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Application of Agile Methodology in Case Company's Project Management

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<p>The objective of this thesis is to study the current adoption of agile principles and methods in the case company's IT development projects. This thesis aims to identify the current strengths, weaknesses and challenges that the agile IT development projects at the case company are currently facing and to use available knowledge and best practices in agile project management to propose solutions to identified weaknesses and challenges.</p> <p>This thesis is based on interviews with the case company's Head of IT PMO and Project Managers of IT development projects at the case company that have been classified as agile. Furthermore, it is based on the case company's internal documents and available knowledge and best practices in agile project management. The thesis is based on a structured approach that starts with investigating the Current State of adopting agile principles in the case company's agile IT development projects, whereafter available knowledge and best practices in agile project management is explored, and finally a proposal is built and validated.</p> <p>The key findings of this study have revealed the weaknesses and challenges that are hindering proper adoption of agile principles in the case company's agile IT development projects. Available knowledge and best practices in agile project management is used to propose measures to improve identified weaknesses and challenges.</p>	
Keywords	Agile, Project Management

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<p>Tämän opinnäytetyön tavoitteena on tutkia ketterien periaatteiden ja menetelmien nykyistä käyttöönottoa kohdeyrityksen ketterissä IT-kehitysprojekteissa. Opinnäytetyö pyrkii tunnistamaan kohdeyrityksen IT-kehitysprojektien nykyiset vahvuudet, heikkoudet ja haasteet ketterien periaatteiden soveltamisessa ja pyrkii käyttämään saatavilla olevaa teoriaa ja parhaita käytäntöjä ketterässä projektinhallinnassa, jotta voidaan ehdottaa ratkaisuja tunnistettuihin heikkouksiin ja haasteisiin.</p> <p>Tämä opinnäytetyö perustuu haastatteluihin, jotka on tehty kohdeyrityksen IT PMO:n päällikön sekä ketterien IT-kehitysprojektien projektipäälliköiden kanssa. Lisäksi se perustuu yrityksen sisäisiin asiakirjoihin ja saatavilla olevaan teoriaan ja parhaisiin käytäntöihin ketterässä projektinhallinnassa. Rakenteeltaan opinnäytetyö alkaa nykytila-analyysillä, jossa tutkitaan kohdeyrityksen nykyistä ketterien periaatteiden soveltamista IT-kehitysprojekteissa, jotka ovat määritetty ketteriksi. Seuraavaksi tutkitaan käytettävissä olevaa teoriaa ja parhaita käytäntöjä ketterässä projektinhallinnassa, jonka jälkeen lopulta rakennetaan ehdotus, joka vielä validoidaan.</p> <p>Tämän tutkimuksen tärkeimmät havainnot ovat paljastaneet heikkoudet ja haasteet, jotka estävät ketterien periaatteiden asianmukaisen soveltamisen kohdeyrityksen ketterissä IT-kehitysprojekteissa. Käytettävissä olevaa teoriaa ja parhaita käytäntöjä ketterässä projektinhallinnassa käytettiin ehdottamaan toimenpiteitä havaittujen heikkouksien ja haasteiden parantamiseksi.</p>	
Avainsanat	Ketterä, projektinhallinta

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List of Abbreviations and Key Concepts

Agile	An iterative and incremental approach to software development
Project	A set of planned unique tasks executed over a fixed period and within certain costs.
PM	Project Management. Application of knowledge, skills, tools and techniques to the project to meet project requirements.
PMO	Project Management Office. The department or unit within an organization that defines and maintains standards for project management.
Scrum	An agile Framework / methodology with focus on regular team meetings, working in short, singular development phases called Sprints and constant reviewing of development that is done.
PPM	Project Portfolio Management. The high-level management of multiple projects in an organization.
PMBOK	The Project Management Book of Knowledge. An accepted collection of processes, guidelines, terminologies and best practices in Project Management.

1 Introduction

Organizations are becoming increasingly more interested in Agile methodologies and applying its principles and frameworks in their business. This thesis studies the current application of Agile methodology in the case company's Project Management.

1.1 Business Context

This thesis study was carried out for a globally operating Finnish manufacturing company. The company manufactures solutions for people's movement, mainly in the form of elevators, escalators and automatic doors. In addition, the company provides services such as lifecycle maintenance and modernization for these products.

The company operates in more than 60 countries and serves more than 450 000 customers. The company has seven production sites globally and a worldwide staff of 55 000 people. In 2017, the company had a revenue of 8.9 billion euros.

The case company's IT Project Management Office (IT PMO) is responsible for overseeing and guiding projects with an IT impact within the organization, and it is the organizational unit that this study has been conducted for.

1.2 Business Challenge, Objective and Outcome

The case company's IT PMO maintains and oversees many internal IT projects using their Project Management model. Projects at the case company are managed either through the traditional "waterfall" approach to project management or through an agile approach. Currently at the case company, not all the IT projects which have been classified as agile projects are working in a truly agile way, i.e. there is a deficiency in completely and properly following the established agile project management methodology and principles.

The aim of this thesis work is to study the current state of agile project management within the case company's IT development projects and compare it versus the theory

and proper application of agile project management methodology. The objective of this thesis is reporting on how the agile project management methodology is currently being adopted, what are the strengths, weaknesses and challenges currently in the adoption of agile project management at the case company and to use available knowledge and best practices in Agile Project Management on proposing how to make improvements to the current state. The main outcome is a report on the current state and a proposal for the case company on how to improve the current state.

1.3 Thesis Outline

This thesis is built upon four major parts, namely the (1) Current State Analysis (CSA) & (2) Literature Review / Available Knowledge & Best Practices, which are used to build the (3) Proposal, which is thereafter (4) validated. The content of the thesis is as follows. The thesis begins with an introduction, after which it presents the research approach i.e. how the data for the thesis is gathered and what it is used for. Chapter 3 focuses on the Current State Analysis of the case company's Project Management in relation to the agile way of working. Chapter 4 focuses on relevant literature on Agile Project Management. The chapter thereafter is dedicated on building the proposal that is built upon the CSA and Literature review. Chapter 6 is the validation of the proposal and lastly chapter 7 is the summary and conclusions.

2 Method and Material

This section describes the method and material that this thesis study is based on. It consists of the Research Design, Project Plan and Data Collection & Analysis Approach.

2.1 Research Design

The study is conducted in five stages as identified in the Research Design in figure 1 below.

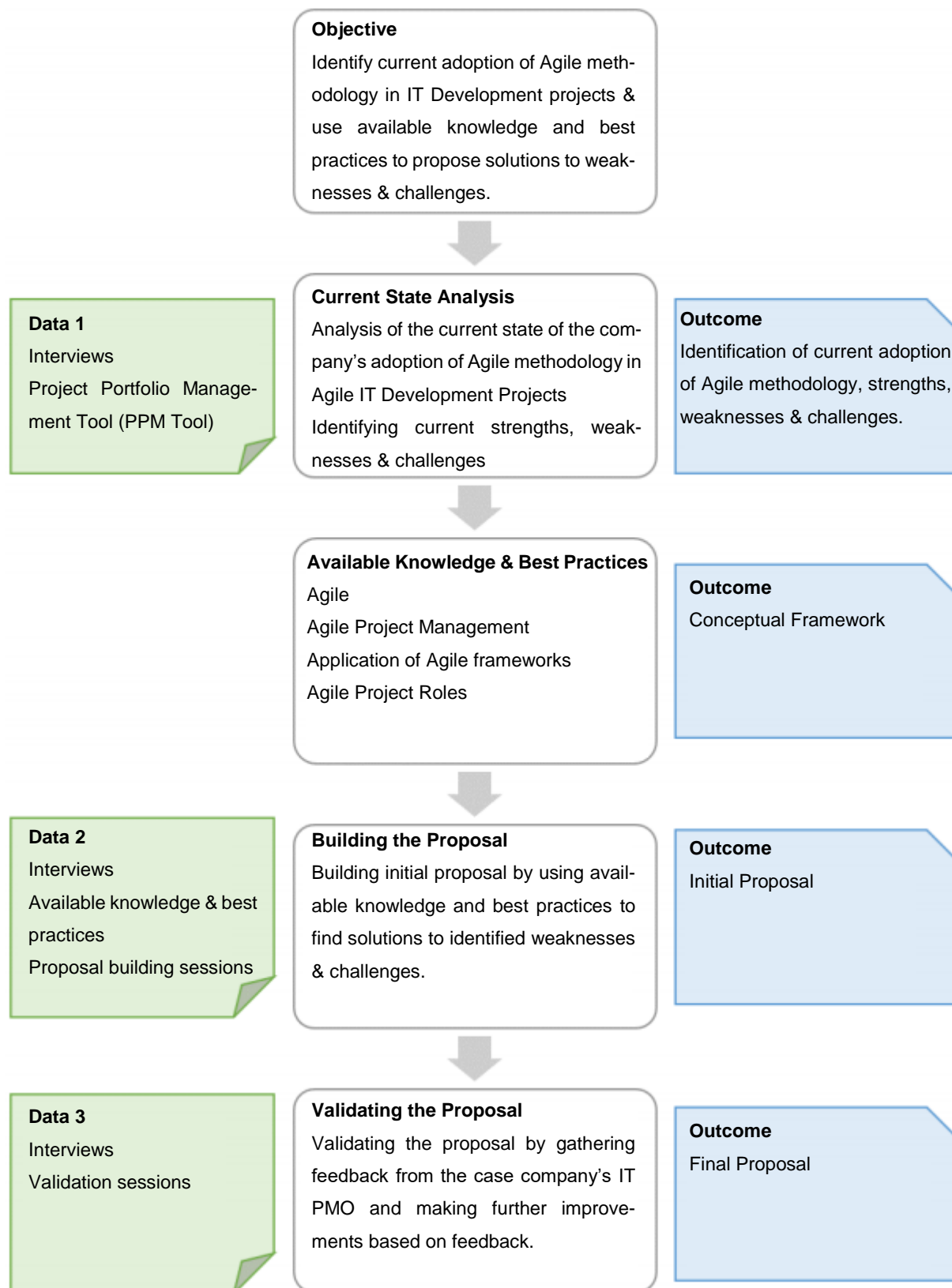


Figure 1. The Research Design of the study

The Research Design illustrates the data sources that this study is based on, the major stages of the thesis study as well as the outcomes of each stage. As the Research Design illustrates, this study starts by defining the objective of the thesis, which is based on the business challenge. Thereafter comes the Current State Analysis stage which is based on interviews and the case company's Project Portfolio Management Tool (PPM Tool). Some initial research into available knowledge and best practices in Agile Project Management is also done. The main outcome of the CSA stage is the identification of the case company's current strengths, weaknesses and challenges in the adoption of Agile Methodologies in Agile IT Development projects.

The next stage is the exploration of available knowledge and best practices in Agile Project Management. The findings of the CSA stage are used to define and limit the scope of research. The outcome of the research of available knowledge and best practices stage is the Conceptual Framework. The Conceptual Framework presents the relevant sections of the knowledge and best practices and connects them with the objective of the study with the aim being the building of the proposal and addressing the identified weaknesses and challenges.

The last two stages of the thesis study are the building of the proposal and its validation. The building of the proposal is based on findings from the CSA stage, the relevant knowledge from the research of available knowledge and best practices -stage and proposal building sessions with representatives from the case company. The outcome of the proposal building stage is the initial proposal. After the building of the initial proposal is the validation of the proposal. The initial proposal is presented to representatives of the case company's IT PMO and feedback is collected, with the outcome being the final proposal.

2.2 Project Plan

This thesis is conducted as a bachelor's thesis at Metropolia University of Applied Sciences in the Industrial Management program. The timeline of this study is from the beginning of November 2018 to the end of April 2019. Figure 2 below shows the timetable of the study in more detail.

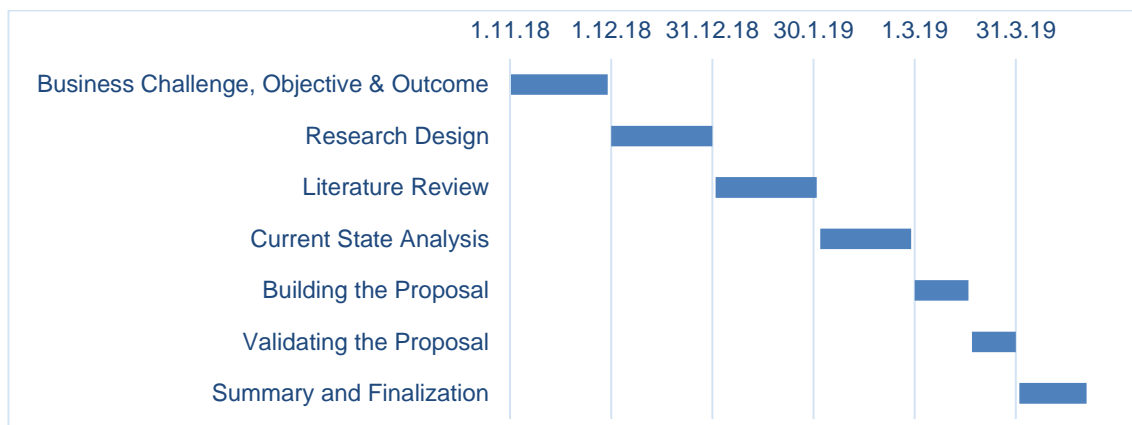


Figure 2. Timetable of the study

2.3 Data Collection and Analysis Approach

The Data for this thesis has been gathered from multiple sources and at three separate stages, Data 1-3. They form the basis for the research of this thesis as demonstrated previously in the figure for the research design. The data that was collected for this study was used for the three main components, i.e. the current state analysis, the building of the proposal and the validation of the proposal. The data collection is shown in detail in table 1 below.

Table 1. Details of Interviews & meetings, in Data 1-3

#	Participant, Role	Type	Description	Date, Length
1	M.S (Head of IT PMO)	Meeting	Thesis objective & outcome specification	28.11.2018, 30 min
Data 1 for the Current State Analysis				
2	M.S (Head of IT PMO)	Meeting	verification of CSA project selection	05.02.2019, 30 min
3	Internal Documents	Text	Internal documents on the case company's project management	February 2019

4	T.S (Project Manager)	Interview	Interview to find out current state of agile project management	12.02.2019, 30 min
5	H.J (Project Manager)	Interview	Interview to find out current state of agile project management	12.02.2019, 30 min
6	H.J (Project Manager)	Interview	Interview to find out current state of agile project management	12.02.2019, 30 min
7	W.S (Project Manager)	Interview	Interview to find out current state of agile project management	12.02.2019, 30 min
8	T.J (Project Manager)	Interview	Interview to find out current state of agile project management	12.02.2019, 30 min
9	T.J (Project Manager)	Interview	Interview to find out current state of agile project management	13.02.2019, 30 min
10	K.O (Project Manager)	Interview	Interview to find out current state of agile project management	13.02.2019, 30 min
11	K.J (Project Manager)	Interview	Interview to find out current state of agile project management	13.02.2019, 30 min
12	V.G (Project Manager)	Interview	Interview to find out current state of agile project management	13.02.2019, 30 min
13	M.T (Project Manager)	Interview	Interview to find out current state of agile project management	13.02.2019, 30 min
14	S.T (Project Manager)	Interview	Interview to find out current state of agile project management	14.02.2019, 30 min

15	S.P (Project Manager)	Interview	Interview to find out current state of agile project management	14.02.2019, 30 min
16	A.J (Project Manager)	Interview	Interview to find out current state of agile project management	19.02.2019, 30 min
17	H.J (Project Manager)	Interview	Interview to find out current state of agile project management	19.02.2019, 30 min
18	S.P (Project Manager)	Interview	Interview to find out current state of agile project management	21.02.2019, 30 min
19	P.T (Project Manager)	Interview	Interview to find out current state of agile project management	21.02.2019, 30 min
20	M.S (Head of IT PMO)	Meeting	Steering meeting, status updates	25.02.2019, 30 min
Data 2 for Proposal Building				
21	Literature Review	Research	Best practices in Agile Project Management	January 2019
22	M.S (Head of IT PMO)	Meeting	Presenting findings from CSA (strengths, weaknesses and challenges) & proposal building	25.03.2019, 30 min
23	H.I, S.H (IT PMO members)	Meeting	Proposal building & initial validation	11.04.2019, 30 min
Data 3 from Proposal Validation				
24	M.S (Head of IT PMO)	Meeting	Validation of initial proposal	17.04.2019, 30 min

As shown in the table above, the data collected for Data 1 was used for the current state analysis. The purpose of the current state analysis is to research the current state of agile project management in the case company's agile IT development projects. The data was collected from internal documents of the case company on project management, interviews with the head of IT PMO and interviews with the project managers of

the respective agile projects chosen for the current state analysis. The interviews were based on questions presented in chapter 3.3.

The data collected for Data 2 was used for the building of the proposal. It consists of meetings with members of the case company's IT PMO. The findings of the current state analysis and the best practices in Agile project management from the literature review were presented to them. The strengths, weaknesses and challenges of the agile projects studied in the current state analysis stage were presented together with key learnings from the literature review and how they could be applied to improve the current state. The last data collection, Data 3, was used for the validation of the proposal.

3 Current State Analysis

3.1 Overview of CSA Stage

The goal of the current state analysis -stage was to understand and report on the way the case company's agile IT development projects are currently using the agile way of working and the application of its various frameworks. The analysis is based on interviews with the respective project managers of 16 selected agile projects that were decided together with the case company's representative. Furthermore, the analysis is based on the case company's internal project management documents. Thus, the interviews and the documents form the basis for Data 1. First the case company's project management model is introduced, whereafter the interviewing process and the findings and conclusions are shown. Lastly the key findings of the Current State analysis are summarized.

3.2 Case company's project management model

The case company's IT PMO is responsible for maintaining and guiding internal IT development and deployment projects. This study focuses on development projects. The case company's IT development projects are managed either through the traditional "waterfall" model or through an agile model. This thesis aims to paint a picture of the current way of agile working in different agile projects.

The case company's project management guidelines have been built upon the 5th edition of the PMBOK (Project Management Book of Knowledge). The case company defines their IT development projects through a set of classifications. One of these classifications is the waterfall / agile classification. At the case company, an IT development project goes through various stages through its lifecycle. These stages are identified through their "K" gates. Agile projects at the case company go through gates K0, K1, K4, K5 & K6. 16 projects that have been classified as agile projects were selected to form the basis for the current state analysis.

Selecting the projects for the current state analysis was done based on the status and phase of the project, i.e. the current project gates and based on different project teams

from different business areas at the case company, such as to paint an accurate picture of the current state. The different projects are managed by their project managers and the agile approach or framework selected to managing a project is done through the discretion of the project manager and is usually based on their own previous experience and knowledge in managing projects in the agile way. Figure 3 below illustrates the different stages in an agile and traditional waterfall project at the case company.

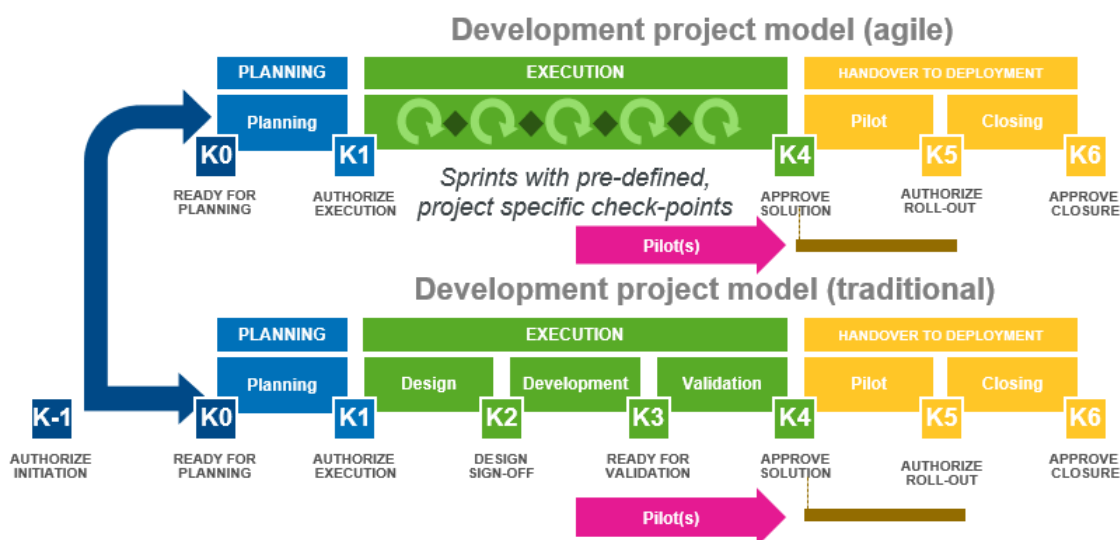


Figure 3. The case company's Project Management model for traditional / agile projects

According to the case company's head of IT PMO, no specific agile frameworks are dictated or proposed to be used in an agile project. The selected approach to agile project management is depending on the project and experience of the respective project manager. If the project manager has no extensive experience in specific agile frameworks, then guidance from the IT PMO is provided. Whether agile project management training is provided depends on a project to project basis. There are no formal trainings as such provided by the case company's IT PMO. If a projects budget allows for training possibilities and there is a need for training and money is invested, then trainings can be held, and there are cases where this was done through the contracting of external agile project management trainers.

Furthermore, having asked the head of IT PMO if any agile tools are necessitated to be used or if any tools are provided for the agile projects, no official tools from the case

company are available for agile project management, for instance for backlog management, Kanban board software etc. Although, some agile project management tools such as Targetprocess or Jira are mentioned to the project managers and suggested to be used for agile projects.

3.3 Current adoption of agile frameworks in projects

The approach to finding out the current state of agile adoption in the different agile development projects was done through interviewing key persons in charge of the respective projects, who in most cases was the project manager. The process began by selecting 10 to 20 different agile IT development projects. The project data was obtained from the case company's Project Portfolio Management tool (PPM tool).

The basis for the selection as described earlier was agile IT development projects from different business areas and teams and agile projects at different project stages which are identified as the K-gates. The proposed selection of projects was then presented to the head of IT PMO, who in this case is also the supervisor of this thesis. The selected projects were then approved to be included in the scope of this thesis's study. The final number of projects was 16. Table 2 below shows the selected projects for the current state analysis stage. The information has been partially anonymized for reasons of non-disclosure agreements.

Table 2. List of projects selected for the Current State Analysis

Project Name	Gate	Portfolio	Project Manager
CD	K0	NE	S.D
SDI	K0	SC	J.T
KKC	K1	SV	J.A
TLR development	K1	CC	S.W
SCC	K1	SC	J.H
KCLCPM development	K1	SV	J.T
PM	K1	ITO	O.K

CGCK development	K4	SV	J.H
FSM development	K4	SV	P.S
HR	K5	HR	T.M
SRM development	K5	SV	J.K
CRML development	K5	SV	G.V
SRP	K5	CP	J.H
VBCJ development	K5	SV	T.P
T&O VT development	K5	SC	P.S
ARM	K5	FC	T.C

Having selected the projects for analysis, the project managers managing the respective agile projects were interviewed to understand how the agile way of working was currently being done in the different projects. Once the selection of projects for the CSA was finalized and approval was received, drafting of the interviewing process began. The questions that were asked of the project managers were based on information from the available knowledge & best practices in agile project management as presented in chapter 4.

A considerable amount of thought was given to how to most effectively understand the current way of agile working in the projects. It was decided to ask the project managers questions on which agile frameworks they were employing in managing the agile IT development projects, how knowledgeable they were about other agile frameworks and if they would be interested in further training on agile project management. The questions presented to the project managers are demonstrated below:

- Are you using a specific agile framework / methodology for managing this project, if so, which?
- What lead you to choosing this specific framework / method?
- Are there formally established agile roles in the project? For example, in a scrum managed project, the Scrum Master, the product owner & the team.
- How knowledgeable are you about other agile frameworks? (Scrum, Kanban, lean, XP, etc.)
- How big is the core agile project team?
- If using scrum, typically how long are the sprints?

- If using scrum, are daily scrums held during a sprint?
- How often does the project team gather and reflect on their work? In a Scrum project, are sprint retrospectives held?
- If using an agile-waterfall hybrid approach, which aspects of the project necessitate this?
- Are you using specific agile tools to manage this project? i.e. Kanban board software, etc.
- If there was any training in agile project management provided, would you be interested, and would it be beneficial?

Based on the interviews with the project managers of the agile projects, the selection of projects paints a picture on the current state of agile working in the case company's IT development projects. The sections below further describe the current state of agile project management at the case company in more detail.

3.3.1 Agile frameworks

About 56% of the projects that were selected for the current state analysis were using some established agile framework in managing the agile project. The rest of the projects were mostly only applying the most basic agile principles. All the projects, which were employing an agile framework were using Scrum or a derivative of Scrum, i.e. ScrumBan etc.

The projects which were not employing an established agile framework were working in an iterative and incremental way, such as is essential for a project to be called agile but were not following any of the established or formal principles that come with most of the agile frameworks. When following an agile framework such as Scrum for example, the framework has cohesive guidelines and principles for the project such as about the roles and responsibilities within a project, how tasks and requirements are divided and selected from the backlog, how long the sprints should be held for and how communication within the teams are channeled. When not following any formal guidelines and principles, the projects tackled these points each in their own ways. This is not to say that following established principles that are outlined in an agile framework, for instance the Scrum

framework, is the only way of working in an agile way but they do certainly provide ease and a standardized approach to agile project management.

For the projects following a framework based on Scrum, there were inconsistencies between the projects on how closely the principles of Scrum were followed and adopted into practice. The Scrum principles have outlined established guidelines on how long the sprints should be and what should be done before, during and after these sprints. A sprint should typically be from 1 to 4 weeks long with daily Scrums held every 24 hours during the sprint period. Most of the projects had sprints that fell in line with the principles of Scrum, but some of the projects had sprints, which were much longer than the established principles. As for holding daily Scrums during a sprint, only very few projects held consistent daily Scrums, mostly bi- or triweekly meetings were held.

3.3.2 Agile project team & roles

Project teams following agile principles are usually quite small. The ideal size of a Scrum team is 7 +/- 2 people. Most projects selected for the current state analysis had ideal core project team sizes to allow for smooth agile adoption. Also, for some of the projects, the size / scope of the project and the amount of people working on the project dictated which agile framework or approach was to be selected. The different members of the project were not always in the same location and this multilocation of project members caused some issues for a few projects in adopting the agile principles fully.

Only a small number of projects were employing formal agile roles such as a ScrumMaster, even though over half of the selected projects were based on the Scrum framework. Some of the project managers tried to act as the ScrumMaster but it was more so in an informal, in name only way and not in practice. All the projects had the three distinct agile roles based on Scrum in some way established; the project manager who in some capacity was also the ScrumMaster, the product owner and lastly the Scrum project team.

3.3.3 Agile project management tools

Based on feedback from the interviewed project managers, no specific tools were dictated to be used in employing agile principles for the projects. The usage of tools varied greatly in the different projects, with some project managers using certain tools out of

personal preference or previous experience. For instance, some projects were using Trello as a basis for a Kanban board. As mentioned earlier, the case company's IT PMO mentions tools such as Targetprocess and Jira for agile projects, but no specific tools are required to be used. All IT development projects at the case company, be they traditional "waterfall" managed or agile projects, are required to maintain a record of the project in the case company's Project Portfolio Management tool (PPM tool). The PPM tool, which is based on RemedyForce, provides many different stakeholders at the case company visibility on projects. The PPM tool also provides rudimentary functions on workloads and tasks, progress tracking, time management etc. In some of the projects selected for the current state analysis, the PPM tool was the only tool used.

3.3.4 Agile project management training

Having asked the project managers of the agile projects selected for the current state analysis if they would benefit from additional training in agile project management, most, if not all of them said it would prove beneficial. There was a broad spectrum of knowledge on agile project management between the different project managers, with some of them having up to 10 years of experience with different agile methodologies and others having just started working with agile. The project managers were most knowledgeable about the Scrum framework, with a few of them having Scrum certifications. As said before, according to the case company's IT PMO, individual agile projects can be provided with training if the budget for the project allows for it. Some of the project managers who received agile training for a respective agile project prior to starting it gave feedback that they would have preferred a more practical oriented training than just learning about the theory.

3.3.5 Strengths

The strengths revealed by the current state analysis in the selected agile projects are listed in this section. Over half of the projects which were selected for the current state analysis were using some form of agile framework like Scrum or its derivative and within the projects, the principles and guidelines of the framework were followed to some extent. The roles and responsibilities of a Scrum based project had been established, i.e. the Scrum Master, the Product Owner and the Scrum Team. The project team sizes in most cases were ideal with the projects having tight, collaborative project teams.

Larger projects had employed external consultancy and review of the agile processes within the project and had derived benefits from the analysis. Agile project management training for the project managers and project team members is available, if the budget of the project allows for it. Certain projects were able to seamlessly switch between different agile frameworks through the project life cycle depending on the current requirements and stage of the project. Lastly, most of the project managers had some experience and knowledge about agile project management and its principles and frameworks, with some of them even having a Scrum certification.

3.3.6 Weaknesses & Challenges

The current state analysis revealed several weaknesses and challenges in the selected agile projects, which cause issues in adhering to and fully adopting true agile principles. Firstly, some of the project managers were overallocated to many different projects. Certain project managers were managing up to eight projects at the same time. This causes issues in adopting and fully focusing on agile principles in the respective projects. According to the own words of the project managers, there is simply not enough time to for instance hold daily Scrums during a projects Sprint because of this. Another issue was that some of the requirements in some projects had too large scopes to allow for efficiently adopting agile principles. As said before, in some projects the scope was so large that the sprints ended up lasting for up to 12 weeks, way longer than what is recommended in the established agile frameworks.

Also, there is a gap in the theoretical knowledge and practical experience between different project managers about the agile frameworks. Some of the project managers have many years of experience with agile project management and some of them even have Scrum certifications. But on the flip side, some of the project managers would benefit from additional agile project management training. In some cases, trainings that have been held in the past were not always convincing enough for some project managers since they would prefer more practical hands-on training rather than theoretical.

Other issues lay with the project team compositions. Even though most of the projects had ideal team sizes for smooth agile adoption, a few projects had too few members to truly work in an agile way. In certain projects, aside from the project manager, the team only had two developers working on developing the requirements of the project. This

meant that the developers had their own approach to the development and did not truly follow an established agile framework. In addition, in some project teams, even though the team sizes were ideal, the project manager faced challenges in convincing the team members to follow a certain approach to the agile way of working. In some cases, for any number of reasons, the original project manager who started with the project was replaced by another project manager. This causes some issues with visibility of how things were done before. There were cases where the project manager came on board the project while it was still running and could not do much to change the agile approach since they did not want to upset the established way of working.

There were also cases where the development of requirements within the project was handled through the contracting of external vendors. This caused some issues for the project manager with the full visibility of the project. In these cases, having asked the project manager about the agile aspects of the project, they were unsure of the agile methods being employed in the project due to the external vendors handling the development. Even though the project has been classified as an agile project, much of the project management work is in these cases following a more traditional waterfall model. Furthermore, in some cases, even though most of the development was done in-house, the multilocation of project team members was causing challenges. This meant that the project team members were physically located in different locales than the project manager. This caused challenges in fully adopting agile frameworks like Scrum, since the project team in projects adopting Scrum principles should be very tight, collaborative, co-located and efficient. In these cases, the project manager struggled in keeping for instance daily Scrums during a Sprint.

Lastly, there were some issues stemming from the limited use of agile tools within the projects. As the case company's IT PMO does not dictate any tools other than the PPM tool to be used, this has limited the potential that could be further achieved with proper usage of agile tools. Each project manager uses their own experience and preference in selecting which tools to employ in their agile project management. A standardized approach with a tool for backlog management, team communication, workflow management, Kanban boards, etc. could provide opportunities for better agile adoption. Table 3 summarizes the strengths, weaknesses & challenges identified in the 16 agile IT development projects selected for the current state analysis.

Table 3. Summary of Strengths / Weaknesses identified in the CSA

Strengths	<ul style="list-style-type: none"> • Project team sizes were in most cases ideal, consisting of 5-9 individuals • The individuals working on the projects have some level of knowledge & experience about agile principles and methodology. Some of the Project Managers had Scrum certification • Over half of the projects selected for the current state analysis were using - to some extent an established agile framework, in this case Scrum or its derivative • Agile training is available if the budget of the project allows for it
Weaknesses & Challenges	<ul style="list-style-type: none"> • Not enough time to employ all agile principles due to time constraints & overallocation • Few projects had too large sprints, up to 12 weeks • Few projects had too small teams • Few projects had issues of multilocation of team members • In some cases, the project manager did not have full visibility of development methods employed by external vendor • The changing of project managers during a project caused challenges in implementing agile principles • The use of agile tools was limited in some cases

The proposal in section 5 is built around these identified weaknesses & challenges together with the findings from available knowledge and best practices in agile project management described next in section 4.

4 Available Knowledge and Best Practices on Agile Project Management

This chapter presents the available knowledge and the industry best practices in agile project management. The knowledge presented in this chapter is used to address the weaknesses and challenges that the case company is currently facing (section 3.3.6) and to build the proposal (section 5).

4.1 Agile

Agile in its traditional understanding, is an incremental and iterative approach to software development. It has traditionally been associated with software development as that is where the methodology was first constructed. In the sphere of Agile Software Development, an iteration usually refers to a development cycle. The defining literature on agile is the *Manifesto for Agile Software Development*, which was published in 2001 by seventeen software developers. The manifesto constitutes of a set of principles advocated by the seventeen software developers, based on their best practices and experiences in software development. The principles that the software developers advocated for software development, such as collaboration between business and development teams, strong emphasis on communication, incremental delivery of working software parts and flexibility to respond to changing requirements, are what became known as agile today. (Misra, 2012)

At its core, the main reason why there was a need to develop the agile methodology was because the traditional approach to software development was not suitable for the development of unpredictable and non-repeatable processes. It is common in development to frequently receive change requests from the customer. The customer requirements rarely stay fixed over the length of the development cycle or a project. The focus in agile methodologies is more on people than processes and the involvement of the customer is greater, which allows for an iterative approach where changes can be made to requirements. In other words, agile methodologies allow for the dynamic adjustment to changing requirements. (Hoda et al 2008)

After its inception, agile has made its way to numerous other fields and practices and has evolved therein. Based on *the 12th Annual State of Agile Report* by CollabNet VersionOne, a software development organization focusing on agile, the adoption of agile methodologies in 2017 by industry is illustrated in figure 4 below.

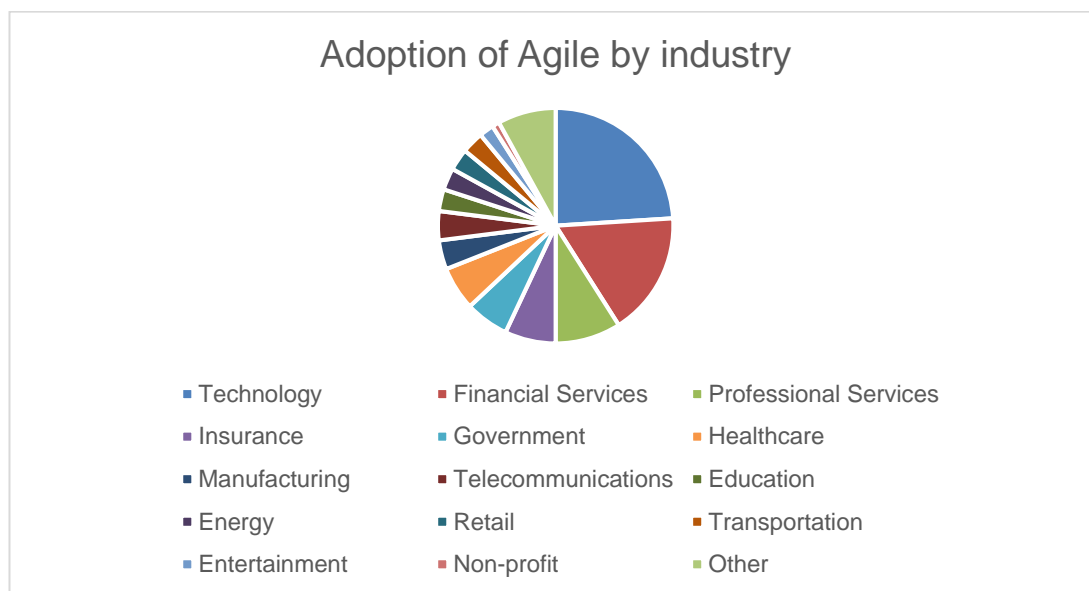


Figure 4. Adoption of Agile methodology by industry in 2017 (State of Agile, CollabNet VersionOne)

The organization does yearly global surveys where they aim to research the state of agile in different organizations. As seen in figure 4 and based on the report, the fields of technology, financial services and professional services make up half of all industries currently adopting some form of agile methodologies. The report also mentions among other topics, the top reasons organizations are adopting agile, with the five main reasons being; accelerating software delivery, enhancing the ability to manage changing priorities, increasing productivity, improving business & IT alignment and enhancing software quality. (CollabNet 2017)

4.2 Project Management

Project management can be defined as the application of skills, tools, knowledge and techniques on a project, which has a set of unique activities and a defined scope and

resources, to achieve a predefined goal, i.e. the objective of the project. Project management specifically puts an emphasis on the management of the following ten topics; integration, scope, time, cost, quality, procurement, human resources, communications, risk management and lastly stakeholder management. (Project Management Institute)

The PMBOK (A Guide to the Project Management Body of Knowledge) specifies the common phases of a project as; initiating, planning, executing, monitoring & controlling and lastly closing. In a traditional waterfall approach to project management, these phases coincide with the life cycle of a project. First all the requirements of a project are defined and signed off by project stakeholders in the initiation phase. Next the implementation of the project is designed in the planning phase. After the planning the designed implementation is built, tested, integrated and finally set up for approval by the customer. Although the PMBOK simply specifies the common phases of a project, and while it may seem like a sequential process, it does not provide any specific framework. (Dolan 2007)

Regardless of which project management framework is followed, be it agile or traditional, they follow the core components of project management which consist of;

- Defining the necessity of the project
- Specifying project requirements, the deliverables and their quality
- Estimating project resources and timeframes
- Preparing a business case, securing stakeholder agreement and funding
- Developing a management plan
- Leading the project delivery team
- Monitoring progress
- Managing budget, communication, risks and changes in the project
- Provider management
- Closing the project

Through these core components and the principles of project management, it can be scaled to vastly different projects with varying degrees of complexity and significance. (Association for Project Management)

4.3 Agile Project Management

The agile way of working and its principles have been adopted into numerous fields and practices since its inception in IT software development and has seen a steady increase in bigger organizations. Agile project management or APM is defined by many of the same definitions as its software development counterpart, namely it is an approach to managing projects incrementally and in iterations throughout the life cycle of the project. Agile Project Management traces its origins to ideas from a paper in the January 1986 issues of *Harvard Business Review* by Professors Hirotaka Takeuchi and Ikujiro Nonaka. The same paper was later used to provide ideas for the formulation of Scrum, an agile framework. The main goal of project management is to successfully manage a project to reach an expected outcome while staying within a specific budget and timeframe. In agile project management the requirements of the project are delivered in parts, all the while being flexible and responding to change. Agile project management at its core, is based on the four values and twelve principles found in the *Manifesto for Agile Software Development*. (Cervone 2011)

The four values are as follows:

Individuals and interactions over processes and tools

Working software over comprehensive documentation

Customer collaboration over contract negotiation

Responding to change over following a plan

The twelve principles are as follows:

Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.

Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.

Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.

Business people and developers must work together daily throughout the project.

Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.

The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.

Working software is the primary measure of progress.

Agile processes promote sustainable development. The sponsors, developers and users should be able to maintain a constant pace indefinitely.

Continuous attention to technical excellence and good design enhances agility.

Simplicity—the art of maximizing the amount of work not being done—is essential.

The best architectures, requirements and designs emerge from self-organizing teams.

At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

Agile project management takes these values and principles and slightly modifies them to fit the project management environment. Emphasis is put on two main concepts; minimizing risk by focusing on short iterations and communicating directly with partners. These two concepts aid the project team in quickly responding and adapting to the changing requirements that are a part of an agile project. The main differences between an agile and more traditional waterfall approach to project management is the emphasis on prototyping, collaboration, interaction between individuals and responding to change instead of following a rigidly structured plan. (Cervone 2011)

In the traditional waterfall approach to project management, the scope is well-defined and acts as a driver for calculating the time and cost of a project. For an agile approach to project management, there is a set of resources that is used in cycles. Not all projects are suitable to be managed in an agile way. However, there are often cases where an agile-waterfall hybrid method could be very suitable. Both traditional and agile approaches have their strengths and weaknesses and as such, choosing an approach to managing a project is heavily dependent on the goals of the project as well as the organizational culture. The pros of traditional waterfall project management are; its suitability for a stable environment where there are clearly defined requirements, the project and the people working on it can be controlled by set defined deliverables, milestones and KPI's, and lastly, many of the assets of previous projects can be re-used in similar projects. The cons of a waterfall managed project are; the project requires heavy investment to clearly define the scope, changes to the scope are slow, risky and can negatively impact the entirety of the project and lastly, the results of the project are usually only evident at the end of the project life cycle. For an agile approach to project management the pros are many. For instance, it is suitable for an environment where the requirements are subject to change and the customer and key stakeholders are heavily integrated in the entire project life cycle. In addition, there is collaborative work between the people involved, there is flexibility in making changes to requirements and the scope and lastly, there is an early return on investment because of the regular delivery of requirements. The cons of an agile approach to project management include possibility and risk of negative impacts to schedule and budget due to uncertainties, which can also make stakeholders nervous. Moreover, there is no tangible benefit or advantage for projects where the scope and requirements are clear and well understood. (Association for Project Management)

As an agile way of working is based on working in iterations and cycles, this can provide in the right environment tangible benefits. The nature of agile working can allow testing of diverse ideas as they can be tested early in the development cycle and can be either completely rejected or improved upon if necessary. In other words, agile can allow for the rapid identification and adjustment of issues early in the project's different phases. This engages the people working in the project and builds accountability and empowerment. Agile also puts great emphasis on extensive communication to allow for more effective organization of teams, which in turn can improve productivity. Additionally, agile can help promote continuous improvement. (Association for Project Management)

The negatives of using an agile approach is that the big picture of a project can become unclear. This can be a point of concern for the project stakeholders. This can be alleviated by building trust and accountability and by regularly holding steerings to manage the project. As the decision to choose either a traditional or agile approach to managing a project is critical, it must be made sure that the approach fits the project strategy. The agile principles focus on the interaction between empowered people and the constant delivery of value. In an agile project, requirements are prioritized and separated into smaller pieces, which are then collaboratively worked on. The project team then holds regular meetings where it learns and adjusts the deliverables. In agile project management, the project planning and execution stages are integrated to allow quick responding to changes. (Association for Project Management)

4.4 Agile frameworks

There exist several different agile frameworks or methods that have been developed since the inception of the agile methodology. In recent years, most of the research of academics on agile frameworks has been focused on two specific agile frameworks; Scrum and XP. Many of the agile frameworks in use today are maintained by professional societies, agile consultants, agile tool vendors and market researchers. The differences between the agile frameworks lay in how the agile principles are incorporated. Many of the frameworks have similar features, with some of them even incorporating and taking on features of each other and becoming new frameworks altogether, but they each have their own distinct unique principles and processes.

The most common agile frameworks in use today include:

- Scrum
- Kanban
- ScrumBan
- Lean
- Extreme Programming (XP)
- Scrum/XP
- Adaptive Software Development (ASD)

- Dynamic System Development Model (DSDM)
- Agile Unified Process (AUP)

Out of these numerous methods, Scrum and the various hybrid forms based on Scrum, namely ScrumBan and Scrum/XP, are the most used agile methods followed by Kanban and Lean. (Litchmore 2016)

4.4.1 Scrum

Scrum is an agile methodology where the focus is on regular team meetings and iterative and incremental delivery and development of a product or service. Scrum essentially works as a process that makes it easier to manage and control product development in a rapidly changing environment. The methodology of Scrum is based on a paper from 1986 by Hirotaka Takeuchi and Ikujiro Nonaka titled “The New Product Development Game” published in Harvard Business Review. Takeuchi’s and Nonaka’s ideas were first applied by Mike Beedle, Ken Schwaber and Jeff Sutherland in 1993 at Easel Corporation. They coined the method Scrum after a rugby term. These individuals went on to write about their experiences in books Agile Software Development with Scrum (2002) and Agile Project Management with Scrum (2004). (Sliger 2011)

Scrum is often referred to as a framework instead of a methodology, due to specific connotations with the word methodology. There are five major activities in the Scrum process; the kickoff, the Sprint Planning Meeting, the Sprint, the daily Scrum during a Sprint and the Sprint Review Meeting. A project following the Scrum framework begins with the kickoff where the vision and a high-level list of prioritized features of a product or service are created. The prioritized feature set or list of project requirements is referred to as the product backlog. After the kickoff the Sprint Planning Meeting is held where the product backlog and the sprint backlog are created. During the Sprint Planning Meeting goals are set for the sprint and the sprint is committed to. After the Sprint Planning Meeting the Sprint can be started. The project team must complete the development of selected features in a set amount of time according to goals, which are established prior to beginning the development. Features to be completed are selected from the product backlog and assigned to the sprint backlog. A sprint is typically between 1 to 4 weeks. During a sprint, the team is solely focused on the tasks in the current sprint and aims to meet the set goals. At this stage no changes can be made to the sprint backlog but

changes to the product backlog can be made in preparation for the next sprint. (Cervone 2011)

A daily Scrum is held during the sprint where team members meet daily in a usually 15-minute session and discuss three key questions; what they have done since the last Scrum, what they are planning on doing until the next Scrum and if there are any obstacles that could potentially hinder their work. The main purpose of the daily Scrum is to track the progress of the team and to remove anything that could pose a threat to the smooth proceeding of work. After each sprint, the Sprint Review Meeting is held, which consists typically of a Sprint Review and Sprint Retrospective. During a Sprint Review Meeting the team presents their completed features to stakeholders and gathers valuable input and feedback. This feedback will then be used for the next sprint and to improve their work. The Scrum framework as presented above is summarized in figure 5 below and constitutes one increment of the product. (Cervone 2011)

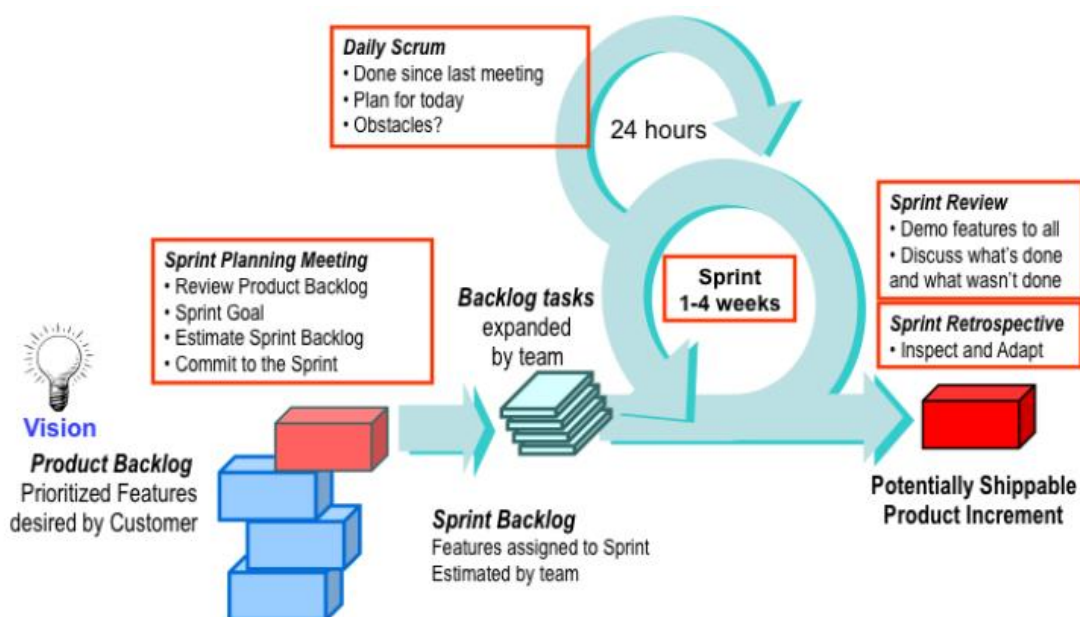


Figure 5. The Scrum Framework (Sliger 2011)

In the framework presented above, there are three different roles; the Scrum Master, the Scrum Team and the Scrum Product Owner. The Product Owner owns the product backlog and is responsible for representing the customer and their needs. The Product Owner communicates the vision to the Team and is engaged with them daily. Authority to make decisions regarding the product and its backlog belongs to the Product Owner. The

Scrum Master is the maintainer of the scrum process. In a project, the Scrum Master can be seen as serving the role that is traditionally assumed by the project manager. The Scrum Master works together with the Scrum Team and the Product Owner and manages communication between them, sets up negotiations and serves the team. The scrum team consists of 5-9 individuals who work together and share responsibility to deliver the product increment and it is the team that performs the work within the sprint. The Scrum Team is self-organizing, which means the leadership is not fixed. The Team itself chooses how it is going to best accomplish their goals. This is so that synergy is born between the team members, which improves efficiency and effectiveness. (Sliger 2011)

4.4.2 Kanban

Kanban is an agile methodology and it translates to “billboard” or “visual card”. Its origins are from engineer Taiichi Ohno in the Toyota corporation in 1953 where it was used to improve efficiency in manufacturing. Kanban provides a method for prioritizing and managing tasks within a project. The focus of Kanban is visualizing the workflow. This is done by separating project tasks into smaller items, which are written on cards and stuck to a board which is called the Kanban board. The cards are moved on the Kanban board according to the progress of the work. In its most simple form, a Kanban board can be divided into three sections, which the cards fall under; work to be done, work in progress and completed work. The project team tailors the Kanban board to suit the scope of their project. (Stoica et al 2016)

The main principles of Kanban are; visualization of the workflow, limiting how many tasks are in progress at a given timeframe, continuous and organic flow of work, and Kaizen, i.e. continuous improvement. Kanban can be used in project management, inter alia, for resource allocation, workflow management and improving efficiency and reducing waste. Kanban is more flexible than Scrum since there are no sprints or assigned roles. As said, Kanban mainly focuses on visualizing the agile workflow and as such, is often used in combination with Scrum or Lean where it can be used as a sort of auxiliary tool. Figure 6 below presents a basic Kanban Board. (Stoica et al 2016)

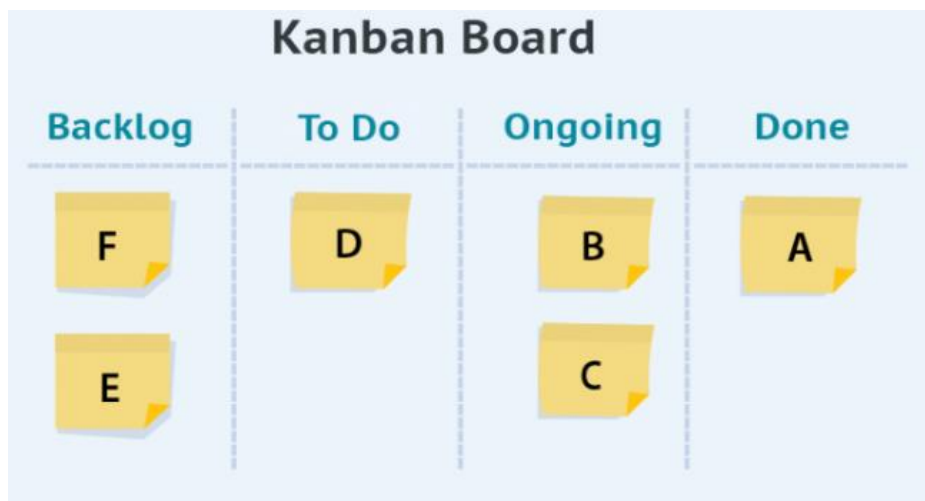


Figure 6. A basic Kanban Board (Digite.com)

Figure 6 above shows a basic Kanban board with four separate columns which contain Kanban cards. The Kanban cards could be used as separate project tasks, which are then moved around the board depending on the status of the task.

4.4.3 Lean Project Management

Lean Project management builds upon agile principles by adding workflow processes. Unlike Scrum, Lean does not dictate any sprints or deadlines. Lean has its origins as Lean Manufacturing at Toyota in 1973. There was a need to work more efficiently while reducing the amount of waste being generated. Through the reduction of waste, costs, production time and quality should be improved. As such, lean can be thought of as a management philosophy. This philosophy, also called Lean thinking, is what can be applied to other areas and fields such as project management. From the project management perspective, a project could have many potential aspects where waste is present. Most wastes in project management are generated from excesses and unproductivity, such as unproductive meetings, rework, excessive planning and documentation. Lean project management aims to eliminate these types of wastes. (Moujib 2007)

Lean thinking has 5 core principles as identified in the Lean thinking book. The 5 principles are; specifying value in the eyes of the customer, identifying the value stream and

eliminating waste, making value flow at the pull of the customer, involving and empowering employees and lastly Kaizen, i.e. continuously improving in the pursuit of perfection. (Pitagorsky 2006)

4.4.4 Agile-waterfall hybrid approach

Instead of using a fully traditional waterfall approach or a fully agile approach to project management, there is often a need and opportunity to utilize a hybrid approach by combining aspects of both traditional and agile project management. The feasibility of different approaches to project management are heavily dependent on the organizational structure and culture and whether there is a possibility of coexistence and fitting in with the organizations current project management models. Especially in more large, complex organizations with large scale projects, there are not always ideal grounds for adopting a fixed approach to managing projects. In such cases, a more traditional waterfall approach could be used for the beginning stages of a project, namely the planning phase. The planning phase of a project usually requires a careful and methodical approach in which case a waterfall approach is more suitable. Then, when the project reaches the development stage, aspects of agile can be used to develop the solution, such as developing a set of prioritized requirements in sprints. (Association for Project Management)

4.5 Roles in Agile Projects

There are several different but all valid opinions about the role of a project manager in an agile project. There is a view where the project manager in an agile project has many of the same responsibilities as in a traditional waterfall managed project. According to that view, the project manager is responsible for managing the scope, costs, risks, communication, quality, resources and project plans in the project. Although in recent years especially in organizations where agile is becoming increasingly more adopted, there has been a shift to a more team-focused road where the project manager aims to empower the skilled professionals that are part of the project team. Even the quintessential material on project management; PMBOK Guide (A Guide to the Project Management Body of Knowledge) - Fifth Edition acknowledges this shift and states that “*The role of*

the project manager is to lead the team that is responsible for achieving the project objectives". This shift challenges the traditional understanding of the role of a project manager, even more so in an agile project. As such, most of the established agile frameworks do not have defined roles for the project manager as the traditional role of the project manager is heavily tied to the waterfall approach. In most cases where the project is managed using an agile approach, the role of the project manager shifts to a focus where the project manager serves the project team and aims to remove any impediments that the team might face. (Cornelius 2014)

In another accepted view, the project manager in an agile project works as the Scrum Master. Since Scrum is the most widely used agile framework, there is a precedent for this view. The responsibilities of a traditional project manager and a Scrum Master are quite different. One key differentiation between their responsibilities is that the Scrum Master is not the sole person to be credited or blamed for either the success or failure of the project. In an agile project following Scrum, the roles and responsibilities that are conventionally attributed to the project manager are distributed between all the project team members, i.e. the Scrum Product Owner, the Scrum Team and the Scrum Master. The authority of the Scrum Master extends only to the Scrum process. While the traditional project manager might be in a situation where they are managing multiple projects at the same time, the tight and collaborative nature of a Scrum Project necessitates that the Scrum Master is usually focused on a specific project and its team. In a project where the project manager assumes the role of the Scrum Master, they are responsible for assisting and motivating the Scrum Team by allowing the team to self-organize, facilitating communication between the different bodies within the project and planning and facilitating the sprints and Scrum meetings. (Banerjee 2016)

4.6 Conceptual Framework

Table 4 below is the conceptual framework, which connects the relevant knowledge and best practices with the aim of this thesis study. The available knowledge and best practices on agile project management as shown in section 4 are used to build the proposal of this thesis study by also addressing the key findings of the Current State Analysis stage (section 3.3-3.3.6).

Table 4. The Conceptual Framework of the study

Study Goals	Reference in section 4
Describing current state of agile adoption in agile IT development projects at the case company (identifying current strengths and weaknesses)	4.1 Agile 4.2 Project Management 4.3 Agile Project Management
Using available knowledge and best practices to explore how to improve current state (how theory could be used to improve identified weaknesses & challenges)	4.4 (4.4.1-4.4.4) 4.5 Roles in Agile Projects

As described in the table for the conceptual framework, the two key goals of this study (i.e. identifying current strengths and weaknesses and exploring how the available knowledge and best practices in agile project management could be used to address the weaknesses and challenges the case company is currently facing), are shown with reference to relevant sections in chapter 4.

First, the concept of agile in its traditional sphere of software development, where it is an iterative and incremental approach to developing software is described. Second, general project management; what its goals are, how it is defined and what components it consists of is described. After which agile project management is delved deep into; what it is, where it can be used and how, what are the pros and cons to it and what its numerous frameworks are, with a deeper exploration into Scrum, Kanban and Lean. Lastly, the roles in an agile project are explored. The next chapter describes the building of the proposal based on the current state analysis and available knowledge & best practices.

5 Building the Proposal

This chapter introduces the approach to building the initial proposal, which is built upon key findings from the Current State Analysis and the conceptual framework from the literature review. Figure 7 presented below shows the approach that was used for the building of the initial proposal.



Figure 7. Proposal building approach

The four steps seen above show how the initial proposal was built, starting with the key findings of the Current State Analysis, which are the identified weaknesses and challenges that the agile IT development projects are facing at the case company. After the Current State Analysis, relevant literature and theory was used to find available knowledge and best practices to tackle the issues identified in the CSA stage. Lastly, joint proposal building sessions with representatives of the case company were held to arrive at the initial proposal.

5.1 Key Findings for Proposal

The key findings relevant for the building of the proposal are presented in this chapter, starting with the key findings from the Current State Analysis stage, whereafter the key

findings and best practices from the Literature review and proposal building sessions are presented.

The examination of strengths and weaknesses as identified in the Current State Analysis in chapter 3 was conducted by interviewing project managers in charge of agile IT development projects, discussing with the head of IT PMO and by examining the case company's internal project management documentation. The key findings of the Current State Analysis are presented in table 5 below and in more detail in sections 3.3.5 and 3.3.6 of the study.

Table 5. Identified strengths and weaknesses & challenges from the CSA

Strengths
Project team sizes are ideal
The project managers have some knowledge and experience about agile project management and its principles & frameworks
Some project managers have a Scrum certification
External consultancy and training in agile are available to some extent
Weaknesses & Challenges
Project Managers and project team members overallocation (Up to 8 simultaneous projects)
Too few project team members in some projects (1-2 developers)
Change of Project Manager while the project is still on-going
Scope of some project development requirements too large (Sprints up to 12 weeks)
Multilocation of project team members
Project Manager does not have full visibility on the development team in some cases
The use of agile tools is limited

The literature review was used to find solutions to the challenges and weaknesses the case company's agile IT development projects are currently facing. The literature on agile project management as presented in chapter 3 provides the foundation to build the initial proposal. In addition, the key findings from the current state analysis were presented to representatives of the case company and their input was gathered to arrive at the initial proposal.

5.2 Theory vs. Current State

In this section relevant theory and best practices in agile project management is described in relation to the challenges and weaknesses that the case company is currently facing. For each identified challenge and weakness, the best practices in agile project management are presented with the expected benefit that is derived from following the established best practice. At the case company, the most widely used agile framework in agile IT development projects was Scrum or one of its derivatives. As such, many of the points used in building the proposal are based on available knowledge and best practices in Scrum. Next, the identified challenges and weaknesses are examined in relation to the established theory and practices of Scrum.

As described in section 4.5, the project manager in an agile project following Scrum can act either in a traditional project manager role or as a Scrum Master. If the project aims to follow the established principles of Scrum as closely as possible and in the case the project manager is acting as a Scrum Master, the project manager should preferably not be allocated to more than one Scrum project. This is to allow the Scrum Master to fulfill their role and responsibilities towards the project. In the case that the project manager does not act as the Scrum Master, such as there being a separate Scrum Master or the absence of one altogether, the project manager usually takes a coordinator role within the project. As identified in the current state analysis, some of project managers were overallocated, i.e. they were managing multiple projects, both agile and traditional, at the same time. This led to the project managers simply not having enough time to follow all the agile principles, such as having daily Scrums during a Sprint. Also, as described further in section 4.5, the project manager or Scrum Master should usually only be focused on very few Scrum projects and teams due to the collaborative nature of a project managed through Scrum. The project manager or Scrum Master should have enough

time to ensure the project team has daily Scrums during a Sprint, to aid them by facilitating communication, removing any impediments, etc. as described in sections 4.4.1 and 4.5.

The ideal team size of the core development team in a Scrum managed project is 7 +/- 2 people as described in section 4.4.1. The team consists of skilled individuals each with their own different set of skills, including technical experts, domain experts and testers. The purpose of the ideal team size consisting of 5-9 individuals is to allow for the team to remain nimble and efficient. The downsides to having a too small team with fewer than the recommended number of individuals causes issues such as decreased interaction between individuals, smaller productivity gains and most adversely, causes skill constraints. The team should effectively collaborate and review the work of each other, which is challenging in a team that is too small. On the other hand, having a team that is too large makes it harder to coordinate and causes complexity. In most cases this team is co-located due to the tight nature of the Scrum team. The challenge of multilocation of individuals that some of the projects at the case company are facing, could, to some extent, be alleviated through the efficient use of tools such as communication tools.

The efficient use of tools is an essential part of any project, be it traditional or agile, as the purpose of the tool is to directly support the managing of the project. The types of tools that are typical for agile methodology are numerous and typically include; backlogs for prioritizing requirements and user-stories, Kanban boards for visualizing previous, currently ongoing and approaching tasks and statuses of the project, task swim lanes, workflows, Sprints, Daily Scrums, burndown charts or velocity tracks. Effective agile tools aim to address the most crucial agile principles and often include solutions for; task management, i.e. Kanban boards, swim lanes, etc., team collaboration, i.e. tools to allow for seamless communication between all stakeholders of a project, and includes functions for metrics, reporting, analytics and integration with other tools. There exists on the market many tool packages with solutions to the aforementioned points. Currently at the case company, based on the findings of the current state analysis, some of the project teams were using some tools such as Trello, Jira or Targetprocess. To improve and increase the healthy use of tools in agile IT development projects at the case company, perhaps a standardized approach regarding tools should be implemented. A list of tools, which meet the case company's standards could be compiled and used as a list to be presented to the project managers of IT development projects. Having an approved list

of tools would simplify the process of selecting tools for the project manager and would likely increase their adoption rate and lead to better following agile principles.

The changing of project managers during the project caused challenges in adopting agile principles. Each project manager has their own experience and skills in agile project management and the change of project managers while the project is on-going disrupts the already established agile way of working. The new project manager might face challenges in convincing the project team members to take on a different agile approach, even though it might be objectively superior to what was used before. Introducing concepts such as Scrum roles or Kanban boards to projects midway while they were previously not using such concepts is without a doubt quite challenging. This highlights the importance of establishing the agile approach to the project early in the project life cycle. Although the focus in agile project management is less on documentation, from the project management perspective certain documentation is still crucial. Establishing a project plan and approach to the agile methodology for a project would alleviate challenges that the changing of a project manager causes in a project. Having such documentation would allow for the new project manager to easily identify how the project was previously managed from an agile perspective, i.e. which framework has been used, what are the established roles in the project, etc.

In a project using Scrum principles, the recommended duration for a Sprint is one to four weeks, as described in section 4.4.1. The reasoning and logic for keeping the sprints no longer than four weeks is to allow for the rapid testing and deployment of the developed solution. This enables the project team to prototype, gather feedback and make any necessary changes to the development of requirements. As the main benefit of agile project management is the benefit that it introduces in allowing for the responding to changing requirements and any issues that arise during the project life cycle, it is crucial to plan and align Sprints to this idea. As the requirements of the project are being rapidly and continuously deployed in short Sprints, this reduces the risks of any grand setbacks or failures. This means that for the cases where some of the projects had sprints up to 12 weeks, the requirements should be broken down into smaller pieces and it should be ensured that the sprints don't exceed four weeks.

5.3 Agile approach deliverable

Many of the challenges that the case company is facing regarding the adoption of agile methodology in their IT development projects can be alleviated through managerial or steering means. As such, the proposal for the case company is to arrange “agile approach” -steering meeting(s) or a deliverable at the very beginning of an agile project at K0 or K1 according to the case company’s project management model. The purpose of which is to establish early in the project crucial matters relating to the agile management of the project, including topics such as;

- Which Agile frameworks / principles are going to be used in this project?
- Do we have an ideal core development team size of 5-9 individuals?
- What are the roles to be established for this project? (To have a Scrum Master or not etc.)
- Ensuring key people in the project are not overallocated
- Do we have the proper agile tools to aid us?
- Is further training on agile methodologies required?

To make matters easier for the individuals in the agile projects, these points can be made into a template that is to be used for the “agile approach” steering meeting / deliverable. As the case company is already using a deliverables-system where at certain points during the project at K-gate phases, certain deliverables must be produced and presented to project stakeholders before approval is granted to continue with the project, introducing such a deliverable should be straightforward. The case company has a list that describes which deliverables are to be produced for which types of projects, i.e. development / deployment projects and when the deliverables are to be produced, i.e. while seeking approval for which K-gate. This proposed deliverable of “Agile approach” could be produced early in the agile project at gate K0 or K1 following the case company’s project management model.

5.4 Implementation and Benefits

The objective of this thesis study was to research current adoption of agile methodologies in the case company's project management, to identify current strengths and weaknesses and to examine if available knowledge and best practices in agile project management provide solutions to the identified weaknesses and challenges. Table 6 below summarizes the identified weaknesses & challenges, what the available knowledge and best practices have to say about the respective points and what the next steps to implement the improvement suggestions are.

Table 6. Summarized view of identified weaknesses & challenges, how available knowledge and best practices address the issue and what is required for implementation

Identified Weaknesses & Challenges	What does theory say?	Implementation
Overallocation of Project Manager	In Scrum managed project, Scrum Master focuses on very few projects at once	Organizational changes
Too few team members	Ideal team size is 5-9 people to allow for close collaboration	Organizational changes
Change of Project Manager during project	No direct principles	Increase early agile project documentation
Scope of requirements too large	Sprints should be 1-4 weeks	Breaking down requirements into smaller pieces
Multilocation of project team members	Due to tight, collaborative nature of agile projects, it is recommended for project team members to be co-located.	Organizational changes, effective use of communication tools
Limited visibility of external teams within project	No direct principles	Organizational changes, effective use of tools
Limited use of tools	Tools can be powerful asset for task management, team collaboration and reporting & analytics	Standardize tools, compile list of approved tools

As described above, some of the next steps are straightforward to implement, while others require organizational changes. The suggestion for the creation of a template to establish the agile approach to a project early in the project stages would already address a few of the challenges currently faced by the case company. The challenges of overallocation of the project manager, too few core development team members in some projects, the multilocation of project team members and in some cases the limited visibility of external teams in the project, require higher level organizational changes, with the focus mainly on resource management.

The expected benefits that would be derived by;

- Reducing the overallocation of the project manager and allowing them to fully focus on few agile projects at a time
- Refining the core project teams to consist of 5-9 skilled individuals that work in close collaboration
- Increasing early agile project documentation, using an agile approach template to establish the agile approach to the project
- Ensuring scope of requirements to be developed is not too large (sprints max. 4 weeks)
- Standardizing tools to improve adoption of agile project management tools
- Providing agile project management training when necessary

would allow for more closely following the established agile principles. The expected benefits of applying the suggested implementation steps are expected to ultimately ensure the closer adoption of established agile methodologies in agile IT development projects at the case company. Next, section 6 presents the validation of the initial proposal through feedback from the case company's representatives.

6 Validation of Proposal

This section describes the validation of the initial proposal built in section 5 previously. First, the overview of the validation stage is presented, whereafter the key findings of the validation are described.

6.1 Overview of Validation Stage

The initial proposal as described in section 5 was built based on the key findings of the Current State Analysis as well as on the available knowledge and best practices in agile project management as described in section 4. The purpose of the validation stage is to ensure that the built proposal is in line with the expectations from the case company. In the validation stage, the initial proposal was presented to the representatives of the case company and feedback was gathered.

6.2 Key Findings of Validation

Based on validation sessions with representatives of the case company, the initial proposal addresses the key problem statement about the projects at the case company that are classified as agile but not fully following the agile principles and frameworks. The initial proposal addresses the identified weaknesses & challenges that are hindering proper agile adoption in IT development projects by using available knowledge and best practices and provides insights into implementing measures to improve the current state. The case company found the identified strengths, weaknesses & challenges valid and agrees that, based on the identified weaknesses & challenges, some organizational changes are required, especially in agile resource management, to address the challenges and improve the current state. The suggestion to incorporate an “agile approach” deliverable for agile projects to address the challenges and improve the quality of agile adoption in projects classified as agile was well received. Not only would it address a few of the identified weaknesses & challenges and that way lead to better agile adoption, but it would also be relatively easy to implement. Overall, the case company found the proposal to be valid as it was presented and thus no changes were needed. The following section presents the summary and conclusions for this study.

7 Summary and Conclusion

This section of the study concludes the thesis by providing the executive summary, the next steps of the proposal, the evaluation of the thesis by focusing on the objective and results and relevancy & reliability of the study and lastly presents some final words.

7.1 Executive Summary

The executive summary aims to give an overview of what was achieved in this thesis study.

- The problem statement of this thesis study was; currently at the case company, projects classified as “agile” are not fully working in an agile way, i.e. there is a lack of properly following and implementing established agile principles and frameworks.
- The objective of this thesis was to identify the current strengths and weaknesses of adopting agile methodology in the case company’s agile IT development projects and to use available knowledge and best practices to address weaknesses and challenges.
- This thesis study has presented a case study of current strengths, weaknesses & challenges based on the current state analysis, which included 16 IT development projects classified as “agile”.
- Available knowledge and best practices in agile project management were used to propose solutions to identified weaknesses & challenges.

7.2 Next Steps of the Proposal

This study identified the key challenges and weaknesses that the case company is currently facing in agile project management in IT development projects. In the proposal,

relevant theory was used to suggest improvements that could be done to rectify the identified challenges and weaknesses. The case company found the proposal to be valid. The next steps regarding the proposal are to;

- expand the scope of this case study to validate if findings can be applied to further projects classified as agile at the case company.
- investigate agile resource management to address identified organizational challenges.
- implement “agile approach” deliverable for IT development projects classified as agile.

The “agile approach” deliverable could be developed and piloted for a handful of projects classified as “agile” at the case company and metrics should be established to follow if agile principles are being adopted better.

7.3 Thesis Evaluation: Objective vs. Results

The objective of this thesis was to analyze the current state of agile project management in the case company and to use relevant theory to propose improvements to the current state. The current state analysis revealed the weaknesses and challenges that the case company is currently facing in their agile project management. The proposal and its validation, as presented in chapters 5 and 6, was built in close collaboration with the case company’s representatives and stakeholders. Through the findings of the current state analysis as well as the building of the proposal and its validation, the objective of the thesis was addressed.

When looking at the results of this thesis in the form of the final proposal, the results of the study are aligned with the expectations. The key question, what are the challenges agile projects are currently facing and how could relevant theory be used to improve the current state, is answered in this study. As for the relevancy and reliability of this study, the solutions to the key question as presented in the final proposal should be found relevant to the case company and it should be possible to derive tangible benefits from

them. In addition, the three distinct collections of data, Data 1-3, come from a variety of different sources ensuring the reliability of this study.

7.4 Final Words

Working on this thesis study has been a grand learning experience for me. It has taught me valuable lessons about agile project management as well as about conducting objective and logical research and analysis. It has given me opportunities to further develop myself and my professional skills. I hope the reader of this thesis can understand the passion and commitment that went into writing it and I hope the reader can reap the benefit of my work. Lastly, I would like to thank the people that helped me along the way and made this endeavor possible.

References

A comparative study of agile methods, people factors, and process factors in relation to project success - Kondo A. H. Litchmore. Capella University – 2016

Agile software development practices: evolution, principles, and criticisms – Subhas Misra et. al, International Journal of Quality & Reliability Management 2012

Agile Project Management – Hoda Rashina et. al, Victoria University of Wellington 2008

The 12th Annual State of Agile Report – CollabNet VersionOne 2017

Understanding agile project management methods using Scrum – H. Frank Cervone OCLC Systems & Services: International digital library perspectives, Vol. 27 Issue: 1, pp.18-22, 2011

Agile project management with Scrum - Michele Sliger, Project Management Institute 2011

APM association for project management – What is agile project management? Available at: <https://www.apm.org.uk/resources/find-a-resource/agile-project-management/> (Accessed 20 Jan. 2019)

PMI Project Management Institute – What is Project Management? Available at: <https://www.pmi.org/about/learn-about-pmi/what-is-project-management> (Accessed 13 Jan. 2019)

Lean project management – Aziz Moujib, Project Management Institute 2007

Agile and lean project management – George Pitagorsky, Project Management Institute 2006

Project management for agile software projects – Stein Dolan, Project Management Institute 2007

The PM role in a lean and agile world – Dave A. Cornelius, Project Management Institute
2014

Analyzing Agile Development -from Waterfall Style to Scrumban – Stoica Marian et. al,
Informatica Economica 2016

Role of a Project Manager in Managing Agile Projects – Soumita Banerjee University of
Bridgeport 2016