CHALMERS
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Agile project health indicators

Project/Project portfolio Health indicators, frameworks and methods in agile projects.

Master of Science in International Project Management

ALEXANDRA ESGUERRA

Department of Architecture and Civil Engineering
Division of Construction Management
CHALMERS UNIVERSITY OF TECHNOLOGY
Master's Thesis ACEX30-19-12
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Department of Architecture and Civil Engineering
Division of Construction Management
Chalmers University of Technology
SE-412 96 Göteborg
Sweden
Telephone: + 46 (0)31-772 1000

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ABSTRACT

Increased amount of complexity in the development of software projects have created the need for new non-traditional methods to run and organize projects. Agile is helping software companies to manage the complexity in their projects and teams to work more effectively towards effective project delivery. However, this methodology also brings uncertainties regarding the ways of working and there is a need for further clarifications and explorations in order to strive towards best practice. Finding accurate ways to ongoing measure the "health" of a project is one central aspect of this. Theory suggests that in order to work agile, one should decrease administrative work in order to help the project have an easy flow. However, the need to still measure end results on projects, is making companies adopt project management methods to work more agile. Having measurements will not only steer the projects towards plan, but it will also help to make more informed predictions of future outcomes. The aim of this master thesis is to suggest what kind of agile Key Performance Indicators are needed in order to measure the health of a project. A total of thirty-four interviews were conducted at different managerial levels in a software company in order to understand their ways of working with project management and agile. Data analysis identified current challenges and expectations for the future. Five different KPI are suggested and those are a combination of agile and non-agile project measurements. In this study, it was found out that the agile adoption in projects and project portfolio is very immature. There are still tension and uncertainties on how to work in agile, certain processes such as the measurements of projects need to be aligned to how agile works and the way it will work in the specific context. Measurements are good to predict the future, however if there is not a commitment from all the levels in the organization, these will not add any value to the projects. Hence commitment, transparency and collaboration among all the levels and in projects is key to have project success.

Key words: Agile, Project KPIs, Portfolio KPIs, agile measurements, project measurements, project management, non-traditional project management.

Contents

Preface

This thesis work has been developed from October 2018 to February 2019 for the Master of Science in International Project Management at the Department of Architecture and Civil Engineering at Chalmers University of Technology. This work is part of an improvement work that is being developed inside a Gothenburg based software company.

I would like to thank my supervisor Martin Löwstedt who helped me and guided me along the process and supported me when things got harder and harder. Thank you so much for your support, guidance and innovative ideas that were really helpful for the development of this thesis. Furthermore, I would like to thank my supervisor at the company Ulf Andersson for his constant feedback, his advice and also for helping me to get in contact with the right people inside the company that helped me collect the right information. I would also like to thank all the people who took the time of their busy schedule to meet with me for interviews as well as informal talk.

Thank you to every person involved in this process in some way or another, for your time, feedback and advice to make this thesis happen. As well as my family that was always there supporting me with their time, their encouragement and believing in me. For you, my little boy, may this be an example that all you have dreamt of can become a reality, you can do all things, and this is for you. The best is yet to come.

Göteborg. February 2019

Alexandra Esguerra

1 Introduction

Fast moving markets and shifting demands are increasing the complexity of operations in many companies. Software companies are facing these challenges as well and they are forced to adopt new ways of working (Bass, 2015). The agile methodology is considered to help companies to better work in complex environments. This particular methodology has been implemented in many different industries but is has mainly been used in software development companies where there is a great need for customer feedback in the development of the end project (Aguanno, 2005). The Gothenburg based software company analyzed works with a variety of complex projects that are helping airline companies "to make the complex more simple" (Jeppesen, 2019). They have been in an undergoing transformation to more agile methodologies in their own ways of working, in order to better support the needs of their customers. This transformation has brought with it many challenges and opportunities. The main goal of this thesis is to explore this transformation. Specifically, there is a need to further develop the ways projects are being measured – that is, the how, why and when should be more explicit.

One of the main methodologies that is currently being used at the company is the Scaled agile Framework (Scaled agile framework , n.d.). This is a methodology that is mostly used in companies with many complex projects unfolding at the same time. According to this methodology there are different levels that covers the whole organizational spectrum. Each level encompasses different roles and practices which, in turn, effects measuring procedures.

This thesis focuses on the team and portfolio level, which covers all the processes and activities needed in order to deliver value within the agile teams (Scaled agile framework , n.d.). For this particular level, there are some metrics that are being studied and suggested. One of the ways of measuring projects is by having defined Key Performance Indicators (KPI), which is helpful to give early signs that something is going wrong or right, it addresses ongoing if something is unfavorable and also assesses actual outcomes. Some methods and theories have been selected in order to give suggestions of the key KPIs that could be used in order to understand and see "the health" (i.e. the performance) of a project and project portfolio in agile. However, this selection was also done with the help of an empirical study, where project managers and managers were selected to provide their feedback and reflections.

Therefore, implementing the right KPIs as well as following key parameters which is the way to measure the scope and the requirements needed in order for those KPI to actually function well inside the company is key to analyse the health of a project. It is also important to know how those parameters are related to agile projects.

The main challenge that managers and project manager alike are experiencing is that there are uncertainties on how projects and project portfolio should be

measured according to agile principles, for instance, there are some KPIs that are already on place but need to be adjusted to an agile way of working. From one side, in agile, there is a good amount of flexibility because you are constantly getting feedback from the customers. You work in loops and not in a linear way. However, on the other side, this could cause misunderstandings because there are timelines, budgets and other managerial requirements that should be followed. Critically comparing agile with more traditional ways of managing projects will be a reoccurring theme throughout this whole thesis. Another topic to be covered on this thesis is uncertainties surrounding the new role of the project manager working in agile ways.

Altogether there is a gap between working in traditional and non-traditional ways. Not many companies have been able to implement agile in their processes in a successful way and the gap of changing from traditional to non-traditional has challenged companies to have a continuous improvement work and start looking for better ways of working.

As of today, there are no consistent way of reporting health on the individual projects at the implementation department at Gothenburg and globally. There are status reported partly inconsistently on individual projects in the portfolio with traditional KPIs like budget, Milestones, Status Color etc. There is a need of quickly evaluate health on single project in an agile environment. There should be some parameters that clarifies how the measurements should be followed.

1.1 Research question

The aim of this thesis is to study the tension from traditional to non-traditional ways of working in software projects and to develop key parameters needed in agile projects in order to measure project health. The specific research question formulated within this overall aim is:

RQ1. What are the key parameters to follow in order to measure the health of project and project portfolio in an agile environment?

The goal with this research question is to develop a method and framework for evaluating and quantifying how an ongoing agile project in the implementation department globally is actually performing. This will be done by defining and suggesting improvements on how to measure and report health on an agile project. Applied within the thesis is also a critical eye on whether agile methods really are so different from more “traditional” methods of managing projects.

2 Theoretical Framework

2.1 The Agile Method

The revolution of agile methods began in the 1990s merging from a collection of different approaches studied in order to reduce complexity in software development projects (Larman, 2003). The concept of Agile product development emerged for the first time among some Japanese automobile manufacturers in the 1980s, later on the concept spread to some of the North American car manufactures and it started to be implemented in the IT industry through exposure in software development conferences (Aguanno, 2005).

Agile was originally created for using on small and single-team projects, but many other companies began to implement this in larger and more complex projects because the increase amount of data and the input from customers were needed in a more frequent manner than in a traditional one (Dikert, 2016). Originally it was created as a methodology to develop software; the constant changing nature of technology made it difficult to utilize traditional approaches for these purposes. In 2001, the term Agile become the name for referring to several methodologies for the development of information systems (Owen, 2006).

Studies shows that by implementing agile the teams reported a substantial increase on some of their key business areas, such as: planning, teamwork, communication, quality, and empowerment, team performance and so on since you constantly receive feedback, this helps to reduce complexity and meet customers' expectations (Simon, 2017). However, authors argue if the reason for agile projects to be successful is the fact that they are customer oriented or the fact that they have flexible ways of working (Stettina & Hörz, 2015).

The agile frameworks are used for complex projects in which the goal is clear but how to achieve it is unknown. Therefore, the project's scope is conceived as variable, and the project's development consists on a series of tests until the solution is found and the desired product is achieved. In contrast with the traditional approaches, agile methodologies focus on change as an advantage to enhance the value of the process (Owen, 2006). The client's involvement in these kinds of approaches is important, because its feedback is used to improve the final product.

Larger companies could have more difficulty when trying to implement agile methods. This difficulty is normally created because the implementation of agile requires change of the entire organizational culture. For instance, the big amount of formal documentation because of the dependencies between projects and teams, could cause some tensions with the top management (Dikert, 2016). Very specified plans could be a big source of contention, rework and delay (Serrador & Pinto, 2015). The change from long-term planning to a short-term planning could also affect management and business related functions (Dikert, 2016). However, a balance between traditional and agile methods are in some cases essential for

achieving both project control, agility (Dingsoyr, 2018) and project success (Sheffield & Lemétayer, 2013).

Agile methods are helping companies to reduce project risks and improve the productivity of the team and the quality of the products, which reduces the complexity of projects (Bass, 2015). Another key aspect in the agile method in the close relationship between clients and developers and their continuing collaboration. But having multiple on-site customers in large projects could increase the risk of failure due to miscommunication among partners. Therefore, having an open and transparent dialogue between all the stakeholders is key to be aligned on the priorities of the project (Dingsoyr, 2018). Even thought, there are not major planning in compare to the traditional projects, there continue to exist a good communication with customer as well as working together with them in order to develop the right requirements, which strengthen both the team and the project development. (Serrador & Pinto, 2015)

Some of the characteristics of the agile methods are for instance that the focus is mainly in short iteration, the progress is measured via completed features and there is more personal and open communications (Sheffield & Lemétayer, 2013). Working in short iterations means that the risk of building something wrong are less because there is a constant feedback in short cycles, which gives more flexibility for change. The progress of this iterations is measured by completed features, which means that rather than trying to measure the percentage that is completed on intangible methods, in the agile way, you measure progress by the tested and completed features. Another key factor is the great focus that the agile processes have on having a more personal communication, rather than spending a lot of time on writing a lot of documents, agile methods focuses on sharing knowledge face to face, in whiteboards and supporting each other (Aguanno, 2005)

'Being *agile* is a declaration of prioritizing for project maneuverability with respect to shifting requirements, shifting technology, and a shifting understanding of the situation' (Aguanno, 2005, s. ch. 5). Other priorities that care of interest in agility include predictability, schedule, cost, the use of specific tools and process-accreditation (Aguanno, 2005). However, in an agile approach, the customer requirements and expectations will constantly change during the development of the project. Time and resources are fixed and agreed upon as much as it is possible but the rest is evolving with the time. Figure 1Gives an illustration of the traditional project and agile projects. In that illustration, it can be seen that features can be changed but resources and time are fixed (Carroll, 2015).

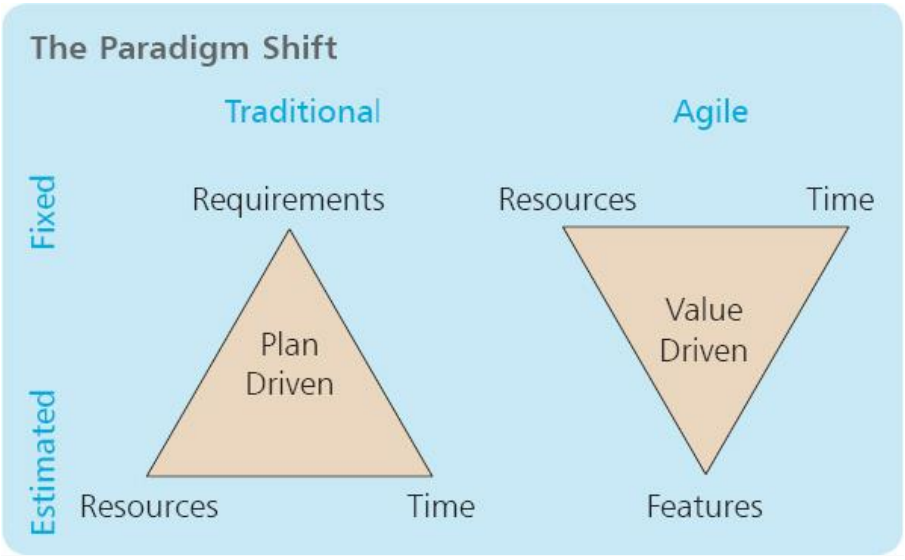

Figure 1. Difference between Traditional and Agile Projects (Carroll, 2015)

Agile approaches and traditional working procedures differs in how projects are executed. For instance, processes such as planning and control are more delegated to the developers and the team. The progress monitoring tracks the amount of the time that was spent on delivering the products in order to have improvements in the future estimates. Another aspects that differs the traditional with the agile is that there is an issue escalation while developing the project. An issue escalation is any problem or issues that could affect the project needs to be dealt with from the appropriate level in the company (Carroll, 2015). Agile projects are as well developed in adaptive lifecycles which includes the flexibility to embrace change in any step of the process, teams are also involved in this and they are given the freedom to work accordingly (Sheffield & Lemétayer, Factors associated with the software development agility of successful projects, 2013).

Aguanno (2005) continues the discussion about the main differences between plan-drive projects and agile approaches, the author states that the latter is more focused on individuals and interactions than processes and tools, it also respond to changes more than following a set plan and it aims to have a good customer collaboration. Customer focus, their needs in times of change, performance management and the social context are related to project success (Sheffield & Lemétayer, 2013).

2.1.1 Agile software development.

'Agile software development is a set of iterative and incremental software engineering methods that are advocated based on an 'agile philosophy' captured in the agile Manifesto' (Dikert, 2016, s. p. 88). The agile manifesto emerged from a discussion that senior managers and software development thinkers had in order to find a common ground that will help everyone to develop better ways of developing software. Some of the main aspects that the manifesto values are:

‘Individuals and interactions over processes and tools.
Working software over comprehensive documentation.
Customer collaboration over contract negotiation.
Responding to change over following a plan.’
(Agile manifesto , 2001)

The manifesto continues on with twelve principles of agile software that simplifies the work of agile and the implementation of it in the company processes (Agile manifesto , 2001). Some of the main values that are addressed in the agile manifesto are adaptability, transparency, simplicity and unity, which should be the base for the development of the team and also their work. Agility is then a way of working in loops where there is a release every three weeks and there will be a constant feedback being received from the customer side (Oluwole, 2015).

2.2 Key Performance Indicators (KPI)

A KPI is a helpful early signs that something is going wrong or right, it addresses if something is unfavorable and also focus on the outcomes of the future. These measurement will also give a clear picture of what is truly relevant in a project and will inform this to all the stakeholders (Harold, 2017). In the Agile software development environment the way of doing these measurements are different from the traditional ones. However, there are few standards traditional measurements that could also be related and use in this way of working (Javdani, 2013). In other words, a KPI tells the manager about the way the organization is performing in their critical success factors so that they can be able to increase performance on the processes (Parmenter, 2015)

In order to have effective and actionable KPIs, there are some key aspects that are important to understand and follow. KPIs should be aligned to the corporate strategy and they should also be predictive which means that it should add business value to the company. An effective KPI is also one that is actionable, the data should be accurate in order to make improvements before it is too late. They should also be a selected one, the fewer the better, these few ones should be easy to follow and understand so that actions can be taken easily. An important aspect is to also have standardize KPIs with standard rules and calculations so that they can easily be shown in a dashboard throughout the company and in order to fulfill all of this, KPIs should be relevant, they must be reviewed periodically in order to have a continuity on the processes (Kerzner, 2013)

Parmenter, 2015 mentions the importance of following some key characteristics for the KPIs. The author assures the importance of having KPIs that are timely (measured frequently), simple (all the stakeholder understand the measurement and the action to be taken), team based (team working closely towards a goal) and it also has a significant impact on the organization.

2.2.1 KPI selection

Selecting the right KPI could be a difficult task. Some could work for certain projects but they could be different for other type of projects. There is also a challenge on this, not everyone in the team will understand the importance of the KPI. Therefore understanding that there is a need of that measurement is essential when choosing the right one. As well as having all the different roles and people involved in the project onboard is critical for the right implementation of the KPI (Harold, 2017). Another critical part of the selection is the implementation part, to establish a sound environment where the KPIs can operate and keep being developed. Once all the stakeholders involved understand and participates on the selection and introduction of it, the process may become smoothly (Parmenter, 2015).

2.2.2 Key Performance Indicators (KPI) in Agile.

The increase amount of uncertainty and unpredictability in the development of projects has increased the need for having health project indicators that are effective. Therefore developing the right and meaningful KPIs will help to have a more formalized metrics management system for both the internal and external stakeholders (Harold, 2017). Software development projects could be in most of the cases very complex, there is not a perfect process, however, the use of agile methodologies have helped companies to develop the best suitable measurements for the health of software development projects (Al-Heyasi, 2018). Having agile KPIs will help to track project and sprint process. This is essential for monitoring and following up all projects and the end result of it. Having agile KPIs is also a way of clarifying to stakeholders how things are going, showing them the aspects of a project that need to be considered in-depth but most important of all, KPIs in agile exits to achieve goals, measure the scope and also add more resources if necessary (Kupiainen, 2015).

Developing health checks and audits on the projects could prevent problems that are detected earlier. For instance, the involvement of different stakeholders could also be affected by the outcome of a project, therefore, it is of great interest for them to follow and measure projects in the correct way (Kerzner, 2013). In the agile environment, the measurement of a project has a different priority and emphasis in comparison with the traditional ones (Goodpasture, 2016). For instance, when comparing traditional vs. agile, there are some fundamentals to why they differ so much. Agile methodologies are more adapted to plans and processes where there is not detailed planning because they deliver every two to three weeks while working in loops. The team needs to adapt themselves to changes in the product requirements developed in the constant communication with stakeholders (STOICA, 2013). According to Rico, 2009, in companied where all the teams work in agile produces better results than the ones working with traditional methods. This is mostly because products have fewer defects and the products that are being developed are constantly being reviewed by the customers which creates an end product that is satisfying.

Measuring in agile vs the traditional way in some cases could also differ, however, there are teams and companies that chooses to use both, the right KPI should be

selected according to the company's needs (Kupiainen, 2015). When working in agile projects, there are some key measurements that can be considered, such as quality (i.e. delivering a good working product), scope (meeting all requirements by the customer), timeliness (delivering on time), and cost (within estimated cost and effort) as some of the attributes of success for a particular project. Other key metrics that are used in agile projects are for instance, defect inflow, the burn down chart that shows the comparison between the progress of the project and the planned work, comments about the project's state and a list of the key risks (Cohn and Ford (2003)). This is also confirmed by Chow, 2008 when in their research it was found that the success factors of agile software development projects are: quality, scope, time and cost, these parameters can also be seen in traditional projects.

2.2.3 Agile Measurements

There are different kind of project practices that could be decided by the predictability or unpredictability of a project. For instance, predictable issues can be measured by using breakdowns and unpredictable issues could be sometimes hard to measure but they can be resolved through study techniques such as prototypes (Aguanno, 2005).

Most of the practices used in traditional software development methods are not always used in agile environments, but some tailored methods could be applied. Some of the practices that are currently used in agile measurements are:

- **Velocity (Productivity):** Instead of productivity, teams in the agile community use the term 'velocity'. The velocity is used to estimate the remaining time that will take to end a project. You estimate this by defining the amount of completed user stories in very iteration. This measurement could help to estimate and see the overall productivity of the different teams (Javdani, 2013)
- **Burn-down Chart:** This is a good tool to plan and monitor the progress in agile methods. It is also a way to show the remaining work. This estimation and comparison between the work that is remaining and the estimated work could be a guiding process to decision making on what to add or drop in case there is any delay on the project (Javdani, 2013)
- **Schedule performance Indicator (SPI):** This KPI will help to provide a clear view of the Schedule variance in the agile projects. This KPI is also used in traditional projects and is normally used for measuring the schedule performance.
- **Cost performance indicator (CPI):** This KPI will show how efficiently the project is spending the budget compared to how effectively it is planned to be spend.
- When it comes to the other parameter that will help to measure the health of a project, Program Management , 2009 argues that risk, Issues & Opportunities (RIO) is developed in order to deal with the uncertainty that every project could face. Having a risk management will help to identify, mitigate and track the progress of a risk.

Table 1 Show the main aim and basis practices of having the above mentioned estimations (Javdani, 2013, s. p. 5).

Practice	Main aim	Basis of practice	Beneficiary	Frequency
Software size	Estimation of software size/effort	User stories	Project Manager	At start of each iteration
Velocity	Overall productivity of team	User stories points	Project Manager	At end of each iteration
Burndown Chart	Progress Monitoring	User Stories	All Team Members	At the end of each iteration
Cumulative flow	Observation of lead time and WIP queue depth	Work in process/progress	Top Managers/customers	At the end of each iteration
Earned Business Value	Monitoring business value delivered to customer	Business value	Top Managers/ Customers	As each feature is delivered
CPI	Budgeting	User stories	Top Managers	At end of each iteration

Table 1. Practices for agile project estimations

Methods in Agile to measure project and project portfolio health. The following methods were used as guidance in order to select some key KPIs that would be helpful for the development of this thesis. These methods have been used in different companies and the Scaled Agile Framework is currently used in the studied company.

2.2.4 The big five

The big five is a method that is used by IBM to measure the health of a project in agile. According to their experience it was determined that the following parameters add business value to the company when being measured in a right way. Each one of those parameters should have a correlated KPI that will help the company to understand the health of the project and if it is going well or not.

- Productivity: time, cost, scope.
- Quality: defect, value
- Predictability: Accuracy, time to accuracy
- Job Satisfaction: Retention, overtime, project results satisfaction
- Innovation: skill growth, process improvement request
- Customer Satisfaction

(Anthony, 2008)

2.2.5 Scaled Agile Framework

The scaled agile framework (SAFE), is a methodology that is used in big companies with complex projects where there are also many teams involved. This is a model that is divided in different modules with flexibility to escalate which allows companies to be more flexible and provide better business outcomes (Dean, 2016). This is used for many companies in different ways and it is meant to be specially designed for the specific need of each organization, the most important outcome of this framework is to help the company to implement agility hence the template should be used accordingly (Scaled agile framework , n.d.)

The Portfolio SAFE framework is used in larger organizations with multiple teams and it includes different levels within the organization, Portfolio level, Large solution level, Program level and Team level (Scaled agile framework , n.d.), for the purpose of this thesis work, the focus will mainly be on three of them , team, program and portfolio level.

2.2.5.1 Team level

This level encompasses the different roles, activities and processes needed in order to deliver value within the agile teams. These teams are an essential part of the program level, without their work, there will not be any customer value delivered. The team have the capacity to define, develop, test and deploy what they consider relevant or not for each iteration. In this level, the main roles needed are the Scrum Master (SM), Product Owner (PO) and the development team (Dev Team) (Scaled agile framework , n.d.)

2.2.5.2 Team Metrics

On the project level, SAFE methods also have some sets of measurements. Team metrics and program performance metrics are the ones used at the end of each iteration and are therefore of great importance for companies (Scaled agile framework , n.d.)

- Deployments and Releases per Time box. This metric is meant to demonstrate whether the program is making progress toward deploying and releasing more frequently. It can be viewed on a PI basis.
- Team Metrics, this are iteration Metrics each agile team gathers the iteration metrics they have agree to collect. This occurs in the quantitative part of the team retrospective.
- Program Performance Metrics. At the end of each project Iteration is a natural and significant measuring point.

MANJIT, 2015 explains that some of the ways to measure the parameters of productivity and cost for instance, is by having a KPI that is called Schedule Performance Indicator (SPI) and Cost Performance Indicator (CPI) respectively. This first one will help to provide a clear view of the Schedule variance in the agile

projects. This specific KPI will actually show and reflect the amount that this project is ahead or behind the planned schedule.

SPI is a KPI that has been used in a traditional way for many years now, however, there are also ways of measuring this in an agile way. The way it is measured is explained in the following tables…. Following is the CPI, this KPI will show how efficiently the project is spending the budget compared to how effectively it is planned to be spend. Both these KPIs are meant to show the productivity of the project and if this is going on the right way or not (MANJIT, 2015)

The following tables describes the main concepts that are part of measuring this KPIs that are part of the team level. Every metric is intend to have a meaning and also a value.

Metric	**Description**
NPI	Number of Planned Iterations
NPS	Number of Planned Story Points
TPB	Total Planned Budget
NCI	Number of Completed Iterationa
NCS	Number of Completed Story Points
TAC	Total Actual Cost

Table 2. Description of the parameters to follow when measuring SPI and CPI. (MANJIT, 2015)

Metric	Description	Calculation
EPC	Expected Percentage Complete	NCI/NPI
PV	Planned Value	EPC*TPB
APV	Actual Percent Complete	NCS/NPS
EV	Earned Value	APC*TPB

Table 3. Calculations for the metrics described (MANJIT, 2015)

This table explains how SPI and CSI should be measured and their own formula to follow. This is mainly done in order to know if the project is following the schedule and the cost planned for the end of each sprint (MANJIT, 2015)

Metric	Description	CALCULATION
CPI	Cost Performance Index	EV/TAC
EAC	Estimate at Complete	TPB/CPI
SPI	Schedule Performance Index	EV/PV

Tabell 4. Calculations for SPI and CPI metrics in agile (MANJIT, 2015)

2.2.5.3 Program level

This level is similar to the team level but scaled. In this level there are several teams aiming to deliver fully working solutions. The people involved in this level are the product management, product owners and the release train engineer which acts also as a Scrum Master. There are also weekly meetings in order to follow up the work that is being done, what differs this level from the team is that this level focuses more on the features that can be delivered at the end of the iteration. The value in the program level is delivered by Agile Release Trains (Scaled agile framework , n.d.)

2.2.5.4 Portfolio level

The portfolio level is a bigger picture view of all the projects being developed. There is a Lean Portfolio Management (LPM) which is the useful resource that supports and helps the teams with the investments and budgets. Another important aspect of this level is the use of a Kanban which gives visibility to the work being developed and it also creates the limits of the Work In Progress (WIP) in order to assure that the demand is matching the actual business value (Scaled agile framework , n.d.)

2.2.5.4.1 Portfolio Metrics

Table 5 demonstrates portfolio metrics used in the SAFE framework. This set of metrics are example of the measures that could be useful to evaluate both the internal and external progress of the portfolio level. This help to see the overall performance of the final results that are shown in the project level and reflected later on the portfolio level (Scaled agile framework , n.d.).

Benefit	Expected Result	Metric Used
Employee engagement	Improved employee satisfaction; lower turnover	Employee survey; HR statistics
Customer satisfaction	Improved Net Promoter Score	Net promoter score survey
Productivity	Reduced average feature cycle time	Feature cycle time
Agility	Continuous improvement in team and program measures	Team, program, large solution and portfolio self-assessments; Release predictability measure
Time-to-market	More frequent releases	Number or releases per year
Quality	Reduced defect counts and support call volume	Defect data and support call volume
Partner health	Improved ecosystem relationships	Partner and vendor surveys

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Tabell 5. Portfolio metrics according to SAFE agile method (Scaled agile framework , n.d.)

The status of projects in a portfolio level is important to measure in order to inform all the stakeholders if the project is going well or not and the resources needed to make this happen. There are some parameters that are important to measure to understand and see the whole portfolio spectrum. The metrics that are good to see at the end of the project are: progress and quality (Krebs, 2008)

When it comes to measuring progress will indicate if the project is running on schedule or not, this will also help to compare how the actual value of a project is in comparison to the planned value. Another one is quality, one way of measuring this is by looking at the total of the unsolved defects of a project or another way of measuring it is by calculating the ratio of total number of test cases to open defects (Krebs, 2008)

Being ahead of the market is a valuable priority for many companies nowadays. Time to market will help to determine if the project is going to be ahead of behind the expected deadline. Some projects may be on track in their project but behind in the market, having a balance between these two is key in order to compete in the market and be ahead in the business (Krebs, 2008). When it comes to quality and its implication in the portfolio level, there are some metrics that are as well used in order provide managers and project managers indicators of how the backlog is progressing, if there any defects that increases or decreases over the development of the project and then it will be able to take actions for avoiding more problems in the future, a KPI that helps with this is the defect trend indicator.

2.3 The importance of agile for project success.

Well-designed and well- executed agile processes lead to project success (Sheffield & Lemétayer, 2013). However, there is very few information about the impact KPIs or any other metrics could have in project success (Serrador & Pinto, 2015). Therefore, there is still a tension on if processes and measurements could actually help agile projects to be successful (Sheffield & Lemétayer, 2013).

According to Serrador & Pinto (2015) agile methodologies help to develop successful projects and have a positive impact on all the dimension of a project. Factors such as efficiency and stakeholder satisfaction were also improved when agile methodologies were in place. Hence, having a balance at the beginning of the project planning where both the traditional and agile methods are being used could reduce project failure. However, Sheffield (2013) argues that 'one size does not fit everybody' (p. 469) meaning that project success is more related to applying the right processes and factors to each individual and specific project. There is not a black and white one type solution that will fit to all kind of projects.

In the portfolio level, agile projects are successful to the extent that all levels of the company want to be part of the change. Factors such as transparency, collaboration and commitment from portfolio and senior managers will create an organizational culture of trust and collaboration that will help the projects to be

successful. (Stettina & Hörz, 2015) Lack of agreement between top management, project managers, project team and customer on which methodology is right or not to use, will cause project failure. Having flexibility and adaptability in the processes to work towards the same goal and the commitment from all the levels in the company will generate better end results and cause project success (Sheffield & Lemétayer, 2013).

3 Methodology

This thesis is designed and conducted as a qualitative research. An "on-site" work was performed to develop this thesis. The great opportunity to spend a good amount of hours in the actual company under study provided me with rich insights of the daily operations of complex agile projects. I had the opportunity to receive guidance from many people in the company and had weekly meetings with the managers as well as the people interviewed. The first two months were dedicated to meet and interview people that could help me get insight into the organization processes, etc. After that I sought actively to gather feedback on my work.

3.1 Problem description

By being able to spend the majority of my time at the company I was also asked to provide them with some suggestions for methods and specific KPIs that could be used to measure performance of their projects. Currently there are no consistent ways of reporting "health" either for the individual projects or the whole project portfolio. Their current ways of measuring is very inconsistent and there is a need to evaluate both the health on single project and on the whole project portfolio in agile environment. The categories in table 5 were used to guide my exploration.

Where	Globally at Crew Ops Implementation projects.
When	Both within the project lifetime and also afterwards when you should judge whether this was a success or not.
Who	Project Managers, Portfolio Managers, Project Directors, Program Managers, Regional Leads etc.

Table 5. Description of the where, when and who to develop the research

The methods they currently use are similar to "traditional" project methodologies and there is not a consistent way of neither managing the projects nor follow up on them. There is not transparency on the information that is distributed, most of the reports that are being used now, shows the status of the project but since there are not standards on the way of working, the information provided on the reports is confusing and does not give clarity on how projects really are doing. This creates uncertainty amongst the project managers in general and also creates misunderstanding on the way things are being measured.

3.2 Research approach

The main research approach is to collect as much data as possible from different stakeholders to understand their perspective but also give suggestions from their own opinion. The data will be analyzed after that and conclusions will be drawn from the collection of the data but also from the different methods that could be related to this topic. The topic of KPIs in project has been there for a while, however, KPI in agile environments is more limited. The information that was

given, was more focus to the traditional way of working therefore the theory used here was thoughtfully selected to fit the specific problem which is about the right project and project portfolio measurements in an agile environment.

3.2.1 Qualitative research

Qualitative research is generally conducted in order to gain a deeper experience of the everyday work of individuals, organizations and groups. It is preferably conducted by having a prolonged contact with the participants operating in the context under exploration (Miles, 2014). I adopted this approach to get an insight into the organization problem, partly by being part of their everyday work, but also by asking questions and interview key persons (Silverman, 2006).

Some of the strengths of a qualitative data is that it may offer an understanding of the issues of 'real work-life' (Miles, 2014). For instance, understanding their way of working and also being involved in their everyday work, provided me with their perspective of their real problems. However, some problems may arise particularly from doing a qualitative research, such as the use of too much data and/or inappropriate methods, therefore, having a specific and the appropriate research method is key in order to develop a sound understanding of the research problem at hand (Silverman, 2006).

The main focus of this thesis is the data collection done by the interviews of project managers and portfolio managers operating within the case organization, both locally and globally. In order to focus the study I selected employees inside the company that are involved in projects in the implementation department. They are mostly project managers, project directors and managers from different levels. A global perspective was also incorporated to a certain degree by involving people from offices globally.

Being part of the everyday work of the people interviewed was a great advantage because the time could be managed in a more flexible way when performing the interviews. It was easier to coordinate with the people by talking to them personally than only by email, but mailing was also the main method to send communication to everyone involved in this research. Some of the main challenges of being part of the everyday work was that I did not have too much time to focus on my writing work, it was difficult for me to do the writing part because of the amount of time I spent at the beginning performing all the interviews. The last weeks of the thesis, I needed to focus more in the theory part and took a pause from being on site in order to focus on this.

Another great advantage of being on site most of the time, was that people was getting familiar to my face and they were able to add (in informal meetings) more input to the report, however, this was also a challenge because I needed to limit my information to the problem I wanted to solve and not what other people wanted me to solve.

3.3 Data collection

In order to understand the problem inside the company and also to gather information about the problem, a data collection was needed. One of the ways this data can be collected was by actively being present on the workplace. Developing a relationship with some of the participants of this data, helped them to open up more and share their experience in a less critical way and more accepting the fact that there are some improvements to do (Maxwell, 2013). Developing relationships with the people in the company was of great importance in order to gather the right information as well as their opinion about the topic, it was interesting to see that people could be skeptical to what you have to say when you have been there for only some time, as the time was progressing people was more open to the opinion of outsiders and have a critical view that helped to open up another perspectives.

When collecting the data, I needed to be aware and responsible for two different perspectives, my role as a thesis worker and also my role inside the company. Both roles are aiming to the same, but they both have different requirements. Therefore being in the middle of these two was in some ways a challenge but also a good way of having an input from both sides. The requirements from the company side were more about the end result, how do I actually collect the data, analyze it and then give suggestions to the problem. However, from the academy part, the requirement were more about the way I needed to write, the way I needed to perform the interviews and also my critical view of the problem. These two perspectives helped me to shape my document and structure it in a way that could be understandable for any kind of reader. The feedback I get from both my university supervisor and the company supervisor was really key to structure my work and to work on the data that was really helpful, their guidance along the way was key to limit my work.

However, meeting both expectations was sometimes a challenge, the amount of work required from both parts was sometimes overwhelming and at the beginning it was really hard to understand what I was doing. Nonetheless, my supervisors' guidance along the way and setting some clear goals and milestones was a big factor to have a successful match of both parts.

Part of the developing of this report was also being involved in informal conversation in the lunch room or the corridors, this was also considered as a data collection in order to have other's perspectives. By listening, the recording of the interviews and/or other information you were part of, you can collect some relevant data that can be missed on the written interview (Maxwell, 2013)

3.3.1 Interviews performed

In order to collect this data a plan was made to interview key people inside the company. There are many different stakeholders that are involved in this research and it was therefore valuable to have the input of the correct people. In order to

know how the problem was perceived, an understanding from different stakeholders was needed, therefore the interviews were divided between the 'as it is' (meaning how the situation is currently) and 'to be' (meaning their expectations for future changes).

The interviews were divided by different roles inside the organization, project manager's perspective and portfolio manager's perspective. Their input in both the 'as it is' and the 'to be' was very useful in order to draw some conclusions on how things could be done in the future and how things could be improved in the present. There was a total of thirty five meetings performed both in a formal and informal way. There were around twelve information meetings performed, in these meetings the main goal was to gather information about the company, how they work and expectations from the stakeholders. There was a total of twenty three interviews and the people interviewed were the Project manager in Gothenburg (8), project managers in Americas (4), in Singapore (2) and senior managers (9).

A total of twenty four interviews were performed inside the company. Those interviews were divided into different roles and some questions were similar but those questions were structured differently in order to gather the information necessary to guide me on the study and to draw some good results at the end. Therefore the structure of the questions were adapted but the content has the same goal. The goal was to understand the current problem, how things are being done and also the expectation of each person involved in the project.

The main objective with these interviews was to explore their point of view on the problem 'as-it-is' right now. Some of the questions that were asked was such as how do you currently measure your projects? Which measurements are you estimating right now? Which of these measurements are key for all the different stakeholders? Others questions were also asked, you can find the whole interview in the appendix.

Another point of view that was important for the analysis of this report, was the expectations from portfolio managers. In order to get their perspective about the topic and also their own opinion of what could be done better, an interview specifically for them was also performed. In this interview there were more direct questions such as, how do you visualize a standard health indicator and how would you like to work with it? What would you like to have in order to measure projects? And more. All of these questions had the main purpose to understand their expectations and also any other key points they wanted to cover. These questions are also attached on the appendix.

The interviews were performed inside the company in an interval of one month. The first three weeks were very intense with a lot of meetings and a lot of input and after those weeks, I started to have skype meetings with stakeholders in American and Singapore in order to gain a global perspective of their way of measuring projects and how they think could be a good way of standardizing these measurements for a more collaborative work globally.

3.3.2 Data analysis

The first step in order to analyze the data collected is by reading and interpreting the interviews and the documents that are being analyzed (Maxwell, 2013). In this report, the results and conclusion are drawn from the analyses of the data collected in the interviews, by having informal personal meetings with other people inside the organization and also by statements collected in the company's main business software.

Another way to analyze the data is through listening (Maxwell, 2013), the interviews were recorded in order to analyze the information collected in more detail. When I had the interviews, I took notes but also recorded the conversations to be able to come back to the recordings and gather more information that I could have missed while writing. However, one limitation was that this recordings were not done in all the interviews but only with some key people I considered was very important to get the right information from them.

As it was said before, the analysis of this data was mainly used from the qualitative research but also from statements found in the company's main business software. The information there was also relevant to understand how things are being done currently, even though some of the information in the page is not up to date, it was helpful to have a view of the current problem. The legitimacy of the information could be discussed further, because the information that is in that software is mainly updated by the employees inside the organization. Hence being critical about the information collected from that source has been a challenge and also a way of critical evaluate the information provided in the report.

The intention of doing a data analysis was in order to draw some results and conclusions. Since the data was collected from a portfolio and project perspective with the respective responsible, then the structure of the results came also from that perspective, project and project portfolio stakeholder's point of view. When the interviews were started, there was not a structure on itself, however once the interviews were performed and also the information started to make more sense, then it was more smoothly to structure the data collected.

3.4 Research Ethics

A standard ethical approach is required in order to have the correct approach to the research that is being done. When performing a research of any kind, there are some ethical issues that need to be considered in order to maintain the legitimacy of the project. For instance, topics such as, worthiness of the project - Is my report worth writing? The benefits and reciprocity of other participants - is people willing to contribute to the study and the research in every sphere of it? Which are the benefits of people helping me with the result of my research? Honesty and trust - is there any trust between the interviewee and the interviewer? Confidentiality and privacy - is the information collected from the company being used in a trustworthy way? (Miles, 2014)

In the case of this study, the results shown are in one way or another of great interest for the people involved in the development of this thesis. Therefore, they were willing to contribute to this study and their contribution made possible to have some end results. These end results, will hopefully help the company specifically the department of Implementation to have some improvement in their way of working and also for their project and project portfolio. The information and results shown here will be taken further to the people involved and they will decide on whether this could be something that can be implemented on their processes or if there are any further studies that need to be performed before the implementation process.

The integrity of data and access to data are some other matters of ethical concerns in a research (Pruzan, 2016). In this report, the integrity of the data has been limited to the insight of every person interviewed. Their opinion has been the catalyst of the data and the results are relying on that information provided. Some people may argue then that the data collected could be more subjective to certain group of people and not objective for the purpose of this report.

4 Results and analysis

4.1 The main challenges

There are some main challenges that are currently a work in progress in the company. In the implementation department there are challenges in the way projects are being measured and some uncertainty when working in the project management domain. The following is a list of those uncertainties that are related to this thesis. The information was provided by the company and identifies their main challenges and current situation. This list of issues were collected from previous interviews performed in one to one conversations with different employees. Managers have gathered their perspective and have done a collection of this issues in order to make improvements.

Actual Condition: There is an uncertainty on the currently way of working. The collection of these different points is mainly from the information gathered from project managers in the implementation department. The following points are related to the development on this thesis:

- Uncertainty in how to interact and what mandate Project Manager have when working with Client Solutions Owner, Scrum Masters and Fixed Teams.
- Uncertainty in what Financial Reporting is needed and how to use it. Templates and processes somewhat broken.
- Uncertainty in estimation processes. Lack of guidance when estimating an implementation project.
- Uncertainty in how to handle Project set-up, standardization, support etc.

These issues are a work in progress in the company. There is an aspiration to work towards better processes and better ways of working. Stakeholders' commitment to see a change and a better development of this processes is what made this thesis possible. In the following chapters, there is an explanation of the different perspectives about the problem and at the end of this chapter there will be some potential solutions on how to measure the health of a project.

4.2 Root cause analyses

One of the main purpose of this thesis is to define and suggest improvements in how to measure and report health on agile projects and project portfolio.

Therefore, interviews were performed to all the Project Managers at the company globally. Their opinion and feedback was key in order to analyze the current situation. It was also decided to divide the interview process in 'As-it-is' and 'to-be' so that there could be a clear process of the things that needed to be collected.

This decision was taken in order to have both perspectives, how things are currently working and also how they would like to see the measurements in the future. Both perspectives are important to close the gap that it is currently happening in the way projects are developed and measured and the expected

result on how they should be. There are current measurements that could be working but they need some adjustments hence knowing the current status and improving it could also be a way of gaining some better view of how the gap can be closed.

The coming chapters provide information about the perspective of the whole problem from all the stakeholders that were interviewed. Their perspective and opinion on this was key in order to develop an understanding of the issue and also provide solutions that were relevant for all of them.

4.3 Perceived problems from the interviewees' perspective.

4.3.1 Project Managers perspective

Project manager recognize that there are some recurrent challenges in the way projects are being measured. They agree that measurements are not working in a standard way and there are many different ways of measuring projects. Some of them have the perspective that there is a lot of information that is not being followed up and therefore they do not find the real meaning of doing it. There are inconsistent ways of measuring and following up the projects and no good guidelines.

The way projects health and the status of reports are measured today are through different reports, such as the steering committee report that is done every two weeks, as well as the weekly reports and also the information collected in software programs used inside the company such as Jira and Primavera. These software programs are used in all the departments of the company to have a collective way of collecting data and for knowledge sharing. In a global perspective, Primavera and Jira are also tools used as the main way of measuring projects. However, they also experience that there are inconsistencies on the way the information is distributed. For instance, when it comes to calculate the budget, there is a lot of work that is being duplicated. There are not direct links between one information to the other which creates extra work to measure and focus on what is needed for the team, the project and the customer.

When performing the interviews, some of the project managers stated that the current systems is working well and is easy to understand and follow, the majority of the people that made this statement, is the people that have been using it for long time, nonetheless, there are some others that do not understand the processes or do not even know how the information should be added. This information should be communicated clearly from the start of a project.

The current reports should be studied deeply, for instance there are inconsistency in some of the information that needs to be provided. The colors showing the state of the project are not standard, which creates an unequal form of measuring and it makes it difficult for other people to understand and follow up. The projects managers' perspective is that the weekly reports should be clearer, in the way the information is given and registered. In a global perspective, the project managers also agree that there are too many reports, they recognize that it could be helpful

to consolidate in just one place all the information so that anyone could have access to them. Using one tool to collect data and information from the projects will help the project managers and other parties involved to understand and follow up easily.

There is also a tension between the agile way of working and the traditional one. On the traditional one, reports and metrics are essential to follow up projects, however, in agile projects, flexibility is key, it focuses on the team taking initiatives and constantly looking to improve the ways of working. Consequently having KPIs could restrict the way the team is performing and it could also put limits on how they work. This tension has to be analyzed in order to set the right measurements, explaining the why behind every measurement will help the team to understand it and a willingness to continue on measuring it.

Another issue that was brought up, was the fact that the reports in Primavera are not aligned to the agile practices. For example, the way projects are measuring the hours could be somehow not flexible, every sprint, there are normally changes and having set hours could be a limitation to improve processes. One of the project managers explained that measuring projects successfully would require consistency in the way the Primavera reports are performed, likewise the information taken from there should give a better view of the project.

One of the questions asked to the project managers was if they knew which of the KPIs are aligned to the organization's goal, the common answer was that they did not know how they were connected. When setting up KPI it is important to know that these are adding somehow value to the organization in general, not only the senior managers should know this, but all levels.

One of the Project Managers was not very satisfied with the way KPI are done now. The person said that this way of measuring are being overuse and there is too many documents in different places that need to be filled up. The project manager suggestion is to reduce the amount of administration, focus on the team and have measurements that add value to the project and stakeholders.

Another good pattern is that could be – in the case the project is part of a program – that the project received updates on the overall status of the program and how your project fits in there. In one case there was also an excellent overview of the business drivers behind the program, and a matrix of what drivers each project contributed to. Unfortunately there is not much information about the program aspect, the projects are more of an endless sequence of delivery. But in the company there are dependencies, and some projects do have a higher purpose such as the first implementation of a new product. This will help to motivate the people preparing the reports, to demonstrate for them what it is used for, they see that for instance delays or increased resource need of one project impacts other projects.

When the answers were collected from the project managers globally, they shared same perspectives about the current situation. There is information that is not

being constantly updated. For instance, Jira is sometimes not really well updated and it could take some time to gather the information in order to create a report.

Something that was mentioned by one of the project managers is that it is important that at the beginning of every project, try to make sure that there is a good communication with all the stakeholders and have a daily contact with the whole team in order to understand their needs and also the problems that the project is having. However, this daily contact is not being followed up in any way, only by the Kanban board.

The budget reports was another aspect that had some inconsistencies. This sheet could be analyzed deeper and see which areas are truly important to measure and which others are not. There is much repetition on the information that has to be given, instead of creating one consistent way that will compile all the information.

On a global perspective they have similar way of measuring projects. Reports are the way of following up, the progress in the projects are in hours spent, measure scope depending of the project, timeline, etc. are the main way of measuring right now. Their point of view about the current problem is the same as the one the other project managers have mentioned before. They agree that there are ways of working that are not consistent and therefore need to be improved and developed further.

4.3.2 Portfolio managers' perspective.

Manager's perspective in the improvement of the current measurements is really important from the overall project portfolio. It is important because they need to understand the overall view of the problem.

Their perspective is that there is not a proper way of following up the projects because of the inconsistent way of reporting. No structure of the processes and the lessons learnt. An overall perspective of how the projects are going is missing. There is not a big picture view of the project portfolio.

There are some of the basics of project management that are lacking. Not because they are not in place, but because they are not being used in the correct way. For instance, budget right now is quite complicated to understand, it should be easier to follow. The fundamentals for project management need some improvement.

The senior manager's perspective about the problems of the current state is that there are already KPI in place, but there is not something on place for the whole Project Portfolio. From a software development perspective there can be some standards when measuring in order don't have a constantly conversation on the point of view of all the different stakeholders.

However, there should be some room for freedom on the way the project managers do their measurements. Standards are good but in the agile way of working, having constantly feedback need some freedom in the reports. Having a

consistent way of working from all the stakeholders, will facilitate the work of the managers and also anyone involved in the projects. As well as having simple but define indicators could help to have a better background of the information.

Improvements have to be done in order to increase transparency between all the people involved. This information should be available for everyone to understand and not only for the Project Managers and Project Directors. Collaboration between PM will probable also increase as they will need help to develop this together.

In a more global perspective, it is also important to involve as many as possible in the understanding of the project health and the view of the project portfolio. There should be a more collaborative way of working and also a consistent way of reporting.

4.4 What should be done in order to add value to a project

In this section some of the key questions to be answered is the expectation of key stakeholder. What do they want to see and how they expect to see the change. If there are any recommendations for the improvement of the current way of measuring and in general their response to the change that is needed. This information is very important when closing the gap and will be used to draw some conclusion.

4.4.1 Project Managers perspective

In order to know the expectation from the project manager's side, some key questions were asked and their answer helped to see the main aspects needed in order to add value to projects. Questions are attached in the Appendix A part, however, one of the most relevant questions asked to the key stakeholder was their opinion about which one of the parameters in a project are the most important for them. Here are some of the key parts of a project and projects portfolio that are of importance for all the stakeholders.

- Budget – it is an important aspect to know and have it clear in order to show the actual value and the planned value.
- Schedule – it is always relevant for all the stakeholders. When the product can go Live and information for the lean managers.
- Scope – Where you can see the specifications from the client perspective. It is always important to have this at the beginning of every project.
- Customer Satisfaction – A good relationship with the client is key in order to have successful projects. Having a survey at the end of the project could be good, however, the questions should be objective to the topic of how the project was performed and not subjective.
- Risk exposure (RIO) – risk that could be encountered during the way.
- Team wellbeing – it is important to know how the team is doing and finding a right KPI to follow this, will improve the results of the whole project because they are working more effectively towards the same goal.

- Quality – this is one of the company's main values. Delivering quality products to their customers and being efficient in the way they work agile.

The above mentioned measurements are currently done, but in an inconsistent way, however, others measurements such as customer satisfaction and team wellbeing are not being considered at the moment, although they believe it is important to have in a well-developed project and to also give a general view of the status of the portfolio.

It was also interesting to see that from a global perspective they considered that those same measurements are of high importance for them. Their input was similar and even though they work differently in a less agile way of working, they also consider that the above mentioned KPIs should be considered. The general view from the different managers is that there are ways of working today that compiles all the parameters that were mentioned above, but there are not consistent way of doing it. Hence, some do it in one way or the other as they consider is the best way.

Project Managers' suggestions

Project managers' globally and locally gave their suggestions on the ways of measuring some of the above mentioned parameters. Their input was really important to the development of the end results. A few of the project managers were interviewed more than once in order to give more feedback on the results and also to further develop the end results in order to deliver the right information. Some of the suggestions are the following:

- Budget – when it comes to budget. There were many different opinions on how it should be measured and also what are the key parameters to follow, however, it was a bit confusing at the beginning which exact information should be collected therefore the following suggestions may not be the final ones :
    - Implementation hours for target scope
    - Rental fee, number of crew members.
    - Hosting: 1. set up fee. 2. Monthly fee.
- Quality – this is one of the company's values and it is of great importance for most of the managers and also for stakeholders in general. The following suggestions are only the point of view of a few of the interviewed. They said that the 'number of bugs' and the 'Speed of the fixed bugs' should be measured in a way that gives a result and a general view of how the quality of the project is actually now.

Another question was about, how they visualize the new way of measuring projects. Here are some of the main answers.

- A dashboard for each project with the KEY KPI. Everything is unified and the KPI should be measuring the same things.
- Global Dashboard: Combine all these KPI to get an overview of all the projects.
- A consistent way of reporting and keeping the information.
- Having good standards for everyone to follow.

- Have indicators as curves, not only numbers. Numbers sometimes could not say too much and could not be relevant for everyone. Curves will visualize the trends and also the capacity of the projects.

Another key aspect that was mention during the interviews was the need to have customer expectations before the project starts. However, this is less of a KPI and more something that will help to see the health of the project. Having constant communication with stakeholders was also seen as important and relevant in order to maintain the health of the project.

Consolidate all the project data in one place. For instance, making sure that all the project managers can work consistently in the new tool called Sales Force, will be helpful to follow up how the projects are doing.

4.4.2 Portfolio Managers perspective

The suggestion from the portfolio managers was also collected, their perspective was also key in order to draw the conclusions that were given at the end. In this area, the focus was more about their expectation on how they would like to see the values and measurements in a more understandable way. As well as having the information that is truly needed from their perspective.

The portfolio manager's expectations are stated here:

1. Value delivered
    a. Goal/ value – The goal is defined and agreed with the client in order to add value to customers.
2. Quality:
    a. Customer perception
    b. How much extra work is generated afterwards
    c. How does the customer perceive it
    d. Do they get any value
    e. How much is tested is more important to know than the number of bugs.
    f. Acceptance test – driven development
    g. Test coverage and test scope.
3. Budget:
    a. Implementation rev/h (revenue/hour)
    b. Implementation hours/ rental revenue – This will help to know and understand how the company is actually scaling
    c. Time to production (deviation) – this will help to know and understand if we are staying on the milestones set.
    d. What is the best forecast? How much has been spent?
    e. Measure budget in a more easy way.
    f. Feature points: effort/value
4. Scope:
    a. What is the scope? – Is the budget actually following the scope of the project
    b. How much of the project have been done?
    c. Fulfillment of sprint plans.
    d. Value Goals – are we actually achieving the goals set?
5. Timeline

    a. What is the plan for the project?
    b. What is the forecast (where we are)?
    c. Measure the timeline all the way to handover.
6. Risk (RIO)
    a. This risk should be used as a driver of action
    b. Have top 3 risks and mitigation of them, not only writing them but actually taking action
    c. Which actions should be taken in every sprint in order to mitigate the risk? Have a follow up of these risks. Mitigate them and take action.
7. Velocity
    a. The velocity needed for the client. The fulfillment of the timeline in order to see the early warnings.
8. Change management that could be happening in the customers' side. How can we together with the client manage the risks that are going to happen
9. Rental – it is important in order to shorten the time as fast as possible.
10. Burn up/ burn down graphs.
11. Amount of rental/ implementation hour – this will improve the efficiency of the project

4.5 Summary of the relevant KPIs

As it could be seen in the sections above, there is a great amount of views on this topic. The interviews performed provided a lot of good input on this area and also things that needed to be improved. A the beginning of the interviews, I was getting a lot of data from different people that wanted to give their opinion about the topic hence together with my supervisor at the company, we decided that it was good to structure our information where we could have the perspective from project managers and portfolio managers only. Table 5 was developed with that purpose, to understand the input received from all the different stakeholders and also have an overview of the KPI that add value to the project and project portfolio.

This summary from the different stakeholders is a conclusion of the data collected. In the table we can see that there are some key KPIs that are more relevant for all the stakeholders than others. For instance, time, scope and budget is of great value for everyone involved in the projects.

However, there are two main aspects that need to be evaluated from the interviews. These measurements need to be considered from two perspectives. The project and project portfolio perspective. Therefore one of the columns consider the important measurements needed from a portfolio perspective as well.

					STAKEHOLDERS
		PM - GOT	PM - AMERICA	PM - SINGAPORE	Sr. Managers
KPI #1	Schedule	X	X	X	X
KPI #2	Scope	X	X		X
KPI #3	Budget	X	X	X	X
KPI #4	Quality			X	X
KPI #6	Risks	X			X
KPI #7	ROI				
KPI#8	Goals			X	X
KPI#9	Time to market				
KPI #10	Velocity of the team	X			x
KPI #11	Value delivered		X		X
		10	4	2	7

Table 6. Most relevant KPIs in a project

The parameters that are listed were taking from a set of measurements that are normally used in agile projects, as well as the one used in the theory and the ones collected from performed interviews. The information that was collected from this table was very important to have as a base for the final conclusions and to make analyzes. The input was collected to have an overview of all the project managers' and portfolio managers' perspective and also an understanding of the most important parameters according to them.

When table 6 was developed, the goal was to give an overview of the opinions collected and also to help the reader follow up on the results of the interviews, understanding that the information is very rich and it could take time to understand.

5 Discussion

5.1 Gap analysis

In order to close the gap, an analysis was required to find the relationship between the data collected and the different methodologies currently used that helps to understand this issue. The following methods are used to understand how to close the gap and also to use methods for the evaluation of the right measurements. According to Kerzner, (2013) a KPI has to be aligned to the company's goal and strategy, they have to add value to the business in some way, easy to understand, standardized and actionable. Therefore, the gap analysis is very important to understand the way behind any decision taken.

There are many different methods that are used in order to analyses KPIs, hence agile KPIs are of great importance in this report. The following were chosen as they were more related to the key KPIs collected from the interviews and the input from different people but also from the methods studied and display in the coming section.

5.1.1 Methods to measure project and portfolio health in agile

In order to define and suggest improvements in how to measure and report the health of a project on agile environments, the following methods were used to evaluate and visualize the health of the ongoing projects and a project portfolio.

5.2 Opportunities for corrective action

In the following section, suggestions will be giving according to the information collected from the interviews and also from the different methods. This section is for highlighting the corrective actions that have been found on the study. The work was divided into different questions in order to give concrete answers to the corrective actions that could be done. The questions are a guide to the structure of this thesis.

The big five	SAFE
• Productivity • Quality • Predictability • Job Satisfaction • Innovation • Customer Satisfaction	• Productivity • Agility • Time-to-Market • Quality • Customer Satisfaction • Employee Engagement

Table 7. Methodologies that introduces the measurements used in agile in order to measure project health.

Table 7 demonstrates the different methods that are used in order to measure the health of a project. Every author has studied in different settings which are the parameters to follow in order to measure project health and their suggestions are the ones described on the table. They are going to be the base of this study and it will be chosen some of those measurements to study, hence not all of them are going to be analyzed but only the ones that were studied and chosen for this thesis. The reason why the focus will be on those is because of the preview studies done in the collection of the data from the interviews.

How the selection was done was mainly from conversations and the feedback received from the supervisors and the stakeholders involved. The big question was if there were any key parameters that could be followed, it is therefore appropriate to keep some key ones from each of the methods and also take into consideration the stakeholder's opinion.

The following questions were used in order to define and suggest improvements in how to measure and report health on agile projects and project portfolio. Some of the questions will be divided in two different perspective, the project perspective and the project portfolio perspective because of the focus this work will have on defining both of these perspectives. There is a great interest from all the stakeholders to know the relevant key parameters for both the project and project portfolio.

- ***What are the key parameters to follow up on?***

According to the input gathered from the interviews, the information collected from the literature and also a critical evaluation of the results, the key parameters that were chosen as the most relevant ones to follow are:

- Productivity: timeline and scope
- Cost
- Quality: defect, value creation
- Customer Satisfaction
- RIO
- Time to Market

There are reason why these parameters are actually important, an explanation of the importance of these parameters, how to measure those and also when it is necessary to measure, is collected and explained at the end of this chapter.

Some of these parameters are currently being used in some way or another, however some of them need improvement and also need to be gathered in one place. Table 7 explains how this key parameters are related to previous research. Anthony (2008) and Scaled agile framework (n.d.) explains that the best parameters to measure in order to know the health of a project are the ones mentioned above. There is a correlation to what the authors said as well as what the different interviewees stated.

One of the questions in the survey aimed to understand how these measurements were related to the company's goal and strategy for this year, some of the responses were that they did not have any good understanding on how these measurements were related to the company's goal. But they agree that by having specific goals, following on timeline and budget and having a satisfied customer will always be aligned to the company's strategy.

- ***How to visualize the result?***

Both project and portfolio managers agree that the results should be visualize in a dashboard. Everything should be together in one place and the information given needs to be clear for everyone to understand, it is important to have transparency in the way the work is done. The information collected should all be in one place and be followed up in order to have good results at the end of the project.

The new company's software called 'sales force' could be a good tool to use and start to do the improvements in the software from the beginning so that there is a consistent way of doing it in the future. This tool can be useful as a starting point in order to have a unify way of measuring the health of the project. The collective view on this point is that it is important to have a common place to gather the information and follow up on the results that have been collected before.

5.3 Key project parameters

In order to demonstrate the key KPI needed to measure project and portfolio health, key parameters are important to understand in order to know the why behind the decision taken. This section will show the parameters studied in this report from both perspectives. One can argue if parameters are actually something that agile projects should follow since, the agile approach is more towards responding to change rather than following a plan (Aguanno, 2005) but for the purpose of this thesis, the focus will be on providing some key parameters to follow and apply in their processes. The outcome of the project is to give suggestions on the key KPI that are relevant for the health of the project and its key parameters. However, selecting the right KPI could be a very challenging task, because they could vary from project to project. Nevertheless the use of metrics to analyze the health of a project are relevant today (Kerzner, 2013) The following are the key parameters suggested to studied and take into consideration.

Productivity

Chow, 2008 argue that the success factors in agile software development projects are scope, time and cost. The last two are included in the productivity parameter. Productivity was of high interest for all the stakeholders, their opinion was that in order to follow up the health of a project, they needed to have a good scope, timeline and a sprint burn down chart. Scaled agile framework , n.d. suggested that at the end of each iteration it could also be relevant to have a program performance metrics to measure how well the project is doing. The selection of these KPIs was done from analyzing both the perspective of the stakeholders

inside the company and also from the previous research done. In this parameter the key KPIs are:

1. Scope – at the beginning of the project it is important to set a scope together with the client, know their expectations, and understand their needs and work together for the action of those goals. It is therefore crucial to have an explained scope and follow up on this. Project scope refers to all the work that it takes to create a product. In Agile processes the scope could be subject to change and it has to be flexible. Therefore it is important to have fixed resources and schedules from the beginning. Work together with the team to set priorities and consider which features the team can support the sprint goal.

2. Schedule performance index – this metric will help to understand the productivity of the project. According to MANJIT, 2015 this metrics will actually measure the efficiency of the schedule. It will also indicate how fast the progress against the progress planned rate is.

Budget

Time to production – According to managers and project manager's perspective budget is of great relevance. There should be a way to analyze if the projects are staying on the set milestones.

Customer satisfaction

Earned business value - Javdani, 2013 states that this is of great interest for top managers and customers. The author also states that 'This metric can be measured in terms of financial value that is based on the estimated ROI prorated to features of each User Story'. That is one way of measuring and monitoring the business value that is being delivered to the customer. This KPI will indicate how much value has actually been generated at a particular milestone

Goals

Clear goals – Having clear goals is as important as having a clear timeline. At the beginning of each project, make sure that there are goals clearly stated with the clients and those goals are also clear for all the other stakeholders. In order to have an effective way of measuring the health of the project, goals could be a contribution to this. Having specific goals stated from the beginning of the project will help to decrease misunderstandings and unclear goals.

RIO

Risk evaluation – currently there is a way for calculating this in an effective way. However, there are no ways of mitigating those risks that are analyzed. Therefore, there should be an action plan on those risks, how do you want to mitigate those risks and also the designation of a person that could do that. Having an action plan will reduce the risk and have a clear communication between stakeholders. Risk assessments are of value to customer when there is a mitigation plan for those risks. Plan ahead what is needed to resolve the upcoming problems.

Parameter	KPI	WHY	HOW	WHEN
Productivity	Velocity	This KPI is used to measure predictability. If it is constantly in red after some sprints then it needs to be studied in more detail.	Not velocity of the team but the project. Story points fully completed in the current sprint/Story points planned currently in the sprint	Every 3 Sprint
	Schedule Performance Indicator (SPI)	This KPI will help to provide a clear view of the Schedule variance in agile projects.	Earned value (EV)/ Planned Value (PV)	Every Sprint
Cost	Cost Performance Indicator (CPI)	This KPI will show how efficiently the project is spending the budget compared to how efficiently it is planned to be spend.	Earned Value (EV)/ Actual hours to date	Every Sprint
	Rental	To understand how efficient the implementation department is at the moment comparing all the projects that are currently in the implementation department.	Monthly rental/ Estimated Implementation hours	Beginning of each project
Customer Satisfaction	Net Customer Satisfaction Score	Customer are at the core of the company values. Knowing if they are satisfied or not with the projects is key to have a good further relationship with them.	On a scale from 1-10 how satisfy is the customer. Three specific question to see what the customer thinks about the project.	Every sprint. Done by the PM and the Customer PM
Risks	Average top three risks	Risk could lead to program failure if not managed appropriately. Managers need to know how likely it is to have a risk that can affect the work in the project.	Average of the impact of the top three risk in a project. If there is a project that is without mitigation plan, it should be considered in red.	Every Sprint

Table 8. Why, how and when of the key parameters in agile projects.

5.3.1 Key portfolio parameters

From a project portfolio perspective there are other kind of parameters that are considered. The way project is measured could also be related on how portfolio is being measured, they are somehow connected. Project portfolio inside the company has a lack of correlation between those two. There is a lack of seeing the relationship between the single projects and projects in general. Having an overview of the overall portfolio and measuring those from that perspective, will help managers have an overview of how the Implementation department is going.

The suggested parameters and KPIs mentioned here were developed and chosen from the results gathered in the interviews and also from the gap analysis. There are somehow relationship from all of their perspectives and the literature studied.

- Value delivered – main KPI is value creation. Value creation will indicate how much value has been planned to be generating by a set milestone.
- Rental – from manager's perspective this is a very important KPI to maintain since it is relevant to always know the efficiency of the implementation department level. According to the information collected on the interviews, this KPI is used in order to evaluate how the products are being developed and how they are being delivered. In order to satisfy customers and deliver the value required, rental is of great interest to keep. The company works with something called KPI14 which is a KPI that measures the value delivered of the project and it is used in the current reports. This information is easy to follow and also important to measure.
- Customer satisfaction – both in a project and portfolio perspective, understand customers need and meet them is of importance for all the stakeholders. Knowing if the customers are satisfied or not has been mentioned in all the interviews performed. There is a need to measure customer satisfaction in a more systematic way.
- Time-to-market (TTM) - In order to be relevant in the market and keep adding value to customers from the managers perspective, this KPI should be measured and followed up. There is still some information missing about the way it could be measured. However, TTM measures the ability of planning that the company currently is able to manage and the execution speed of the processes, how fast are the teams in executing.
- Quality – last but not least is quality control from a portfolio perspective. This parameter is of highly importance since it is connected to the company's main values. One of the KPI that was mentioned and is therefore considered here in the results is the acceptance test. This test is done in order to add value to the project by knowing if the requirements of the code used in the software are being met. This is in order to have a successful implementation of the software.

Main Parameters	KPI	WHY	HOW	WHEN
	Time-to-market (TTM)	In order to be relevant in the market and keep adding value to customers	Number of releases per year. This measures which is the ability of planning that the company currently is able to manage and the execution speed of the processes, how fast are the teams in executing.	Every year

Quality	Acceptance test	For the successful implementation of the software. Add value.	Acceptance criteria average.	End of the project.

Table 9. Why, how and when of the key parameters in agile project portfolio.

5.4 Evaluation of the final metrics

In order to bring some more clarity to the suggestions given in the above section, feedback from managers was required in order to have their perspective about what could actually be applied in the current improvement processes of the company. The following is the discussion about the final KPIs that were selected and an in-depth information of those that will be part of the conclusion.

5.4.1 Agile Project

In agile projects, customers' requirements and expectations will constantly change, there are some key parameters that are fixed such as time and resources, however, others parameters could change over the period of the project (Carroll, 2015). According to (Aguanno, 2005), parameters such as predictability, schedule and cost are of great interest when working on agile projects. The interviews showed the same information as the authors. Stakeholders agree that agile parameters are relevant for this kind of projects.

It was a lot of discussion on how and which were going to be the most relevant KPIs and parameters to follow. The suggestions mentioned above were given and those were rejected by managers which made the work even more complicated at the end. Therefore in order to get a deeper insight into what was really wanted and expected as the end result, other interviews were performed to specific people that would guide me to get a better understanding of the 'how' those KPI could be measured accordingly. In this final evaluation, the input gotten from managers about this will be the final result for this thesis work.

In order to have more clarity around the suggested KPIs, the following parameters were determined to be the most relevant ones and the applicable KPI will also be explained and analyzed here.

5.4.1.1 Project Productivity

One KPI that is used to measure the schedule, is the Schedule Performance Indicator (SPI). According to MANJIT, 2015 this KPI will help to provide a clear view of the Schedule variance in the agile projects. Earned Value Management calculations based on hours spent and planned to be spent in the project.

The company is currently using this KPI to understand how the earned value is in compared to the planned value. However, lack of clarity around this measurement was missing and it was therefore important to explain in more detail how this could be measured, when and why. Table 5 gives a detail explanation of this.

5.4.1.2 Project Cost

Cost was also mentioned early as an important parameter to follow. The KPI that was selected in this new suggestion was Cost Performance Indicator (CPI). This will show how efficiently the project is actually spending their budget and how it is planned to be spend. This is a traditional way of measuring it.

There is a scale that will determine if the project is on budget, over budget or under budget. It will be shown at the end of the spring as a sign of the health that the currently project is having. Is the status colour well or not.

5.4.1.3 Project Customer Satisfaction

Customer satisfaction was a concern for all the stakeholders involved. It is important to know if the customer is satisfied or not with the end result but also along the process of the project. Currently there is a way of measuring this only at the end of the project, however, there is not a measurement that shows how satisfied the customer is during the development of the project.

Hence a suggestion to measure this was also given. The Net Customer Satisfaction Score was the KPI suggested and this consists of having a scale from one to ten and from that scale determine how satisfied or not is the customer with the work so far. One question will be asked just to have a record of their satisfaction during the progress of the project. From cero to six will show that the customer is not likely satisfied, from seven to eight it is likely satisfied and from nine to ten it is satisfied. This measurement will also help managers to follow up the status of the project. If there is a constant red box at the end of each sprint, then project managers and managers in general will have to take notice of this and develop a better relationship with their customers.

5.4.1.4 Project Risks

Another parameter that has been suggested to study and analyse is a KPI that shows the status of the project risks. Since risks that are not mitigate or do not have an action plan could cause project delay or even the cancelation of it then according to managers, it is important to have a way of measuring this. The impact of a risks could be high, low or medium, therefore a KPI that analyses the impact of a risk have been suggested. An average of the impact of the top three risks in a project could give an understanding of the likelihood of a risk happening and impacting the success of that project.

For instance, if there is a project that has five different risks, their impact is calculated from one to five times the likelihood of this risks happening, then the average of the results will determine if the impact of the risks in the project is low, medium or high.

All the above mentioned KPI are great for managers because it will be easy for them to follow up on the projects in a way that is more understandable. However, it is important to consider as well if these KPIs will add more work to project managers. Their major concern when asking about this measurement was that they already had so much work to do in collecting data from other parts, they did not want something more that would add more work to their everyday schedules. This measurements need to be communicated properly and also make it in an easy way to follow.

5.4.2 Agile Portfolio

Another level to be considered in this thesis is the portfolio level. According to Scaled agile framework , n.d. in this level, there is a visibility of the work in progress of all the projects in order to the actual demand that the projects have are matching the business value of the whole company. There are some parameters and metrics that are also suggested to be relevant on the portfolio perspective.

5.4.2.1 Time to Market

Time to market was one of those KPIs that was suggested to be measured in a more agile way. This agile way is suggested by Scaled Agile Framework, n.d. as one that is needed in order to have more information about how the competitive level of the company is at the moment. Krebs, (2008) argues that being ahead of the market is of great importance for many companies and there is a need to develop products that are competitive in the market. One way of measuring it is being determining the number of releases per year and understand the value to the market.

5.4.2.2 Quality

Quality is also one of the company's main values, it is therefore a measurement of great importance. Scaled Agile Framework, n.d. and Anthony, (2008) suggested that this is a key parameter to follow in agile. Measuring it accordingly will add value to both the project and portfolio level.

6 Conclusions

Finding appropriate measurements to assess the health of individual project and the project portfolio is challenging, not the least because the multitude of factors in need of consideration. Traditional and agile ways of working in software development companies have created tension in regard to how processes are being developed. There are uncertainties in the way of working and this has developed the need for improvements in different areas. However, there is still a confusion about both the merits and methods of working "agile" in projects, comparing to more traditional methods. Some authors even suggest that there seems to be benefits from adopting both of them, for different project phases. An overriding question is further whether "agile companies" really are working in non-traditional ways at all? Are KPIs aligned to the agile methodology and if so, how should they be measured?

In order to answer these questions, RQ1 was pursued by developing a frame of key parameters needed in order to measure health in project and project portfolio in an agile context. Studies show that even though companies are trying to be agile, the processes and measurements are not set up accordingly. There are still inconsistent ways of measuring and not really balanced between the traditional and non-traditional (Serrador & Pinto, 2015). In our case study, guides and handbooks explain how they should work in agile, however, some of the processes lack this agility where flexibility and less documentation is needed.

When working in agile, there is more freedom in the way of working and there is more flexibility on the way of reporting. The reports that are developed in agile are fit for purpose, where everything that is being reported has a specific meaning. On the other hand, in a more traditional way of working, reports are structure in a way where things are more systematic and without a lot of flexibility (Carroll, 2015). The systems and processes that were used need to be now adapted to a new more flexible way of working. This will benefit both the organization and the team project. Flexibility will decrease the amount of paperwork and increase productivity (Sheffield & Lemétayer, 2013). One of the main concerns of project managers was the amount of work that these 'new' measurements could add to their daily work, currently there are inconsistent ways of measuring and this adds to their everyday work. Being able to understand if this is something that the team and projects really need will help explain the why behind every measurement added.

Measurements are good because it helps to decrease uncertainties regarding future outcomes and evaluating and comparing projects in a portfolio, however these measurements need to be aligned to the organization's goal and agile methodologies otherwise those will result in more workload for the project managers and more confusion.

Sheffield & Lemétayer, (2013) explained that well-designed and well-executed processes in agile leads to project success, hence the following summary of the suggested KPIs not only explains their purpose but also why, how and when in

order to clarify and have transparency on the way projects should be measured to be successful.

From a portfolio perspective, Stettina & Hörz, (2015) argues that transparency, collaboration and commitment from all the people involved in a project are important factors for project success. Currently the way of collaborating is somewhat limited, hence some suggestions are to create more transparency on the way the information is shared and. Collaboration between project managers is key in order to develop commitment within the project teams. Lack of engagement between top management, project managers, project team and customer will cause project more likely to fail. Having flexibility and adaptability in the processes to work towards the same goal and the commitment from all the levels in the company will generate better end results and cause project success (Sheffield & Lemétayer, 2013).

In order to measure project and portfolio health a set of KPIs were suggested to be implemented into the agile projects. Hence these kinds of measurements need to be adapted to their specific project and environment. This could be discussed together with the customer and the project manager in order to determine which one is relevant for their work. This is done in order to create a more transparent way of working as well to receive the commitment necessary to work on this.

6.1 Research question

What are the key parameters to follow in order to measure health in project and project portfolio in an agile environment?

6.1.1 Suggested KPIs

The parameters proposed are: Productivity, Cost, Customer Satisfaction, Risk, Time to Market and Quality. Each parameter has its own KPI and the following KPIs were suggested in order to measure project health. Some of those were shaped and reshaped in order to meet the companies' criteria but are all in all considered appropriate and valuable indicators to be implemented in their processes. As mentioned before, it is important that every company evaluates their current situation and then determine the kind of measurements that could be useful for their particular situation. The suggestions were divided into two different levels, project and portfolio level.

Project level:

- KPI # 1: Velocity – Will help to measure predictability. It is measured the amount of story points fully completed so far by story points planned currently in the release. In order to understand if the project is in delayed, or is ahead of plan or is as planned, a scale was determined and it shows in colors red, green and white how the project is going.
- KPI #2: SPI – This KPI will help to provide a clear view of the Schedule variance in the agile projects. As is was mentioned earlier, it is measured EV/PV. The scale to determine if the project is on schedule or not is the following: =1 on Schedule, <1 Behind Schedule and >1 ahead of plan.
- KPI #3: CPI - This KPI will show how efficiently the project is spending the budget compared to how effectively it is planned to be spend. It is measured: Earned Value

(EV) / Total actual Cost in Euro. The scale the follows is: =1. On budget, <1 Over Budget and >1 Under Budget.

- KPI #4: Risk – This KPI is developed in order to deal with the uncertainty that every project could face. It will be measured by: the average of the top three risk. Likelihood times impact. If there is not a mitigation plan in any of these risks, then it is highly risky. The scale to follow is: 1- 6 lower risk, 7-12 Medium risks and 13-25 High risks.
- KPI #5: Customer Satisfaction – There is a need to understand how satisfy is the customer in each sprint, therefore a survey with three question will be asked at the end of the sprint and from a scale of 1-10, the company will know how satisfied is the customer with the work done this far. It is going to be bases in three questions team, management and value. The scale to follow will be: from 0-6 not likely satisfied, 7-8 likely satisfied, 9-10 extremely likely satisfied.
- KPI #6: Rental – Is a KPI that is currently being measured and it is used in the beginning of the projects in order to understand and set the right resources to the right project.

Portfolio Level:

- KPI # 7: Time to Market: In order to be keep being relevant in the market. Time to Market will help to analyze of the portfolio is ahead of competition or if there are any delays and them it may have an impact on the business value.
- KPI #8: Quality: One of the company's main goal is quality. Delivering quality products are of importance for all the levels. A KPI for the acceptance test should be evaluated.

The above KPIs have been selected as a base for measure the health of project and project portfolio in Agile. These measurement have been both a combination of the suggestions given in the interviews performed as well as methods and frameworks that are currently used in the development of projects in agile. Each parameter follows a KPI that indicates every two to three weeks the status color of the project. For example, "Red" indicates that immediate measurements should be taken by the appropriate manager.

When implementing new ways of working such as agile, there is a need for clarity and transparency on how things should be done, this is one of the main characteristics of working in agile. Hence one suggestions is that it could be good to have workshops to communicate the KPI and how these are related to agile with all the PM. Their input is of great value and even though the suggested measurements could be good from the management perspective, including the input of project managers would also help to make the process a success. Authors agree that one of the strengths of agile is the open communication and the interaction between the different roles in order to have the same knowledge.

Various research studies indicate that another key factor for project success is to have good collaboration between all the stakeholders involved in a project, some of the project managers agree that collaboration between the different roles will help the team and everyone to understand the project and how it can be measured accordingly. There is also a need for collaboration between project managers in order to share their knowledge and experience in all the phases of the project. This could be done by having a PM community and a person in charge of developing

this. Strengthening the collaboration between them will develop a more consistent way for knowledge sharing. Therefore, it can be concluded that in order to reach project success and obtain good results in measuring the health of a project, there has to be collaboration from the bottom to the top.

Another key aspect that was discovered in this thesis is that, measuring projects successfully would require consistency in the way reports are performed, likewise the information provided from different sources should give a better view of the project and aim towards the same goal. When working in agile, the information has to be clear and transparent, hence there should be consistent ways of measuring as well as keeping the information.

At the beginning of every project, each PM could make a study of the kind of measurements or KPIs that can help them to have successful/ healthy projects. These suggestions are given in order to have a base, however, every project has its own complexity, it is therefore important to determine which measurement is really relevant for the specific project. For instance, the key KPI suggested to evaluate the health of the project are velocity, CPI, SPI, risk and customer satisfaction. These would help to determine whether the project is following specific requirements or not.

If managers want project manager and/or managers to be engaged on entering the data, there should be places where everything is explained easily and also the motivation of why this will help, people need to understand the why before performing. In a global perspective, project managers also agree that there are too many reports, they recognize that it could be helpful to consolidate in just one place all the information so that anyone could have access to them. Using one tool to collect data and information from the projects will help the project managers and other parties involved to understand and follow up the health of a project as well as previous experiences will help to improve the future outcomes.

As it was mentioned earlier, the adoption of agile in traditional environments could be in some cases very immature, there are still many traditional ways that tend to create tension with agile projects since project are not black and white. A KPI will help to understand the status of the project but it will not provide with the last word of how projects in general are performing. In contrast to the traditional projects, agile methodologies focus on change as an advantage to enhance the value of the process, therefore having processes that are constantly changing should be a part of all the processes.

Finally, it can be said that agile projects are meant to facilitate the way projects are done, by constantly receiving feedback and creating a good team dynamic, it helps to reduce complexity and to meet customers' expectations. In order to achieve this, traditional ways need to be reconsidered and changed accordingly. Measurements are traditional oriented, but they have been adapted to agile projects in order to bring that flexibility and to reduce complexity. The goal of this thesis was to discover how these KPIs could be applied in agile projects, it will hopefully help the readers to know how, when and why this measurements are important from an agile perspective.

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Appendices

Appendix A
Stakeholders Interview

Questionnaire for defining the health of the Crew Ops Project Portfolio and individual Projects.

As of today there are no consistent way of reporting health on the Crew Ops Project Portfolio and individual Projects. There are status reported partly inconsistently on individual projects in the Portfolio with traditional KPIs like budget, Milestones, Status Color etc. There is a need of quickly evaluate both health on single project and on the whole Project Portfolio in an agile environment.

- What would you like to have in order to measure projects?
- Which criteria you believe are important in order to measure the health of a project?
- How do you know a project is on health?
- Which areas of a project are really important for all the stakeholders?
- Which of these KPI do you think are aligned with the organization's goals?
- What value do you think this KPI would add to the projects?

Key performance indicators. Which others of the following mention KPIs do you think will help to the improvement of the project processes?

- ✓ Customer satisfaction
- ✓ Best agile practices
- ✓ Team velocity
- ✓ Time to market
- ✓ Values delivered.
- ✓ Budget
- ✓ Timeline
- ✓ Scope

Different stakeholders – what does the PM need in order to efficiently measure. What does the customer need?

B: Project Managers Interview

Appendix B
Questionnaire for defining the health of the Crew Ops Project Portfolio and individual Projects.
As of today there are no consistent way of reporting health on the Crew Ops Project Portfolio and individual Projects. There are status reported partly inconsistently on individual projects in the Portfolio with traditional KPIs like budget, Milestones, Status Color etc. There is a need of quickly evaluate both health on single project and on the whole Project Portfolio in an agile environment.
Business value:
To have an unified way of measure project health will increase visibility of single project and project portfolios status and we can quicker take actions for mitigation and deliver successfully. I.e. no impact on revenue or rental.
What do we have:

- How do you currently measure and follow up projects?
- Which criteria you believe are important to measure the health of a project?
- How do you visualize a standard health indicator and how would you like to work with it?
- Which areas of a project are really important for all the stakeholders?
- Which of these areas should we consider on the metrics for Project Health Indicators?
- Which of these KPI do you think are aligned with the organization's goals?
- How do you measure the quality of a project?

Key performance indicators. Which others of the following mention KPIs do you think will help to the improvement of the project processes?

- ✓ Customer satisfaction
- ✓ Best agile practices
- ✓ Team velocity
- ✓ Time to market
- ✓ Values delivered.
- ✓ Budget
- ✓ Timeline
- ✓ Scope

Expectations:

- What would you like to have in order to measure projects?
- How would you like to measure projects?
- Who should do that?
- How should we maintain this?