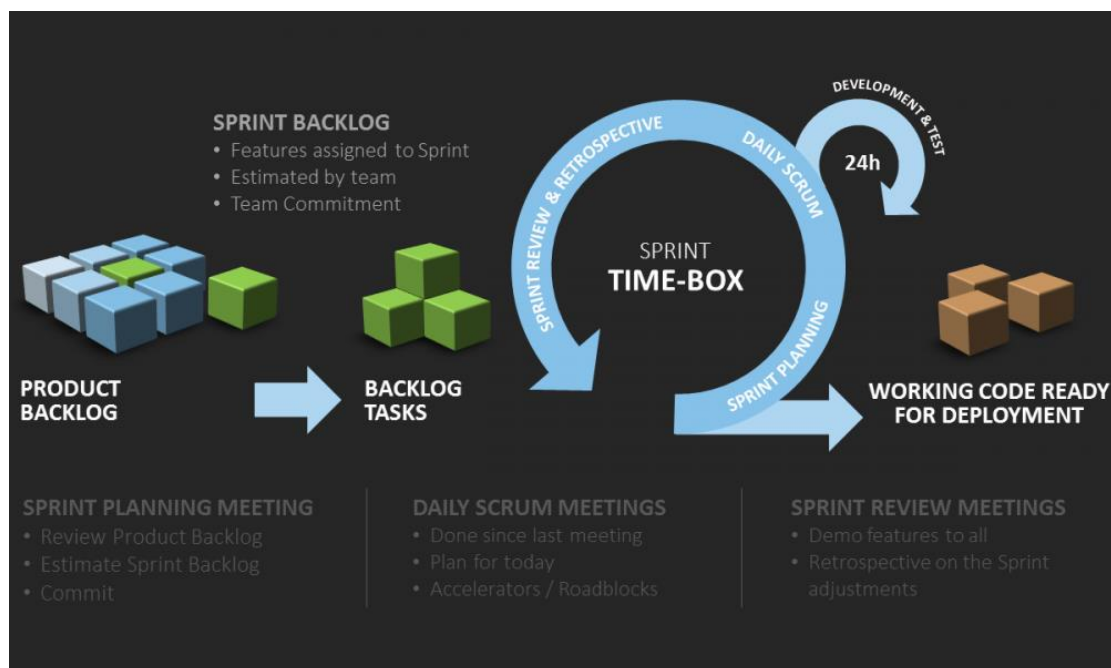


PROJECT MANAGEMENT WITH AGILE PERSPECTIVES

Thesis for computer science education



DEN 12 APRIL 2016
MIKE MAMERY SANOH
Copenhagen Business Academy

Innehållsförteckning

1	Introduction	3
1.1	Problem perspectives	3
1.1.1	Goal	4
2	Traditional project management.....	5
2.1	Project	5
2.2	What is a project management?	6
2.2.1	Start up	7
2.2.2	Planning	7
2.2.3	Execution	8
2.2.4	Closing out	8
2.3	The Traditional Project Manager	9
2.3.1	Responsibilities	9
2.3.2	Challenges	10
2.3.3	Skills	11
2.3.3.1	Project management process skills	11
2.3.3.2	Interpersonal and behavioral skills	11
2.3.3.3	Technology management skills.....	11
2.3.3.4	Desired personal traits.....	11
3	Systems Development Methods	13
3.1	Historical Development of System Development.....	13
3.2	Agile methodology.....	14
3.3	Disciplinary vs Agile	17
4	Agile Project Management.....	19
4.1	Practices and rules.....	19
4.1.1	Scrum skeleton.....	20
4.1.2	Scrum flow	20
4.1.3	Scrum Artifacts	21
4.1.4	Stakeholders	21
4.1.5	Team	21
4.1.5.1	Required skills for a team member	22
4.1.6	Product Owner	22
4.2	Scrum Master with management responsibilities	22
5	Empirical Studies on Scrum.....	25
5.1	Respondents	25
5.1.1	King.com.....	25
5.1.2	UsTwo.com.....	25

5.1.3	Hypergene.se.....	25
5.1.4	Citerus.se.....	25
5.1.5	Adaptive.se.....	25
5.2	Empirical results	26
5.2.1	Have you worked with a modified version of scrum's methodology if yes please describe it?.....	26
5.2.1.1	Analysis on the use of Scrum methodology	28
5.2.2	How do you use the method in your work as a Scrum Master or project manager in agile?	28
5.2.3	What are the major benefits of Scrum?.....	31
5.2.4	What are the main characteristics you consider are most important to a Scrum project manager?.....	32
5.2.5	If you should choose a project manager what characteristics do you expect from him?.....	33
5.2.6	What did I learn from the survey?	34
6	Comparing Agile Project Management and the Traditional Waterfall Method....	35
6.1	What are the Similarities?	35
7	Supplementary knowledge	36
8	Conclusions	38
9	Survey Questionnaires.....	39
10	References.....	40

1 Introduction

As the title reveals this paper is about project management. More specifically, management of projects that support the agile system development methods.

The basic ideas of this paper comes from a graduate course called “System development”. The goal of the course was to learn about systems development theories. During the same course we were introduced an agile approach of system development followed by a small practical project. The subject seemed very interesting to investigate further even after that small practical project on XP/scrum. The purpose of further investigation on the subject is to check if there are any discrepancies between what we as computer science students have read about systems development methods and how companies use them in real life when it comes to manage project. Today projects represent a very large part of the organizations and people's daily lives. It has also become increasingly important for companies to be the first on the market with new products and to be rapidly capable to transform the organization in order to meet new market demands. Therefore, there is a strong focus on new way of managing projects. How will a project manager act in that new environment? We know that the basic idea of the project manager has been to manage, support and monitor the process and the project manager traditionally has authoritarian role.

Despite the increased focus on education and sophisticated methods, many problems remain in project management. More than half of IT projects are not delivered on time and the planned budget is exceeding. Until now, people in the field have tried to address these problems by refining proven methods, reducing uncertainty through a rigorous planning or appoint "heavy" people with traditional managerial skills to the project. Most of today's companies are under competitive pressure then the need to work in the project constantly. Uncertainty, turbulence, and the rapid changes characterize the real world. The changes include both market and technology, as well as skills, values and attitudes among employees. Many companies are operating in growing industries. The agile methods were created as a response to the traditional project management method, known for its rigidity. An authoritarian leader figure will not fit an agile project because it will not give him power or space to function in such an environment. The agile project manager will encourage individual thought and action.

There are currently a large number of different methods for systems development and project management based on different philosophy.

1.1 Problem perspectives

The core idea of the agile methods is to try to make development more flexible and easier to maneuver. The basic idea is that in a changing world developing methods are required to handle change as a part of reality, not those who close their eyes to change or try to regulate them. Flexibility rather than rigidity is characterizing agile methodology. In 2001, the Agile manifesto for Agile development software was born as a reaction against the traditional approaches¹. A number of agile gurus formed the Agile Alliance², an alliance that markets and promotes the use of agile methods "Agile" has become an umbrella term for a set of values, attitudes and principles, and

¹ Management 3.0, page 20

² <https://www.agilealliance.org>

there are a number of development methods within the agile family³. The Alliance has helped to document a number of agile methods, with the same values and vision of development. The Agile Alliance is marketing the agile methods very hard. Most information about agile methods are on the internet, including the companies that use and training in agile methods. This can lead to further distortion of information when those corporates are aiming to sell and make money on agile methods and do not describe them very well. Right now, it has gone a little fashion to develop Agile and even companies that are representative of traditional methods are jumping on board to show how they can work with agility within a formal framework⁴. Computer science students are curious to know more about the world in which agile system works. Moreover, the agile methods rely on a different hierarchical structure. Their principles rely on the developers; therefore, words as leadership, management and control are not part of the daily life in agile environment although they are there but in another form.

1.1.1 Goal

The word project manager becomes taboos in agile, the role closed to project manager is Scrum Master. So it feels relevant to examine how the perception of projects and project management differ from the traditional to the agile school. How is the work of an Agile project manager and the statutory work for a traditional project manager different? How is their work different? It is only the role of an agile project manager or Scrum Master, that we observe deeply and no other roles in a project, even if other roles will be mentioned at the time when we first look at how it generally is to work with agile methods. The role is a combination of concrete specific tasks that include the responsibilities of the agile project managers together with personal qualities they should have. The empirical study includes only agile project management and is set against the theoretical picture that literature gives about the traditional project manager. Scrum will be the method I have chosen to focus on this paper when it comes to choose the agile methodology.

Chapter 2 describes a literature study of traditional project management. The nine process groups known as knowledge area will not be subject of a thorough study in this paper. Thus, they will be mentioned.

Chapter 3 talks about the system development. It begins by describing what a system approach is, and then take up the methods' emergence and use from a historical perspective. This is followed by a more developed definition of the agile methods. The chapter concludes by describing the differences between agile and disciplinary methods, where iterative and waterfall model-based methods represent a common generalization of the disciplinary.

Chapter 4 describes Scrum as agile project management method.

Chapter 5 describes an empirical study of Scrum. Scrum Masters who are responsible for projects have described how they use Scrum in their companies.

Chapter 6 focuses more on how agile project manager is different from a traditional project manager based on the use of Scrum in really life and relative to theories. Similarities between the traditional and the agile project manager based on the empirical results are also presented. It is an analysis of the traditional project

³ System Development Course

⁴ <http://www.ibm.com/developerworks/rational/library/feb05/krebs/>

manager's roll against the result we get from the empirical study of the agile project management.

Chapter 7 presents some complementary knowledge and chapter 8 is the conclusion.

2 Traditional project management

When it comes to discussing about traditional project management, it is important to define it. The chapter "Traditional project management" opens the paper with the theoretical part describe the literature, which has something to say about the traditional project management and existing theory about the project manager role.

2.1 Project

We characterize a project by four mean criteria:

- ✓ Objectives manage project.
- ✓ It only exists during the time required
- ✓ It has limitation in terms of money and other types of resources
- ✓ It is always something that is new. It is unique and not a copy of something.

A project is not a routine operation, but a specific set of operations designed to accomplish a goal⁵. A project is carried out under certain constraints as cost, time and scope. Figure 3.1 illustrates the relationship between those main constraints in a project. Time is the available time to deliver the project, cost represents the amount of money or resources available, the scope consists of a list of deliverables, what needs to be developed in the project and quality represents the fit-to-purpose that the project must achieve to be a success. The area of the triangle is quality of the project. Each constraint tries to affect the other two. The three constraints are interrelated. We cannot increase the scope without increasing the time and the cost. If we try to squeeze any of those constraints, then the quality will be affected. A good manager will always try to manage those three constraints. In many cases scope was the primary driver because we previously thought that scope was known early in the project and cost and schedule varied⁶.



⁵ Antvik, Sven & Sjöholm, Håkan. (2007). *Project management and methods*. P.12

⁶ Highsmith, Jim. (Second Edition). *Agile Management Project*. P.20

Fig 3.1⁷: Triple constraints

2.2 What is a project management?

A project management is the application of knowledge, skills, tools and techniques to a broad range of activities in order to meet the requirements of a specific project. In order to ease the management, organizations performing projects will divide each project into phases. A collection of those phases are known as the project life cycle. Fig 3.2⁸ describes a project management life cycle, which is the basic framework for managing all projects. It describes the phases from the start of the project to the end of the project. The vertical axe represents the degree, which is the cost and the staff. The horizontal axe is the project time. Cost and staff are low at the start but they are increasing at execution phase and at the end, they drop rapidly because we want to close the project. There will be no more people involved. As we move forward in our project, the risk and uncertainty are decreasing. As we get deeper into the project, the cost of changes becomes higher.

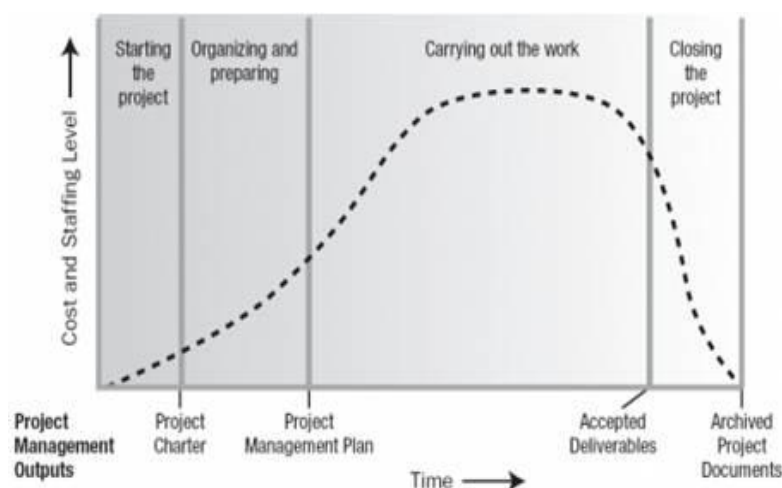
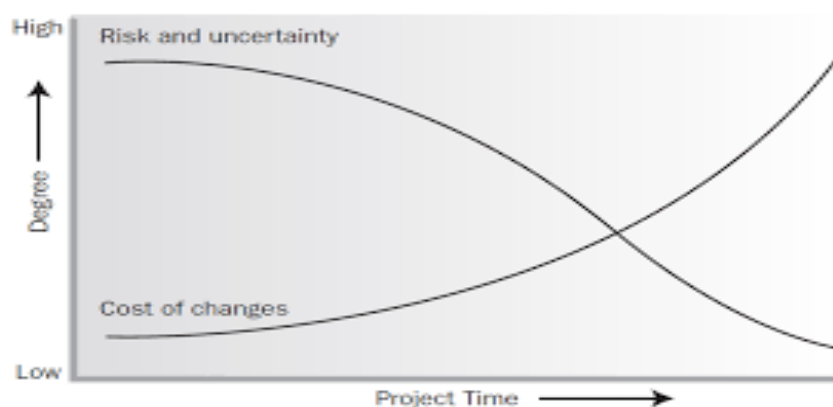


Fig 3.2: Project life cycle⁹



⁷ Highsmith, Jim. (Second Edition). *Agile Management Project*. P.21

⁸ PMBOK

⁹ <https://www.uakron.edu/pmo/plc/> (office)

Fig 3.3: Risk and uncertainty¹⁰

The project life cycle will depend on the engineering domain we are working in. Every project has its own specific domain phases' structure. We have different life cycles: Predictive life cycle where the problem is well known and you can go through a series of software to deliver the product. In the iterative life cycle, the problem domain is not well known. Divide the projects in several iterations up to two months for each iteration. Each iteration consists of phases (requirements, analysis, development, testing and deployment). At the end of the first iteration, we deliver version one and get the feedback of the customer. Based on that, you build the second iteration, which will be the last delivery. The adaptive life cycle is the same as the iterative incremental but here the iteration size is very small. The project life is characterized by more uncertainties. Initiation, planning, execution and closing are the expressions mostly used to describe project phases. PMBOK uses the same expressions for describing project management processes. To avoid the confusion, this paper will use following project management phases¹¹.

2.2.1 Start up

The feasibility study and a business case may be appropriate and accepted to start the project.

- ✓ Appoint a project manager and a project team
- ✓ Set up the project Office and strategies
- ✓ Perform a phase review
- ✓ Internal kick off
- ✓ External kick off

2.2.2 Planning

The project manager leads the project team in preparing the Project Plan, which includes plans for requirements, the project objectives, the project scope, resource, procurement, risk, time schedules, budget and communication.

When the board and the stakeholders have approved the business case then the project manager will prepare the **planning phase**, which consists of six steps¹²:

- ✓ Define clear objectives of the project. What do we hope to achieve by implementing this project?
- ✓ Clarify the scope means that how are we going to achieve this project. The scope is broken down into units of work to be delivered. It is commonly called Work Break Down Structure (WBS)
- ✓ The organization breakdown structure (OWS) is characterized by staffing requirements. What skills are required to perform the tasks
- ✓ Assign responsibilities to the chosen skills

¹⁰ <http://www.ctrmforce.com/project-management/> (Force)

¹¹ Antvik, Sven & Sjöholm, Håkan. (2007). *Project management and methods*. P.19

¹² Antvik, Sven & Sjöholm, Håkan. (2007). *Project management and methods*. P.43

- ✓ Time schedules are determined when having a clear picture of the objectives and the available resources
- ✓ The budget costs are allocated against each of the work units.

2.2.3 Execution

When the planning phase is over, the ***execution and controlling phase*** starts. Following four steps are performed¹³ during the execution phase:

- ✓ Actual Costs (AC)
- ✓ Achieved performance
- ✓ Earned value (EV)
- ✓ Analysis including trends

Additional activities are performed as well:

- ✓ Communication
- ✓ Change management
- ✓ Monitoring and necessary actions
- ✓ Handing over to the customer

2.2.4 Closing out

The project is closed internally as well externally. Following tasks are also performed during that phase:

- ✓ Learning from experience
- ✓ Archiving
- ✓ Internal close out

As we said earlier the above phases constitute the project life's cycle. Within each stage (phases) of the life's cycle various processes are performed. The project manager will need to implement a range of management processes under each of the five phases. These processes describe what happens within each phase. The various types of processes have been classified and Grouped into nine categories in the PMBOK Guide, known as Project Management Knowledge Areas¹⁴. The purpose of these Knowledge Areas is to better organize the different processes and making the processes having common characteristics in one category.

Process groups are the processes that are taken place throughout the Life Cycle of a Project. The project manager has the responsibility to monitor and control all the processes that occur during the life cycle of the project. Monitoring and controlling group is the only process group that occurs through all the phases of the life cycle of the project. Below we have the project management knowledge areas.

- ✓ Perform time management is about recording the time spent by the people in the project

¹³ Antvik, Sven & Sjöholm, Håkan. (2007). *Project management and methods*. P.44 (Boehm & Turner)

¹⁴ PMBOK (Project management Body of knowledge 2000 Edition, Page 4)

- ✓ Perform cost management helps the project manager to control expenses related to the project
- ✓ Perform quality management represent a set of rules that the project manager will follow to make sure that the produced deliverables are fitting the purpose.
- ✓ Perform change management is a set of rules the project team can use to control change effectively.
- ✓ Perform risk management describes the steps we need to take to identify, monitor and control risk.
- ✓ Perform issue management is a set of rules to manage issues when they occur
- ✓ Perform procurement management is a method by which items are purchased from external suppliers
- ✓ Perform acceptance management are steps taken to perform user acceptance testing.
- ✓ Perform communications management

2.3 The Traditional Project Manager

The project manager's primary task is to lead and manage the project from start to finish. This include managing both the people involved in the project and the task itself.

The project manager coordinates the effort of the people who may not be used to work with one another. The traditional project leader must work with this diverse group of people so that they merge into an effective working team¹⁵.

The Project Manager will work to carry out the project tasks so that the project's objectives are accomplished. It is important that the project manager can encourage the project's participants, control, manage and operate project forward. Projects are specific and are outside the usual line hierarchy.

The project manager must constantly work to convince their environment and acquire influence. There are no absolute answers but some guidelines and principles can be discerned to facilitate and define the project manager's role.

The project manager's role can be examined from three angles¹⁶:

- ✓ The responsibilities you will have as a project manager
- ✓ The challenges you are likely to face
- ✓ The skills you will need to perform

2.3.1 Responsibilities

The most obvious responsibility of the project manager is the **project**. Responsible for the project's objectives. These are limited but require a very clear and dynamic activity. The project manager's role in the project can be compared to the CEO role in a business. He is also responsible for the cost, the schedule, the task or functionality and the quality of the result. He has the duties to run the project efficiently.

A project manager in many ways has the final responsibility for the project's success or failure.

Moreover, you have responsibility to the **organization**. As a project manager you should provide an acceptable return on Investment (ROI) to your organization. At the

¹⁵ Project Management, Gary R. Heerkens, page 19

¹⁶ Project Management, Gary R. Heerkens, page 38

same time, you should make decisions that are in the best interests of your organization and those decisions may not be the best for the project. In addition to that, you should keep your organization proactively informed about your estimating, status reporting and bad and good forecasts. Do not fail informing people involved in the project.

It is important that the project manager is aware of the personal reasons for which the mentor has asked to take the project in the organization. This, because it is essential to understand the background of the project in order to avoid stepping on anyone's toes, and later disable a successful outcome of the project. Constantly having her eyes up and keep a good communication with the mentor is therefore an important part of the project manager's job.

You have also responsibilities to your **team**. That means that you should make sure that your team is properly informed throughout the project and it receives fair and constructive feedback from you as project manager. Do not forget to recognize the team's performance.

The project manager's role is all about managing performance and he is responsible for both the entire group but also the individual participants' performance.

The final responsibility is to **yourself**. Your personal growth and development as project manager depend on yourself.

2.3.2 Challenges

When it comes to challenges, you have to bear in mind that the gap between your responsibility and the existing authority in the organization can be extremely wide. You will need to compensate your lack of formal authority by relying upon your expertise and your ability to influence and persuade.

The project manager can also be very challenging to handle opposition and criticism from others involved, and stakeholders.

There is often some resistance in organization against the unknown or unpredictable.

The manager must therefore work to build up the credibility in the project.

Leading a project is completely different from leading a department. A project is a new assignment and it has not been done before. We have no idea about the final product and all the rules and process for producing it. For you to succeed, you'll have to rely on your ability to coach, mentor, and motivate in order to get the level of performance you need from those assigned to work on your project. You'll have to condition yourself to seek acceptable solutions, rather than perfect ones.

So if you feel mentally prepared to accept this challenge, you're well on your way to becoming a successful project manager. The only thing left is to learn how to do it the right way.

In addition to that the project manager should provide a credible estimation which meets the goals of the project (cost, schedule, quality and the tasks). If that is not the case, the project manager is running into problems which can jeopardize the return on investment (ROI).

As a project manager your team's members can be more committed to their functions in the department than their tasks in the project. This strong loyalty to their functional departments can lead to counterproductive situations in the project. The project manager should be aware of that.

It is a difficult situation for more project managers to his or her functional supervisor or to the board of the organization.

Suppose that you're just beginning a project. It is likely that you are short of information when you start the project. That increases the level of uncertainty. In a situation such as this, the project manager uses ranges of values when providing estimates on cost and schedule. That does not provide certainty that the management needs for approval. There are always uncertainties related to project.

2.3.3 Skills

In order to fulfill the responsibilities described above and face all the challenges you will need very diverse skills and a set of knowledge. Gary R has broken these skills into four skill and knowledge categories¹⁷:

2.3.3.1 Project management process skills

You should know about project management tools, techniques, and process technology and be capable of applying them. For example, you should be able to prepare a customer requirements document, construct a network diagram, and construct a work breakdown structure. You cannot coordinate and create a high quality project plan without these skills. If you do not have these skills, you can expect to meet problems of respect from both the organization and your team members.

2.3.3.2 Interpersonal and behavioral skills

Managing project is about getting things done through people therefore your behavioral skills are extremely important. Here are some examples: Team and individual leadership, oral and written communication, conflict resolution, negotiation, influencing, delegating, coaching and mentoring.

Some commonly used tasks for the project manager: Manage and distribute work, invite to meetings, making project plan together with the project participants, responsible for project reaches goals, report back to the steering committee and follow up project meetings.

Project manager who are missing these skills should develop them.

2.3.3.3 Technology management skills

Most projects have one or more integrated technologies. Your ability to understand, guide and use the application of these technologies is vital for your success as project manager. For example, a project manager with a computer science education will have sufficient knowledge in a software development project. Here are some examples of technology management skills: proficiency in project's core (primary), technology, proficiency in supporting technology areas, design skills, product knowledge and process knowledge¹⁸ as described.

2.3.3.4 Desired personal traits

According to some studies there is a strong correlation between personal traits and success as a project manager. Most studies have shown following personal characteristics:

¹⁷ Project Management, Gary R. Heerkens

¹⁸ Project Management, Gary R. Heerkens, page 38

- ✓ Project managers must always be thinking like a generalist, meaning that he must pay and care about everything and everybody.
- ✓ You must also have a high tolerance for ambiguity as a project manager. You need to develop processes for finding truth and narrowing down inputs without getting frustrated.
- ✓ Moreover, a high tolerance for uncertainty is demanded to a project manager. As a project manager, the norm is to make many decisions without sufficient information. You must condition yourself to making decisions that are only acceptable, not perfect.
- ✓ Honesty and integrity are traits which can rise you to the top. One of the best behavioral traits for a project manager is to be known as doing what you say you'll do. Be closed to the company's principles even in the face of bribe or adversity.

Even if you are qualified and proficient in many of the skill areas, you can fail as a project manager if you cannot apply them properly in your daily activities as a project manager. The functional competencies refer to your ability to support the various skills. For example, develop and follow appropriate processes and procedures for accomplishing your work as project manager. A job description will probably contain many of these functional competencies. What you won't find in job descriptions are the unofficial duties that project managers perform in the course of carrying out their mission. For example, educate and develop your team and maintain professional relationship with the people involved in the project are unofficial functions.

Each project has a client in the form of management, customer or client, an end user and possibly a number of other stakeholders. They all have expectations from you as project manager. The manager needs to have an appropriate way to follow up on previous work and learn from their mistakes, and to ensure that objectives will be achieved. To be able to look back one must first look to the future, create realistic plans, acquire the necessary resources, utilizing an effective system for monitoring and reporting.

There are a number of factors that affect the project's output. Several out of these are factors that the project manager is responsible for or able to influence and control in the right direction. Depending on the basic conditions of the project will see the success factors vary, but most have the following in common: Clear structure at work, ideally full-time dedicated project manager, clear directive, enthusiastic team's members, common goals for all involved, clarified expectations, roles and clear division of labor, taking into account the participants' values, good planning, the goals broken down into milestones, revision of the objectives, continuous information and monitoring of results. The most common pitfalls according to experienced project managers are: The project is unclear, project managers cannot generate enthusiasm and motivate the project team. It is only the manager that can decide how much time he will spend on each part and coordination of the project. The contact with the client should be kept but the question of any adjustments should be made by the project manager himself.

3 Systems Development Methods

Tools are created to extend their mental and physical strength. It is natural to think of physical tools, like a hammer and saw. But in today's information society tools are used to fit business's needs. System developers need a toolbox. Such box usually consists of techniques and tools to support from the beginning to the end of the development process¹⁹. One of the goals for these developers to use methods is to handle development efficiently and competently²⁰.

Today there are a variety of methods, although the number varies considerably between different sources. Many companies claim to use a development method, but research shows that they do not do it as expected. One of the reasons is that the methods do not meet developers' needs or to several of these methods are theoretical products and therefore do not always work as intended²¹.

According to Fitzgerald (2002), a method is a coherent and systematic approach to attack a problem (based on the particular philosophy of system being used) that guides developers in which steps should be taken, how these steps should be designed and why these steps are important in the development of an information system.

System development method is a mean to ensure that quality and provides a common notation for those involved. The method aims to control, plan, manage and evaluate projects. The basic idea of the methods is to assist the individual developer to get on right track, to remove some of the responsibility from the individual. The more detailed the method is, the less responsibility the developer has and vice versa. This tension between small and much responsibility is important to create motivation within the organization.

3.1 Historical Development of System Development

In the early years of system development most developers worked without a direct plan to follow, they developed ad hoc. That period was characterized as the pre methodology era and the importance of computer application development was on programming. The focus was on solving technical problems and getting systems working²². It was a major achievement to get a program to run at all.

The programmers were well trained but they were poor communicators. The procedure was usually up to the individual developer and based on personal experiences and knowledge. This led to many problems in estimating the time and cost of development and applications were delivered late and over budget. Meaning, that projects were not well controlled and managed. These problems led to a growing demand of a more disciplined approach to system development. Thus the first system development methodologies were established during the 1960s.

The pre methodology era has shown some weaknesses regarding analysis and design. There was at the same time a strong will to have an accepted system development methodology. These concerns have given birth to the evolution of the system development life cycle or waterfall model during the 70s and some of the 80s.

¹⁹ Beynon-Davies, P., (2002). Information Systems- An introduction to informatics in organizations. New York: Palgrave

²⁰ Avison, D., & Fitzgerald, G. (2002). Information Systems Development: Methodologies, Techniques and tools 4th edition. London: McGraw-Hill Education

²¹ Avison, D., & Fitzgerald, G. (2002). Information Systems Development: Methodologies, Techniques and tools 4th edition. London: McGraw-Hill Education

²² Avison, David & Fitzgerald Guy. Methodologies for Developing Information: Systems: A historical Perspective

The waterfall methodology includes phases, procedures, tasks, rules, techniques and tools. It has a number of stages of development that are expected to be followed sequentially. These stages consist of feasibility study, requirements, analysis, design and implementation. It has helped to improve deliveries and unexpected high costs were reduced.

However, the approach presents some limitations: The approach fits well a stable environment but the business and its environment change frequently and that makes waterfall's modelling processes unstable. It is output driven and changes in design processes will be costly. Users cannot see the system before it is built. The waterfall also fails to meet the need of the management because it is more concentrated on single application.

As a response to the criticisms of the waterfall model, a number of approaches to system development was born during the period methodology era. Their primary goal was to improve the traditional waterfall model.

The methodology arena was dominated by incremental or evolutionary development which includes prototyping.

The incremental development consists of building up the previous version rather than developing a new system each time. It takes into account the problem on an unstable environment where the requirements are changing frequently. It aims to reduce development time.

People used to these methodologies as a panacea to the problems of traditional approaches. For many organizations the choice a methodology has not always worked as expected. They have found their methodology not successful after being around all these methodologies. Therefore, many organizations have rejected these methodologies. Let's try to understand that by mentioning few reasons. They have not solved all the problems they were supposed to solve. They have been criticized for being very complex and their use and processes require significant skills. Moreover, their tools are very difficult according to critics. They may not allow requirement to change during development. Thus, the great challenges in the 1980s and 1990s, that methodologies would solve most of the system development problems have not been achieved. The current situation is described as the post methodology era, where various eras of methodology have been identified. This era is described as a period of maturity where for example users and customers are more involved in a system development process where changing requirements are accepted as a working principle. These features are found in an agile development²³.

3.2 Agile methodology

Although some of the Agile methods have been upwards of 20-30 years as the term is agile method slightly newer. In February 2001, met seventeen people who were developers and users of Agile methods²⁴. They met to see if there was something in

²³ Avison, David & Fitzgerald Guy. Methodologies for Developing Information: Systems: A historical Perspective, page 10

²⁴ The Agile methods represented were ASD, Crystal, DSDM, XP, FDD, Scrum, and "pragmatic programming

common among the various light methodologies²⁵. Koch came up with four basic items they agreed on:

1. There is a need for methods that can respond to changes in the business environment, therefore the collection of methods is named agile instead of light. However, the name agile was not only to get an umbrella, but was also a marketing policy, since the 17 people saw a difficulty getting very technical people who wants to use a method that went under a generic name such as "light" (light-weight method).
2. A manifesto was drawn up²⁶, that captures Key values that all agile methods are based on, and it sounds:

We are uncovering better Ways of developing software by doing it and helping others to do it. Through this work we have come to the below conclusion:

Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over Following a plan.

That is, while there is value in the items on the right, we value the items on the left more (for example individuals and interactions).

The four statements of the Agile Manifesto are simple. The first and third are distinguished by communication which is a success factor when people develop software. The second and fourth statements emphasize that we can produce successfully a software that allow changing requirements of the users. The four statements of the Agile Manifesto are quite high level and abstract. They leave a lot of room for interpretation.

3. The third agreement was twelve agile principles that go through and divides Manifesto into smaller components²⁷.

4. The last level was an even more detailed activity agreement that gave clearance for each individual method to develop their own characteristics, so long it behaves well to previous agreements.

It is a common misunderstanding to say that agile methods are against the processes, and a plurality developers embracing the wrong agile methods to avoid having to follow a predetermined process.

Koch (2005) argues that every single agile method has its own process. Furthermore, Koch believes that the Agile methods have much in common, especially mobility (agility), change planning, communication and learning²⁸.

²⁵ Kock, A, (2005). Agile Software Development: Evaluating the Methods for your organization, page 225

²⁷ <https://www.agilealliance.org/agile101/12-principles-behind-the-agile-manifesto/>

²⁸ Kock, A, (2005). Agile Software Development: Evaluating the Methods for your organization, page 5

Mobility (Agility) is the area which is different from the traditional systems development, because the traditional development means everything has to follow a plan by controlling unpredicted events and environmental influences. However, the agile development is changing towards the outside world's change and impact.

Change is thus welcomed within the agile development methods, to provide more information so that a better product can be created. The traditional methods often consider changes as an enemy that must be checked. Thus, they accept that change is something necessary, but it is something that benefits neither development or organization. None of the above approach will always work and should not be seen as an optimal approach. Depending on different situations, they are suited for different occasions.

Planning is as important in agile as in traditional methods, but with different planning, particularly when it comes to the deviations from the plan. When changes are made in the agile development plan, the new information is added into the project. The idea is to get planning to adapt to reality. Traditional development is done by trying getting reality to conform to the plan, in extreme cases, get a new plan.

Communication within agile methods is most verbal, the only time written documents actually are used is when it can be considered to bring information on the black board. Although the agile methods do not have the intention to eliminate the written documentation so do they certainly do not have documentation that solely aims to be archived. Traditional methods do not argue against the communication, but considers that the communication occurs through the planned activities and through the documents, but this often creates misunderstandings later in the project. Which method is most suitable is not always easy to determine. The spoken communication is not always good, sometimes forgotten important parts away, and two people may have different recollections and perceptions of such communication. Koch believes that if something is worth talking about, it is also worth documenting²⁹.

Learning is an important part of agile methods; therefore, we need to see each project as an increased experience. The methods create a lot of communication between stakeholders in order to accelerate learning. The learning process will result in change of requirements for the new system through an iterative process. The traditional methods are seeing learning in a different way. During the planning phase, they believe that there is enough information to complete the project and it is just about to find all the requirements and so on. When this is not true, developers fix them. The reality is that everyone involved in the project learns something during the project life cycle, but it is not certain that it is an important knowledge. We evaluate and integrate every new piece of information only if it brings value.

²⁹ Kock, A. (2005). Agile Software Development: Evaluating the Methods for your organization, page 5

3.3 Disciplinary vs Agile

Table 4-1 summarizes what Boehm and Turner (2003) calls for "Home Ground" and it addresses the fundamental differences between Agile and disciplinary methods.

Table 4.1. Agile and Disciplined Method Home Grounds³⁰

Characteristics	Agile	Disciplined
Application		
Primary Goals	Rapid value: responding to change.	Predictability, stability, high assurance
Size	Smaller teams and projects	Larger teams and projects
Environment	Turbulent; high change; project-focused	Stable; low change; Project/organization focused
Management		
Customer relations	Dedicated on site customers; focused on prioritized increments	As needed customer interactions; focused on contract provisions
Planning and control	Internalized plans; qualitative control	Documented plan, quantitative plan
Communications	Tacit interpersonal knowledge	Explicit documented knowledge
Technical		
Requirements	Prioritized informal stories and test cases; undergoing unforeseeable change	Formalized project, capability, interface, quality, foreseeable evolution requirements
Development	Simple design; short increment; refactoring assumed inexpensive	Extensive design; longer increments; refactoring assumed expensive
Test	Executable test cases define requirements, testing	Documented test plans and procedures
Personal		

³⁰ Boehm, B., & Turner, R. (n.d.). Rebalancing Your Organization's Agility and Discipline. P.4

Customers	Dedicated, collocated CRACK* performers	CRACK* performers, not always collocated
Developers	At least 30% full time Cockburn level 2 and 3 experts; Greater knowledge is required, where the developer dare to break the rules in the method and adapt to a new situation.	In the early stages of development, pretty much is required, the longer the project goes, the less knowledge is required.
Culture	Comfort and empowerment via many degrees of freedom.	Comfort and empowerment via framework of policies and procedures.
*Collaborative, Representative, Authorized, Committed, knowledgeable		

After creating a common ground for characteristic between agile and disciplinary approaches Boehm and Turner (2003) are presenting the balanced criteria. Table 4-2 takes up five factors that determine whether it is best suited to use agile or disciplined practices in a specific project.

Table 4.2. The Five Critical Agility/Discipline Decision Factors³¹

Factor	Agility considerations	Discipline Considerations
Size	Well-matched to small products and teams. Reliance on tacit knowledge limits scalability.	Methods evolved to handle large products and teams. Hard to tailor down to small projects.
Criticality	Untested on safety-critical products. Potential difficulties with simple design and lack of documentation.	Methods evolved to handle highly critical products. Hard to tailor down to low- criticality products.
Dynamism	Simple design and continuous refactoring are excellent for highly dynamic environments, but a source of potentially expensive rework for highly stable environments.	Detailed plans and Big Design Up Front excellent for highly stable environment, but a source of expensive rework for highly dynamic environments.

³¹ Boehm, B., & Turner, R. (n.d.). Rebalancing Your Organization's Agility and Discipline.

Personnel	Requires continuous presence of a critical mass of scarce Cockburn Level 2 or 3 experts. Risky to use non-agile Level 1B people.	Needs a critical mass of scarce Cockburn Level 2 and 3 experts during project definition, but can work with fewer later in the project—unless the environment is highly dynamic. Can usually accommodate some Level 1B people.
Culture	Thrives in a culture where people feel comfortable and empowered by having many degrees of freedom.	Thrives in a culture where people feel comfortable and empowered by having their roles defined by clear policies and procedures.

In Boehm’s article, there are 5 decision factors in determining relative suitability of agile or disciplined methods in a particular project situation. Those factors are: size, criticality, personnel, dynamism and culture. As for personnel, it does refer to extended Cockburn method skill rating scale.

There are also home grounds which are the sets of conditions under which they are most likely to succeed. The more particular project’s conditions differ from them; the more risk is in using one approach (agile or disciplined) in its pure form. One of the home grounds are “Cockburn levels” based on Alistair Cockburn. Those are the levels of skills and understanding what is required in order to perform various method-related functions as for example using, tailoring, adapting or revising. These levels are scaled from 1 at least to 2 but there are further levels which are rated as very skilled developers. This scale is also helpful for creating a rating scale for personnel decision factors.

In the series of steps, Boehm does not only emphasize on considering the current statement of the organization but also the consideration of the close future.

4 Agile Project Management

Scrum belongs to the agile development methods. This method is not only designed for software development, but is a more general method for managing product regardless of technology. Scrum is a term in the sport of rugby and means to bring the ball back in play. Like most other Agile methods, Scrum is not so much about process, but more on the philosophy of working method.

4.1 Practices and rules

Scrum tackles the complexity of software development projects by implementing an approach called empirical process control which emphasize three fundamental

principles: **Visibility, Inspection** and **Adaptation**. The above approach is described in the following sections.

4.1.1 Scrum skeleton



Figure 5-1 Scrum skeleton³²

Scrum's practices are essentially based on an iterative and an incremental process³³. The lower circle shows an iteration which is a set of repetitive activities developed one after another. Each iteration gives birth to an increment of product. The upper circle represents the daily inspection that happens during the iteration where team's members are meeting to inspect each other's activities and to adapt the requirements. The cycle repeats until the end of the project.

4.1.2 Scrum flow

The minimum plan necessary to start a Scrum project consists of a vision and a Product Backlog. The vision describes the objectives of the project and what do we want to achieve. The product backlog is a priority list of what the project will implement, this list also includes estimated times for when the different parts will be ready. The product owner does prioritize what is most important for his organization and what gives the most value. The Product backlog defines the functional and nonfunctional requirements and must be developed and changed when the business conditions or technologies are changing. The Product Owner is responsible for the product backlog³⁴.

All work is done in sprint, a sprint is usually a 30-day iteration where the overall effort is focused towards a specific goal³⁵. Each sprint is initiated with a Sprint planning meeting where the product owner, the team and the scrum master decide about what will be done for the next sprint. The product owner selects from the highest priority product backlog. The sprint planning meetings are maximum 8 hours. It has two parts. The first four hours are spent with the Product owner who presents the highest priority product backlog. He explains the intentions, purpose, meaning of the product Backlog to the team. He tells the team what is desired and the teams tells the product owner how much of what he wants can really turn into functionality. During the second four hours of the Sprint planning meeting, the team plans out the Sprint. All the tasks of the plan are placed in a Sprint Backlog

³² Ken Schwaber, Agile Project Management with Scrum, page 5, Real Book, Microsoft

³³ Ken Schwaber, Agile Project Management with Scrum, page 5, Real Book, Microsoft

³⁴ http://dbmanagement.info/Books/MIX/Agile_Project_Management_With_Scrum.pdf, page 71

³⁵ Agile Project Development with Scrum, page 20

Every day team members are getting together for a 15 min meeting called Daily Scrum. During this meeting, team's members should report progress and obstacles to the Scrum Master. Each of the participants in any way answer three questions:

What have you done since the last meeting? What will you do the next meeting?

Is there anything preventing you from doing what you have planned? The first two questions give the meeting participants full insight into how the project progresses. The third question provides a basis for problem solving. Anyone may attend and listen at the meeting, but it is only the Scrum Master and team members may speak

At the end of the Sprint, a Sprint review meeting is organized. It is a four hours meeting during which the team presents the result of its work. Every Sprint review meeting makes visible the difference between estimates and reality and between what the team thought it could do and what it really did. The Sprint review inspection is particularly powerful because real functionality is being inspected.

After the Sprint review meeting and just before the next Sprint planning meeting, the Scrum Master holds a Sprint retrospective meeting. It is a three hours meeting where the Scrum Master encourages the team to revise its development within Scrum practices. The purpose of the Sprint retrospective meeting is to inspect how the Scrum process worked during the last Sprint and adjust it to improve the next Sprint.

Each Sprint will increase the product value and provide new features and enhancements that can be delivered to the customer.

4.1.3 Scrum Artifacts

The requirements are listed in the product backlog. The Sprint backlog defines the work or tasks the team has chosen in order to turn the product backlog into a shippable product functionality. The burndown chart shows the amount of work remaining over time.

4.1.4 Stakeholders

There are three different roles in Scrum; team member, Scrum Master and Product Owner. The remaining people have some interests in the project but are not committed to do something. But it is still important that at a later stage of the project, they are involved and they give their view of the developed product. At the daily meetings they are all welcome to listen but it is only those who have been assigned a role that is allowed to speak. All of the stakeholders are brought together at the end of every Sprint to inspect progress on the application and to figure out whether it meets their perceived needs. If the expected results are not achieved then the process, people, technology, or requirements will be adapted to be more effective³⁶.

4.1.5 Team

The team are those who perform the actual work of problem solvers and designers. The team should not exceed 10-15 people³⁷. Optimally, a team should include seven people³⁸. The ideal team size for a small project consists of 5-9 people. This is considered, according to experienced researchers, be an optimal size for this type of

³⁶ Ken Schwaber, Agile Project Management with Scrum

³⁷ Agile Software Development: Evaluating the methods for your organization

³⁸ Ken Schwaber, Agile Project Management with Scrum, page 30

work. How the work then proceeds and who does what is determined entirely by the team members. During the sprint, all members have a role but these roles are flexible. The idea is that everyone should be able to exchange data with another, or anyone in a team should be able to take a task. A team must contain all the knowledge needed to complete the tasks it gets during the sprint. The team members are not connected to any title. Each of the team members has his strengths but he continues to learn other specialties. For example, someone with primary skills in testing must also help with analysis and programming.

The team has the responsibility to plan and execute its work and it should manage itself. According to the project's objectives they choose user stories from the product backlog for a Sprint which will be turned into an increment of potentially shippable product increment in 30 maximum calendar days. Once the Team makes this commitment, the clock starts ticking. At the end of the Sprint, the Team demonstrates the working functionality to the Product Owner.

How can we see that the team is fulfilling its responsibility? The answer is the Sprint Backlog and the burn down chart which show the visible manifestation of their work.

4.1.5.1 Required skills for a team member

The Team must consist of development engineers with excellent design and coding skills³⁹ and they should be familiar with Scrum. The team should understand what we mean by refactoring⁴⁰. The code has been refactored to remove any duplicate or ill-structured code, contain no clever programming tricks, and be easy to read and understand. Code has to be all of these things for it to be sustainable and maintainable. If code isn't clean in all of these respects, developing functionality in future Sprints will take more and more time.

4.1.6 Product Owner

Product Owner (Product Owner) is the client and has the task of ensuring that the Scrum team is working on the right things from a business perspective and to ensure that client organization get something back on their investment⁴¹. It is therefore the person representing the purchaser interests, but must not be a customer, but can belong to the organization. The Product Owner administers a "product backlog" where all requirements for the product line up along how profitable they are deemed to be. This leads to a document that is available for the entire organization so everyone knows what's coming in the new release. The task requires broad knowledge of technology, marketing and business processes.

4.2 Scrum Master with management responsibilities

While the traditional project manager defines and manages the work, the Scrum Master has the responsibility to manage the Scrum process⁴². The Scrum process defines practices, meetings, artifacts, and terminology as described above. The Scrum

³⁹ Ken Schwaber, Agile Project Management with Scrum,
http://dbmanagement.info/Books/MIX/Agile_Project_Management_With_Scrum.pdf
page 79

⁴⁰ Caroline H. Lektor (Copenhagen Business Academy)

⁴¹ The Scrum Primer: A Light Weight to the Theory and Practice of Scrum, page 4

⁴² Ken Schwaber, Agile Project Management with Scrum,
http://dbmanagement.info/Books/MIX/Agile_Project_Management_With_Scrum.pdf
page 29

Master is (Primer) responsible for knowing these and knowing how to apply them correctly. He has to inspect the project, makes it visible and adapt it accordingly. The Scrum Master fills the position normally occupied by the project manager. Scrum Master has three main tasks. First, he must take the responsibility to teach team members how they should use the method until they can do it themselves. Second, the Scrum master has to courage up, lead and guide the team. Thirdly, he must ensure that the rules are followed and get the team to follow the process no matter what happens⁴³. The Scrum rule does not allow interference during the Sprint and it protects the team and its work. Moreover, the Scrum Master should reassure the product owner that the process will be responsive to his or her needs. He should keep eye on the balance between responsiveness and focus. The project manager or the Scrum Master has the responsibility to protect the team's focus for the Sprint. Traditionally, the project manager tells the team what to do and manages its work. In Scrum, however, the team selects the work that it will do during each Sprint. Every day the Scrum Master meets the teams for a brief meeting called daily Scrum. The focus should always be on giving teams the best possible position to achieve its goals for the sprint. After each sprint, the Scrum Master organizes an evaluation meeting called sprint retrospective with the Scrum team where experience gained and the lessons that have been discussed. The aim is to raise team knowledge and increase motivation for the next sprint.

Schwaber⁴⁴ says in his book that he has experienced that some companies have been using waterfall in an agile approach. He had the impression during the daily Scrum meeting that this team didn't own its work. Someone had told the team what to do, and it was dutifully following instructions. Rather than working together as a team, one individual would analyze the requirement, another person would design the requirement, the next person would code the design, and then, finally, someone else would test the code. This method provides no opportunities for collaboration.

Waterfall methodology gathers all the requirements and during the meetings to review the progress, developers and managers would ask customers if the requirements that they have gathered and the models that demonstrate them constitute a full and accurate representation of what they want. If they say yes, it will be increasingly expensive for them to change their mind.

The Scrum Master should bring the Product Owner and the Team together. They must learn to understand each other. The Team and the Product Owner should speak the same languages. As we know, the Product Owner talks in terms of business requirements and objectives, whereas the team speaks in terms of technology. The Scrum Master has the responsibility to teach the Team to talk in terms of business needs and objectives. The Team and the Product Owner should have the same understanding about the Product Backlog.

The Scrum Master makes sure that the estimates take into account the time for doing analyze, design and coding of the requirements in the Product Backlog. That should include as well the unit testing. The estimates should also allow time for code reviews, for refactoring, for writing code cleanly and legibly, and for removing

⁴³ The Scrum Primer: A Light Weight to the Theory and Practice of Scrum, page 5

⁴⁴ Ken Schwaber, Agile Project Management with Scrum,
http://dbmanagement.info/Books/MIX/Agile_Project_Management_With_Scrum.pdf

unnecessary code⁴⁵.

He should make sure that every increment of potentially shippable product functionality that is demonstrated at the Sprint review must be complete. It must contain all analysis, design, coding, testing, documentation, and anything else appropriate for the application. Make sure that unperformed bugs and testing should be put back on the product backlog as not completed work. Make sure that after the Sprint planning meeting, the Sprint Backlog is not touched when the team has launched its work.

How does a project manager do report its work in agile? In the product backlog, we have the details about project's requirements called user's stories. It can always change. The daily Scrum meeting allow to get a feel and progress of a sprint. The sprint review meeting is providing whether the project is creating an increment of potentially valuable functionality. All of this information, both dynamic and static constitute the Scrum project reporting. These reports could for example be a statistic snapshot of the time estimated against the real time. Everyone can have access to those reports to see the project's progress⁴⁶. The traditional projects managers keep stakeholders and management informed about project progress through periodic reports. These reports include the percentage of completed tasks and eventually problems and solutions. It is task based reporting method.

The Scrum Master will instead plan and report requirements and not tasks. Mikael told me that he is tracking progress and completion of functionality rather than tasks. He is using the Product Backlogs to show the difference between the Product Backlog plans at the start of the Sprint and the end of the Sprint. He is going over these reports with the steering committee and uses the Product Backlog Burndown report to show the implications of completed Product Backlog to the entire release schedule.

Scrum works only if everything is kept visible for frequent inspection and adaptation⁴⁷. Practices such as the Sprint review meeting, the Daily Scrum, the Sprint Backlog, and the Product Backlog keep everything visible for inspection. A Scrum Master must be vigilant and make sure everything is visible. Find a way to make Scrum understandable to everyone in his or her vocabulary.

It sometimes happens that Scrum Master makes allow the team to adopt XP as a programming practices such as pair Programming, test Driven development/unit testing, continuous Integration, refactoring, acceptance testing, sharing codes, coding standards and small Releases. The team must an excellent understanding of these practices.

⁴⁵ Ken Schwaber, Agile Project Management with Scrum,
http://dbmanagement.info/Books/MIX/Agile_Project_Management_With_Scrum.pdf, page 75

⁴⁶ Ken Schwaber, Agile Project Management with Scrum,
http://dbmanagement.info/Books/MIX/Agile_Project_Management_With_Scrum.pdf, page 83

⁴⁷ Ken Schwaber, Agile Project Management with Scrum,
http://dbmanagement.info/Books/MIX/Agile_Project_Management_With_Scrum.pdf
page 97

5 Empirical Studies on Scrum

The goal was to interview companies that have experience using agile project management, more precisely how they use Scrum as project management tool.

5.1 Respondents

It has been difficult to find participants for the survey. Most of them were either busy or they were not interested in it. It has also been several cases where they have heard about Scrum but they have no idea how to use it as project management methodology. Finally, five agile project managers have accepted to participate in the survey. Below we have the list of the five participants.

5.1.1 King.com

Henrik Sebring is Lead Producer at King.com. He is also a project manager in the computer games business. He has broad experience in various aspects of game development (PC, console & mobile). Direct experience with designing new concepts, developing full game designs and implementing the design in the project. Interested in all things regarding project management and people interaction. Henrik Sebring has studied Computer Science for people working life in Sweden.

5.1.2 UsTwo.com

Michael Rosenberg works today as a Project Manager at UsTwo.com. He is an organizational Coach with 10 years of experience from Lean and Agile transformations, Project and Team management, Strategy Coaching and Workshop Development. Diverse experience from multiple roles such as Team Leader, Scrum Master, Line Manager, Project Manager, business development, requirements handling, sales and as Designer. Michael Rozenberg has studied civil engineering and he is certified Scrum Master.

5.1.3 Hypergene.se

Ulf Atles is responsible for Management Consultancy at Hypergene.se. Hypergene.se is a web-based product for planning, monitoring and analysis. Ulf Atles is an economist and he has been responsible for the "Products" in previous job. He has an extensive experience in process and product development and is Certified Scrum Master.

5.1.4 Citerus.se

Lena Ackander is working at Citerus.se. Citerus.se develops software for businesses and organizations. It also offers training courses and seminars. It has helped clients enter new markets under conditions which in advance seemed impossible. Lena is an experienced and committed leader and Agile coach with a passion to lead and support change and development at all levels in an organization, from individuals to the management teams. She helps customers create efficient flows and an agile business and coach people in their roles, such as Scrum Master, Product Owner, Agile project managers and executives, to assume their roles and to grow to their best self.

5.1.5 Adaptive.se

Måns Sandström is working at adaptive.se. He has the expertise to guide efforts to create an organization steeped in agile values and habits. By combining the

knowledge of agile approach and the psychology of change, he helps you to think new ways when you meet changes. He has experience from agile development, from the technical, leadership, organization and change management. He helped establish agile team that delivered a high quality product and the development of the new, agile-oriented company.

5.2 Empirical results

The following is a summary of the interviews; Lena Ackander from Citerus.se answered the questions as an agile coach. Others have answered and described the situation in their own company.

5.2.1 Have you worked with a modified version of scrum's methodology if yes please describe it?

Sebring:

Henrik Sebring is a Lead Producer at King. He explained that people have different way of implementing Scrum. He has experienced that companies change Scrum principles and adapt them to their companies. Sebring said that instead of building a development team with various disciplines they choose a team with same skills, for example programmers, designers, testers are placed in separated teams. In traditional, idealistic Scrum, each team should be full of generalists who are equally capable of doing every task that the team commits to. He thinks that what is realistic is to staff the team with sufficient resources that they can deliver end-to-end, useful functionality. This behavior shows that Scrum can be adapted. Sebring said that the project manager role is divided between the product owner and the Scrum Master. The product owner is the ambassador of the stakeholders. In this case they have updated Scrum to their business reality. In fact, there is no project manager responsible for defining and managing the work as the traditional project manager. In Scrum the project manager is responsible for managing the Scrum process which defines practices, meetings, artifacts and terminologies. It can also happen that they appoint project manager to be responsible for the project and a Scrum Master to keep the team dynamic. Working as a project manager in Scrum requires that you are proactive and have technical skills. He said that he was responsible for the success of the project when he was working as a Scrum Master. He helped increase the probability of success by helping the Product Owner select the most valuable Product Backlog and by helping the Team turn that backlog into functionality.

Mikael:

Michael Rozenberg said that some companies believe that Scrum should change according to their needs. He said that it has happened that the product owner cannot be present at the development site more than one day a week then you get to manage communication in other ways. First, in Scrum the product owner needs to be available to his or her team. The best product owners show commitment by doing whatever is necessary to build the best product possible – and that means being actively engaged with their teams. That is what Scrum recommends. Here they have adapted to their situation. Another example, apart from the 15 min daily scrum meeting, a technical meeting is organized afterwards when all the technical staff is gathered. These meetings are also held short. The meetings are partly to repeat the demos before

presentation to the customer. In Scrum there is no technical meeting but a sprint retrospective meeting.

Michael Rosenberg said that there is no project manager in Scrum. But if the project is extremely large then a project manager is needed. That is not in line with what agile is claiming. When the project is large then we use the concept called Scrum of Scrums. "The Scrum of Scrums is analogous to the team level Daily Scrum except the Scrum of Scrums is a virtual team composed of representatives from a number of individual Scrum teams that collaborate to integrate and ship a product(s)"⁴⁸. For big projects make sure that the team knows how to do agile and have the rest of the company understand it. Michael is working today as a Scrum Master and a coach. Generally speaking, he is managing the project and the team. He is coaching the team how to use the scrum processes which are the basis of the Scrum team's productivity. He said also when it comes to risk analysis in agile management, the team is responsible for that. Furthermore, Michael said that in big projects external experts are hired to mitigate risk. That fits the traditional project management where risk management is a central part and it is included as one knowledge areas in PMBOK. But it is a pure violation of Scrum when an external team is hired to handle risk. In Scrum we have short iterations with focus on working software, automated tests and frequent deliveries. That helps the Scrum Team to avoid big risks that jeopardize the project. Agile is a mindset than a tool. He said that many companies use scrums as they fit them even if it is against scrums rules. He is sometimes using his own version of Scrum. My meeting with Mikael shows how easy it is for people to misunderstand Scrum. People tend to interpret Scrum within the context of their current project management methodologies. They apply Scrum rules and practices without fully understanding the underlying principles of self-organization, emergence, and visibility and the inspection. Avoid telling to a team member to do something than the assignment in the sprint. This practice was a violation of a fundamental Scrum rule: the team must be left alone during the Sprint to accomplish the goals to which it is initially committed. Sometimes projects are so complex that they require something more than the normal implementation of Scrum. The number of inspections must be increased as the degree of complexity is increasing. By increasing inspections, the opportunity for adaptation also increases.

Ulf:

Ulf said that he has worked with companies who use scrum, but in some of those companies Scrum method has been adapted to fit the company's reality and prospects. The basic idea with Agile is that a changing world requires developing methods that handle these changes as a part of reality, not ones that turn a blind eye on changes or who try to regulate them. We need flexibility - not rigidity. Agile is an umbrella term. It is a set of values, attitudes and principles. In Agile, there is a number of different development methodologies. We should adapt Scrum principles to changes. It is very important that the method is adapted to the company's reality and not vice versa. Adapt the company's reality to the method will only lead to frustration.

⁴⁸ <https://www.scruminc.com/scrum-of-scrums/>

5.2.1.1 Analysis on the use of Scrum methodology

It depends on how you interpret it. There is a contradiction in the agile world. Some believe that one should follow the method to the letter if it will work, while others still believe that flexibility is important. Flexibility means that we should expect changes and adapt the development to external requirements, it may in some cases mean the method can not be applied without being changed.

Companies in the survey have in one way or another changed the method or been positive to make changes which indicates that it is relatively common to deviate from the method and adjust it to your needs. It is important to follow the rules and it is also important not to give up the process for the sake of clarity. Companies emphasized that the method should be adapted to the company's reality and not vice versa.

Forcing the company's reality into the method would lead to frustration. Flexibility to the customer and adaptation to the market reality, make it possible to do changes and bring in new requirements during the development process.

Boehm and Turner (see section 4.4) conclude that behind the choice of method we can make use of their balanced criteria; size, critical factor, dynamism, staff and culture, to find out if a project is best suited for an Agile or disciplinary method.

The authors are not against a mix of agile and disciplinary procedures but they think that all companies have different conditions regarding the use of the method, management, technology and personnel.

The companies we have been in contact with did not seem to have chosen the method Scrum as such, but because it is one of the most used Agile methods. Lena says that Scrum is easy to understand, can be used on an entire business and the language is the same regardless of level. The companies seem to emphasize that it is not the method which is the most important, but the underlying agile mindset, with frequent meetings and to sit together which facilitates communication are essential.

Companies have a great awareness of the methods, not only among developers but also the whole businesses. That is not strange because agile wants the management to understand how the process works, something that may not be as common in traditional development, and second, when there is a great interest for developers themselves to understand the method and being capable of adapting new situations.

According to Boehm and Turner, it requires more knowledge and understanding of methodologies with related functions when we are in an agile project. In agile methods, the team as a whole manages the development and individual developers are responsible for their part.

5.2.2 How do you use the method in your work as a Scrum Master or project manager in agile?

Sebring:

The product backlog is the scope of the project. When you build it, makes it clear that you have a clear vision and an ordered set of prioritized requirements. For example, I have a vision of building a car. Who is going to use that car, what the car is used for? What features the car should have? When you are starting getting all the requirements it is important to group them in terms of how much it is going to cost to deliver this item. High value items with low cost are going to deliver first. The team member takes from the top of the backlog the smallest amount of item they think they can execute. Sprint is time boxed (1 to 4 weeks). Every item has a size called points. We start the project by making a rough plan of elements or features that will be

incorporated in the project. These major "features" get a time and resource estimation. The resource estimates take into account whether the job is done by a programmer, designer or graphic artist. For the next three weeks they do a detailed planning where each feature is broken down into a number of tasks. A task consists of 4-16 man hours. Each team is responsible for developing and estimating the time needed for their own tasks. Every morning he holds a daily Scrum meeting with the team where everyone must answer the following three questions: What did I do yesterday? What shall I do today? Is there anything that prevents me from performing my duties? Every day the team is updating how many hours are left on their tasks and the completed tasks are sent to testing, which are also to some extent taking into account the quality of executed tasks. Through the daily morning meetings with the team Sebring can quickly fix the problems that might otherwise slow down the speed. It is tough to teach people to appreciate the time it takes for a task to complete. Sebring presents every day the "burndown chart" which shows how much time is remaining for this sprint period as well as the speed at which the team operates. At the end of each period, the team shows up what had been completed and the evaluated results. The team is then prioritizing features after necessities. They are either marked as finished or they need more work to achieve the required quality level. Finally, the team plan the next iterations. Sometimes the team iterates over certain features because they have not been sufficiently finished.

Ulf:

According to Ulf Scrum works best for known technology and simple requirements. He has experienced sometimes that when the sprint is more than two weeks the developers can end up in a waterfall process in which much of the time was spent on unnecessary things. Just because some team members did not really understand Scrum. You have to make sure that the agile principles are well understood by the teams.

The Project manager is supported by Scrum because Scrum is so clear in the division between roles. Does everyone understand the process? which is a basic requirement, so it works. The opposite would be that you like the traditional believe that the manager knows all, reply to all, has a mandate to do everything etc. You can not ask about the exact release in an Agile project. At prioritization levels and decision Scrum supports well project manager, but there are no engineering practices.

Lena:

As a Scrum Master and Coach it is important to follow the Scrum principles. The method provides a number of rules to follow, 15-minutes meeting every day and so on. In these meetings, my job is to take up any problems and obstacles the team may face and i must constantly work with changes. Scrum set high and different requirements to the Scrum Master compared to other methods. You have as project manager find your own way. Scrum is about changes. Companies who want to use Scrum will ask you a lot of questions. For example, why do we do this in this way? You will find a lot of questions that there are no direct answers or solutions which you can feel good about.

The word Scrum Master in Scrum is to emphasize that there is no question about a traditional project manager, the two are essentially different. As a Scrum Master you are a coach and not a project manager in the traditional sense. The Scrum master lays down guidelines which are in line with the business rules and agile rules but it was the team that solved the task itself. The Scrum Master helps the team to be better but it is

the team that solves the problem, plan and monitor their own work. He is responsible for marketing the project and to get the product owner and other stakeholders to understand that they live in another world. A world full of sequential thinking contrary to some Scrum key principles. Scrum supports project manager in their work with quite formalism which makes it possible to measure and monitor daily activities. Scrum is an empirical process; it is constantly evaluated to allow the result to be good. The opposite is a traditional defined process of using the same input is expected to get the same output every time, but it is not sure it's the right thing. The formal Scrum is the daily meetings that provide an extremely important status check, burndown chart, etc. Scrum in many cases are much better to-date information than any tool in the traditional methods. It is the Scrum Master's responsibility to report errors, other cost effectiveness and things that the organization is doing wrong. Wrong person in the management can be a danger for the Scrum Master's job if he comes with too many claims about inefficiency.

Mikael:

Mikael said that he had sometimes received the whole product backlog from the stakeholders. He has to make sure that it is implemented. He said that Scrum is about people and Scrum relies on individual and team commitments rather than on top-down control through planning. He believes that self-organization and human commitment are far more powerful mechanisms than imposed controls and plans.

He emphasized that his role is to protect the team from impediments during the Sprint. However, the Scrum Master has to operate within the culture of the organization. He should recognize the value of teamwork to this organization. Michael emphasizes that he has no authority over the development teams; He said that he must be present only to ensure that the Scrum process is adhered to and that the teams' needs are met. The Scrum rules are reinforced during sprint planning meetings. He must make sure that everyone answers these three questions: What have you done since the last Daily Scrum? What are you planning on doing between now and the next Daily Scrum? Do you have any impediments to report?

As Scrum Master you become a representative of the method. You are supported by the method by making it very easy to send out status reports externally. You should have full time control of the situation and know where you are in the project. Internally, the team is working and the Scrum Master has no delivery responsibility.

Mikael said that Scrum requires complete transparency. Every day, the team has to synchronize its work so that it knows where it stands. I often ask them question about the completeness of their codes, and I suggest them remedies, but the solution was their responsibility. He believes that it is the mindset of Scrum which is the most important. Scrum is more about frequent meetings and sitting together, which facilitates communication. Agile release cycles should certainly be kept shorter than a year, and are often as short as 6 months or 3 months. A release is, in turn, made up of iterations. For a given project, iteration length will typically be fixed at a length somewhere between a week and a month. When it comes to this basic Scrum principle, Mikael thinks that some companies have been missing focus on the release. A release should not exceed more than 6 months and that is why there is a need to have a longer horizon than Scrum suggests. One must be able to sync with other projects sometimes or book a test environment several months in advance. One must be able to talk to the product owner about where to go. Scrum is focusing on one sprint forward.

Furthermore, Scrum does not mention anything about how to solve conflict. It just mentions that the Scrum Master is responsible for solving it.

5.2.3 What are the major benefits of Scrum?

Sebring:

The method gives Sebring the opportunity to focus more on the quality of the project. As game projects manager he has learnt that it is fun to drive Scrum. At each finished product there is a possibility to iterate the process to improve the quality. Scrum is value driven project management method. It is already possible to see a shippable product functionality after only one iteration. A product which can show value in a short time.

Sebring experienced that Scrum improves credibility with the clients because they get higher quality product. The Sprint Review leads naturally to a product that the client wants and is excited about

Mikael:

Scrum takes the burden from you when you are part of a team, it's a way you get affected by the method. The good thing about the breakdown, everything becomes very clear and structured. The team stands on the board and it becomes simple and clear to discuss issues with everyone. Scrum Master is not included in the team and he is not really a member of the development team. Members of Scrum Team are the people who actually work with the project. As a Scrum Master I am helping the team to facilitate their tasks. Sometimes it can feel stressful to have an overwhelming amount of things on the board that has to be done. Moreover, Mikael thinks that Scrum does not solve all the problems because it does not say anything about how the problems should be solved. The only thing Scrum does is to lift up the problems to the surface. Scrum is on team and organizational level. There are no direct guidelines for programmers. It is good to have seniors who can the architecture in the team. It is very nice to early have feedback in Scrum. You get early response when you do something wrong for example coding. That improves your learning capacities. It is good to involve the customers from the beginning. Customers understand how Scrum process works if they want to implement fully Scrum. Agile project managers have difficulties to understand that the team is responsible, and there is no project manager to ask them questions. The team is working under their own leadership and commitment. You accept working with Scrum means that the management is aware of how the process works.

What takes time and energy is to ask people to embrace new different mindsets. It can feel stressful having to be responsible in the beginning and you have to get people feel comfortable with it. The method simply will not fit all. Some will be unhappy to manage themselves because the situation is uncomfortable. It is about coaching everyone to like the method, and if that is not the case, then the people who do not want can stand outside the team.

Ulf:

The benefits he sees with working with Scrum is that everyone is working in parallel and having clear roles. Scrum has helped him to Scrum puts the control of the value stream back in the hands of the business. It delivers products more quickly and has allowed my clients to change priorities and requirements very quickly. Scrum has

shown the real potential of the team already after the first sprint. That is wonderful. Scrum creates a safe working environment.

Lena:

One disadvantage that comes with the use of agile methods is lack of knowledge about working process among project participants and stakeholders. All the participants should understand the method, not only the development team but the whole organization and the customer.

She believes that if software companies want to survive today they should implement agile. Agile is a simple framework but it is not simple to adopt. It takes a lot of time and hard work to adopt.

5.2.4 What are the main characteristics you consider are most important to a Scrum project manager?

Sebring:

Sebring thinks that an agile project manager should have following skills:

Leadership skills, good listeners (very important to listen to the group to find out what happens in the team), coaching approach (the group solves problems and it is the project manager's role to ensure the team can manage their tasks).

Being focused on the problems that come up during meetings with the team. Without a detailed planning be able to look ahead and work pro actively.

Michael:

Scrum Master must constantly keep focus on the process. It is easy to lose control on the whole process if focus is not there. Scrum Master should have a social role.

You have to be responsive (listen to everybody), to drive the team (every day follow up and have the energy to take hold of what it is coming up) and social (must be able to talk to people) and being good at delegating responsibility. You must have confidence in you. The scrum Master has to have good people skills, good communication. Compare to my previous work as project manager, the project manager does not need to do the whole work alone. He should empower people with tasks. According to him agile is about reducing costs and develop faster. The cost is evaluated after each delivery. Risks are reduced, he said. For the project to achieve a successful result it is required that the Scrum Master himself follows the Scrum rules. He can not say that that responsibility is on the team and then begin to determine exactly what to do in any case. You have to be driven out to make sure that conflicts are solved by themselves. If the team fails to solve a conflict, then the Scrum Master has the responsibility to take the discussion to the right body outside.

Ulf:

Traditionally, the project manager is hold responsible for the results. That leads to a pressure that goes out to the developers. It happens a lot of things that you cannot control. But in scrum the distinct roles give another responsibilities and the results responsibility lies higher up. The Scrum Master puts more responsibility on the team to plan and commit to the project. It is thus a more pleasant task to be Scrum Master than traditional project manager. The quality of the product is up to the product owner and management. The Project announces only the risks associated with different decisions.

A very important person according to Ulf is the product manager. Someone who has overall product liability. The work as a project manager in agile projects require that you are pretty tough and can clarify roles. You need to make the team feel comfortable and be pro active against other stakeholders involved in the project.

The main characteristics of the project manager in agile are diplomacy, social and serve as a sounding board, driving, experience and strength and integrity to say no.

Måns:

Måns believes that an agile project should be a project that delivers value early and frequently and whose existence is on the premise, "Can we deliver good value on our costs?" rather than the traditional "Have we consumed our budget yet?". An agile project manager is someone who can take the traditional project steering model and transforming it into something that adheres to the agile mindset.

Scrum is designed for product development, not for executing projects. Wrapping scrum with a project steering model and evaluating scrum is like evaluating a swimming suit underneath a winter coat.

Lena:

It is not sufficient to fully understand the framework of agile to be a good Scrum Master. Lena said that it also requires some management skills. It is about communication inside the team and how to make people work together and interact. You have the responsibilities to make the team interested in Scrum. It also an advantage of having some traditional management skills. She said that many success histories. The main characteristics of the project manager in agile are responsiveness, creativity and courage. The Scrum Master should be able to overview the operations and reconcile different opinions and desires. Scrum is good because it is the only method that can be used for all operations. Everyone can understand regardless of your position in the organization.

5.2.5 If you should choose a project manager what characteristics do you expect from him?

Sebring:

Hire a project manager who matches the work culture of the company. There are many project manager's personalities and many different types of leaders. By an employment it is important to explore the prospective project manager's personality and leadership style as carefully as his / her experience of managing projects.

Mikael:

Scrum Master is a person who can take initiative, understand, advocate and adopt agile principles, understand that you can not take things directly from a book, you must be opened for new situations.

Lena:

To be current as Scrum Master you should possess coaching characteristics. As a person you must be willing to re-evaluate your leadership, be willing to change and see alternative solutions to problems. One must be able to talk to both technicians and director. It is the face of the project. He has received a project management training,

old project managers have difficulties to be educated as Scrum Master because they are accustomed to say what everyone should do. Scrum uses a flatter structure and it is the team that is delegating the working plan and the follow-up.

5.2.6 What did I learn from the survey?

As Scrum Master you must find your own ways. The leader in Scrum is called Scrum Master to emphasize that there is no question about a traditional project manager, the two are essentially different from each other. The Scrum Master is a coach and not a project manager in the traditional sense. Scrum Master works to ensure that the team has the potential to solve the problem, plan and monitor their own work.

Scrum Master is not a member of the team at the same way as the traditional project manager is involved in the project group, that is why the Scrum Master does not have more power than the remaining members of the team.

As Scrum Master you will be a representative of the method and it is the Scrum Master's job bringing all communication towards other stakeholders, to take initial contact and solve all potential conflicts and obstacles. Internally, it is the team which is responsible for the development and the Scrum Master has no delivery or performance accountability. The results responsibility lies on Product Owner. It is the team that is responsible and the project manager or Scrum Master is here for answering questions. It is therefore a prerequisite for everybody involved in the project to be aware of the process and make Scrum to work.

Mikael spent a great deal of time and energy to convert people to agile mindset. Communication, both internally and externally, ensure that people should talk to each other, solve the team's long-term and short-term problems, check the status of the project, make the right priorities and ensure that the team is working on the right things every day. That is something which takes time. Internally, it may in the beginning seem stressful for team members who are not used to take responsibility to do their own breakdowns in small "tasks" and do time estimation. It is difficult to teach people to estimate time needed to complete a task. The situation with responsibility to the team members and no responsibilities to the traditional project manager would make a traditional project manager unhappy. One of our respondent said that they did not employ traditional project managers to Scrum Master because they have difficulties to get rid of their old habits. Ulf thinks that the Scrum responsibility is too heavy for the traditional manager and leads to stress as it moves through the rest of the team. Therefore, the role of the Scrum Master is comfortable, putting more responsibility on the team to plan and commit to the project.

Scrum supports Scrum Masters in their work by offering pretty much formalism, which makes it possible to measure and monitor daily. The daily meetings provide according to Lena extremely important status check of the project and Sebring also believes that through meetings you can quickly fix the problems that might otherwise slow down the speed. Sebring says that Scrum tools give very often a better updated information than any other tool in disciplinary methods. For a project to succeed, it requires according to Sebring that the Scrum Master himself should follow the method and rules.

Sebring says that it is important for the Scrum master to be focused on the problems that come up during the meetings with the team and to be able to operate without a detailed plan and be proactive, for the project to succeed. Scrum master must constantly keep the focus on the process, a lot can after a while become habit and it can lead to carelessness. Successful results require a capacity to overview the company and the ability to reconcile different views and wills.

I have learnt from the survey that Scrum has some advantages which can be useful to all project managers. The biggest advantage of Scrum is the clear division of roles and all working in parallel. The parallel approach gives the opportunities to complete the documentation when something is done. Michael believes that the early feedback is a great advantage and you have all the time control on the situation and know where you are in the project, a status report does not take more than five minutes to write. Sebring believes that the method allows him to focus on the quality of the project. One advantage is the mixed team which consists of seniors who have better knowledge of software development. Having a mixed team is an advantage according to Ulf. The decomposition into smaller pieces of the requirements on the board is also positive because everything becomes clear and structured. It will be easier to discuss what is at the board with everyone. Scrum does not say anything about how a problem should be solved, but just lift up problems to the surface. Suddenly you start to question things in the existing operations and visible problems in a different way and it is difficult when there is no clear solution to solve them. Then there are no rules for how problems should be solved and how conflicts can be handled, it is the Scrum Master's job to solve them. Sebring finds it relatively difficult to show project status to external customers, especially in situations where they do not take the time to check themselves the latest increment. In an agile project you can not ask about an exact release in the same way as in a traditional project. Mikael said that Scrum is easy to understand, regardless of your position in the company, and can be used on an entire business.

6 Comparing Agile Project Management and the Traditional Waterfall Method

We start by looking at similarities and differences between traditional and agile project management. What are the company's use and view of the scrum in relation to the discussed theories? Furthermore, we will discuss how an agile project manager's work differs from the traditional project manager.

6.1 What are the Similarities?

In an agile development we do not know in advance what extent the project will have in its entirety. In Scrum the product owner is responsible for the product backlog. It is not definite from the start but it changes during the project. Therefore, it is more appropriate to compare the traditional project requirement or scope with Scrum sprint backlog, where the most significant differences are the time frame which is very short in scrum. Instead of taking three months to gather all the requirements in the traditional project management, it will take one sprint or iteration of one to three weeks to present an increment of potentially shippable product functionality to the customer.

Something that is often observed around agile methods is the difficulty of applying the method on large project. Above all, to the possibilities of a good communication environment is changing. Boehm and Turner (see Sec. 4.4) are emphasizing that agile methods do best when they are used by small development team. Scrum is not an exception, but believes that 5-9 developers are optimal size. The ability to a quick change fits this factor. Through a small team is easier to verbally obtain what is needed.

When it comes to big project we should be more careful with the use of agile methodologies. There is too little time to create a team spirit. This activity normally takes place outside project boundaries but should be helped by closer cooperation in the project's framework. Again the closed and oral communication, often less official, play a vital role in the agile methods. In a Scrum team any member should take a task in the present sprint. Furthermore, the survey shows that, Scrum or Agile thinking should fit people working in the team otherwise they should be sorted out from the team.

Traditional project managers tend to focus on requirements as the definition of scope. The agile managers are focusing more on delivering value. They do not do up-front planning. The traditional project management follows the plan and protect it from external influences. They do not like changes. In emergency situation changes can occur and that is explained by the poor planning. Much is done via documentation and learning happens by following the same document from time to time. This is not consistent with the agile methods where learning lies in the oral communication and documentation only performed when it can bring something that the oral transmission cannot handle. A general advantage and a potential success factor with it, the interviewees indicate, is that the agile methods do not hide problems behind extensive documentation without lifting them up into the daylight.

Instead of focusing on planning and execution of the tasks as the traditional project manager does, an agile manager will focus on product features that give value.

7 Supplementary knowledge

This chapter describes what the respondents have missed to inform me about.

Moreover, it explains how respondents can misunderstand Scrum's terminologies.

I wanted to make clear that all my respondents have been using the world planning in the traditional way. The world plan is connected to certainty and prediction. The more useful definition of plan in Agile will be speculating than planning⁴⁹. Plans in agile context is for changes and they should not be stopped. We should adapt plans because the customer's requirement changes. Speculating is more appropriate term as uncertainty increases. In traditional project management we are planning because we expect the project result to conform to that plan. Deviations from that plan are big mistakes or a sign of a team's failure with terrible consequences. In agile we do not trust the plan as understood by traditional project management. The agile plan is speculation which is only one piece of information, which is examined to determine the next iteration. What we gain from the speculate phase is a released plan based on capabilities and stories⁵⁰. Traditional project management takes a lot of time and effort. It fails to understand that software is intangible. Being intangible means that it is impossible to predict any degree of occurrences. This is where agile is different. Rather than try to fix the scope and to drive the data cost within a triple constraint. Team gets together and figure out what is going to go in to the next production release of their software and how they will go to build it and its features. Activities of mutual working together to create one solution to our problem that produces. Release planning is not an estimation there is a piece of release planning which involves estimation. That is for example we can find a bunch of user stories we put some

⁴⁹ Jim Highsmith , "Agile project Management", P.130

⁵⁰ Jim Highsmith , "Agile project Management". P.83

estimates on them and some constraints about the team capacities are. This estimation is actually a very small part of the release planning. We should keep in mind that the release planning is dynamic and it can change.

The release planning gives you an idea about how many iterations the team thinks it needs. They are velocity estimates because they are not yet executed. What is velocity? It is a measure of a team's rate of progressed used to estimate future commitments. We measure it by summing the number of stories done in an iteration a sprint.

We do not know how many iterations it will take. It is only based on our best estimates. It is not based on actual facts. But this is quite better than spending three months gathering requirements and do some estimates. Even after three months you still have level estimates, you still do not have number that are real. Agile release planning will take you 2 till three weeks.

Moreover, I found interesting to add extra knowledge the Scrum Master must know. Agile budgeting and risk mitigation. Cost and risk mitigation have not been well covered in the survey. How do we budget a Scrum project?

The first concept we need is velocity as described before. We look at the number of sprints. Get a full understanding of the backlog with all the stories measured in points. We look the budget from three scenarios. The best case scenario for budget, the most likely and the worst case. For example, the backlog size is 250 points and the team velocity is 50 points, the team cost is 200000 DK per sprint and the sprint length is 2 weeks. Let's assume that the worst case is 6 sprints. 4 sprints for the most likely case and two sprints for the best case. The cost for the worst case is 1200000 DK, for the most likely case the cost is 800000 DK and the best case costs 400000 DK. Now it is now possible as a Scrum Master to inform the management about the cost of the project.

Previously, the interviewees agree that good coaching skills are required to be a good ScrumMaster. You should create a team dynamic (help the team with its self organization, teach how to work the agile way, open conflicts and help to solve them and help the team to make decision effectively and efficiently), meeting (it is important to have a really important agenda for all the meetings by creating a meaningful agenda to all the participants at time, make all the facilities ready for the meeting, create meetings minute, organize follow up and store results), I help to see the bigger picture (Share insights by spreading the word across teams, optimizing the flow of information between team and management, create structure in alignment with management that enables effective collaboration between involved parties, knowledge sharing sessions), product (I support the product owner and the team creating a release planning, help the product owner to create and share the product vision and to create the product backlog, start with finding user stories and present them to the teams by using artifacts like backlog and sprint planning) and learning.

When it comes to risk, traditional project management techniques as described in PMBOK would recommend a risk register to monitor for managing and controlling risks. That goes also for Scrum. Table 7.1 is an example of a simple register.

Table 7.1: Simple Register⁵¹

⁵¹ Singh, Monika & Saxena, Ruhi "Risk Management in Agile Model", P. 44

Description of risks	Date identified	Likelihood	Severity	Priority	Owner	Action	Status
	When the risk was identified?	Probability for the risk to happen	Impact on the desired outcome	Optional	Who owns the risks?	How to manage the risks?	Is the risk opened or closed?

It is an obligation that the risk register be made available for the team so that it can be managed and monitored collaboratively. At every sprint meeting, the risk register must be reviewed and updated with any new information obtained over the sprint. This way risk management becomes an integral part of Scrum. It is important for a Scrum Master to have sufficient knowledge how to manage and monitor risks. But many Scrum Masters give away that responsibility to the team.

8 Conclusions

The paper starts by describing the background for the traditional project manager and his work and role against the results we got out empirically for the agile project manager. The most significant difference is that an agile project manager has no result and delivery responsibility. These factors lead to a more open environment for communication where deficiencies and errors may be noted, which in turn can have a positive impact on the end product.

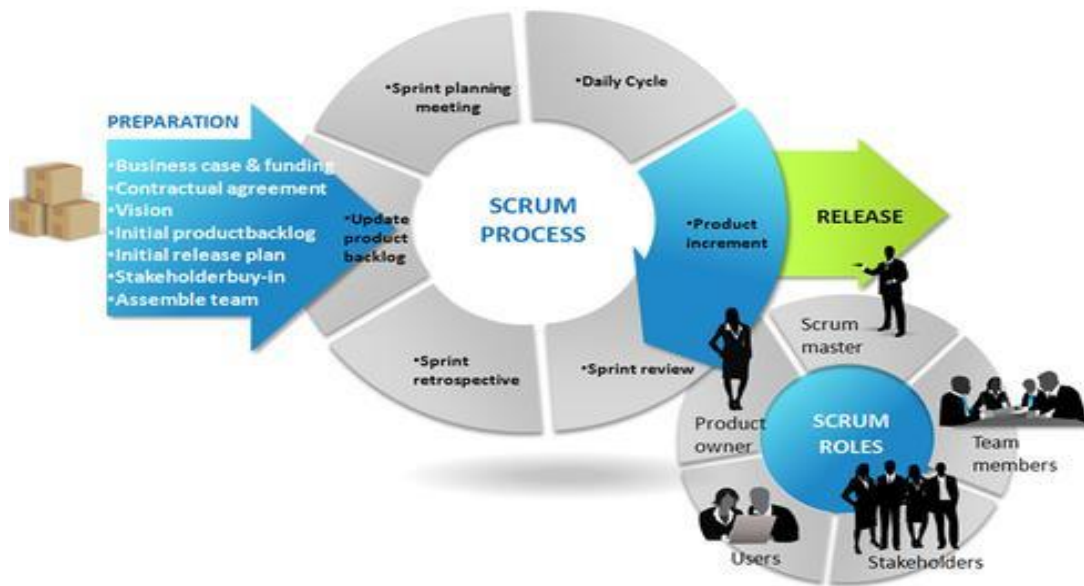
It is up to the agile project manager to create an effective system tools for monitoring and reporting, just as in traditional projects.

A self-organizing and determined team takes the role of the agile project manager differently. The project manager is not included in the team. Both the agile project manager and the team are jointly responsible. The Agile Project Manager makes it possible for team to do its work. To be able to act effectively as agile project managers you should therefore have a coaching attitude, the ability or capacity to take people, to be sure of the Agile thinking and happy with change. The agile project manager should have some of these skills such as driver, excellent coaching knowledge, problem solver and coordinator. We should also mention that not everything is working good with agile. For example, it cannot be used for large projects. One of the success factor is that problems are not hidden behind extensive documentation. Problems raised in daylight in agile projects. Moreover, agile gives a clear structure at work, good planning, clear division of work, makes goals to be broken down into sprint or milestones and so on.

Our knowledge contribution is in addition to existing theories about the project and specifically to project management. We have by studying the agile project manager empirically found a deep understanding and described it in relation to the traditional manager.

Let's embrace Scrum as project management methodology!!!!

SCRUM PROCESS



9 Survey Questionnaires

1. Questions about the respondent name, education and workplace
2. Have you worked with a modified version of scrum's methodology if yes please describe it?
3. How do you use the method in your work as a Scrum Master or project manager in agile?
4. What are the major benefits of Scrum?
5. What are the main characteristics you consider are most important to a Scrum project manager?
6. What do you think is good about Scrum?
7. If you should choose a project manager what characteristics do you expect from him

10 References

- Agile Alliance (2006). What is Agile Software Development.
<https://www.agilealliance.org> .
- Antvik, S., & Sjöholm, H. (2007). Project management and methods.
- Avison, D., & Fitzgerald, G. "Methodologies for Developing Information Systems: A Historical Perspective".
- Boehm, B., & Turner, R. (n.d.). Rebalancing Your Organization's Agility and Discipline.
- Davies, Paul Beynon. (2002). Information Systems- An introduction to informatics in organizations.
- Force, C. (n.d.). <http://www.ctrmforce.com/project-management/>.
- Heerkens, Garry. R. (2002). Project Management.
- Highsmith, Jim. (Second Edition). Agile Project Management.
<https://www.agilealliance.org>.
- Koch, Alan S. (n.d.). Agile Software Development.

Office, P. m. <https://www.uakron.edu/pmo/plc/>.

PMBOK. (2000 Edition). A guide to the project management body of knowledge.

Scrum Primer. (Version 2.0). A Light Weight to the Theory and Practice of Scrum.

Schwaber, ken. (Januar 2016). Agile Project Management with Scrum.

Singh, Monika & Saxena, Ruhi “Risk Management in Agile Model”

<https://www.scruminc.com/scrum-of-scrums/>

http://dbmanagement.info/Books/MIX/Agile_Project_Management_With_Scrum.pdf

<http://www.ibm.com/developerworks/rational/library/feb05/krebs/>