint meetings. The team members are required to work on their deliverables and communicate on their progress, as well as where they face barriers. It is important, to create awareness of agile processes and to ensure that all participants have the same understanding and can work together efficiently. In Scrum, this is role is taken on by the Scrum Master, but many companies also make use of the role of an Agile Coach. An Agile Coach is responsible for supporting teams and individuals in adopting and improving agile methods (Kelly, 2009). Traditional organizations are suggested to accept and support those new roles, if they want to work Agile in their operations.

3.2.3 The Project Manager Role

In this section, the role of the manager will be further analyzed. The role of the project manager varies quite strongly throughout different project management methodologies, but it is always a dominant role. According to most definitions, project managers are responsible for the overall success of an implementation, and their responsibilities may involve the coordination of tasks, as well as reporting and to delegating the work packages. In agile development, a project manager is not necessarily required, as there is no reporting to a higher instance, and the team is mostly self-organized. To connect an agile team to an organization, some responsibilities of the project manager can be transferred to the Product Owner, the Scrum Master or other team members. This means that the role of the project manager, which is more of a "command and control" type of role, needs to be adapted, as agile teams are in need of a more dynamic approach (Taylor, 2016).

Other former responsibilities of the project manager are to coordinate the interactions, and to follow the communication plan of the development team. It might still be important for one central person to be defined, who takes care of everybody's understanding of the definitions being used, and that everyone is following the defined processes. It might be suitable for these tasks to be performed by the product owner, as he is also the one who sets the prioritizations for the deliverables. This means that it continues to be important to have certain tasks performed by a project manager, and that the role is still to be used, but it has to be adapted to become more of a "gate-keeper" (Taylor, 2016).

3.3 Processes and Communication

3.3.1 Directing and Control

One of the challenges crucial to working with an agile team is how those self-organized teams can be connected efficiently to the company by using the right communication channels. Agile processes require flexibility and freedom in order to be able to navigate in volatile environments (Augustine, Payne, Sencindiver, & Woodcock). Traditional companies are used to directing ongoing projects, and to having a strong control over their processes. For the management section, this would mean a regular alignment and setting of goals for the operations. In many companies, those topics are aligned in Steering Meetings or in jour fixes between the management or leadership team and the operational representatives. Slow procedures need to find leaner interactions with the team, and have less focus on formal and directive processes (Kashyap, 2018). It is crucial to understand that working together with an agile team also requires a change in the mind-set and possibly the culture of the management and leadership of the company. It would be a first step for the leadership of the company to become more agile and allow the company's goals to be more adaptable. Agile teams are driven by a purpose and so should be the whole company. The leadership is required to help the operating team define a vision, and to enable them to work efficiently towards defined goals. It is important that an organization understand that agile methods are not linear and sequential processes, like the processes many companies are used to. In this environment, the leadership teams need to instill agile values throughout the entire enterprise (Rigby, Sutherland, & Noble, 2018). The point is that conditions can change quickly, and the operating team needs freedom to react. This freedom of the team however, is not a free card, to not achieve their goals, as they still have to explain everything they do. For instance, if the vision of a company is to have a new platform for its customers, and the goals are set, to have a first version running within one year, the product owner may supervise this in an agile way using a defined product backlog. The product backlog might be adapted during the Sprint meetings, but the overall purpose of the team would not change, and the platform would be developed and delivered, but it might look a bit different then defined at the beginning.

3.3.2 Agile Processes and Interactions

In agile delivery models, teams are often self-organized in order to work efficiently as described in Section 2.6. When Scrum is used, the team must meet daily to align the tasks that have to be dealt with, and to address the issues that are blocking specific tasks. Those meetings are crucial for making the work more transparent, and provide a platform for discussing daily tasks. Every two to four weeks, the Sprint Planning Meeting is held, where the work packages are reprioritized and the goals for the next sprint are set. In these meetings, the business side evaluates the deliverables from the development sector, and team aligns the required tasks. In order to analyze and improve the processes continuously, retrospective meetings are held regularly, in which the team discusses what has been working well, and what should be improved in order to work more efficiently. Those meetings lead to more transparency, flexibility and adaptability of the team and to work in self-organized way towards a common goal. It is crucial that the team is able to alter the prioritization after certain instances have changed, or new complexities have been discovered, even if this leads to a different outcome. In enterprises however, processes need to be followed, and managers usually rely on defined milestones, as has been described in Section 2.7. Companies now face the challenge of allowing agile teams to form their defined processes, if they want to implement agile teams. On the other hand, organizations need to find a way to change the agile team in order to keep on track with the organization's interests. This might mean that the product owner or the business representatives need to guide the self-organized team, in order to comply with the processes and the goals of the company. This can be achieved by first defining a specific goal, and then giving the team the freedom of choosing how they would like to achieve a successful delivery, as agile teams are purpose driven. For this reason, it could be a solution for the management of a company to focus more on products instead of processes (MacKay, 2018).

3.3.3 Communication Strategy

Beside the interactions of the operations with the management layer, a communication strategy also needs to be found. In many traditional projects, communication consists of defined reports that are sent regularly. Reports are important for the top ranks of management, as they ensure that the projects are being executed according to the plan. In the project management standards, the people responsible for certain work packages report to the project manager, while the project manager reports to the organization. In agile methods, the progress is aligned in the meetings that are held, and reports are usually not sent on a regular base, as tasks are very flexible. A big advantage of agile processes is that the work is very transparent, so the progress can be tracked constantly. The daily or weekly tasks are tracked with the help of software tools or on Kanban boards, where the prioritization is defined. Companies need to find a suitable way in which the organization and the team are able to communicate effectively

with each other. Studies indicate that it is possible for agile practices and plan-driven developments in a traditional setup to coexist within an organization (van Waardenburg & van Vliet, 2013). This means that the management can still conduct regular meetings and define milestones while the team is working agile, and the progress is tracked in real time. This could even improve the overall efficiency of a company, if the organization finds a good way to set up the cooperation. It must also be allowed for the management, to look into the tasks and the progress of the team, as transparency is an agile core value. Regular reports can still be maintained, but it is also important to recognize that the reports will not be classic reports for the tracking of progress according to a specific plan, as this would hinder an agile working style. If reports are to be used, they have to be written in order to inform management about important decisions that have been made during the operations, and about the changes that have been made, to ensure an efficient workflow. It is also suggested for reports in agile operations to follow the SMART criteria, which means that they must try to be specific, measurable, assignable, realistic and time-related (Adanza, 2016). The more agile an organization becomes, the more the communication might change, as the teams will be increasingly empowered and self-controlled.

3.4 Planning and Prioritization

3.4.1 Operational Management

When looking at the operational management, three levels can be identified for operational performance: societal level – operational sustainability, strategic level – operations strategic impact, and the operational level – operations performance objective. The third level is relevant to the operational activities of a company, and it contains the five operation performance objectives, which are: (1) quality, (2) speed, (3) dependability, (4) flexibility and (5) cost (Slack, Barandon-Jones, & Johnston, 2016). These performance parameters are crucial, in order to ensure that the operations are well aligned, and to evaluate the success of an implemented agile team. Quality is important for the company, when meet customers' expectations, and is also important in order to reach the companies' standards. For the operating team, quality matters, as it makes the development more reliable. When the implementations become more complex, following quality standards is indispensable. Speed is crucial to the company, as it means a faster reaction to changes in the markets and to customer requirements. Fast adaptations increase the customers' satisfaction, as they receive their required features sooner. For the operating team, speed is relevant, as they need to be able to adapt features to upcoming challenges or changed environments. Dependability means, to work reliably and deliver work items as they are expected. For the company this would mean to control the operations and to ensure that the defined goals are met. For the operational team, dependability means to ensure the set targets on an operational level, so that increments can

be delivered, as they have been forecasted. Flexibility is important for the company, as they need to be able to adapt to changes on the market, new business requirements or new and disruptive technologies. The operating team needs to stay flexible, in order to adapt to operational changes or the change of priorities. Costs and efforts are also crucial in order to stay within the given budget boundaries. It is relevant for the company to keep the operations as lean and efficient as possible, in order to stay competitive. For the operating team it is important to stay within the defined budget, and not gain too much additional effort that may arise from the requirements of the organization and changes in the implementation. To find an efficient agile connection, it is crucial to align those indicators properly, and to ensure a good balance between the team and the company. A key to managing and optimizing the performance successfully might be to focus on regular feedback, and to improve processes continuously (Windust, 2012). This means that feedback should be given frequently, and that actions should be made accordingly, to find the best individual setup. Managers should also conduct regular check-ins with team members, and optimize the cooperation. In the context of this thesis, those continuous improvement circles are a core value of an agile mind-set, and therefore an important aspect, when agile teams are connected to a traditional organization.

3.4.2 Innovation and Prioritization

Anyone can provide innovative ideas for the optimization of a product, or find new features, when using an agile process. This means that new ideas could come from the individual team members, employees, users, and people from inside or even outside the industry (Poetz, Franke, & Schreier, 2014). When both managers and team members have good new ideas, the question arises, who will decide, which ideas are to be prioritized, and which features are to be implemented first? In agile software development, the reprioritization is mainly made within the sprint meetings of the self-organized team, which occur every two to four weeks. In Scrum for instance, the product backlog is defined at the beginning, and adaptations during the different phases are made by product owners, as they represent the business. New innovations within an organization can be made from many sectors, and it has to be decided, which of these innovations will be implemented. If, for instance, a software platform is developed in smaller increments, the users can already experience some features while the development of the full product is still ongoing. In many modern platforms, the development is a continuous process, since software that is accessible online needs to cope with security issues, or deliver new requirements to meet the demands of the users as fast as possible. In an efficient agile connection, it is crucial for a company to make the right decisions, and empower the right people. This means that the company needs to identify and accordingly empower their key employees with the best knowledge of customers' expectations, and are therefore qualified to make the best decisions (Butler, 2017).

3.5 Trust and Empowerment

3.5.1 Empowerment of Project Teams

When the scope of projects is changed or adapted, it is also important to have an efficient way of prioritizing new innovations and features. In agile projects, adaptations are usually prioritized by the product owner every 2 to 4 weeks, and goals are set by the management or leadership of the organization. It must be ensured that the team is able to make certain adaptations themselves, for bigger decisions however, the management and business representatives must be included. A company usually permits the implementation of a project, and defines the objectives that have to be delivered at the beginning of this project. This process might often occur around once a year. Some companies use a steering committee to guide the development phases from the organizational perspective, and to set priorities during the implementation. This approach is not recommended in an agile environment, as the product owner and the team members are required to make the prioritization. This means that the management of a company needs to let go of a certain amount of its control and needs to allow the teams more freedom. In an agile context, the role of the management takes over the advising of the team, instead of being responsible for assigning specific tasks (Berczuk, 2018).

3.5.2 Establishing Trust

In order to stay flexible and adaptable, a self-organized team must be allowed to make their own decisions and adaptations when delivering a product. The team must however also follow the strategic goal defined by the company and work according to the company's standards. To achieve an empowerment of the team, tolerances can be set for decisions regarding the fields of budget changes, as well as changes to time and scope, as defined by the project management framework PRINCE2. Projects that do not give tolerances often fail, finish late or end up being over budget (Barry, Mukhopadhyay, & Slaughter, 2002). The bigger these tolerances are set, the more freedom a team has to navigate in its environment and to ensure a successful implementation of the project. This empowerment can be set for certain phases and might vary a lot between different companies, projects and teams. How much empowerment is given depends on the situation and the amount of trust a company has in the key stakeholder (Krow, 2017).

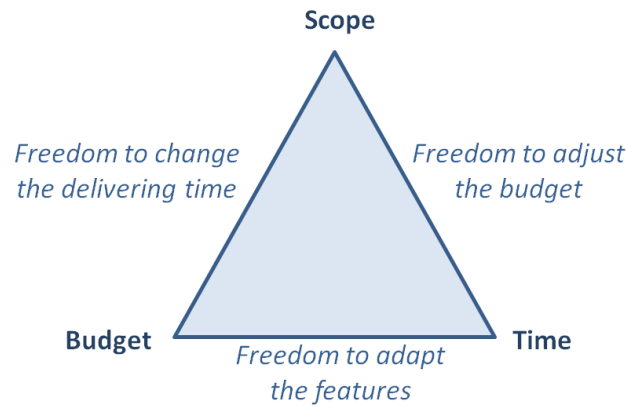


Figure 7: Project management triangle, to illustrate the degrees of freedom.

So, the most crucial tolerances are scope, budget and time, as those are also the main performance indicators for operational processes. An advantage of these criteria is that they can be very well measured and monitored. The three criteria are also described in the Project Management Triangle, as shown in Figure 7. This triangle determines three effective constraints of which not all can be fixed simultaneously and for which tolerances are required (Minkiewicz, 2009). For this reason, the tolerances are often used on at least one of the three criteria in order to succeed. Freedom can be given to the operating team, by allowing them to adapt the scope, time or budget up to a certain extent, without any need of aligning those changes with the organization. If the team, for instance, is allowed to adapt the scope but not the budget or time, it is able to reduce the functionality of a product in order to deliver in time and budget. This degree of freedom is very critical, as it defines how empowered the self-organized teams are, and how capable they are of handling issues and barriers on their own. In an agile operational approach, a shift often has to take place, in order to no longer work with a fixed scope, but rather work with a fixed budget and time with a varying scope (Arabi, 2019). This shift is illustrated in Figure 8.

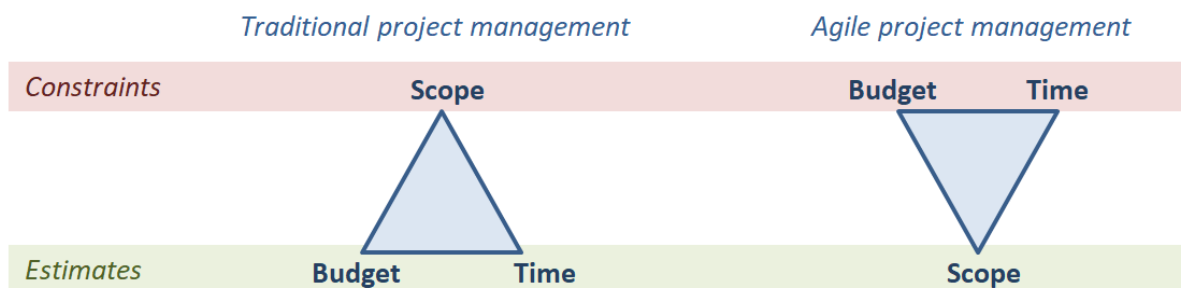


Figure 8: Traditional vs. agile project management

In an agile project, usually the team and the meeting schedule is fixed, but the implemented features will be adapted during the sprints. While in the traditional waterfall process, the plan creates cost and time estimates in the agile process, the plan creates feature estimates. The

challenge for companies is to accept this shift and that managers no longer can expect a defined timeline, when an application will be delivered. A possible solution to this dilemma can be to not define the final application, but to learn to work in smaller deliverables, which managers can also rely on a track the progress (Verwijis, 2016). This means, managers can define how much people will work on the product and how the timeline should look like, but the deliverables need to be evaluated continuously and prioritized by the team.

3.6 Implementing an Agile Connection

3.6.1 The Maturity of an Organization

To evaluate how a traditional organization might be able to adapt its process, it is helpful to understand how mature the corporation is. The maturity level of a company indicates the capabilities of a company to assess, evaluate and perform their processes. In software development, this definition is provided the CMMI-DEV and ISO/IEC 33001:2015 model, which provides standards in process assessments, highlighting the need to establish, measure and optimize processes (ISO, 2015). In the first initial stage, processes often are unpredictable and the company works in a very reactive way. In the second stage, the company begins to be more managed, and already uses characterized processes, but it is often still quite reactive. In the third stage, the company starts to become more proactive, has clear processes, and the performances are measured and managed. In the fourth stage, the processes are quantitatively managed, based on their performance. In the last stage, the company has achieved to implement continuous process improvements, which means that it is capable of optimizing its processes constantly. Figure 9 illustrates the maturity levels for integrating new processes.

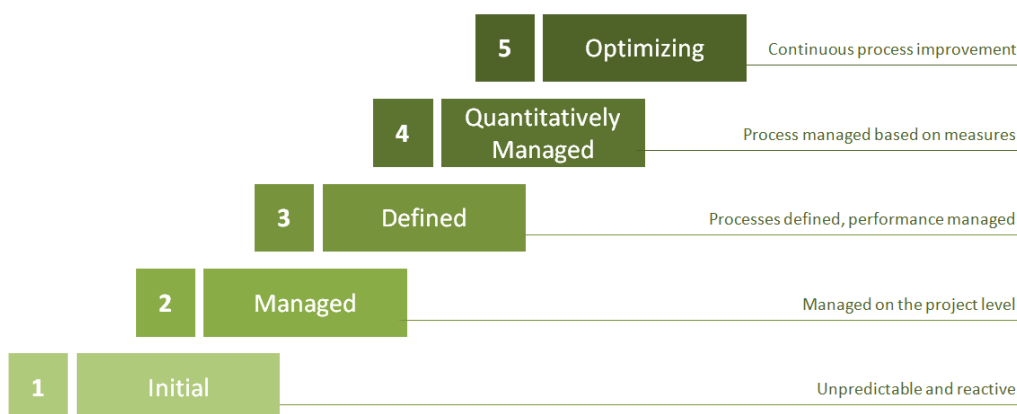


Figure 9: Maturity levels of a traditional organization.

Studies of highly mature companies indicate that there are no major contradictions between high-maturity processes and the use of agile methods (Bass, Allison, & Banerjee, 2013). When it comes to implement agile processes, the maturity level is often not measured by certain

process definitions or quantitative management capabilities, but rather fosters more subjective capabilities (Fontana, 2014). This means that a company that is able to empower their teams effectively has a better chance of successfully implementing agile teams. Depending on the individual situation and the maturity level of a company, it can define how agile teams should be connected to the organization, and what processes should be implemented to become more agile step by step.

3.6.2 Connecting Agile Teams

When an agile team is to be “connected” to a company, it might not be enough to just implement agile processes and frameworks. The whole company’s culture has to be adapted to a certain extent, and a shift in the mind-set of employees away from the traditional structures is required. In the literature referenced, different approaches can be found on how this can be done, like the ten stages of the agile transformation journey (Denning, 2019). Those stages require shifts in the mind-sets of involved stakeholder where a top-down approach is recommended. This approach starts with actions from the leadership team, who need to initiate the change and distribute it across the organization. To emulate key practices and avoid pitfalls in this process it is further crucial to learn from experiences and peer practitioners (Denning, 2018). If a company does not plan to go “all-in” on agile, but rather plans to implement agile step by step, used literature also suggests proving the concept of agile operations first in one or several smaller pilot teams. After having gathered experience from those first projects, and after the new operations have been proven successful, more teams can be allowed to adopt an agile working style (Hein, 2016). Other important aspects that need to be considered, when implementing Agile are the overcoming of early setbacks, and the evolving of an idea to establish agile as the normal way of working in an organization (Windust, 2012). In the mentioned sources it is also outlined that agile teams lead to a shift in power, attitudes, values, mindset, ways of thinking and ways of interacting with stakeholders. This means that when an agile team is connected to a traditional company, those changes need to be understood by the employees and the whole organization needs to adapt to a certain extent to be able to interact with the agile team efficiently.

3.7 Trade-Offs between Freedom and Control

In the previous sections we have evaluated what it means to connect an agile team to a traditional company. In the following section, based on these definitions and aspects, the contradiction between freedom and control will be discussed. First it will be evaluated what the impact of a stronger and a weaker connection is and what relevant trade-offs have to be made. Afterwards, the dependencies and the factors to find a good connection will be discussed

based on the literature used. The defined connection will serve as a base for the illustration of what freedom and control means in the context of agile operations.

3.7.1 Freedom versus Control

Focus on Control

When a company plans on integrating an agile team, it must define how they should be connected to the company, and how much it wants to control them. A strong connection would mean align the teams very strongly to the company. In the terms discussed that are necessary for an agile connection, this would mean to set up meetings with the team and the executives or managers of the company very frequently, and possibly to require a sending of regular reports. It also denies the team the ability of making many adaptations to the agreed backlog, time schedule or budget, and monitors the performance very closely. The team will have to align most of the things they do with the company, and are not allowed to reprioritize their own work packages. An example of this would be to have weekly alignment meetings with the managers of the organization or the project manager, and to create monthly reports. Budget overruns and reprioritization have to be done in alignment with the managers. This strong connection would trigger a more plan-driven workflow that is less product oriented, which would not enable the many advantages that come with agile operations. It would also hinder the team in their daily operations, and would have a strong impact on the team's flexibility, which could lead to additional work and a reduction of creativity. The literature used discusses that a more plan-driven approach in software development cannot handle uncertainties in a complex project environment, as it slows down its adaptability (Harris, Collins, & Hevner, 2009). Having more control over processes would further affect the company and the management, as it could increase the workload and the alignment for the managers. It also requires the company to have a much more detailed understanding of the project and might lead to micromanagement, which hinders the innovative potential of Agile (Deng, 2019). With this in mind, a strong focus on control increases the alignment efforts of a company and would not only negatively affect the team, but the whole organization by making processes slow and costly.

Giving Teams Freedom

On the other hand, a company can also allow their teams more freedom and empower them to make their own decisions. This would mean that the management and executives of the company do not have a large amount of interactions with the team and don't set up many restrictions. Meetings would be less frequent and the team would reprioritize their work packages on their own. The team would still need to deliver a good outcome to the company, but the process chosen for achieving good deliverables would be up to the team. This means

that the company needs to become more product-oriented and that it needs to understand that the exact outcome is often unknown in the beginning of a new project. An extreme example of a weak connection between agile teams and a company is for them to only meet once a year where the direction and the goals for the teams are set. No formal reports need to be created, and the company only gets involved if it seems necessary. The team would be given budget and time frames, and would be given the freedom of independently creating their own prioritization of the work that needs to be done. An empowered team would have the possibility of making many decisions on their own and therefore ensuring fast and efficient operations. The team would be able to react quickly to changes and would benefit from the lean setup of agile operation as discussed in Section 2.2. The effort for alignment meetings between the teams and the management would also be reduced. But when a team has a very weak connection to a company, the guidance is very limited, which is normally provided by the company. This could also be seen as a disadvantage, as it limits the possibility of the team to address urgent topics towards management, or to request additional support. With less communication, it can be more difficult for the management to serve the team as an enabler and connect them with other departments. Some sources describe that too much freedom will not always lead to the desired outcome, as the team requires guidance to some extent (Maruping, Venkatesh, & Agarwal, 2009). Teams that are self-organized may not deliver what the management intended them to, or their use of the provided budget might not be in the interest of the executives. Other studies found, that more freedom in different processes does not necessarily lead to a better outcome in terms of quality, scope, time or budget (Litchmore, 2016).

Discussing the Trade-Offs

As discussed above, a team can be stronger or weaker connected to an organization and the executives. Previously, the advantages and disadvantages of stronger or weaker connections have been described according to the used literature. When a team is very tightly bound to an organization, this can not only lead to disadvantages for the team, but also for the company. A lot of alignment effort would erase the benefits of the agile processes and increase the efforts for both the team and the managers. In contrast, a very weak connection would empower the team members to make their own decisions for the operations. This would require a high amount of trust, and the team would have to be measured on the outcome of the product they deliver. Too much freedom however can not only be a risk for the organization, as it could lead to wrong investments, but it could also hinder the team, as they are not able to use the management as an enabler, and they would have less guidance to align their work within the company. The examples described above are extreme cases, and the best setup can be found somewhere in between. Companies have to find their individual balance, to support the team

and protect their own interests. This depends on the situation and the maturity level of the company, and on the requirements, the organization has towards the team. It is often suggested that agile principles work better in complex and unknown environments, while closely managed processes work better in controlled environments. Beside those criteria, it is also crucial to understand if a company would like to be more plan-driven or more purpose-driven, in order to find the right setup. Table 3 summarizes the most important trade-offs between giving more freedom to the team or maintaining more control. The dependencies for a good setup will be discussed in the next section.

More Control	More Freedom
<ul style="list-style-type: none"> • Operations can be well controlled • The management is more included • More alignment effort is required • Better governance capabilities • Risk of micromanagement 	<ul style="list-style-type: none"> • Operations are more flexible • Focus on purpose • Trust has to be established • Higher potential for innovation • Risk of having an unwanted outcome

Table 3: Summary of the trade-offs between more freedom and more control.

3.7.2 Dependencies for a good Balance

A good alignment between a team and the management of an organization enables the teams to coordinate with other development teams and communicate with other departments as well as senior management, which can be beneficial for the operations (Karlstrom & Runeson, 2005). This means a healthy middle ground between too much control and too much freedom needs to be found. The team should have enough freedom to be able to stay dynamic and adaptable, but also have enough communication with the management to receive the required guidance and contact with the organization. Based on the used sources it seems evident, that a generic answer for how to set up a balanced connection cannot be defined, but each organization must find its individual solution for its specific situation (Solinski & Petersen, 2016). The ideal setup depends on different factors, such as, the industry the company competes in, how complex the software is that needs to be developed, how many dependencies the software has, which current processes are in place within the organization, which values are relevant to the company, or who the people are, who are participating in the process. The processes and best practices gathered from literature can be used in order to learn from other companies. It is possible to divide the factors into internal and external dependencies. External dependencies define the industry the company is operating in, which kind of software is being developed, or who the customers are and what their expectations are. Internal dependencies are the kind of organizational structures that define which policies and processes must be in place, and how strongly the leadership team will decide to get involved. Some sources highlight the importance of the interplay between the control modes, the chosen

methodology and the requirement changes for internal dependencies (Maruping, Venkatesh, & Agarwal, 2009). The company must decide if it wants to work in a more plan-driven or in a more purpose driven way, and if it wants the shift of its culture to be more agile or if it wants to perform a slow transformation over a longer period of time. The organization must decide how strongly it wants to align with the team, and if it wants to get involved directly in the regular meetings. If a company wants to work with agile teams, trust is a further very crucial aspect in order to give the team the freedom they need. The company needs to be able to establish trust to empower the team and its team member to handle the operations and make their own decisions. The identified main dependencies are listed in If a company wants to work with agile teams, trust is a further very crucial aspect when giving the teams the freedom they need. The company needs to be able to establish trust, to empower the team, and the team members have to handle the operations and make their own decisions. Empowerment means that the sponsor of a project trusts the teams, and allows them to make adaptations, in order to ensure a good outcome. It has been outlined that the project management triangle in an agile approach may change from estimating the budget and time, towards estimating the features. This means that a company must learn that the final product is often not defined from the beginning, and that it needs to trust the team to make the right decisions. The more a company empowers the operating team, the faster and more efficient the team will be able to adapt to changes. By empowering the team more, the company gives up control on the outcome, but if trust has been established, the final product can be more satisfying, as the team can work more independently in the right direction. The challenge of the company is, to find a good balance between empowering the team too much, and putting the company's interests at risk, and trying to control the team too much, so the team cannot make relevant decisions on their own. To find a good balance for the company, it is important to understand where the company currently is and what maturity level the company has in using Agile. If the teams receive too much empowerment too early, it could mean a high risk for the company, so trust has to be established throughout the process.

4. Empowerment means, that the sponsor of a project trusts the team and allows them to make adoptions in order to ensure a good outcome. The more a company empowers the operating team, the faster and more efficient the team can adapt to changes. By empowering the team more, the company gives up control of the outcome, but if trust has been established, the final product might be more satisfying, as the team can work more independently in the right direction. The challenge of the company is, to find a good trade-off for not empowering the team too much, to put the company's interests at risk, and giving them enough freedom for decisions, so the team can make relevant decisions on their own. To find a good balance for the company, it is important to understand where the company currently is and what maturity

level the company has in using Agile. If people get too much empowerment too early, it could mean a high risk for the company, so trust has to be established throughout the process.

External Dependencies	Internal Dependencies
<ul style="list-style-type: none"> • Industry • Complexity and risk of the project • Requirements of the customers 	<ul style="list-style-type: none"> • Strategic interest of the leadership • Requirements for the operations • Current structure and processes

Table 4: Summary of the main dependencies for a good balance.

It has further to be noted that there are two kinds of control modes for operating teams – formal and informal controls (Maruping, Venkatesh, & Agarwal, 2009). So, besides the formal setup of regular meetings and reporting's, there is always the possibility of informal control, which allows managers to get more involved with the operations. In agile processes, the operations are very transparent, and the progress can always be monitored on Kanban boards or in the Scrum Backlog. This progress is tracked and updated by the team on a regular, often daily base. This means that in many cases, formal reporting is not required, as all work items and the progress can be reviewed on demand, and urgent issues are directly escalated in case the management intervention is needed. For these reasons, tolerances can also be given, in terms of budget, time or scope, in order to reach clarified boundaries.

3.7.3 How to find a good Balance

Finding a good balance allows companies to achieve a high number of benefits, and is therefore a crucial aspect of an agile connection (Solinski & Petersen, 2016). While agile methods are hardly ever used in their original format, and companies use their individual processes to connect agile teams to the company, there must be some principles or best practices on how to find a good balance between too much freedom and too much control. This balance depends on the aspects discussed in the previous section and is different for each organization. There cannot be a generic answer on how to find a good setup or a one-size-fits-all solution (Moirá, 2017). To find a good balance, there is one important principle that can often be found in the literature used, and which is one of the core elements of an agile mind-set, and its continuous improvement. As it is hard to give one answer, on what the best setup for a good balance between freedom and control is, it is important that the current processes should always be reviewed and adapted, in order to optimize the alignment between the stakeholders and improve the outcome. Implementing agile processes in an organization means constant adjustments, a continuous transformation, and respond to organizational learning (Joroff, Porter, Feinberg, & Kukla, 2003). It is important for the leadership of a company to understand that working with an agile team means that there might be no final

solution, but that the setup has to be continuously improved and processes have to be optimized.

It has been discussed in this thesis that too much control over the agile teams not only hinders the agile operations, but also brings many drawbacks to the management. The same thing can happen, if the connection between team and company is too weak. This way not only the management loses its control, but also the agile team might experience certain drawbacks in its operations. This means that the answer must be found somewhere in between. A good option that can be found in the sources of literature, and can be used for some situations, is to start small, maintaining more control in the beginning, and slowly empowering the team over time (Nicholls, Lewis, & Eschenbach, 2015). This means that in order to figure out a good balance, the company could start with smaller pilot projects, in which the management is involved more strongly and still has more control over the progress. Once the outcome was successful, and trust could be established, more freedom can be given and the team can be more empowered. With this approach, it is possible to have a very low risk, and the employees will slowly get used to the new way of working. If the first projects are successful, the company also has a good argumentation for realizing bigger projects with agile teams, and can learn from its previous experiences. If issues are identified or the performance of the team does not meet the company's expectations, the control over the teams can be increased. With this approach and with continuous improvements in place, step by step the maturity level of the company can be improved, and it can find its optimal way of connecting Agile.

3.8 Summary

In this section, the integration of agile teams into traditional organization has been discussed by combining traditional project management standards with agile concepts. Each company needs to find its individual method of aligning the agile team to their specific needs, but overall challenges are often similar. In the following, the connection of an agile team to a traditional organization and the identified key aspects from the theoretical evaluation will be summarized. The identified key aspects will serve as categories for the empirical part of this thesis, when discussing the agile connections with practitioners from the industry.

3.8.1 Defining a Connection

For this thesis, it has been evaluated, how companies with a hierarchical structure can implement agile teams. This means that those companies manage their projects in a more traditional way, and use established plan-driven processes with frameworks like the PRINCE2. As discussed in this thesis, the connection of an agile team to a traditional company depends on many aspects, and an organization needs to decide, to what extent it would like to integrate the teams into the company. Figure 10 is a simplified illustration of how this connection could

initially look like, and where adaptations may have to be made. It shows how different cultures are merged in an agile team, and that a connection to the hierarchical management and leadership layers of the company has to be found. Further it is proposed that an agile connection cannot work, if the management and the leadership of a company do not also adapt to the new way of working to a certain extent. On the other side, the team might also need to accept certain changes, as it is not really possible, and not recommended to work fully self-organized within a larger organization.

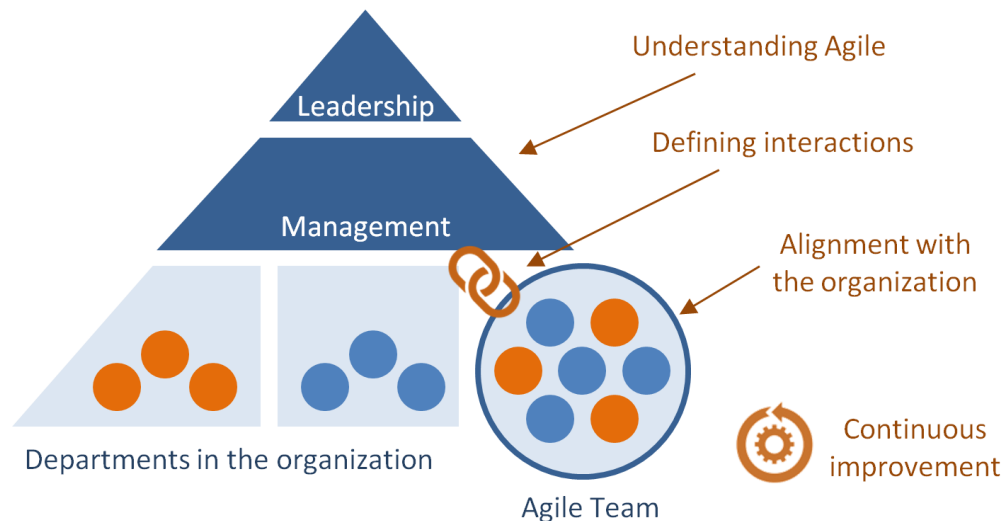


Figure 10: Illustration to connect an agile team to a traditional organization

It has been found that companies, who implement agile teams, need to find a suitable setup for their individual situations, and it cannot be generalized, what a connection must look like. The reason for this is that too many factors have to be considered for an efficient connection, and thus the ideal way of connecting an agile team will vary in each organization, its interests and the projects it is working on. Nevertheless, the key aspects and elements that need to be considered are very similar, and can be found consistently in the literature that was referenced, as well as in established frameworks. In the next section, the identified key aspects for this connection will be summarized, including their challenges and possible solutions. Figure 7 should serve get a better understanding how an agile connection can look like, but also as an illustration for the discussion on the contradiction between freedom and control in this thesis.

3.8.2 Key Aspects of a Connection

Culture

A very important aspect, when implementing agile teams, is the cultural shift that has to take place. It has been explained in Section 3.1 what the difference between the “traditional” and the “new” paradigm in an organization is, and that agile approach is more like an organism and less like a machine. In traditional organizations, agile teams are connected to the existing,

established structure, which is often very hierarchical. Not only the culture of the company, but also the cultures within the company need to change when agile teams are used. Three major cultures, which are often present in traditional were discussed: the operational or business culture, the engineering or development culture and the executive or leadership culture. In agile operations, teams start to become more cross-functional, the different cultures are mixed, and employees need to understand the new way of working. Organizations face the challenge of realigning those groups and finding a good way of working together efficiently. Knowing the maturity level of a company helps to understand where the company currently stands, and to work towards being more agile step by step. A shift in the company's mind-set is necessary, and has to take place not only in the agile project teams, but throughout the whole company. This means that employees outside the team also have to understand the agile concepts, in order to work together with them efficiently. For this reason, it is crucial that the leadership of the organization pushes the new concepts, and makes sure to set up a proper working environment.

Roles and Responsibilities

Traditional companies are used to having defined roles and responsibilities, and employees are often used to following specific tasks. Agile methodologies also make use of defined roles, but generally, agile working principles are more purpose driven, and the focus lies more on the team and not the individual. Team members have to be empowered and receive more influence in the operations. Team member's tasks can change more often, and companies need to be aware of this flexibility. The challenge companies face is how this can be made compatible with a hierarchical structure. While Scrum roles are often used in the operations, responsibilities from the organizational side can also be defined. Agile Coaches can additionally support the implementation of new processes, and thus ensure an overall success of adapting to Agile. The organization therefore needs to adapt certain functionalities within its structure in order to find a good way, of connecting an agile team.

Communication

A further aspect that is crucial to the company, is finding a strategy for proper communication, and how the interactions between the team and the management should be set up. Here it may be seen that steering committees, as they are often used in traditional approaches, hinder self-organized teams, and the organization might need to find better ways for aligning with an agile team. Additionally, the management itself needs to become more flexible, in order to be able to work together with agile teams. This means that product features and prioritization could change from time to time, and that the communication between the operating team and the team is often empowered to make more decisions on their own. Micromanagement should

be avoided, and the organization will need to find a suitable setup of regular to align with the members of the teams. Also, the reporting needs to be adapted accordingly, when teams follow agile practices. It has to be accepted by the company that the progress of the team can be tracked in real time on agile boards or in the software, which is being used. This new, more transparent way of working does not prohibit using formal reports, but it is recommended that if reports are to be used, they are adapted in order to support the agile operations.

Planning and Prioritization

A traditional company is often used to having control over their projects and having certain milestones that can be defined, and reached by the team. In agile teams it is often unclear in the beginning of a project, how the product will look like at a certain stage, as this will be developed as time goes by. Companies need to change from having plan-driven approaches, towards a more purpose-driven approach. Agile processes, have a strong customer focus, and the teams often have the highest priority set on satisfying customers' needs. In a company, many people have specific interests for how the team should work, and which features should have priority. The question might occur, who is in charge of the prioritization of those new features? In an agile team, the product owner usually decides on the prioritization for the sprint, but how broader decisions are made by the organization is not defined by Scrum or similar methodologies. This means that in order to reach long term goals, the company must have certain positions in place that are responsible for making decisions on which features have priority, or who have the authority to give more power to the team.

Trust and Empowerment

If a company wants to work with agile teams, trust is a further very crucial aspect when giving the teams the freedom they need. The company needs to be able to establish trust, to empower the team, and the team members have to handle the operations and make their own decisions. Empowerment means that the sponsor of a project trusts the teams, and allows them to make adaptations, in order to ensure a good outcome. It has been outlined that the project management triangle in an agile approach may change from estimating the budget and time, towards estimating the features. This means that a company must learn that the final product is often not defined from the beginning, and that it needs to trust the team to make the right decisions. The more a company empowers the operating team, the faster and more efficient the team will be able to adapt to changes. By empowering the team more, the company gives up control on the outcome, but if trust has been established, the final product can be more satisfying, as the team can work more independently in the right direction. The challenge of the company is, to find a good balance between empowering the team too much, and putting the company's interests at risk, and trying to control the team too much, so the team cannot

make relevant decisions on their own. To find a good balance for the company, it is important to understand where the company currently is and what maturity level the company has in using Agile. If the teams receive too much empowerment too early, it could mean a high risk for the company, so trust has to be established throughout the process.

4 Empirical Study

In chapter 3, which was dedicated to the theoretical part of this subject, it has been evaluated how a connection between an agile team and a traditional company can be defined and implemented. Challenges, solutions and trade-offs have been discussed from a theoretical viewpoint. In this chapter, this theoretical part should be verified with ten practitioners from relevant organizations. For this reason, the interview approach and the used guideline for this empirical in-depth study will be first outlined and described. This also includes a short description of the roles of the participants and the companies they work for. This will be followed by a summary of the interviews' outcome and a description of how the identified key aspects are handled by the participants. In addition, specific findings that have been identified regarding freedom and control will be stated and it will be summarized how a good balance can be found according to the interview participants.

4.1 The Interviews

4.1.1 Methodic and Data Analysis

As was made clear in the theoretical part of this thesis, how an agile operational team can be connected to a traditional company, this theoretical elaboration is challenged by an empirical in-depth study to round off the analysis and identify gaps and consensuses. For this reason, ten semi-structured interviews have been conducted with participants who work in more traditional organizations, and are using agile operational teams. The answers and descriptions from the interviewees have been concluded and evaluated in accordance with established standards for qualitative content analysis (Mayring, 2000). Categories have been formed out of the theoretical part and have been discussed in the interviews to understand the experiences of the participants and identify gaps and agreements to the theoretical findings. It was evaluated, which processes the companies are using and how their agile teams are connected to the company. Afterwards it was presented, what works well, where the companies face challenges, and what is important to them. The details can be found in the Interview Guideline in Section 4.1.4. The feedback from the interviews has been transcribed, brought into context and summarized to identify similarities and divergences. Those findings will be described and concluded in this chapter. Finally, the results will be evaluated and used, to answer the research questions with empirical evidence, and to develop specific recommendations for traditional organizations today, who use agile teams in their operations.

4.1.2 Selecting Criteria

To find suitable interviewees with the relevant experience, the method of purposeful sampling has been used as this method enables a good basis for an in-depth analysis of the subject (Patton, 1990). For the interviews, larger private companies have been conducted which

establishing agile methods in their software development processes or smaller more specialized companies, which work for larger corporations. Large organizations often cooperate with smaller software focused companies to make use their expertise and know-how. For this reason, participants from both sides can be used in the interviews to cover both perspectives. Interesting roles for the interviews are Agile Coaches, Scrum Master and Product Owner as well as other involved stakeholders to address concerns from different angles. It is important that the interviewees have expertise and experience in agile methods and that they are interested in the topic, in order for them to give valuable feedback. The companies of all interviewees are located in Vienna to help narrow the sampling to a specific area. In summary, the predetermined criteria of the interview partners are: (1) professionally involved in agile software development processes, (2) working at a larger company or at a software supplier for a larger company and are (3) located in Vienna.

4.1.3 Interview Participants

People from agile environments have been asked to serve as interview partners or with possible recommendations for other experts with even more knowledge or experience in the field of agile software development at larger organizations. With this approach, 10 relevant interview partners have been found to make an in-depth analysis of the topic. The interviewees received information about the interview approach and the main topics beforehand, so they could prepare for the meeting. In the following is a description of the interviewees.

Interviewee Description	Agile Context
Ionut Sontea and Claudia are Agile Coaches at ING in Vienna. Their agile teams are divided into different purposes with different customer-oriented software development requirements.	13 squads (each ~7 team members)
A Senior Agile Coach at a big Austrian bank. His teams develop platforms, analytics or digital solutions in the banking industry.	Around 40 agile teams
Stefan Fuhrmann is team lead of agile operating teams at Novomatik. His teams develop and test online games.	3 agile teams
A department head in a large technical company, who started to establish agile methods in his operational teams.	Several agile teams (~60 team member)
Dr. Wolfgang Göbl works in an agile environment at Iteratec as a senior lead IT consultant. He is also the president of the architectural thinking association.	Several agile teams located at the clients
Dragos-Codrut Badea works as a Project Manager and Scrum Master at the Erste Group in Vienna. He could also share experiences from past employers.	3 agile teams (each ~8 team member)
MSc. Tanja Baricic-Boehm is a Scrum Master and Agile Coach at Rewe International Digital.	2 agile teams (each ~8 team member)
MSc. Georg Grünauer works as Team Lead and Product Owner at Smatrics. Smatrics is a joint venture between OMV and Siemens,	Agile team of around 10 team members

which develops hardware and software for electrical charging stations.	
MSc. Alexander Antonic works as a Product Owner at Jagger. Jagger is developing cloud-based business automation software solutions with a high customer focus.	3 agile teams (each ~5 team member)
Ing. Markus Ullly works as a Product Owner and Project Manager at TÜV AUSTRIA. He develops a new customer platform for the group in an agile process.	Agile team of around 8 team members

Table 5: List of Interviewees.

The companies chosen, have a focus on agile software development processes and adapting them to their specific needs. ING is the only company who made a company-wide agile transformation in order to cope with rapidly changing requirements. All other companies maintain a more hierarchical organizational structure, but use agile processes to deliver the software. Most of the companies only recently started to use agile methods in their operations and are still in the process of establishing those new concepts.

4.1.4 Interview Guideline

The interviews have been conducted in a semi-structured way by discussing several main topics and questions based on the literature part of this thesis. All interviews were scheduled for one hour and took mostly place at the headquarters of the interviewed company or a public place nearby. The interviews were divided into following four parts:

1. Introduction of the participant and the company.
2. Understanding operations and interactions between the team and the sponsoring organization.
3. What works well and what are the challenges of connecting agile teams, how are the key aspects handled and what solutions are in place.
4. Discussion of freedom versus control and how to find a good balance.
5. Analyzing and reflecting if something was missed out.

This guideline aimed to first create an understanding of the individual situation of the company being interviewed, and how agile methods are being applied. Afterwards, the strengths and weaknesses of their setup for building the connection between the operational team and the sponsoring organization are discussed. The issues and solutions raised have been further examined, and the key aspects that have been developed in the theoretical part of this thesis, have been evaluated. Further it was discussed, whether a strong connection between the team and the sponsor is better for the operation, or if it is better to give the operating team more freedom. This also included a discussion, about how a good balance can be found from their perspective. Finally, it was reflected if something important was left out, or if the participant

want to highlight anything from their experiences in this context. The detailed interview guideline with all the questions can be found in the appendix.

4.1.5 Reflecting on the Interviews

The interviews have been conducted with companies operating in different industries that deliver online platforms or software components to operate specific systems. All companies had a strong customer focus, some had their focus on business to business, and some on the business to customer segment. With this diversity in software products, a broad range of the research question should have been covered, while still retained enough similarities regarding the agile processes to perform an in-depth analysis of the subject.

Software development commonly happens with external software companies, who are responsible for providing the required expertise, and for delivering the software components. In the interviewed companies, agile teams often consisted of external and internal employees, where in some cases the whole agile team has been provided from the software supplier. Those mixed or fully external teams are then connected to the company, who sponsors the operations. So, the focus has been directed on the setup and the interactions between the team and the company as well as the challenges and solutions when a connection is established.

The interviews have been used to first understand the individual situation of the company and then dive into a deeper analysis of how the agile teams operate and interact with the larger organization. The outcome was quite comprehensive, as throughout most companies, similar challenges and difficulties have been identified. For the agile connection the interviews showed that it is not so relevant, which kind of software is actually developed, if it is a modern online platform or a classical hardware operating system. The setup of the agile teams looked very similar in most cases, but varied, depending on the size of teams. Raised issues and solutions were also mostly comprehensive and the general understanding of what is to be expected of agile operations. Responsibilities of certain team members were also mostly similar, only the names of the roles were used in different ways or some tasks were shifted. One of the differences was that some companies were more agile and purpose-driven, while other companies still preferred to stay more controlled and use a plan-driven approach.

4.2 Outcome and Findings

4.2.1 Outcome of the Interviews

The outcome of the interviews is summarized below, and composed into separate points that are relevant in the context of this thesis. It will be discussed in which points the participants

were consistent in their answers, and where differences could be identified. Selected quotes have also been included, to highlight important statements and make viewpoints relatable.

Reasons to work Agile

One of the most important factors for the companies when working agile, was to have more flexibility and a faster time-to-market for their software components. This means that increments of the software are ready quickly, and the team is able to make changes when they are needed. A further important factor that was often mentioned was to increase the customer value and to deliver what customers actually want. This can be interpreted as being more innovative, which was discussed in Section 2.3. Less frequently mentioned has been, the saving of money, and reduce the reduction of the risk of a big failure in complex environments. Those reasons are conforming to the advantages described in the theoretical part of this thesis and which can be found as well in other sources (Rigby, Sutherland, & Noble, 2018). From the leadership perspective, it was also mentioned that bigger projects that were performed in a waterfall process, often did not deliver what they promised. For this reason, Agile was seen as a good alternative that could prevent larger investments failures.

Used Frameworks

The interviews showed that most companies use Scrum or Kanban or a combination of both with some adoptions to the frameworks described. Scaled agile frameworks were hardly used, but interviewees were mostly aware at least of the existence of those frameworks. Two companies used an individual mixture of frameworks that have similarities to SAFe, but added a stronger customer focus. All companies used their own individual set of processes and methods, to fit to their specific needs. Almost all companies used the roles of a Product Owner or someone else, who was responsible for the product. It was always either a Scrum Master used or an Agile Coach, who was responsible for creating awareness for agile processes. The regular meetings were usually said to be scheduled every week, every two weeks or every four weeks. Scrum generally often had to be adapted, and in certain situations, the 2- to 4-week periods were too slow for urgent requirement changes. It was mentioned in the interviews that this could be handled, by having longer Sprints in the beginning of a project and near important deliverables to set up more meetings.

Adaptions to Agile Concepts

Not one company used a framework in its original format, as it is described in theory. Most companies used the parts of the frameworks that they liked, and implement them within their processes like the roles of Scrum, or the board from Kanban. A combination of those two methodologies was also discussed in this thesis in Section 2.4. A good suggestion to adapt and combine different concepts was given by Tanja Baricic-Boehm: “We try to work as closely

as possible to the theory in the first month, and then we make adaptations as we need them, but it is important to see how the theory was meant to work.” The interviews also showed that processes and practices need to be reflected upon, and optimized continuously, which is also common in an agile environment and is suggested by agile methodologies. Formal retrospective meetings as defined in SCRUM, were only conducted in three cases, but it was mentioned that reflection and improvement is also on the agenda in other meetings or in more informal discussions.

Bottom-Up versus Top-Down Approach

In most cases, the agile transformation was pushed by the team, or certain motivated employees who saw the potential of an agile working style. This means that the change was mostly pushed bottom-up and not top-down from the position of the company leadership. To establish an agile way of working in a company, the operational side as well as the leadership team is required to understand agile, and should be fully committed to it (Denning S. , 2015). As discussed in Section 3.6, most sources recommend pushing an agile way of working top-down, in order to increase the success rate and the commitment of the employees. An Agile Coach who was interviewed suggested a solution to this dilemma: “First the team needs to push the agile mind-set bottom-up, to create awareness of Agile, and to convince the leadership team of the new practices. Once first projects have been successfully executed, an agile way of working can be pushed top-down and be distributed across the company.”

Implementation of the Agile Team

Most interviewed companies had a traditional organizational structure, and used agile operational teams. The connection between the leadership team and the teams was usually not too intense. In most cases, formal meetings were scheduled around 3 to 4 times a year or only on demand. The teams had to focus on the customer needs and as long as those needs, where met the leadership of a company didn't need to be involved very much. This means, that most companies had already changed their operations, to be more purpose-driven, while the company remained plan-driven. In those cases, the budgeting of the resources was only once a year, with recurrent reviews of the situation throughout the year. A steering committee was only used in one case, as the word “steering” became a negative overtone in an agile environment according to an Agile Coach. In most companies, the responsibilities of a Project Manager were still used, but they were often combined with the role of the Product Owner or the Scrum Master. One or more Agile Coaches were in place in four companies.

Plan-Driven versus Purpose-Driven

In all cases except for one, external employees were also involved in the agile operations. External team members were treated like regular team members, and no issues with this

constellation could be found. In two cases, the agile teams were fully engaged with external employees. For the company it was mostly irrelevant, if the employees were internally employed or sourced externally, but more strongly how much the people were trusted, when delivering the expected products. The difficult part for the setups was to find proper contracts between the involved parties in order to work more purpose-driven. For this reason, agile teams often work on a time and material base, to enable a shift in the project management triangle, as discussed in Section 3.5.2. It was often mentioned, that sponsors try to give projects fixed prices, with a defined outcome on a specific date in order to work more plan-driven. As described in Section 3.8.2, this is a common challenge in agile environments, and might require establishing trust between the involved people and a change in the manager's mind-sets as well. An Agile Coach stated: "A cultural shift is required to make the teams more purpose driven and give them more control over the product."

Connection between the Team and the sponsoring Organization

In most of the interviews, a similar connection to the one described in this section could be observed. This means that most companies used their existing traditional structures, and connected agile teams to it. The teams mainly used agile concepts like Scrum and Kanban, and all teams were found to be more focused on the product, as is common in agile processes. The organizations remained in their hierarchical structure, and departments remained as they had been before even the communication strategy continued in its original structure with only minor adaptations. Only one company ING, completely transformed its organizational structure to become fully agile. ING just recently had performed a global company wide agile transformation, and had completely restructured its existing structures, in order to become more customer and product oriented. When it comes to the five key aspects for the connection, which are summarized in Section 3.8.2, the interviewees were able to confirm the relevance of those aspects, and it was identified that they themselves had already considered most of those aspects, as discussed in the next Section. One point that was identified missing, was the contractual situation, but as the legal perspective is not in the focus of this thesis, it is not among the most relevant aspects, which will be discussed.

4.2.2 Key Aspects

Culture

A change in the culture of the companies was not yet focused in most cases, as most companies have not been using agile for very long. As mentioned in the previous section regarding bottom-up versus top-down approaches, agile processes were generally pushed bottom-up, and it still had to be proven to the organizational leadership that those new processes worked well. It was also observed that the teams mostly consisted of developers,

testers and technical people, while people from the business side were less involved with the teams. Most teams had a strong customer focus, and they were rated on their outcome in terms of sales. In two cases, representatives of the executive culture were directly involved in the operations and participated in the Scrum meetings. In most cases, the Agile Coaches or practitioners worked hard to push the agile ways within the company, and it was their duty to convince the leadership team of the new ways of working. It could have further been observed, that many teams started with smaller projects and grew bigger over time, which was discussed as a good approach in Section 3.6.2.

Roles and Responsibilities

All ten companies interviewed used the role of the Product Owner, who often additionally served as the Project Manager. This role also highlights the increased customer focus, when agile concepts are used. A Scrum Master was not always in place, but the Scrum Masters responsibilities were transferred to certain team members or spread across the whole team. Assigning of the Scrum Masters responsibilities to certain team members can also be found in used literature as a more natural approach (Srivastava & Jain, A leadership framework for distributed self-organized scrum teams, 2017). From the company's perspective, the roles were often not as clear, and many companies saw the agile teams somehow as project teams. This also proves that those companies try to connect their agile teams to their traditional organizational design, as it was described in Section 3.8.1. To direct the agile teams, managers and business executives were aligned regularly with the teams and had control over the outcome. Agile Coaches were used in four cases, which was important for establishing an agile way of working across the organization.

Communication

In most of the companies that were interviewed, the managers and executives aligned in regular Jour Fixes with the representatives of the agile teams. Those alignment meetings had already been in place before the teams became agile or were similar to meetings from plan-driven project management methodologies. Meetings between the team and the organization were scheduled every two weeks or quarterly. Projects on a strategic level were mostly planned yearly, and the progress was reviewed continuously, depending on the situation. The meetings mostly contained people from the company in higher ranks, people from other involved departments, and the product owner of the agile team. Mostly, formal reporting did not take place on a regular basis, but it was mentioned that reporting was also performed in a more informal way. It was also mentioned that the work method was very transparent, and could be observed on Kanban boards or with the help of digital tools like Jira, at any time by the management sector.

Planning and Prioritization

It was observed that the teams generally transformed to be more purpose-driven, but still had many additional plan-driven elements in place. Usually, a shift could be observed from fixing costs and time, and allowing the deliverables to be more flexible. This was explained by using the project management triangle in Section 3.5.2. Certain planning structure and milestones continued to be used, in order to align the teams with the company or other departments. The prioritization of the overall goal was usually defined by the managers and executives. Boundaries were also provided by the management, and the team needed to handle the situation or escalate issues. A defined prioritization or a change of process was rarely in place, but the product owners were expected to prioritize operational decisions like the backlog for each Sprint on their own. For the prioritization of tasks, the product owner usually aligned with the team, but in some cases, the product owner also aligned with the managers or other departments of the organization. The scope was generally defined by the product owner in alignment with the team, which is common in the Scrum methodology as explained in Section 2.4. The management and executives had to be informed and were able to overrule the teams' decision when needed. It was highlighted by most teams that the customers were focused on more, compared to their previous processes, and an important goal for the teams was to satisfy customer's needs. This mind-set shift was very important in order to become more purpose-driven as it was described in Section 3.6.2.

Trust and Empowerment

In most cases, trust was seen as a very important factor when working together. In case additional resources were required, or the budget had exceeded the forecast, the management usually had to be involved. Those topics had to be discussed with the executives of the organizations. In some cases, the teams had certain tolerances in terms of budget or time, as is common in a more plan-driven project management and described in Section 3.5.2. It was apparent that trust was a crucial factor between the product owner and the organization. Depending on this relationship, more freedom could be given to the team. It was also mentioned that the team continuously worked to improve the maturity level of the company, in order to increase their freedom. This was also described to be a useful approach for establishing agile operations in Section 3.6.1. Most stakeholders seemed to be very aware of their current position and how well the company can deal with the agile processes that were in place. Some participants mentioned that their company was not as mature as they would have liked it to be, but that they were making progress with every successful project.

4.2.3 Findings regarding Freedom and Control

Gathered from the theoretical research, and with the help of the empirical data collected, certain findings can be summarized that address the contradiction between freedom and control, when agile operations meet traditional organizations. The findings were identified throughout the research section, and were confirmed within the empirical in-depth study. The findings intend to narrow down the profound topic, to specific statements that develop a viewpoint that most sources and companies can agree on. It will be explained how the findings affect the cooperation, when it needs to set up a connection between agile teams and the organization. It will also be discussed what this means for the contradiction between freedom and control and for the decisions a company will make. The findings are summarized in Table 6 and explained in more detail below:

Finding 1	In practice, companies combine agile and traditional concepts individually to connect agile teams to their organizational structure.
Finding 2	A good balance depends strongly on the situation and the expectations of the company.
Finding 3	A good balance is crucial for both the team and the company.
Finding 4	A good balance can be found, by starting small with a more controlled connection and empower the team when trust has been established.
Finding 5	There is no final defined setup, but the optimal balance between freedom and control has to be continuously evaluated and improved.

Table 6: Findings for the contradiction between freedom and control.

Finding 1: In practice, companies combine agile and traditional concepts individually to connect agile teams to their organizational structure.

It has been found that most companies use concepts, existing frameworks and best practices in their individual ways to fit their specific needs. It is very likely that a majority of organizations prefer to sustain both agile and traditional systems for their software development (Vinekar, Slinkman, & Nerur). This means that companies use Scrum, Kanban or similar methods in their agile teams and integrate them into their existing company structure, with individually defined processes, for solving individual challenges. In practice, theoretical processes often need to be adapted, and when an agile team is used for operations in a traditional company, the consideration of certain key aspects is crucial for a successful connection between them and the organization. It has been found in the empirical study that most companies made use of certain concepts and best practices from different methods as well as frameworks, similar to the ones described in Section 2 of this thesis. All companies adapted those principles to their individual needs, in order to work efficiently. Some companies also tried to learn from other companies that are known to be pioneers in applying Agile. This has been confirmed by Ionut Sontea, for instance: “We always work to improve our processes based on our experiences, and learn from successful agile companies like Spotify.” After the discussions

with all interview partners, it has been shown that an adaptation to the individual needs of the company is required, as there are far too many dependencies, to define generic solutions that can be applied unchanged in every situation.

Finding 2: A good balance depends strongly on the situation and the expectations of the company.

As every company needs to find its own ideal setup when connect an agile team, there is a strong dependency on what the company expects from its agile operations. Does the company want to have an agile transformation in the long run, or does it only want to experiment in smaller pilot projects? Does the company want to be more plan-driven and have more control over their operations, or does the company want to be more purpose-driven and allow the teams more freedom? This depends a lot on the situation of the company and if it is in an industry, which requires more innovation or has a strong customer focus. The different dependencies can be classified into knowledge-, process or resource based, with the knowledge dependencies being the predominant ones (Strode, 2016). It was observed that all interviewed companies faced very individual challenges, depending on the environment they operated in. Often, the product development processes had to be closely aligned with the requirements of the customers, or the terms of the management. Also, it was revealed that often, the processes were adapted to the needs of certain stakeholders or participants, to meet their expectations. For instance, some people don't want to meet every day, so the daily stand-ups are set up less frequently. It was also stated by one practitioner: "We adapt our setup to the requirements from the management, since in the end, they are responsible for the outcome." With the findings from the interviews, it can be confirmed that the situation and the individual requirements are crucial to finding a good balance. Additionally, it was mentioned that the use of agile teams strongly depended on the complexity of the projects. This was stated specifically by Tanja Baricic-Boehm: "We rate our projects on complexity. The more complex a project is, the better it is usually, to use an agile approach." For very straightforward applications, it might not be required to use an agile approach at all. This can also be confirmed by sources, who help implement agile methods (O'Loughlin, 2018).

Finding 3: A good balance is crucial for both the team and the company.

To find a balanced setup, it has been established that too much control over an agile team not only hinders the team in its operations, but also negatively affects the management and the organization, as discussed in Section 3. It is evident that control is not helpful for agile operating teams, it leads to a lot of effort for the management, and it also leads to slower processes, which is not good for the organization. On the other hand, if a team has too much freedom, the company will not only lose its control over the team, but the team may also suffer from the lack

of guidance. This means, neither a very strong nor a very weak connection between an agile team and the organization is a very preferable solution for either side, and it is very important to find a suitable balance. The interviewees, who worked in agile teams, preferred to receive more freedom, and recommend empowering the teams more. Practitioners who were more involved with the management of the organization often wanted more control over the teams, as their goal was to reduce the risk factor. It was however admitted from both sides that alignment meetings are important not only for aligning the goals, but also for aligning with other departments, and checking if the projects are on track. It was mentioned by a Product Owner that: "Freedom is good for the team, but if we get too much freedom, the risk increases that the outcome will deviate too much from the expectations of the management.". The Agile Coaches highlighted that a good alignment between all stakeholders is crucial, although it means additional effort. Therefore, they established a transparent working style, and try to establish easy communication. It was also mentioned by an Agile Coach that: "The management can review our process in real time on our Kanban boards, it can then decide on their own, how much they want to be involved." From all discussions it could be seen that it is crucial to find a good balance between too much alignment and avoiding the risk of developing in a wrong direction.

Finding 4: A good balance can be found, by starting small with a more controlled connection and empower the team when trust has been established.

To find a good balance between freedom and control, the factors that affect the connection have been discussed in Section 3.7. It was found that for a good balance, it might be a good idea to start with smaller, more controlled agile teams. When those pilot projects have been successful, it can be identified if the new processes work. Once trust has been established, and the company has learned from its previous experiences, the teams can be empowered more, and bigger projects can be executed in an agile way. Pilot projects can also support an agile transformation later on (Wilson & Sobejana, 2015). This means, a small project can be used to prove that an agile approach works for the company, and for the collection of first experiences. The pilot project can be very effective for finding a good balance without having a high risk of failure, when agile teams are introduced. In the majority of the interviews conducted, it was observed that smaller pilot projects were used, to gain experience in agile processes. It was made apparent that organizations, who introduce agile methods bottom-up, often need to start small, as they do not normally have a very extensive budget, or a large amount of trust established yet. But aside from this issue, the notion was raised by many Agile Coaches and Scrum Masters that introducing agile concepts with small pilot projects is an effective way of testing those new processes, and convincing the managers of a company. One of the Agile Coaches mentioned that: "In the beginning, we start by controlling the teams

more, and we give them more freedom, as they deliver successful products”. Two Agile Coaches mentioned that they were currently working on improving the maturity level of the company, in order to enable the teams to more freedom and a more purpose-driven way of working. It was added that: “For us, it is a back-and-forth process. We give the teams more freedom until we see that it is not increasing the output. Then we reduce the freedom and try to control the outcome more.”

Finding 5: No final setup can be defined, but the optimal balance between freedom and control has to be continuously evaluated and improved.

It has been found that a generic answer for how a final setup could look like cannot be made, as it depends on too many factors. Also, the processes and alignments between the team and the organization have to be individually defined for each organization in its current situation and environment. For this reason, the setup continuously needs to be reviewed and improved. Regular reviews and ongoing improvements are also an agile core value and are used in most agile frameworks, but are also recommended for the business in general (Suer, 2019). It is important to make a change in a company’s mind-set towards a more transparent and flexible environment, in order to be able to constantly review and improve processes and interactions. It is recommended by agile frameworks to evaluate, how flexible organizations see their current processes and if they are constantly working on the improvement of their interactions, for instance by setting up retrospective meetings. Although not all the organizations that were interviewed used formal review meetings to improve their setup, all of them seemed to work hard on optimizing their processes. One of the Product Owners explained their approach to regular meetings: “We do not conduct specific retrospective meetings, but we discuss the processes during our regular meetings and implement improvements.” It was made visible in the discussions that the interviewees spent a lot of effort on reflecting on their teams and how they perform. The participants often tried new processes or best practices, and observed how the overall outcome can benefit by delivering better products. In most teams, there were active challenges that needed to be fixed, but it was clear that continuous efforts were being made in order to fix these problems, and improve the operational setup. Partially due to the often-new processes that are being implemented, and which still are in need of adaptations, continuous improvement, was always determined as a crucial factor in the interviewed cases.

4.2.4 A good Balance

Weaker connected Teams

Agile teams, which had weaker connections to the management of an organization, showed a stronger customer focus and had a good understanding of the business. This means that the team aligned less often with managers, and was generally more purpose-driven. Often, they

had already been working in Agile for a longer time, and had already found a good setup for working together. Trust could be established, and the management was able to empower the key stakeholder of the agile teams, to make even bigger decisions on their own. It was observed that the teams had to present good results to the managers, and as long as the customers were satisfied and the outcome was good, the teams continued to get the freedom it needs. Formal meetings were not so frequently required, and even informal exchange between the company and the teams were often very few. It was revealed that teams continuously optimize the processes, and work in a very transparent way, as it helps them to work more efficiently and establish a relationship of trust with the management. The alignment with the organization was mostly based on a strategic level, to ensure that the customers' expectations were met. The teams were able to reprioritize operational tasks quickly and this way could focus more on achieving their goals. It was expected from the team members to work more autonomously and on what had been aligned with the others. The teams were driven by a shared goal, and had enough empowerment to work on their own and delivering the expected products. These benefits confirmed what could be found in the literature used, as benefits of agile processes. The agile practitioners were usually very satisfied with this outcome and tried to work towards more independence, as it meant more freedom to operate for them. They used their success stories in terms of time-to-market and flexibility, also to convince the organization of the agile processes. On the other side, challenges that were mentioned in weaker connections, was the awareness of the people, and the understanding of the agile concepts by all stakeholders. If trust needs to be established, it is very crucial, that all involved people have the same understanding of the goal. This leads to a couple of challenges in the setup of the team. Trust needs not only to be established in the beginning, but must to be maintained continuously throughout the operational time. It was mentioned that when new members are introduced to fit to the team, the process somehow starts over again, and new team members need to find a way to fit into the way of working. The agile processes have to be considered especially when recruiting new people, as people with the right values and the right mind-set are crucial to successful projects. What has also been mentioned is the contractual situation in the teams, as agile operations usually work with a time & material contract. Many companies still would like to have a fixed price offer, which is often hard to target, and which would require more control over the team, to be able to work towards the agreed product. This issue has also been discussed in Section 3.6.2, and the solution might require a shift in the mind-set of managers towards an acceptance of the fact that the specific outcome is often unknown. A further challenge that was mentioned, was that people also the organizational side often were not aware of what agile operations mean. This was countered with trainings, and by highlighting the important points, when agile teams are used in

operations. As described in Section 3.2.2, Agile Coaches can also be a source of support here, as they ensure that all the people involved understand the new way of working.

Stronger connected Teams

In some of the interviewed cases, the control was more important, and the company expected the teams to work more in a more plan-driven way. A stronger controlled team usually involved managers who try to be more integrated in the operations, and are regularly aligned with the operational teams. More meetings to align the prioritization with the management sector were scheduled and the leadership team wanted to be involved in certain decisions. In some cases, the managers were included in the operations earlier in their career, and therefore already had a good knowledge of the operational work needed. Companies who wanted to control their teams more, had often just started implementing agile teams, and therefore were just in the beginning of establishing trust. This confirms what was discussed in this Section 3.7.3, to start with smaller more controlled teams and introduce agile methods step by step. The tolerances for teams making their own decisions were set very low. One of the things that worked very well in strongly controlled teams was the alignment between the team and the organization. Open issues could be addressed quickly and the management was always aware of what was going on in the daily work process. With this close connection, it is also easier to get the support of the management, and the managers can implement their ideas into the operations more quickly. These advantages of a strong connections are complying with what has been described in Section 2.6. On the other hand, a strong connection also leads to more effort on the manager's side and on the team side. It was mentioned that this could make the projects difficult to manage at some points, as managers might have different ideas as the project team. It was also mentioned that it could lead to micromanagement of higher people, if they do not trust the team enough, or are afraid the team will do something that is not in their interest. Beside the fact that it was easier to meet deadlines for more agile teams, it was apparent that the customer often was not in the focus, as the teams struggled to handle all the required internal communication. The practitioners mentioned that they tried to solve the slow process with rapid prototyping or by putting more focus back on deliver the product. But overall it was evident that the additional efforts that are required for having more control needed to be balanced out in other areas, and often brought bigger disadvantages than what had been gained through the increased control. It was often difficult for the managers to cope with the work-load and to have to understand all details of the operations. It was mentioned in the interviews, that some managers did not enjoy to working so transparently, which is required if they plan to be involved in the agile operations.

Discussing a good Balance

It was made clear, that all interviewed organizations are working on finding their best setup and on optimizing their processes continuously. Some participants said that it would be good for them to align only all couple of months with the management, some prefer a higher frequency, depending on the situation. It was highlighted that alignment must not always occur be formally and can also take place on demand. If more freedom is to be given to the team, the maturity level of the company and the people involved must be at a high enough level. It was mentioned by Agile Coaches that it is their responsibility to increase this maturity level, and to therefor ensure a good balance. But even for Agile Coaches, it was crucial for the teams not to receive too much freedom, as it increases the risk of developing wrong products and therewith lose money and time. It was highlighted by many people, that with more freedom, the customer focus must be increased. This confirms with the discussion in this thesis, that a shift is required from being more plan-driven towards a more purpose-driven organization. This means a good balance depends on the capabilities of the company, and on the company's readiness for cultural shift. Many organizations started the shift with small and more controlled teams as discussed in this thesis. It was mentioned that with this approach, the risk can be decreased, and a good setup can be tested step by step. To find a good balance, it was also seen that all interviewees constantly have to work to review and improve their processes. One anonymous participant mentioned for instance: "We have tried out many process optimizations. Some of them worked better and some of them turned out not to be an improvement. We currently found a good setup, but we are still continuously reviewing our processes and team structures." This among other statements confirms the importance of continuous improvement for many organizations.

4.3 Summary

In the theoretical part of this thesis it was developed, how an agile team can be connected to a traditional company, and what effects this connection can have. Important aspects have been highlighted and challenges as well as solutions have been outlined. In the interviews those results have been discussed, and it was evaluated, how organizations connect agile teams in practice, and if they can confirm the findings from the theoretical parts or find gaps between theory and practice. The interviews were evaluated by categorizing the statements and grouping them, to help get an understanding of where the participants have had the same experiences, and where differences can be spotted. The final results have been described and summarized in Section 4.2 by also including some quotes to understand the reasoning behind certain aspects. Specific findings that have been identified as relevant if an organization wants to connect an agile team, without changing its traditional structure, have also been included. The outcome of the interviews is used to answer the research questions in the next section with empirical evidence and formulate specific recommendations.

5 Results

In this chapter, the results of the theoretical and empirical evaluation from the previous sections will be used to answer the research questions and summarize the findings. In addition to this, specific recommendations will be outlined, which have been derived from the analysis and can be useful to organizations, which want to implement agile teams in their traditional organizational structure. Furthermore, limitations and recommendations for future research will shortly be discussed.

5.1 The Research Questions

5.1.1 How can agile software development teams be set up in larger organizations without performing an agile transformation?

In many agile guides, it is suggested that an agile working style requires an agile transformation across the whole company. In this thesis, it has been found that agile operations can also be implemented well in a traditional company, by adopting certain aspects, and "connecting" an agile operating team to a more hierarchical organizational structure. To achieve this connection, it has been found, that it is crucial for a company to first know what it wants to achieve when adapting its operations. The organization should be aware of its goals and its reasoning for these changes. The company should also be aware of the environment it is operating in, how complex the projects are, and how important innovation is for its deliverables in order to find a suitable setup. These recommendations could be found in the used literature and were able to be confirmed by practitioners. The company should also be aware of its own capabilities, its situation and its requirements towards the new teams. To implement Agile across multiple teams or the whole company, there is not yet a fully developed framework available, which can be used. Companies in practice often try to learn from other companies like Spotify or best practices, when Agile is implemented. There are several concepts developed like the SAFe to scale agile concepts or find new organizational structures, which support agile operations better. Most of those concepts require a company-wide agile transformation and a redefining of existing hierarchical structures, or can only applied for specific situations.

This thesis has described, how an agile team can be connected to a company without the need of a transformation by examining both sides and evaluating the coupling elements. It has been found, that for most companies, the investment and risk for an agile transformation is too high so companies implement their own setup of agile concepts step by step. While it is often recommended in theory, that agile principles should be pushed top-down from the leadership positions, the interviews have shown, that companies often introduce agile processes bottom-up. This means that the teams start working Agile, and try to prove to the company that this

style of working is better suited for the team, and that performance will increase. The failing of the waterfall approach in various software projects was a huge catalyst to shift to more flexible processes. It could have been observed, that key stakeholder often remained the same on both sides during a shift towards Agile, but the responsibilities of the roles changed. For instance, the Project Managers might take on the position of the Product Owner or the Scrum Master. With the change in the operations, software development cycles get smaller, and products can be delivered more frequently and be reviewed by all participants. Agile teams are allowed to work on their own up to a certain extent, while the strategy and the overall goals need to be aligned with the business executives. More flexible operations offer a lot of advantages for the product development of a company, but it has been found, that more freedom is not always better and that it is crucial to find a good balance. To implement a connection and find this balance, certain key aspects have to be considered, which have been developed in this thesis and will be concluded while answering the second research questions.

5.1.2 What aspects have to be considered when an agile team is connected to a traditional organization?

While discussing the first research question, the possibilities of connecting agile teams to traditional companies were discussed. As described, it has been found that it is possible to combine agile operations and hierarchical organizational structures and a combination of different principles are also used in practice. In this research questions the results of how the combination of agile and more plan-driven principles could look like will be summarized, as well as what is crucial to consider in order to successfully implement an agile self-organized team in a traditional company. For the evaluation, fundamental ideas from established frameworks like PRINCE2 have been merged with contradicting agile methodologies like Scrum and the combination has been underpinned with practices and recommendations from different sources. In the following, the identified key aspects and how should companies should treat them will be concluded. The connecting elements have been verified by the practitioners in the interviews, and it has been discussed how they are set up in their companies.

Probably one of the most crucial aspects to consider is the individual culture of an organization. This also includes the mixture of different cultures within a company like the executive culture, the business areas, and the operating people like the developers. In agile teams, those cultures will work closer together and values and assumptions have to be aligned. The managers and executives need to decide, how much they want to be involved in the operations and how much freedom the teams will get. To unleash agile capabilities a shift might be required, to give up certain control processes and to be more customer focused. This means, the culture of the whole company might have to adapt to a certain extent, in order to understand agile concepts, as well as allow the teams more independence. As described in literature used and confirmed

in the interviews, a very important role needed to succeed is the role of the Product Owner. This role often acts as a bridge between the operating team and the sponsoring organization. In this position it is also possible to take over responsibilities of the Project Manager and coordinate the operational plans. If agile principles are implemented on a larger scale, it is also to make use of Agile Coaches to align the agile integration company-wide and to ensure processes are set up well and understood by all employees involved. Further, it is crucial to have a clear communication strategy between the teams and the organization. This means how often an organization is aligning topics formally and informally with the team, and who is participating in alignment meetings. It has been shown that teams who are connected closer to each other, align weekly or bi-weekly with the managers, while in a weaker connection, the team only needs to align quarterly with the organization or even less. As agile teams usually work very transparently, formal reports are often not required by the team. It was observed that alignments often happen informally or on demand when needed instead, in order to stay more flexible.

A further key aspect is the planning and prioritization of tasks and deliverables. When it comes to project milestones, a shift away from expecting a defined outcome on a defined time is required also within the organization, in order for them to understand that the product is often not exactly defined in the early phases of a project. In an agile process, tasks are defined and prioritized during the operations on a regular basis. This means, a company needs to decide, how much it wants to control the progress and how much it wants to get involved in the process. Prioritization might happen up to a certain extent within the team and on a higher more strategically level by the company. In a more agile environment, decisions are driven by the customer and both the team and the company work towards the same purpose. In order to enable the team, to work more independently, it has been found that the trust between the key stakeholder from the organization and the team is a further crucial aspect. Companies need to empower their teams in order for them to work efficiently. Experience and time is crucial for establishing trust and improve the processes constantly to work together efficiently. The maturity level of a company can be used to discuss how well a company can handle agile operations. If the company feels mature enough and has established enough trust between the main participants, it can give the teams more freedom and empower them to work towards a certain goal using agile concepts. Those key aspects can be named among other things that need to be considered when an agile team is connected to a traditional company. How to set up a proper connection and find a good balance will be discussed with the third research question.

5.1.3 What are the relevant trade-offs between freedom and control when agile teams are used, and how can a good balance be found?

With the first two research questions, an understanding has been created of what it means to connect an agile team to a traditional company and how this connection can be set up. In this research question it will be discussed, what it means for the company in terms of giving more freedom or remaining more controlled, and how a good balance can be established.

As it is very clear in the literature referenced, and could be confirmed through the interviews, agile operating teams need a lot of freedom in order to work probably, and to enable the advantages of agile software development, like adaptability and fast reaction times. But it has also shown that too much freedom is not good for the teams either, as certain guidance is very important and it gives the team the possibility to address issues or questions to the organization. Too much freedom also increases the risk of the team working in a wrong direction with unsatisfying results, and a wasted investment for the organization in terms of budget and time. On the other side, very strongly controlled teams lose their capability to innovate or work creatively. If the team needs to constantly align with managers, and needs to constantly report its progress, the team might start to focus more on the processes and less on the customers, which can be very negative for an agile operating team. This also affects the managers negatively, as they need a lot of time for alignment and also need a detailed understanding of the operations. It contains a high risk of micro management, and of managers interfering too much with the team, and keeping them from doing their work. For this reason, it has been shown, that it is crucial to find a good balance between enough, and too much control. As a good approach, it has been recommended to work in small steps, and to learn from experiences that will help establishing trust over time. This means that finding a good balance can be started with smaller more controlled projects, and over time, when the first pilot projects have been successfully executed, the teams can receive more independence in their operations. With this approach, the maturity level of the company can be increased step by step and with a lowered potential of risk. In order to allow an agile team more freedom, it has also been found that a shift might be required across all affected parties from a more plan-driven approach towards a more purpose-driven environment. In an agile organization, the executives are mainly required to provide direction and to serve as an enabler for the teams, in order for the team to focus on producing valuable products for the customers. Additionally, it has been found that a certain amount of interacting processes are also beneficial for the team and the overall outcome, as they give additional guidance and clarity. How these interacting processes, like alignment meetings or reports, will be set up, strongly depend on the organization and its environment. This means, that the individual setup of how the team is connected to the management depends strongly on the current situation of the organization and their projects, as well as on their requirements and expectations from agile operations. It cannot be generalized, how many meetings should be scheduled or how often results should

be presented in order to have the highest efficiency, as it depends on too many company internal and external dependencies. It has been found that one of the most crucial factors to find a good balance is continuous improvement. This means that while implementing agile methodologies, the organization should constantly review their processes and interactions to improve them over time. It should be continuously identified what works well, and where improvements can be made to optimize the processes and interactions. This makes the working style of the organization more transparent as well as more flexible for challenges in the future.

5.2 Recommendations for Organizations

After the theoretical and empirical research in this thesis, certain recommendations can be derived to organizations, who want to use agile teams but remain their established structure:

⇒ **Be aware of the environment you work in**

In order to find a suitable setup, it should be known how predictable the projects are and how important innovation is for the organization. Agile processes are usually recommended in more complex environments.

⇒ **Know about the importance of customer focus**

Ensure that the organization knows what it expects from agile teams and about its capabilities. If it wants to work more agile, a shift is required from towards a more purpose-driven environment. This also means involving business departments more in the development of its products during the whole process.

⇒ **Allow more flexibility in the developed products**

Focus on the outcome and let the team make the small decisions. It is not required to specify everything from the beginning, but it can be very beneficial to start faster and have first deliverables earlier in order to make required adaptations.

⇒ **Start small and advance step by step**

Start with small pilot projects and make adoptions step by step in order to find a good setup. This approach minimizes the risk and helps employees to get used to the new processes and working style.

⇒ **Focus on continuous reviews and improvements**

Work more transparently and allow more flexibility in the operations. Regularly review processes and make improvements where it is required in order to find the most efficient setup for the organization.

⇒ **Build trust and empower employees**

It has been found, that in order to succeed with the implementation of agile teams in larger organizations, it is crucial to establish trust between the stakeholders and

empower employees to make their own decisions and work towards a common purpose.

⇒ **Allow failures and learn from experiences**

Adopting to Agile is a process, where you are learning constantly. This also must include allowing failures in order to learn from them and advance the organizations capabilities.

5.3 Limitations and Recommendations for Further Research

The level of this thesis has been rather high, in order to get a holistic view of the given challenge and work out the contradicting elements. A more detailed evaluation of the impacts of the interactions and the change process could be pursued. This could also include taking the people factor more into account, as it is important in an agile team, to have the right employees with the right mindset. Also, the impact of an agile change on employees within the established hierarchical structure could be evaluated in more detail.

6 Conclusion

This thesis has examined the connection between agile operational teams and a larger, more traditional organization. The thesis has focused on agile software development, but the outcome may also be applicable to other operational areas and agile teams at larger organizations in general. It has evaluated what a connection between a team and a company can look like, what key aspects must be considered and how a good balance between too much freedom and too much control can be found when the teams are to be managed by the company. To achieve a reasoned base for these conclusions, state-of-the-art theory has been reviewed and summarized, including different concepts which are currently in development. Following this, established plan-driven frameworks have been combined with popular agile methodologies to define relevant aspects and interactions when an agile team is connected to a traditional organization. Recommendations and best practices have been included, and challenges as well as possible solutions have been outlined. There has also been a discussion of what must be considered when an agile team is introduced and what the trade-offs for the organizations are. This was followed by a summary of how a connection between an agile team can be defined and what an organization must consider when it plans to maintain its existing structure and does not intend to implement an agile transformation. This is relevant, as not many papers discuss the combination of traditional and agile concepts within an organization, and agile methodologies mainly focus on the operations and do not describe how a connection to the organization should be set up. The theoretical results have been verified in an empirical in-depth study with practitioners from ten larger organizations which use agile teams for their software development. This study served to round off the analysis and identify gaps and agreements between theory and practice. It has also been used to derive specific findings which have been identified in all participants regarding a connection between agile teams and a larger organization. Using the theoretical analysis and the empirical evidence, the three research questions have finally been answered in the result section. This section also described specific recommendations for organizations which have been identified during the evaluation and can be useful to organizations which want to use agile teams with only little adjustments of their current structure.

It has been shown that agile operational teams can be used in larger traditional organizations without an agile transformation, which is done in practice. Agile teams are connected to organizations by defining roles and interactions between the team and the organization and by implementing specific processes. Those processes are often based on established processes such as SCRUM or PRINCE2 but always need to be aligned to the individual situation and requirements of the organization. The thesis has found that the organization can give the teams more freedom by increasing their tolerances in terms of time, budget and scope. To empower

the teams, it is very crucial to establish trust between the main stakeholders, which in most cases are the managers from the organization and the Product Owner from the team, who is responsible for the prioritization of the deliverables. The main risk identified of a greater empowerment of the teams, is the risk of working in the wrong direction and delivering products which are not useful. For this reason, it is crucial to find a good balance and use the connection to coordinate regularly with the teams and guide them in the right direction together with the organization's business units. A good practice which has been found is to start with more control and empower the team over time once the team is able to successfully deliver its goals. It has been found further that a shift in the mind-set of all employees involved is required, from a more plan-driven approach towards a more purpose-driven approach. Employees must accept that the final product which is developed cannot be defined at the beginning, but involves a journey where different areas need to work together with each other efficiently and serve a common purpose. Finally, this thesis has found that processes and interactions between the team and the organization can never be final, but need to be reviewed and improved constantly to make the cooperation more effective and also able to adapt to internal and external changes.

Bibliography

- Adanza, F. (2016). The best way to do agile project reporting. SmartBear Zephyr.
- Aghina, W., De Smet, A., Lackey, G., Lurie, M., & Murarka, M. (2018). The five trademarks of agile organizations. McKinsey.
- Ambler, S., & Lines, M. (2019). Introduction to DAD. Disciplined Agile Delivery.
- Anderson, D. J. (2010). Kanban: Successful Evolutionary Change for Your Technology Business. Blue Hole.
- Arabi, A. (2019). Agile Funding Model. Spring Agile.
- Augustine, S., Payne, B., Sencindiver, F., & Woodcock, S. (n.d.). Agile project management: steering from the edges. Association for Computing Machinery, pp. 85-89.
- Axelos (2017). PRINCE2 Handbook. Axelos.
- Barow, S. (2017). Architecture Erosion in Agile Development. DZone.
- Barretta, J. (2009). Learn to be Agile. CIO Canada; Downsvie.
- Barry, E. J., Mukhopadhyay, T., & Slaughter, S. A. (2002). Software Project Duration and Effort: An Empirical Study. In Information technology and management, pp. 113-136. Springer.
- Bass, J. M., Allison, I. K., & Banerjee, U. (2013). Agile Method Tailoring in a CMMI Level 5 Organization: Addressing the Paradox. Journal of International Technology and Information Management, pp. 77-98.
- Beedle, M. e. (2001). Manifesto for Agile Software Development. Available at: <https://agilemanifesto.org/> (Accessed: 03.02.2020).
- Berczuk, S. (2018). The Manager's Role on a Self-Organizing Agile Team. TechWell.
- Bergh, C., & Benghiat, G. (2017). Analytics at Amazon Speed: The New Normal. Business Intelligence Journal, pp. 46-54.
- Bossert, O., Kretzberg, A., & Laartz, J. (2018). Unleashing the power of small, independent teams. McKinsey Quarterly, p. 67.
- Butler, N. (2017). Prioritisation tools and tips for Agile projects. Boost.
- Campbell-Kelly, M. (2002). The History of the History of Software. IEEE Annals of the History of Computing, p. 40.
- Collier, K. W. (2011). Agile Analytics: A Value-Driven Approach to Business Intelligence and Data Warehousing. CIO Insight.

- Conboy, K., & Carroll, N. (2019). Implementing Large-Scale Agile Frameworks: Challenges and Recommendations. *IEEE Software*, pp. 44-50.
- Davis, D. (2018). Change is a constant: why agile software development fits today's utility. *Clean Power Research*.
- Den Haan, J. (2018). How to scale agile: 6 keys to success. *InfoWorld*.
- Deng, W. (2019). Empowering employees to be creative. *The Business Times*.
- Denning, S. (2015). How to make the whole organization Agile. *Strategy & Leadership*, pp. 10-17.
- Denning, S. (2018). Six Lessons That Society Must Learn About Agile. *Forbes*.
- Denning, S. (2019). The ten stages of the Agile transformation journey. *Strategy & Leadership*, pp. 3-10.
- Derksen, J., & LaBar, D. (2016). Customer Expectations Becoming 'Liquid' and Changing at a Lightning Pace. *Wireless News*.
- Dingsoeyr, T., & Falessi, D. (2019). Agile Development at Scale: The Next Frontier. *IEEE Software*, pp. 30-38.
- Elliott, E., Fons, F., & Randell, A. (2015). *Business Architecture and Agile Methodologies*. Business Architecture Guild.
- Florentine, S. (2019). Top 12 project management certifications for 2020. *CIO*.
- Fontana, R. M., Fontana, I. M., da Rosa Garbuio, P. A., Reinehr, S., & Malucelli, A. (2014). Processes versus people: How should agile software development maturity be defined? *Journal of Systems & Software*, p. 140.
- Göbl, W., & Schwarzer, B. (2019). Architectural Thinking Framework. Available at: <https://architectural-thinking.com/> (Accessed: 03.02.2020).
- Guerra, D. (2018). The super agile revolution. *Industrial and Systems Engineering at Work*, pp. 43-47.
- Harris, M. L., Collins, R. W., & Hevner, A. R. (2009). Control of Flexible Software Development Under Uncertainty. *Information Systems Research*.
- Hein, R. (2016). How to get agile to work at your company. *CIO*.
- Herbsleb, J. D., & Moitra D. (2001). Global software development. *IEEE Software*, pp. 16-20.
- Hoda, R., Noble, J., & Marshall, S. (2013). Self-Organizing Roles on Agile Software Development Teams. *IEEE Transactions on Software Engineering*, p. 422.
- Huckabee, W. A. (2015). REQUIREMENTS Engineering in an AGILE Software Development ENVIRONMENT. *Defense AR Journal*, pp. 394-415.

- ISO. (2015). ISO/IEC 33001:2015. Available at: <https://www.iso.org/standard/54175.html> (Accessed: 30.01.2020).
- Joroff, M. L., Porter, W. L., Feinberg, B., & Kukla, C. (2003). The agile workplace. *Journal of Corporate Real Estate*; Bingley, pp. 293-311.
- Kakar, A. K. (2016). *Assessing Self-Organization in Agile Software Development Teams*. Stillwater, pp. 208-217.
- Kamepally, A. K., & Nalamothu, T. (2016). *Agile Methodologies in Software Engineering and Web Engineering*. Modern Education and Computer Science Press.
- Karlstrom, D., & Runeson, P. (2005). Combining Agile Methods with Stage-Gate Project Management. *IEEE Software*, pp. 43-49.
- Kashyap, S. (2018). *Traditional vs Agile Project Management Method*. ProofHub.
- Kelly, A. (2009). *The Role of the Agile Coach*. AgileConnection.
- Krow, E. (2017). *The Key To Employee-Empowering Leadership*. Forbes.
- Ladas, C. (2008). *Scrumban: Essays On Kanban Systems For Lean Software Development*. Modus Cooperandi Press.
- Larman, C., & Vodde, B. (2019). *Large Scale Scrum*. Available at: <https://less.works/> (Accessed: 05.02.2020).
- Laux, I., & Kranz, J. (2019). *Coexisting Plan-driven and Agile Methods: How Tensions Emerge and Are Resolved Completed Research Paper*. International Conference on Information Systems.
- Levans, M. (2019). 2019 Technology Issue: Watch the whirlwind. *Modern Materials Handling*, p. 7.
- Litchmore, K. A. (2016). *A comparative study of agile methods, people factors, and process factors in relation to project success*. Capella University.
- MacKay, J. (2018). *The Ultimate Guide to Implementing Agile Project Management (and Scrum)*. Planio.
- Maruping, L. M., Venkatesh, V., & Agarwal, R. (2009). A Control Theory Perspective on Agile Methodology Use and Changing User Requirements. *Information Systems Research*; Linthicum.
- Maruping, L. M., Venkatesh, V., & Agarwal, R. (2009). A Control Theory Perspective on Agile Methodology Use and Changing User Requirements. *Information Systems Research*, pp. 377-399.
- Masur, D., & Schaffner, D. (2016). *The Rise of Agile*. Accenture.
- Mayring, P. (2000). *Qualitative Content Analysis*. Forum: Qualitative Social Research.

- Minkiewicz, A. (2009). Respect the Triangle. Cost Engineering, p. 4.
- Mitsuyuki, T., Hiekata, K., Goto, T., & Moser, B. (2017). Evaluation of Project Architecture in Software Development Mixing Waterfall and Agile by Using Process Simulation. Journal of Industrial Integration and Management.
- Moira, A. (2017). How to pick the best project management methodology for success. CIO.
- Ng, L. (2019). Why the Agile Method Often Fails in Big Companies. Medium.
- Nicholls, G., Lewis, N., & Eschenbach, T. (2015). Determining When Simplified Agile Project Management Is Right for Small Teams. Engineering Management Journal: EMJ, pp. 3-10.
- Nokes, S., & Kelly, S. (2007). The Definitive Guide to Project Management. Financial Times.
- O'Loughlin, E. (2018, 12 39). Agile vs. Waterfall: Matching Method To Project Requirements. Softwareadvice.
- Patton, M. Q. (1990). Qualitative Evaluation and Research Methods. SAGE Publications, Inc.
- Poetz, M., Franke, N., & Schreier, M. (2014). Sometimes the Best Ideas. Harvard Business Review.
- Project Management Institute (2013). PMBOK Guide - 5th edition. Project Management Institute.
- Reifer, D. J. (2017). Quantitative Analysis Of Agile Methods Study (2017): Twelve Major Findings. InfoQ.
- Rigby, D. K., Sutherland, J., & Noble, A. (2018). Agile at Scale. Harvard Business Review.
- Saboe, D. (2017). Lightning Cast: The Agile Business Analyst Mindset. Mastering Business Analysis.
- Sacolick, I. (2018). What is agile methodology? Modern software development explained. InfoWorld.com.
- SAFe (2019). SAFe. Available at <https://www.scaledagileframework.com/> (Accessed: 03.02.2020).
- Schein, E. H. (1996). Three Cultures of Management: The Key to Organizational Learning. Sloan Management Review; Cambridge Vol. 38.
- Shealy, M. (2019). A comprehensive guide to agile project management. Available at <https://opensource.com/article/19/8/guide-agile-project-management> (Accessed on 03.02.2020)
- Slack, N., Barandon-Jones, A., & Johnston, R. (2016). Operational Management, eight edition Pearson Education Australia.

- Solinski, A., & Petersen, K. (2016). Prioritizing agile benefits and limitations in relation to practice usage. *Software Quality Journal*, pp. 447-482.
- Special Report: Managing complexity - Software development; The software-development industry. (2004). *The Economist*, p. 90.
- Srivastava, P., & Jain, S. (2017). A leadership framework for distributed self-organized scrum teams. *Team Performance Management*.
- Srivastava, P., & Jain, S. (2017). A leadership framework for distributed self-organized scrum teams. *Team Performance Management*.
- Srivastava, P., & Jain, S. (2017). A leadership framework for distributed self-organized scrum teams. *Team Performance Management*; Bradford, pp. 293-314.
- Stoica, M., Mircea, M., & Ghilic-Micu, B. (2013). Software Development: Agile vs. Traditional. *Informatica Economica*, pp. 64-76.
- Stray, V., Moe, N. B., & Hoda, R. (2018). Autonomous agile teams: Challenges and future directions for research. *19th International Conference on Agile Software Development*.
- Strode, D. E. (2016). A dependency taxonomy for agile software development projects. *Information Systems Frontiers*, pp. 23-46.
- (2017). Success Rates Rise - Transforming the high cost of low performance. *Project Management Institute*. Retrieved from PMI.
- Suer, M. F. (2019). Continuous improvement – now more than ever. *CIO*.
- Sufi, M. (2018). How To Apply Agile Project Management. *SPF Consulting*.
- Taylor, K. J. (2016). Adopting Agile software development: the project manager experience. *Information Technology & People*; West Linn, pp. 670-687.
- van Waardenburg, G., & van Vliet, H. (2013). When agile meets the enterprise. *Information and Software Technology*; Amsterdam, p. 2154.
- Verwijs, C. (2016). The Agile response to “How much will it cost, and when will it be done?”. *Medium*.
- Vinekar, V., Slinkman, C. W., & Nerur, S. (2006). CAN AGILE AND TRADITIONAL SYSTEMS DEVELOPMENT APPROACHES COEXIST? AN AMBIDEXTROUS VIEW. *Information Systems Management*, pp. 31-42.
- Wilson, N., & Sobejana, M. (2015). Using a Pilot Project in Transitioning to Agile. *Gartner Research*.
- Windust, J. (2012). *The Ultimate Guide to Agile Performance Management*. Cognology.
- Winston, R. (1970). *Managing the Development of Large Software Systems*. IEEE WESCON.

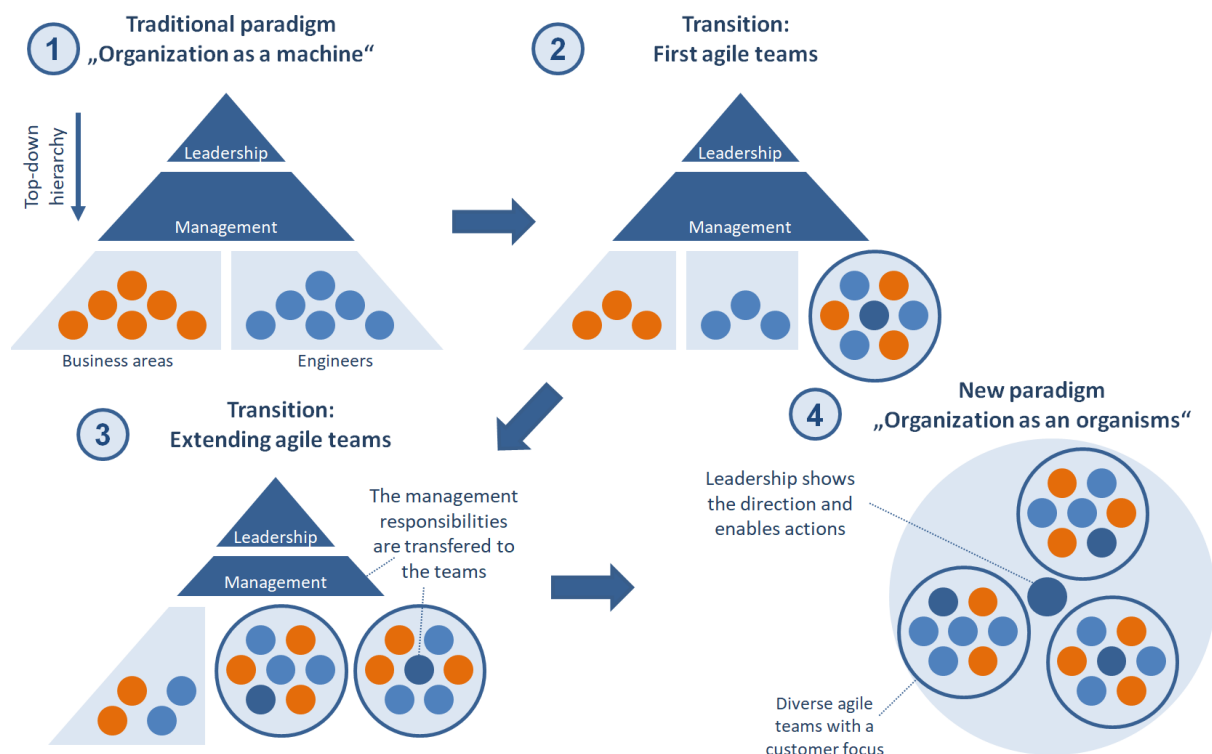
Appendix

A) Principles behind the Agile Manifesto

Following 12 principles are defined in the agile manifesto for software development:

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

B) Transition from a “traditional” to the “new” paradigm



This illustration shows, how an organizational change from a traditional paradigm to an agile paradigm can look like as discussed in this thesis. In the beginning only certain self-organized teams are used. When more teams are implemented, the management layer will be integrated to the teams and give them more empowerment. The agile organization is then fully purpose driven, with no management layer anymore, but only the leadership to give direction and function as an enabler for the teams.

C) Detailed Interview Guideline

Introduction

- Name of the interviewee?
- Name of the company?
- Current position?
- Involvement in the agile process?
- Purpose of the team(s)?
- What kind of software is developed?
- How are the projects financed?

Questions to the Agile Operations

- What methods/frameworks are used?

- What roles are used?
- How often does the team meet?
- Since how long are agile methods practiced?
- How have agile methods been introduced to the company? (top-down or bottom-up)
- What were the reasons to introduce agile methods?
- What works well in the current setup?
- Where are challenges of the current setup?
- What has been tried to solve the challenges or could be recommended?

Key Aspects

- Culture
 - Are the agile methods pushed by the team or by the leadership?
 - How did agile software development affect the culture?
- Roles and responsibilities
 - What roles are used on the side of the sponsor?
 - What roles are used on the side of the operating team?
 - How are the responsibilities divided between those two sides?
- Communication
 - How do the operations and the sponsor communicate with each other?
 - How often are formal meetings scheduled?
 - Are you making use of formal reports?
 - What works well and what are current challenges?
- Planning and Prioritization
 - How are milestones and project plans handled?
 - How does the prioritization process look like?
 - Who is doing the prioritization?
 - What stakeholders are involved in bigger decisions?
- Trust and Empowerment
 - How much is the team empowered to work independent?
 - Is there a certain budget defined before the sponsor has to be involved?
 - How do you empower teams or establish trust?

Freedom vs. Control

- What are strengths of a strong connection in your setup?
- What are weaknesses of a strong connection in your setup?
- What are strengths of a weak connection in your setup?

- What are weaknesses of a weak connection in your setup?
- What is important for a good balance in your setup?
- How can a well-balanced connection be found?

Open Discussion

- Was something important missed?
- Do you have other comments or something you want to share in this context?