UNIVERSITY OF LJUBLJANA

SCHOOL OF ECONOMICS AND BUSINESS

MASTER'S THESIS

MOVING FROM TRADITIONAL TO AGILE PROJECT MANAGEMENT

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XP – Extreme Programming

WIP – Work in Progress

ROI – Return on Investment

PMBOK – Project Management Body of Knowledge

WBS – Work breakdown structure

INTRODUCTION

Agile methods are increasingly being adopted in software development, which enables entities to implement a new way of doing business using new methods. Several Agile methods recorded an increase in practice, such as Scrum and Kanban. Scrum is a method used in many software organizations. These organizations use a variety of applications to support their business process. Examples include the ability to manage projects, special time management applications in project management, control tools, applications, and quality control techniques used to support coding. Intensive use of applications in software development creates opportunities that include various types of data stored, enabling data-based decision-making (Brynjolfsson, Hitt, & Kim, 2011). Agile methodology is a framework that implies "thinking out of the box" where the developed projects need to be fast, and interactive, to have good communication with team members, communication with customers, transition, understanding, willingness, learning from mistakes and constant preparedness of the team to deliver something new and improved. According to one survey conducted in Denmark, 40 per cent of projects was conducted using the Agile methodology (Pries-Heje & Baskerville, 2017).

Despite the vast amount of data stored in applications, software development decisions have usually been based on subjective aspects, such as previous experiences of managers and stakeholders, intuition, or a combination of both (Cusumano, MacCormack, Kemerer, & Crandall, 2009). One of the reasons why companies fail to use the data stored in the application is due to difficulties in access and integration (Schaap, 2017). In general, each application applies its data and behaviour models and focuses on software processes. It is necessary to convert all the stored data in applications into information to be used in the project and presented to the team. Data is automatically stored, sorted, and integrated and represents a good team strategy in achieving goals and designing the project. Recently, the evolution of Agile development has been considered in the context of continuous software engineering related to the use of data development and user-related data (Hoda, Salleh, & Grundy, 2018). Azure DevOps and Clockify have frequently used applications. The first application is commonly used in project management in software projects to define tasks assigned to a team, and the second one, Clockify, supports the previous one in tracking time and controlling the duration of team tasks.

The Agile lifecycle consists of collecting the requests, analyses, coding, and then doing parts of functionalities discussed with customers for further progression. The focus is on the process and continuous interaction with customers where their opinions, desires, and preferences are important (Sharma, Sarkar, & Gupta, 2012). Positive gains are that Agile is very adjustable in terms of communication with the customer. It is always possible to change to ensure the contentment of customers, then for Agile projects, there is no need for enormous documentation, it only needs data about the product and its characteristics, it

also decreases risks of error that may occur, date, and the time required for each interaction (Sharma, Sarkar, & Gupta, 2012). The drawbacks of Agile are a lack of understanding with the customer, and a lack of documentation that will lead to problems, for example, when a new team member joins the team. Likewise, if there is no understanding between the customer and developer the resources and time will be spent with no results (Sharma, Sarkar, & Gupta, 2012).

Agile methodology is becoming more and more popular and broadly included in company processes. Previously, the Agile methodology was used in different special job requirements including special teams and groups with good flexibility, accessibility, and energy efficiency. Likewise, all that required greater difficulties which the organizations needed to encounter. Difficulties in adopting Agile occur when the management and team members do not want to adapt to the Agile process, they do not understand it, there is hard communication with customers, which can lead to misunderstanding, not accepting accountability by team members, not enough resources of the company for the project (Kuusinen, Gregory, Sharp, & Barroca, 2016).

Some practices show that it is better to learn from mistakes and know company processes very well, which means knowing how to improve processes, adapting them to the current situation in a company, when it is good to use Agile and when it is not a smart choice. It is crucial to use agile principles, already available methods with the possibility to improve them and adapt to company processes. Afterwards, a company that wants to be Agile needs to seek a mentor, a person who has enough knowledge and experience in Agile and it is willing to learn and educate team members and help them (Shore & Warden, 2007).

Agile has evolved in various approaches that have changed according to the company's needs. In the beginning, the Code and Fix approach was used. That approach consisted of simple coding and correcting things that had not been done correctly, which are not working or not in line with customer desires. The problems here are no good results, a lot of correction, waiting for all to be coded and after checking if something is wrong and spending a lot of resources. Because of those problems they needed something different when the Waterfall approach appeared. The Waterfall approach consisted of 6 phases: requirements, design, development, integration, testing, and deployment. This approach implies the completion of one stage and then starting with the next stage. Problems with this approach are that it was not easy to return to the previous phase and that lead to high risk in the schedule of projects and no elasticity which means that organization and team needed to perfectly know their processes because it was no time for big changes. The next problem is small elasticity and decreased communication with customers which means doing what is discussed in beginning about requirements with no time for changes. The third approach is the Spiral model was made to decrease risks in projects by prototyping and progressive delivery. This model was based on deliveries in parts and understanding the feedback of customers with upgrading. Later models were introduced, for example,

Rapid Application Process, Scrum, and XP (Extreme programming) (Ambler & Holitza, 2012).

To overcome challenges in software development, different researchers and practitioners were focused on developing various methods and techniques, also a handful of principles known as Agile principles stated in the Agile Manifesto to instil Agile thinking that outlines four values (individuals and interactions over processes and tools, working software over comprehensive documentation, customer collaboration over contract negotiation, and responding to change over following a plan (Misra, Kumar, Kumar, Fantazy, & Akhter, 2012).

Nowadays, companies throughout the world are using Agile methods, Scrum is one of the most common among them. Scrum was defined by many authors. One of the definitions is: "Scrum is an iterative and incremental process driven by product backlog meant for managing software projects" (Srivastava & Shilpi, 2016). According to Schwaber and Beedle "Scrum is a management and control process that cuts through complexity to focus on building software that meets business needs" (Anderson, Concas, Lunesu, Marchesi, & Zhang, 2012). One of many things that makes Scrum efficient is self-organizing and cross-functional teams. A team can react to problems quickly and they have the authority to take action. That is a difference between Agile and traditional methods that imply consulting with their leader before any action. There are several disadvantages in traditional project management methods, for example, the effort required in the planning phase and the fact that half of the resources are used before even starting the development, and customer requirements change very often which leads to the possibility of a project being changed before starting (Cervone, 2011).

"The State of Agile" brings the annual report saying that the use of Kanban in 2015 increased from 31 to 39% and almost 50% in 2016. One of the main advantages of Kanban is that it helps overcome challenges, allows teams to respond to the dynamic market, increases quality, and reduces waste (Ahmad, Dennehy, Conboy, & Oivo, 2017). Kanban, compared to other methods, has a focus on what needs to be done, prioritizing tasks, and defining workflow and lead time delivery. Kanban also outlines crucial tasks that need to be done to reduce the risk of project incompletion. Kanban allows for work to be done depending on the skills that the team and developers have. No additional features and codes are added if the team knows they cannot program and test it. Also, the team does not test something they cannot deploy. In that way, Kanban is helping eliminate waste and it is suitable for IT projects (Lei, Ganjeizadeh, Jayachandran, & Ozcan, 2017).

When it comes to Kanban principles the authors (Anderson, Concas, Lunesu, Marchesi, & Zhang, 2012) presented the core Kanban principles for software development:

- Visualize work,
- Limit Work in Progress (WIP), and

- Manage flow.

Scrum and Kanban, when compared, show certain similarities. One of those is that they are both Lean and Agile and can break down work into smaller pieces. Besides, the things they have in common are transparency and cross-functional teams. Also, they are both focused on delivering software early and often, use similar techniques of limiting work in the process and assigning story points. All of that shows that Agile methods are better compared to the traditional project management method (Lei, Ganjeizadeh, Jayachandran, & Ozcan, 2017).

Additionally, both methods are more efficient compared to the Waterfall method. They contain feedbacks to improve developing software. They focus on project scope, time, and quality and emphasise project value (Lei, Ganjeizadeh, Jayachandran, & Ozcan, 2017).

The purpose of this master's thesis is to understand the transformation from traditional to Agile project management. Moreover, my master's thesis aims to define and get a better understanding of Agile principles, roles in teams, way of working, experiences in adapting Agile, communication with customers and team members, differences between Scrum and Kanban, and to understand economic reasons for transferring from traditional to Agile methods. Furthermore, this master's thesis strives to investigate how and to what extent Agile methods are used and how Agile helps companies in delivering sprints and final products to customers.

To better understand and acquire comprehensive knowledge of Agile methods, my master's thesis pursues the following research goals:

- To comprehend company experiences in adapting Agile,
- To explain the benefits of using Agile methods,
- To understand problems and challenges companies are facing in adapting Agile methods and principles,
- To explore the transition from traditional to Agile methods and their challenges which include the adaption of the new working environment in teams, constant communication with customers, and all fast and constant changes, and
- To explain the benefits of using Agile methods in the company and to comprehend improvements for future usage of Agile.

Given the above, the main research questions of my master's thesis are:

- How well does the company accept Agile methods when transitioning from traditional methods?
- What is the experience a company compiles when transitioning from traditional to Agile methods and what activities need to be undertaken to satisfy the customers' needs?
- What are the key company challenges towards reaching their goal of becoming Agile, to be competitive in the market?

The thesis includes a literature review including various books, scholarly papers, research papers, websites, conferences, scientific journals, and e-books. The literature review helps in deepening and broadening knowledge about the topic, understanding what Agile is, Agile methods, particularly Scrum and Kanban, how companies are using Agile, experiences in adapting Agile, what the difficulties in adopting Agile are, and which challenges companies had to overcome to completely transfer to Agile methods successfully. Besides, it helps me summarize the theory, definitions, and concepts and obtain better knowledge which is a crucial research part of the thesis.

For the practical part, I have implemented empirical research based on an interview with relevant representatives of various companies that are currently using Agile methods. The interviews provided me with companies' experiences, challenges and problems when adapting to new ways of the working environment, the benefits and drawbacks of Agile methods used on daily basis.

1 TRADITIONAL PROJECT MANAGEMENT IN SOFTWARE DEVELOPMENT

A project is a nonpermanent venture undertaken to produce a special product, service, or result (Project Management Institute, 2017). Each project has its defined starting point and end. The end of a project is to be known after accomplishing the required goal defined at the beginning of the project, it is terminated if project goals cannot be reached or if there is no further necessity for the project (Project Management Institute, 2008). Project management is the implementation of knowledge, capabilities, equipment, and methods in project stages to reach the set requirements. Projects are developed in different industries, including new, modern technology, people, and the team for successful implementation. Traditional methods are based on the use of material assets, human capabilities, obsolescent ways of implementation and knowledge. To implement successfully project goals, it is necessary to define the required resources and valuable ones for the team (Drouin & Besner, 2012). When it comes to project management, there are relevant skills: the capability to work with a group of people (in the team), the capability to plan, arrange, think about what can be done and in which way, to have a clear judgment and to resolve potential problems. Besides, it is very important to gather people in the team with different backgrounds and those majoring in various fields to gain a range of ideas and solutions for successful projects (Levasseur, 2011). Using project management has its benefits, for example, better guidance in human resources, physical and economic assets, increased productivity and trustworthiness, higher worker ethics, lower expenses, shorter development cycles, and improved customer association. On the other side, each project has some risks because it is hard to say with high reliability which risks will appear. Because of that, the project manager decides which tasks are priorities and change the project scope, quality or timeline to reach customer goals, desires, and projections (Schwalbe, 2015).

Authors (Kolltveit, Karlsen, & Grønhaug, 2007) defined six different perspectives in project management:

- Task perspective,
- The leadership perspective,
- The system perspectives,
- The stakeholder perspective,
- The transaction cost perspective, and
- The business by project perspective.

Task perspective – the central point of this perspective is to deliver the desired final product as the customer requested into the prepared financial plan and schedule. The main questions regarding this perspective are the process of preparing, controlling, workload, project aim, and outcomes.

The leadership perspective – the characteristic of this perspective is the leadership and guidance of the entire team. Also, this perspective includes education, task preparation, relationship, solving problems, fast reacting, good organizational skills, and decision-making.

The system perspective – this perspective is based on findings that are crucial in examining the entire project for bringing a decision. It is important to inspect the whole company and structure as an effective process and arrangement.

The stakeholder's perspective – the gist of this perspective is to have constant, ethical, and truthful communication with stakeholders for the best results in the project. It is also essential to ensure discussions, various tactics, and plans.

The transaction cost perspective – this perspective is related to perceiving a project from a financial point of view, as earnings by providing a product or service successfully. Here is important to carefully examine and plan the project, its completion, and communication about further improvements in the project.

The business-by-project perspective – a perspective related to project funding, advantages, positive sides, outcomes, and prosperity of the project.

In project management, the commonly used perspectives refer to human resources and the overall project concept. Some projects are using more perspectives in combination for better results. In conducted research, the most superior perspectives regarding the implementation of projects are the leadership and task perspectives. Besides using different perspectives, it is essential to focus on implementation, schedule, financial resources, arrangement, job classification, collaboration with personnel, company values, and good communication (Kolltveit, Karlsen, & Grønhaug, 2007).

The project has been defined as a major method for operating innovations and new ideas and leadership skills are extremely useful for projects with no previously defined desires and functionalities, which are nowadays very common and fast-changing (Lenfle, 2008). Because of certain changes, the need for innovation occurs, whether due to the need for new functionality or design, and it implies accomplishing all changes within schedule, financial resources, time, and required standards. Authors always describe project management as a reasonable and logical view that leads to fulfilling all previously defined requirements by customers in the prescribed period, schedule, and defined quality (Bergek, Jacobsson, Hekkert, & Smith, 2010). Besides, books and theory do not include possible changes and new requirements that are possible to occur, which will lead to changes in all defined resources and the scope of the project. For example, the difficulties arising in developing complex types of products are preparing the company structure, procedures, and routines. Also, to provide sufficient knowledge, expertise, and capabilities regarding the topic to the entire team on the one hand and, on the other hand to customers, for better understanding (Lenfle, 2008). Table 1 shows six perspectives on project management.

Table 1: Six perspectives in project management

Perspectives	Main focus areas (key factors)		
	Issues in focus	Underlying theories	Methods and tools
Task	The project scope of work Project targets Project results Planning and Control	Scientific management The rational choice	Management methods Work breakdown structure Scheduling and control Resource planning and monitoring Cost estimation
Leadership	Uncertainty Leadership/ management Communication Learning	Team organization Communication theory Process Leadership theory Change	Evaluation and feedback Communication plan Responsibility matrix Organization Milestones Decision
Systems	Elements and systems Boundaries Dynamics	Systems Interrelations	System models Mapping Simulations
Stakeholder	Stakeholders Stakeholder communication Negotiation Relationship Influence and dependence	Agency Power Network and relations	Stakeholder analysis Stakeholder communication plan Stakeholder strategies

(*table continues*)

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Table 1: Six perspectives in project management (cont.)

Transaction cost	Transaction Transaction cost Production cost Governance structure	Incentive Transaction cost Contracting Innovation	Contracts Contract development Contract negotiations Contract execution Incentive Innovation
Business	Business Project results Success Strategy Profit	Accounting Financial Strategy Portfolio	Payback Net present value ROI Excellence model

Source: Kolltveit, Karlsen, & Grønhaug (2007).

According to Lenfle (2008), three known views from project management are significant in the success of the project:

- Heavyweight project managers,
- Overlapping problem-solving cycles, and
- The integration of customers and suppliers into product development activities.

Heavyweight project managers are usually highly ranked, educated, and proficient workers with official guiding authority on project management activities and implementation stages. These managers have leadership abilities and are focused on designing the processes (Anantatmula, 2010) and their activities with substantial idea planning that are interpreted into real, strong, and valuable products or services. The heavyweight manager is responsible for planning the processes, giving new ideas, and leading and controlling unknown activities (Rauniar, Doll, Rawski, & Hong, 2008).

Overlapping is an activity of beginning one activity, for example, the development process before finishing the previous activity like the design of the product (Wang & Lin, 2009). This overlapping is possible and may lead to uncertainties during processes. These risks are arising if the developing phase is not suitable for the design phase and overall plan which demands the alignment of the phases that are overlapped. The process requires more time, money, effort, and communication to improve what is already implemented to fit the process (Chakravarty, 2001).

The integration of customers and suppliers into product development activities is a popular method for reducing costs and better communication between them for delivering the product. Novelties and understanding of customer needs are extreemly valuable for organization and team capability (Bayus & Shane, 2008). A better understanding of the customers and suppliers will lead to lower costs and mistakes during the implementation and development stage of the project. Supplier knowledge and skills can be very important and valuable to the team as a new resource or group of valuable abilities. This association

with customers and suppliers can benefit innovative processes (Handfield & Lawson, 2007).

A project manager is responsible for multiple tasks: defining the stages in the project, scheduling the plan of the project, focusing on project advancement, taking care of all possible modifications or risks in the scope of the project (Smith, 2017), following the results of the project, understanding the mistakes that occur during the implementation and collecting all the information for further projects (Đerić, 2016).

It is general agreement that individual projects could fit and be presented with these phases despite the fact of differences in complicacy and project range. According to the authors (Hewagamage & Hewagamage, 2011) if the project cannot be launched and it is not suitable for phases of the project lifecycle then it is not evaluated as a project. To some authors, the project lifecycle consists of six phases, nevertheless, those phases are also classified into four main phases: defining the project, planning, implementing, and completing the project.

Figure 1:Project lifecycle stages
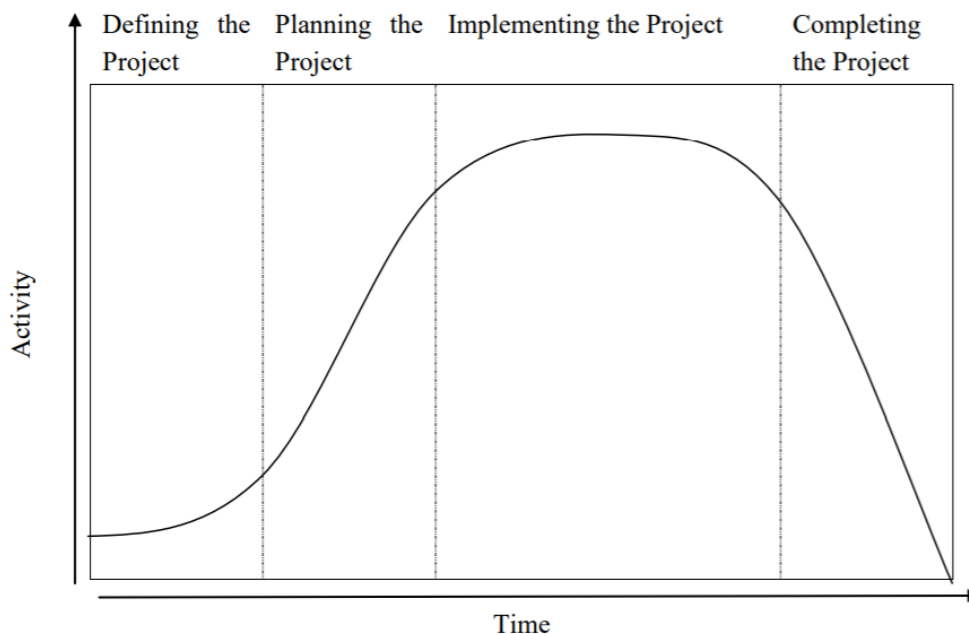
Source: Haynes (2004).

A phase in the project is a set of insightfully connected activities that leads to the delivery of the project until its end (Project Management Institute, 2017). A phase defining the project is starting phase in the project lifecycle. This phase includes required meetings, discussions, selection of the team members, development of the resources for the project plan, and acquiring the project infrastructure (Webster, Knutson, Dinsmore, & Cabanis-Brewin, 2004). Planning the project phase includes the broader definition of the budget and particular schedule. Also, in this phase, it is important to define resources, acquisitions, and

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control plans. In this phase, the focus is on understanding how the project will be executed and which resources will be required in the process for its successful execution. Implementing phase implies the actual working activities for delivering the final product and accomplishment. Completing the project is the final phase which implies the work on final, minor activities, archiving the documentation, and transferring people from the project (Project Management Institute, 2017). Figure 1 is demonstrating the project lifecycle stages.

1.1   Waterfall approach

The Waterfall model is the most popular traditional method named waterfall because the development phases are organized downward. An organization of this model is to separate the process into various phases where the output of one phase is used as the input of the next phase. This means finishing with the previous phase before starting the next phase without mixing the phases (Balayi & Murugaiyan, 2012). The waterfall model is developed to overcome some issues and constraints (Andrei, Casu-Pop, Gheorghe, & Boiangiu, 2019) that forgoing this method was proven to be great in developing the software or operating system when needed but, on the other side, it required major records in software that proved not to work properly for other major developing of applications and electronic document in which data is arranged in rows and columns of a grid and can be manipulated and used in calculations. The evolutionary software development method is a little bit different because it is accepting the responses and reactions of customers in development processes, using their experience to enhance the product functionalities (Mantere & Alander, 2005). Constraints of this method are demanding requirements for servicing and changes from a customer that are hard to follow. The spiral method together with Waterfall had insufficiencies, difficulties to remain functional, and changing the codes and the core system which leads to various obstacles (Misra, Kumar, Kumar, Fantazy, & Akhter, 2012).

When it comes to projects, companies spend significant financial resources for the delivery of the project but not all projects are delivered on time, within the scope, and financial resources and certain do not achieve the purpose and goal of the project (Marks, 2012). There are innumerable cases of project failure but also various studies claim that the causes for the failure of the project are a selection of unsuitable methods in project management. Usually, users and project developers stick to what they know the best, how they are used to doing it, and what they are the most experienced in with no tendency to acquire new skills (Ahimbisibwe, Cavana, & Daellenbach, 2015).

The Waterfall model used in the project management lifecycle has been widely recommended (Younker, 2008). The Waterfall is designed to have predetermined phases when all the required goals are set. These phases are formed as phases where each next phase requires the evaluation from the previous phase with no ability to transfer to the next stage if the previous has not been finished or skip one of the classical phases (Andrei,

Casu-Pop, Gheorghe, & Boiangiu, 2019). This method is for managing the project with a team that has understandably defined roles, working together to reach the goals that are not anticipated to change. Also, this method is good for extensive projects that will not end in a short time, with considered characteristics and details (Andrei, Casu-Pop, Gheorghe, & Boiangiu, 2019). Figure 2. demonstrates the traditional processes of the Waterfall method for software development.

Figure 2: The Waterfall processes
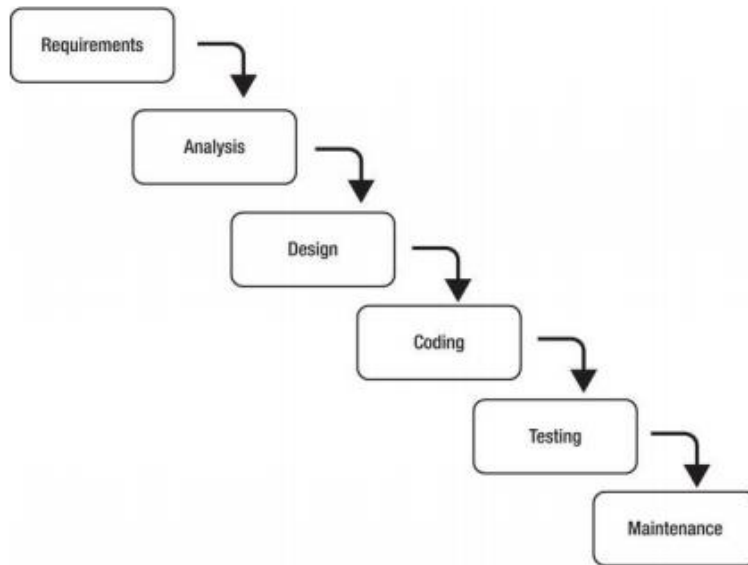
Source: Blankenship, Bussa, & Scott (2011).

The waterfall model relies on planning and organizing all the activities in the beginning and doing analysis after all requirements are set as desired (Davis, 2013). The requirements phase is the first phase consisting of desires and information received from clients about the goals and how the system development process is to be defined. The analysis phase requires a short analysis of the information and documentation about the processes. The design phase is based on the previous agreement with clients about what new functionalities, software or platform are desired to look like. This phase consists of the selection of the correct algorithm, design, software architecture design, database, theory schema, form of data, and representation diagram design. The coding phase consists of the actual writing of the codes that will be used in the process of software development. The testing phase implies testing of created and developed parts of the final product according to previously defined requirements. Also, in this phase, the possible bugs are found that are fixed, improved, or cleared. The last, maintenance phase consists of improvements, or modifications once the software has been completely developed (Alshamrani, Bahattab, & Fulton, 2015).

1.2   The project management body of knowledge

The project management body of knowledge (PMBOK) is organized and initiated by Project Management Institute to establish the standards and understandings to guide projects (Matos & Lopes, 2013). For victorious results and positive effects of the project, required project management procedures, equipment, and abilities need to be followed and respected (Project Management Institute, 2017). PMBOK is accepted as a positive implementation method that is widely acknowledged and consists of nine knowledge areas that are divided into five phases of the project lifecycle, including well-established total knowledge (Zwikael, 2009). Besides, these standards are assisting project managers in the implementation and successful completion of the project. PMBOK is considered a significant and dominant standard and project managers are familiar with its procedures. These standards are supported by project managers in the process of gathering official certification (Muñoz, Blanco, & Capuz-Rizo, 2018). Therefore, it is also very important for management to know and understand the applying scope, project nature, abilities for communication features, and regular traditional management. According to Fitsilis (2008), there are nine knowledge areas:

1. Project integration management relates to the combination of various procedures and activities in features of project management. It includes procedures like developing a project charter, developing a preliminary project range statement, establishing a project management plan, directing and managing project implementation, leading and controlling project progress, involving change control, and project closure,

2. and project scope management by covering procedures accountable for standard and controlling of project scope. The project scope includes scope planning, scope definition, creating work breakdown structure (WBS), scope confirmation, and scope control,

3. Project time management relies on the timeline of completion of the project. Project time includes activity definition, activity succession, activity resource evaluation, activity duration evaluation, schedule development, and schedule control,

4. Project cost management involves procedures like cost estimating, cost budgeting, and cost control that is related to possible costs,

5. Project quality management relates to guaranteeing the realization of all required goals of the project and leading to contentment. Project Quality includes quality planning, performing quality assurance, and performing quality control,

6. Project human resource management relates to arranging and guiding the project team. Project human resources include human resource planning, gathering project team, evolving and directing the project team,

7. and project communications management is related to the transmission of information inside of the project team and its procedures. This includes gathering, sharing, keeping, and distributing details and knowledge,

8. Project risk management is related to managing risks in project management procedures and it is following risk management planning, risk discovering, qualitative risk

evaluations, quantitative risk evaluations, risk response planning, and risk tracking and control, and

9. Project procurement management related to obtaining required products or services for successfully finishing the project. Project procurement includes plans regarding buying and procurement, plans about negotiation and agreements, seller decisions, seller desire planning, contract regulations, and agreement terminations.

The project management body of knowledge consists of five process groups (Varajão, Colomo-Palacios, & Silva, 2017):

1. Initiating,
2. Planning,
3. Executing,
4. Monitoring and controlling, and
5. Closing.

Initiating phase sets a focus on discovering and recognizing calculations and predictions appointed by stakeholders, clarifying project range, project accomplishment standards, opening capital, and approving and validating the end of the project after successful implementation of this phase (Chaves et al., 2015). This phase is related to promoting shared context. The unsuccessful actions from previous projects are evaluated as ideas or advice on what not to do (Project Management Institute, 2017).

The planning phase includes the interpretation of the project management plan together with all required documentation that will help in further project development. This is a continuous process that should be reviewed after each new detail in the project is received that will modify the process of the project (Project Management Institute, 2017).

The executing phase includes multiple important undertakings as obtaining, developing, leading and supervising the project team, and assigning and allocating the information (Project Management Institute, 2017). This is done by inspiring the sharing of group and individual information for better communication, understanding of information, and collaboration between team members (Talja & Hansen, 2006). In situations when team members struggle or are in unpredicted circumstances then they ask for advice from team managers of their team or other teams if they were involved in comparable circumstances (Oborn & Dawson, 2010).

The monitoring and controlling *phase* consist of tracking the progress and addressing the challenges of the project for improvement (Chaves et al., 2016). The goal is to create more confident and authoritative processes. Also, this phase is for considering the timeline of the project, range, financial plan, wished final product, and to prevent unexpected situations. A role for project managers in this phase is to constantly inform the stakeholders about the process and progress of the project with reports or with paper records. In this phase, it is important to follow the progress and to actively involve stakeholders and team members.

Furthermore, it is important to learn the unsuccessful actions and improve the progress (Project Management Institute, 2017).

The closing phase involves transferring the phases from "Resolved" to "Finish" status. Besides, it is important to consider whether the project was successful, within the budget, timeline, and resources (Bloch, Blumberg, & Laartz, 2012). It is on the project manager to consider whether the project was phased where resources are missing, and which phases had determined problems. In addition, this phase is calculating the strengths and weaknesses of the project and evaluating the performance of the team members (Isik, Arditi, Dikmen, & Birgonul, 2009). These phases are designed to be applied to all types of projects and it is rare to find a project that does not go through these phases. For the previous methodology known as Waterfall, the limits and purpose of the project are extremely strict. (Project Management Institute, 2017).

1.3   Reasons for a project failure

Many projects fail because they are incomprehensible (De Bruijn & Ten Heuvelhof, 2010) and the definition of success and failure which leads to projects that are labelled as a failure, however, determines the status of the real project of how effectual it is. In addition, if the project is worthwhile to the company on the one side, and on the other side exceeds the schedules and financial plans continuously, in its further implementation it will probably lead to overstepping the positive sides in a company and eventually worth it is to bring. Numerous explorations have been conducted to better understand why a project fails and why there is no improvement in work. Many reasons for a project failure include four categories: people, technology, procedures, and organizational structure (Marchewka, 2014). Figure 3 represents four categories of reasons for the project's failure. Below are categorizations further explained:

- People: the important fact in project management is to receive encouraging feedback (Vargas, Hejderup, Kechagia, Bruntink, & Gousios, 2018) from customers about successful projects. Their role is to obtain and sustain the financial schedules of the project. Also, it is important to have spiritual and psychological support from management, and discussions about possible misunderstandings. Users and developers should cooperate and share knowledge that varies from technological to business one, to better understand and develop workable software. If a user is not involved in the development phases, it could lead to passed chances, impractical presumptions, and deficiency in selling a product. Other problems can be unacceptable cooperation, disrespect of other team members and their opinions, and not well-defined obligations (Marchewka, 2014),
- Procedures: includes a group of procedures from the management and development aspect. The management part of the project is to interpret aims and intentions. Besides, management support development phases hold the entire project implementation, test,

assemble, and represent. If procedures do not proceed as planned, budgeted, or scheduled, this will lead to low quality of the product, exceeding of deadlines, and additional work that has not been previously required,

- Technology: problems with the execution of a project can be non-compliance of the technology or assets, like obsolete technology, with procedures, a product, or structure. As one of the principal parts is to select the proper technology or assets that fit the project procedures and do not interfere with the normal flow and course of the project, and

- Organization: if projects lack plans, approaches, and schedules, it can lead to investments in unprofitable projects and failure in noticing the potentially successful projects. Future modifications in project functionalities and characteristics are making space for project priorities transitioning and financial misplacement (Marchewka, 2014).

Figure 3: Four categories of reasons for a project failure

People	Processes	Technology	Organization
• Lack of Top Management Support • Ineffective User Involvement • Lack of Skills • Lack of Experience • Poor Communication • Poorly Defined Roles and Responsibilities • Lack of Accountability • Unrealistic Expectations • Conflicting Stakeholder Goals • Poor Decisions	• Poorly Defined Goals & Objectives • Poor Planning • Lack of Controls • Poorly Defined Requirements • Changing Requirements • Inadequate Testing • Project Management & Product Development Processes Nonexistent or Not Followed • Poor Execution	• Obsolete • Unproven • Incompatible	• Lack of Direction • Changing Priorities • Lack of Funding • Competition for Funding • Organizational Politics • Bureaucracy • Lack of Oversight • Poor Change Management

Source: Marchewka (2014).

2 AGILE PROJECT MANAGEMENT IN SOFTWARE DEVELOPMENT

Agile project management is commonly used in software development and has become accepted in more and more companies because of the ability to adapt to accelerated changes, react correctly in terms of project insecurities, and adjust to different aims and project desires (Rasnacis & Berzisa, 2017). On the other side, Agile is known as an approach with the main purpose to deliver to customer demanded functionalities in a short period, promptly and where work is divided into interactions with planned activities (Baskerville & Pries-Heje, 2013). Agile methods are referring to variable, fast, unstable, and changeable circumstances for progress and establishing software. Besides, Agile methods are opposed as the option that cannot be used in every process or stage of

developing a product or conducting a project. Authors support Agile as one of the most reliable (Warren, 2014) and trustworthy processes to use.

According to Paulk (2012), Agile methods are approaches to create delivering processes undemanding, uncomplicated, supportive, and beneficial for the use which will bring certain significance to the processes. Guiding team members, helping in overcoming troubles and possible problems, creating team roles, and investigating team abilities and what influences their better performance (Rashid & Khan, 2016). Besides, the Agile method is used when the goals and aims of the project are correctly defined but the way of reaching those defined aims is not known, it is up to the team and project manager to research and design the idea and to search for the best possible and corresponding way to deliver the project with all fulfilled requirements set by a customer (Petrović, 2018).

2.1 Agile Manifesto

By discussing, occupation, and proceeding with the progress in development approaches, a group of software experts, namely Kent Beck, Mike Beedle, Arie van Bennekum, Alistair Cockburn, Ward Cunningham, Martin Fowler, James Grinning, Jim Highsmith, Andrew Hunt, Ron Jeffries, Jon Kern, Brian Marwick, Robert C. Martin, Steve Mellor, Ken Schwaber, Jeff Sutherland, Dave Thomas, had their visions in 2001, found a common language and established Agile methods (Ambler & Holitza, 2012). Experts from the developer community defined the term Agility as developed software (Agile). And they wrote a Manifesto defining a new approach known as agile software development. By discovering a better way to develop software, developers help themselves and others (Highsmith). They realized the significance of developing more models that will complement each other while being structured and team-focused, Agile, and workable. The founders of the Agile manifesto enabled twelve principles that support all methods (Ambler & Holitza, 2012).

Paulk (2012) listed the principles of the Agile Manifesto as follows:

- The prime concern is to fulfil the needs of customers with the constant and simple delivery of software,
- Acceptance of all changing requests from customers, even at any point of the process for creating and contributing the competitive advantage,
- Regular distribution of software, from several weeks to several months, with a tendency to shorten the delivery cycle,
- In the project, the entire team should work together in solving problems on daily basis,
- Assist each person that is inspired and trustworthy and confident, they will do the job in the best way,
- Communication which requires face-to-face conversation is the best option for transferring intents, ideas, and information,
- Leading evaluation and estimation for improvement and progress in functional software,

- Agile methodology is stimulating constant maintenance in all phases of the development of working software,
- Constant focus, adaptation, and proposals of models are strengthening and extending Agility,
- Clarity and understandability are very important for what has been done and what is to be done yet,
- Good organization, establishment, and association in teams lead to motivation for proposing the greatest ideas, novelties, and design, and
- In each sprint, the team discuss constantly good practices, negative experiences, and possible improvements in processes.

Agile methods describe practices and define helpful roles and expectations (Sidky, Arthur, & Bohner, 2007). These methods allow you to create flexible software, allows to track project progress that requires communication and collaboration with users, and it is easy to use (Edeki, 2015). Agility is an expression of a method or progress that follows the principles of manifesto and value (Ambler & Holitza, 2012). Unlike agility, the traditional methodology is complex with large documentation, difficult to deal with changes in the development phase, less flexible, requires learning, and lacks interaction with an end-user (Hunt, 2006).

Ambler and Holitza (2012) said software development is resilient and complete if the centre of attention is based on four values:

- Team members and constant delivery beyond procedures and techniques,
- Functional software and less massive paperwork,
- Communication with customers about product functionalities and schedules, and
- Reacting to modifications as discussed and defined inside the schedules.

Regarding the first value, team members are an important value to the company because all procedures in the development of the product and improvement come from people and programmers (Oh & Choi, 2020). Techniques and procedures support the creation of software, however, the team of people working together and using techniques present the major goal (Hunt, 2006).

The second value is determining the evaluation of functional software regardless of whether it contains documentation or it does not meet the customer's desires, then it has no value. Functional software may have documentation that is the opposite of the Waterfall method, and Agile uses paperwork for the functional software (Hunt, 2006).

The third value, Agile does not diminish the value of signing agreements, however, in achieving the development of the procedures, it respects more cooperation during the procedures with customers and the realization of value for the customer and modifying individual parts to achieve better value (Hunt, 2006).

The last value, each plan contains predetermined characteristics, procedures data, and customer wishes. Agile appreciates all these contents but the ability to change the process with the customer agreement about new items and discoveries is crucial to change the plan value (Hunt, 2006).

The nature of Agile methods is to deliver customers working software with functionalities as demanded in the specification and establish teams, but not large ones, that will collaborate and be inspired (Rasmusson, 2010). Also, that inferred responding to all replacements and modifications no matter in which implementation phase or under which circumstances the product is. Besides, Agile methodologies are the correct technique for providing standard and functional final products based on the desires of the customer (Dingsøyr, Nerur, Balijepally, & Moe, 2012). Agile methods are methods with a common goal and achieving growth, minimizing the unnecessary and unprofitable effort that leads to overmuch and needless paperwork, which implies tracing in the paper form required and mandatory situations, complete involvement, and communication with customers into developing processes about new functionalities, undertaking and embracing possible changes and fast responding to requirements (Lee & Xia, 2010).

2.2   Agile methods

The Agile approach is a substitution for traditional methods that could not achieve and manage today's fast and changing requirements (Watkins, 2009). Agile methods emerged as good practice for remaining competent and taking control of the market for the successful delivery of products according to all specifications from customers (Gerster, Dremel, & Kelker, 2018) whereas traditional methods had an insufficient response to immediate and demanding requirements. The way for remaining successful is to have a good base of knowledge, constantly analyze positive sides inside the company, and regulate and adapt those positive functionalities to achieve results and meet the customer's needs (Armanious & Padgett, 2021). A very important component inside a company is to have the ability inside the team to realize team prudence, their willingness to learn about new requirements on the market and the ability to transfer the acquired skills to others to meet the market needs (Abbasova, Bagautdinova, & Degtyareva, 2020).

The essential part for prosperous results is to support Agile methodology, achieve a good position on the market, gather knowledge, and deliver a high-quality product with all necessary details. Success relies on knowledge, understanding, and willingness to teach, study and share the lessons learned with other team members (Al-Alawi, Al-Marzooqi, & Mohammed, 2007). In addition, workers or team members should be aware of agile advantages (Rover, Ullerich, Scheel, Wegter, & Whipple, 2014), have good knowledge, acknowledge problems, and find the best possible solution. To achieve the goal and completely utilize Agile methods it is necessary to organize, plan and conduct tactics for studying and educating team members and the organization (Mircea, 2019). It is expected

from team members to be ready for constant studying and willing to develop abilities regarding validating and solving problems in fast-changing environments (Inayat, Marczak, & Salim, 2013). For example, current active viruses have occurred and companies are facing the unknown, so they are striving to find how to remain on the market in such an environment.

Management in a company defines and studies procedures intending to create the company and its workers skilled at using the right systems. The process of educating workers implies the acquisition of knowledge, retention and sharing of the acquired knowledge with other team members (Takpuie & Tanner, 2016). Besides, it is important to reshape silent knowledge and understand clear and straightforward knowledge that will benefit every team member and company. Tactics for education consist of certain components: studying procedures, management guidance, internal education, procedures of acquiring knowledge, and knowledge management system (Armanious & Padgett, 2021). To achieve this component and to prepare the right tactic, some companies decide to use specific equipment and methods for receiving knowledge and being able to share learning. Therewith, the tactic is organized as a well-planned system for educating workers (Wale-Kolade, 2015) by arranging small groups that fit the timeline and enabling each worker to improve, upgrade their knowledge and understand Agile methods to create a favourable position on the market. It is fundamental for organizations to be open-minded (Tjosvold, Zhang, Wen-Dong, Shiu-ho Wong, & Yu, 2022) and enthusiastic about Agile tactics with readiness to start developing software and using Agile as a method. Following the tactic will bring new knowledge, expand existing knowledge about processes and maintain rivalling situations (Harding & Read, 2017). This method helps a company to outsmart other companies, comprehend the issue and react accurately with a suitable solution. In addition, organizations are capable to track the market position before and after the implementation of Agile methods for rational following the improvements (Heimicke, Kaiser, & Albers, 2021) and progress compared to other companies.

Top management should determine and specify guidance practices for the motivation of team members for persistent education (McHugh, Conboy, & Lang, 2011) and the creation of a well-informed group of people that can pay attention and react in time with an idea (Macauley, 2015). For successful preparation and education of team members inside a company, it is suggested to organize education propositions that consist of five routines: intellectual program, common perception, individual proficiency, structural belief, and organizational acquiring knowledge (Armanious & Padgett, 2021). Each routine helps a company to improve processes, as an intellectual program refers to top management motivating and stimulating internal education for the employees to easily adapt to Agile methods for a successful and efficient working environment (Mkoba & Marnewick, 2022). Common perception refers to imagining the entire process of development and delivery in the future with Agile methods and the possibility to enhance. Individual proficiency is related to each team member that is willing to study and evolve as an individual with many ideas for upgrading. Structural belief means that all team members share their collective

knowledge and make progress with the help of a complete team. Acquiring knowledge within the company is the potential skill of the team and company to recognize drawbacks and learn how to handle them (Armanious & Padgett, 2021).

If a team have the appropriate expertise and a good leader, they can bring the best technical and procedural decisions. Involving developers in the procedures brings about the empowerment of the team (Hoda & Murugesan, 2016). Due to the rapid implementation and delays in decision-making, a manager needs to work with developers who will anticipate rapidly the next step and improve the proposal and clarify procedure developments (Boehm & Turner, 2005). This means that the development team has the freedom to decide how much work to take over, rather than having someone from outside do it, and for that, it is necessary to enable a lot of knowledge and learning inside the team (Poppendieck & Poppendieck, 2003). It is important to provide the client with full use of the system as the product develops, how much it costs, how it is advertised, and whether the architecture is transparent and flexible.

Information systems are the result of the mutual interaction of many teams and development organizations. All members involved in the project must have a clear understanding of poor thinking and collaborate well with each other (Kropp, Meier, Mateescu, & Zahn, 2014) to promptly learn and avoid failure. Therefore, it is necessary to optimize the entire development process and ensure a positive relationship between teams that individually develop parts of the process (Poppendieck & Poppendieck, 2003). Delivering products to market as quickly as possible makes us competitive. That is why those companies that deliver the final product without major shortcomings will receive feedback from the customer as soon as possible and be more successfully involved in the next iteration. Frequent communication allows a client to change his decision later on during the process when he knows what he needs, will easily manage, solve problems, make the right decisions, and assist team members (Kniberg, 2011).

The purpose of working and adapting to Agile methodology is to bring a company in the situation for easier tracking of what is done, meeting the schedule goals, and advancing the progress of delivering the required product and workable software (Rasnacis & Berzisa, 2017). The Agile method should keep the team away from low execution methods and increase positive results inside the organization. Agile methods are valuable and can manage (Pereira & de F.S.M. Russo, 2018) successfully in volatile environments. An essential part of Agile methods is not only fast and right response to the customer's requirements but bringing novelties inside a company (Baseer, 2015) in the development activities. In the beginning, it will be useful for a company to define a real situation inside the team, and recognize and examine basic parts of work, for example, "is there a way to modify the current development process?" and "what Agile methods will contribute to the company?". Before implementation of Agile methods, it is essential to gather relevant information about the company and team volume, form of procedures previously used (Karlsen, Pedersen, Trautwein, & Solli-Sæther, 2022), educated people that have

experience in Agile methods and earnings on previous projects implemented by the use of traditional methods. Also, team velocity, customer contentment, a proper following of the schedule and possible ways to upgrade.

Using Agile methods and becoming popular in a fast-growing environment implies operating with many of the mentioned techniques with previously clearly defined aims of the company. Also, some organizations use methods for visibility of the project position, estimation, and observations of possible issues and it is important to follow the schedules and deadlines (Sidky & Bohner, 2007). For successful accomplishment and delivery of the project, it is crucial to think and observe all possible techniques and methods to select the most appropriate ones for a certain company because each company has different requirements. Constant communication, collaboration, and usage of the right techniques will bring benefits and profit to the company (Mihalache, 2017). According to the conducted research, Agile methods were proved to influence positively the working process, the team as arranged category, the negative indicator is the orientation of team members. On the other side, the advantages of using Agile methods are enhanced discussions, better understanding, contributed value, and high-speed delivery of the software (Tarwani & Chug, 2016) which leads to the accomplishment of the team. An advantage of Agile methods is meeting customer requirements and finishing and delivering the product, whereas traditional methods are directed to non-compliance with the schedule, delivering a product of an inadequate standard, arising in extensive expenses, and overall dissatisfaction with the project. The development of the product with Agile methods enables project teams to deliver functionalities on time through the constant involvement of customers in the process and pursuing the prescribed guidelines (Mihalache, 2017).

Agile methods are based on correspondence between customers and system developers, where knowledge management takes a part in the process (Chan & Thong, 2009). For prosperous and effective knowledge management it is important to base it on people's motivation, abilities and opportunity commitment (Argote, McEvily, & Reagans, 2003). This means that factors are classified as ability-related, motivation-related and opportunity-related factors. Essential knowledge management outcomes consist of knowledge creation, retention and transfer. These factors are considered fundamental in the knowledge management process and drive knowledge management outcomes. Personal acceptance and appreciation of Agile methods depend on abilities, motivation, opportunity factors and knowledge outcomes. In addition, as a supplement to this framework, these are Agile characteristics that help in establishing the horizon of the adaption of technology (Chan & Thong, 2009). As described, factors and characteristics for accepting Agile methods are visible in Figure 4.

Agile methods have certain elements that proved to be successful. One of those elements is direct and brief progress that is split into more patterns, uncomplicated arrangements, constant communication, opinions and responses from the customers, and untimely delivery. All of the elements are done by sustained analysis, testing, and collaboration with

customers about new functionalities and possible changes, which results in a positively implemented methodology (Sandstø & Reme-Ness, 2021). Overall components that affect the organization are communication, mutual appreciation inside the team, knowledge, and willingness of transferring what is learned to other team members, professional path, engagement from top management, awareness of positive and negative sides, familiarity, implementing awarding program for supporting hard-working, tutoring, and counselling. If there are any lacking components, practice and advice should be provided, help, education from external companies, and socializing between co-workers. Agile methodologies will not fit and are not appropriate for all projects, therefore, it is important to research all components of Agile methods and identify if the company is ready for changes and if Agile is its best option (Chan & Thong, 2009).

Figure 4: Factors and characteristics for accepting Agile methods
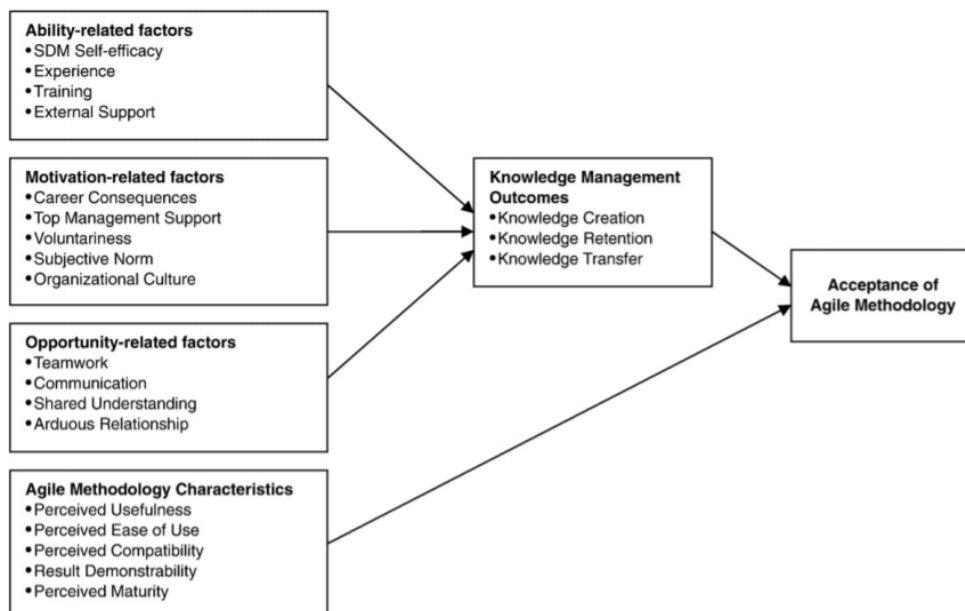
Source: Chan & Thong (2009).

The idea of Lean manufacturing comes from Japan, where Ohno Taiichi developed Toyota's manufacturing system in the late '80s (Bhamu & Sangwan, 2014) and applied a set of principles that increases competitiveness, reduce costs and losses in the production procedures, in construction, and to healthy services processes (Kniberg, 2011). The concept of Lean describes a systematic approach to providing value by encouraging teams to make decisions and to adapt to everyday obstacles and their resolution. Therefore, ways are being sought to connect the principles with the methods and implement them from the idea to the delivery of the product (Čiarnienė & Vienažindienė, 2013). Agile methods have established practices. Principles provide an understanding of a particular issue, and practices provide ways to implement the principles. In Lean Software Development: An Agile Toolkit book, written in 2003, focuses on the seven principles (Poppendieck, 2003)

of thinness and offers ideas on how to translate them into agile practices, these principles are:

- Eliminating waste,
- Intensify learning,
- Decide as late as feasible,
- Deliver as rapidly as feasible,
- Empower the team,
- Create integrity, and
- Look entire optimization.

Eliminating waste is the ability to produce what the customer demands in the shortest possible time without losing added value. Loss is anything that prevents the customer's requirements from being met quickly. According to Marie and Tom (Poppendieck, 2003) loss can be:

- Transport (documentation handover),
- Waiting (team member is not assigned to a new task),
- Overproduction (the team develop functionalities that are not needed by a customer),
- Defects (the team deliver a version of a program that consists of mistakes that should be fixed),
- Inventory (products that are not in use, but are part of the project lifecycle),
- Motion (replacement of non-productive team members),
- Overprocessing (used protocols by a team member with no efficiency), and
- Skills (wrongly supervised team members).

Eliminating waste and achieving improvements in the procedures are of great importance. Agile practices solve this by using retrospective meetings (Ahmad, Lenarduzzi, Oivo, & Taibi, 2018) after the iteration is over. The team regularly communicates what has been done well and what needs improvements before the next retrospective (Poppendieck, 2003).

Knowledge creation is the best way to succeed in software development, where teams acquire new knowledge and skills every day by working and educating (Ryan & O'Connor, 2013). Knowledge is a priority in higher team productivity by using knowledge creation techniques such as pair programming, training, documentation, code reviews, using different tools, and transferring knowledge in a team.

Deciding as late as feasible is good because postponing the decision brings new facts and information in time before presenting the solution and starting a hasty new procedure. Solutions must be flexible and architecturally well-designed, and decisions should not wait too long in order not to slow down the team and the entire project. In Agile software development, iterative planning is approached at an iteration planning meeting where

functions are selected from a list of requirements (Al-Zubaidi, Dam, Choetkiertikul, & Ghose, 2018).

Delivering products to the customer as quickly as possible makes us competitive (Ambler & Lines, 2012). That is why the companies that deliver the final product without major shortcomings will receive feedback from the customer as soon as possible and be more successfully involved in the next iteration. Speed allows the client to make a late decision once they have recognized what they need (Kortum, Klünder, & Schneider, Kurt, 2019), they will easily manage, solve problems, make the right decision, and help individual team members.

Agile methods have a goal to minimize difficulties through prompt reactions and better communication, cooperation (Kaim, Härting, & Reichstein, 2019) and confidence between team members (Zielske & Held, 2021). Besides, uncomplicated procedures, lower expenses regarding modification requests, an organized timetable for all new request desires, and fewer possibilities for mistakes (Baig, Shah, & Sajjad, 2017). The most broadly used Agile methods are Scrum, Kanban, and XP (Extreme Programming) (The 13th Annual State of Agile Report, 2019).

Scrum is a framework applied in the development of software products. This method is appropriate for complicated situations where it is important for team members to rapidly react to changes and adapt to certain circumstances (Gonçalves, 2018). Scrum is known as a very successful, innovative, and productive framework that meets customers' needs and delivers a worthwhile product. Scrum is composed of many iterations known as "Sprints" and those Sprints are composed of "Events". Also, Scrum requires Scrum Master, Product Owner, and team members (Gonçalves, 2018).

Kanban is a framework that is interpreted from the Japanese word "Kan" which means visual and "Ban" which means board. Kanban requires dividing the work into smaller items, to explain what work requires on cards which are then set on the Kanban board. That way, the work and what needs to be done is transparent and visible to all team members. In addition, in this framework, it is important to set the work in progress (WIP) limits because such work is clear and comprehensible to all team members. With clear and transparent processes and tasks, the team can deliver constantly new features, finish work on time and deliver it to the customer (Luisanna, Mannaro, Concas, & Marchesi, 2011).

XP (Extreme Programming) is a framework that consists of a group of essential worth, propositions, and application operations that contribute to the extensive well organized, systematic, functional, and successful development of software (Pearman & Goodwill, 2006). The focus is to accept and support the change that normally happened. XP is distinguishable due to its defined execution plan and support of four values. Those four values are communication, simplicity, feedback, and courage (Pearman & Goodwill, 2006).

3   SCRUM METHOD

Scrum is the most broadly used and practical Agile method for software development with majority of users operating with Scrum (14th Annual State of Agile Report, 2020). It dates back to 1986 when Hirotaka Takeuchi and Ikujiro Nonaka described teams as very effective, the product development process as faster with a new, different, and integrated approach (Takeuchi & Nonaka, 1986). In the 1990s, Ken Schwaber and Jeff Sutherland used such an approach to software development separately. In 2001, the first book on Scrum was published, entitled Agile Software Development with Scrum, along with Ken Schwaber and FMike Beedle. Scrum is not a typical method, it is more of a framework for developing complex products and it has a special scrum team and related roles, events, products, and rules. Scrum is based on the theory of empirical process management which represents knowledge gained through experience and decisions made on the known facts. Scrum is a time-limited gradual approach to software development and project management. Scrum teams are self-organized and mutually functional composed of experts from various fields (Schwaber & Sutherland, 2020). Scrum is the approach with frequent delivery of software based on Agile principles and the Agile Manifesto. It is composed of sequences of time blocks called sprints. The duration of the sprint is from one to four weeks, and it is determined by an aim or concept which is thereby separated from modifications, permitting the team to put the centre of attention on providing functional software. Before every sprint, work items are selected from the remaining products and the team undertakes to deliver them by the end of the sprint. For all of this to work, Scrum Master is hired, whose task is to solve obstacles in delivering the functions to which the team is dedicated. Stand-up meetings are held every day, which enable the team to discuss the problems of adequate delivery. At the end of each sprint, a retrospective is held to enhance and upgrade the process. Figure 6 shows the whole process of the Scrum approach, together with characters, schemes, and parts of the product with developed functionalities (Blankenship, Bussa, & Scott, 2011).

Scrum uses time-limited stages with project development as well as stages of organizing the project schedules. For the acceptance of new methods to solve problems on the project, it is important to map all the stages in Scrum to analyze the artefacts. The aim of the company is when using this method to allow straightforwardness, visibility, clearness, conformity, and examination in the development procedures (Blankenship, Bussa, & Scott, 2011).

Scrum implies scheduled iterations regarding time which leads to selecting the right time for each interaction where the best option is to stay within the same time duration because in that way team members determine the rhythm (Kniberg & Skarin, 2010). Figure 5 shows the scrum approach process.

During the planning and development phases, Scrum requires time to organize events which outline, examine possible artefacts, and adjust the newest techniques to resolve

complications (Schwaber & Sutherland, 2020). In the development process, these events ensure clearness, modification, and examination to reach the goal (Lei, Ganjeizadeh, Jayachandran, & Ozcan, 2017).

Figure 5: Scrum approach process
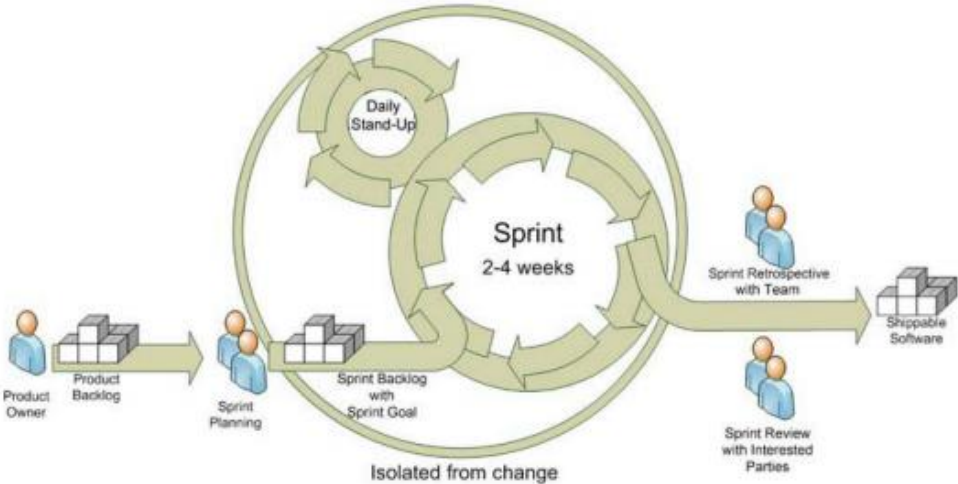
Source: Blankenship, Bussa, & Scott (2011).

Scrum is formed of a Scrum team, consequences, events, and regulations. Regulations are the most important item for resolving conflicts within the project (Lei, Ganjeizadeh, Jayachandran, & Ozcan, 2017). Table 2 shows the scrum implementation characteristics.

Table 2: Scrum implementation characteristics

Overarching process improvement framework	
ChatComponent	None
FacilityComponent	None
SocialComponent	None, but part of a larger professionalization effort
TimeComponent	None
Main drivers for the implementation of Scrum	
ChatComponent	An increasing amount of requirements: Quickly growing
FacilityComponent	development team
SocialComponent	Increasingly growing development setting
TimeComponent	The unprofessional and unstructured product development process
	Low development productivity: Unclear product definition process
Initiator for implementing Scrum	
ChatComponent	Chief Technology Officer
FacilityComponent	Chief Technology Officer
SocialComponent	Development Manager
TimeComponent	Development Manager / Product Manager

(table continues)

Table 2: Scrum implementation characteristics (cont.)

External Advice	
ChatComponent	Initial Scrum training
FacilityComponent	Initial Scrum training
SocialComponent	External advice after implementation
TimeComponent	No

Source: Vlaanderen, van Stijn, Brinkkemper, & van de Weerd (2012).

3.1   Roles

The Scrum team is composed of a Scrum Master, Product Owner, and members of the development team. The team can arrange responsibilities and work interventional. Accordingly, they have domination in the project and are aware of ways to achieve aims with no support from individuals outside the team and their instructions (Schwaber & Sutherland, 2020). The team develop products gradually, with comments accepted by the Product Owner.

The Product Owner is accountable for product management, product requests list, and the highest engagement around the practicability and worth of the project (Bass, Beecham, Razzak, Canna, & Noll, 2018). The function is to resolve stagnant backlog items. In addition, he is responsible for achieving the project objectives as well as the ability of the development team to understand the long-term objectives that are set and to work at a high level to enhance productivity (Kristinsdottir, Larusdottir, & Cajander, 2016). The Product Owner manages the backlog of products and is the customer representative in the team. This is a person who arranges meetings with customers to determine the regulations and requirements set by them. Also, he/she shall be responsible for increasing the value of the product produced by the team. The Product Owner is therefore responsible for the success of the project and the team itself (Blankenship, Bussa, & Scott, 2011).

A Scrum Master relates to the team intending to better understand the extended plans of the project and enlarge the logic and order of Scrum in a company (Noll, Razzak, Bass, & Beecham, 2017). A Scrum Master is accountable for acknowledging the Scrum project, although, he/she is also responsible for everything that is done in the team by providing cooperation to the team members (Bass, 2014) through meetings, intending to enable the achievements, and completion of the sprint. It enables and protects the team from external influences and at the same time, represents the link between the team and the Product Owner. A Scrum Master eliminates obstacles the team is facing and tries to increase their productivity (Ereiz & Mušić, 2019). A Scrum Master is neither the head nor director, he is a communicator and team trainer, the so-called "servant leader". He resolves conflicts in the team and directs the team to the right path, which is the delivery of value to the customer (Blankenship, Bussa, & Scott, 2011). The development team is accountable for the execution and provision of the product portion that can be developed at the end of each "Sprint" (Morandini, Coleti, Oliveira Jr, & Corrêa, 2021). The team controls the

implementation of the final product. Members of the development team are individually organized and supervised. The principal thing for scrum is the scope of the team which is determined as the perfect scope of the development team of up to seven members (Lei, Ganjeizadeh, Jayachandran, & Ozcan, 2017). The development team is usually small and achieves Agility but is also large enough to perform most of the work. The rule is not to exceed ten members, but it mostly consists of around seven members. Interruption of the sprint can be done only by a Product Owner, but under special conditions like selling the company, change of business requirements, etc. (Blankenship, Bussa, & Scott, 2011).

A Scrum Team is a product delivery team, consisting of a dozen people from various professional orientations (developers, testers, designers). A Scrum Team can self-arrange and its key role is to complete the sprint (Bittner, Kong, Naiburg, & West, 2017). In the team, everyone decides equally as a group what should be done in the sprint, as well as which techniques will be used in the project, all in the direction of accomplishing the result (Karabiyik, Jaiswal, Thomas, & J Magana, 2020) at the end of a sprint and ensure successful project realisation. Other colleagues are familiar with each part of the product and influence others to increase productivity. The team within its work is in constant cooperation with the Scrum Master and Product Owner where they work together intending to achieve positive and successful work. The three principal artefacts inside the occupation of Scrum are product backlog, burn-down chart, and sprint backlog (Blankenship, Bussa, & Scott, 2011).

3.2   Sprint planning

There is a sprint planning meeting, and then the team chooses between the product that is lagging with the items to be solved in the sprint and plans for the work to be done (Fowler, 2019). The result of the planning is recorded in the lag of the sprint. In the sprint, the product becomes visible and usable. The key idea is that the sprint should provide valuable product functionality and build on the previous increase. The goal is to perform the tasks previously defined in the sprint and by the delivery date so that the sprint increase shall be an added part and bring about the finished product. The increase is to be done if it is following the established acceptance criteria and, therefore, can be delivered to the client. As a time-limited event, the sprint end date does not change. The team may reduce the functionality that will be delivered at the end of the sprint, but the delivery date cannot be changed (Rising & Janoff, 2000). During the sprint, the team holds daily stand-up meetings, the goal of which is to fulfil the sprint task. Before the delivery, the increment is produced during the sprint, and the team performs a sprint review. At the end of the sprint, a retrospective meeting is held where the team evaluates the project. As a result, there is a report created regarding the improvements made, as well as collaboration among the team members (Blankenship, Bussa, & Scott, 2011). The backlog of products is a list of the still present jobs on the project that the team is obliged to finish, and it constitutes the compulsory desires of the customers' product (Sedano, Ralph, & Péraire, 2019).

A product backlog is supervised by the Product Owner, and he oversees organizing, adding or withdrawing individual parts from the already provided list. At the centre of the list, there is the user story, the fundamental element of Scrum. Based on the measure of the pace of product backlog, determines how many items the team can deliver. The user story is a list of priority items contained in the product backlog (Lucassen, Dalpiaz, van der Werf, & Brinkkemper, 2016) and is intended for the team or developers to create and increase the value of the product for the customers. Throughout the sprint, it is possible to append user stories to the product backlog, nevertheless, until the existing sprint is completed, it will not be revealed to the team or its members. A user story is a card that gives details about new parts intended to increase the value for the customer (Blankenship, Bussa, & Scott, 2011).

Before every sprint begins; a planning meeting is organized. At this meeting, the characteristics of the sprint that the Product Owner presented in the product backlog are regulated (Blankenship, Bussa, & Scott, 2011). The team gets in the sprint the user stories selected by a Product Owner and turns them into tasks with a certain time limit using different tools. Usually, the team decides whether to accept such sprints and within what time limit. However, all the sprint work is reviewed once more, and it is calculated how long it takes each team member to finish it (Alhazmi & Huang, 2018). When the team votes and dedicates all sprint tasks, the Scrum Master pauses the sprint modifications. All team members, a Scrum Master, and Product Owner are participants in sprint planning. Throughout the creation of a sprint, daily meetings are organized for the team by a Scrum Master and Product Owner that lasts for approximately 15 minutes (Stray, Sjøberg, & Dybå, 2016). The meeting is organized to envisage the problems that affect the work process itself, as well as the possibilities of getting to realize what has been done, how much, and what is planned next. All meetings within the work of the sprint are limited in time. First, the Product Owner and the development team meet and agree on what will be done in the sprint, and then later, the development team decides how to implement the task (Pham & Pham, 2011).

3.3   Sprinting

A sprint review or iteration review in Scrum is a meeting where the development team shows how much has been done in the sprint from user stories until it means that anyone interested in reviewing the iteration or sprint can participate in the review (Fowler, 2019). This is how feedback is obtained because stakeholders have insight into product progress. It is in Agility an informal meeting of a few minutes at which the development team shows what it has done in achieving value for the customer. The procedures in the Scrum method consist of sprints, which represent a time frame for creating a usable and finished project. A sprint is mostly a two-week project scheduled plan (Sharma & Kumar, 2019) that contains what needs to be constructed, how, and what should not be transformed throughout a Sprint. A Scrum team plan all sprint aims at company meetings which are

regularly organized. All sprints aim to generate and design a working completed product. Also, a short meeting, with the usual time frame of fifteen minutes, named a Daily meeting, is organised each working day. This meeting enables all the involved team members to identify and recognize the enhancing parts of the procedures and follow the aims (Stray, Lindsjørn, & Sjøberg, 2013).

Scrum is a methodology created of multiple "sprints" that last usually from two to four weeks which leads to the development of a product that has certain functionalities that work (Berczuk, 2007). The focus of all sprints and activities is generated in the product backlog. That is formed of various bugs, attributes, and all activities that lead to delivering the functional product. For each sprint, the way of working of a function is agreed upon, the customer's requirements for the function are collected, they are distributed to the programmers, there is a distribution of responsibilities and duties, and the design is agreed upon within the team, it is coded, tested and checked if everything works as intended. The optimum goal of the sprint is the delivery of the final product, and all changes are created by the team of programmers, designers, and testers (Arachchi & Perera, 2018). All the user stories of the project are divided into smaller parts that can always be completed faster and provide value to the customer. As the sprint progresses, it is possible to see through a graph showing the intensity and amount of work remaining. The intensity of work presented in this way with the combustion table enables easier communication with team members. Basically, in the Scrum approach, some roles make up the Scrum team, these are Scrum Master, Product Owner, and Development Team. A Product Owner's task is to manage the product backlog which involves preparing the user story by sorting tasks' priority and setting them on the customer requirement list (Trivedi, 2021). In addition, he/she participates in determining the time frame for the delivery of the product and content being responsible for the return on the product (return on investment) and accepting or rejecting the results of the development team. Each sprint is a time-limited period to create and increase the use-value of the product. Before the start of the sprint, the entire scrum team meets at a sprint planning meeting and the goal is to form an initial plan that has its own goals and direction of development limited in time (Blankenship, Bussa, & Scott, 2011).

3.4   Review

A sprint review shall be performed after the completion of each sprint. At this review, all members of the development team attend the meeting together with Scrum Master and Product Owner, as well as stakeholders and customers. The review includes non-formal verification and a sample of developed software with functionalities at the finishing point of the sprint (Fowler, 2019). This is an opportunity for the customer at the meeting to provide a response and judgment according to the developed functionalities to the team about the product, and at the same time, to evaluate the funding and benefits from the investment. The goal of the review is to show realistic functional software that satisfies the customer's desire. At the same time, it is considered and communicated when every

individual from the team has described the contribution to the result and throughout implementation in the Sprint Review meeting (Blankenship, Bussa, & Scott, 2011).

3.5   Retrospective

After finishing with the sprint, there is a sprint retrospective held following a sprint review. The retrospective is the potential and capability of the team to perceive everything that has been done in a sprint (Jovanović, Mesquida, Radaković, & Mas, 2016), whether it is good or bad. The whole team attend the meeting, including a Scrum Master and Product Owner. Thus, it is an opportunity to deliberate on any issue that has an impact on the provision of products to customers. The Scrum Master allows each team member to comment on issues related to working itself, organizing them in writing using post-it notes within a specific time frame. At the end of the meeting, he/she is obliged to announce all the reported bad and good sides during the sprint written on the notes. This is good for the team because it presents shortcomings but gives possible new ideas that would be applied in practice and improve work (Andriyani, 2017). Post-in notes are used usually in three different colors. The first color labels "what went positive throughout the sprint". The second color labels "items that were contradictory throughout the sprint" and the third one labels "items that were negative throughout the sprint". The team is then granted with time frame that is no longer than five minutes to note numerous assumptions about the sprint on the paper. For each team member that is marking the positive and negative sides of the sprint, it is a confidential and soundless time. After a passed time, all notes are collected and placed on the wall in the workroom. Later, all notes are arranged as related and comparable classes. An enterprise is often viewed as a set of interconnected and integrated processes, which influence the handling of message flows, the implementation of rules, and the definition of overall process execution. It represents the most complex approach to integration. After the sprint review, and before the start of the next sprint, the Sprint Retrospective meeting shall be organized. The length of the Sprint Retrospective may be longer, and it takes a certain time to comment on. The check is usually done for adequate consideration of all aspects of cooperation and communication of people within the process (Blankenship, Bussa, & Scott, 2011).

4   KANBAN METHOD

In the literature, Kanban appears in various contexts and the word "Kanban" itself means a card. When it comes to software development, Kanban is known as a traction system. This concept appears in Toyota, where it was introduced as a material supply system, and is based on the idea of "Just-in-Time" using the principle of towing work (Lu & Bodek, 2018). Kanban has been created Kanban board with cards, the rules we adhere to and the restriction of work, achieved work and obstacles. The data on the board is arranged and

accessible to everyone, and the cards contain information about the workflow and upcoming work tasks (Anderson, 2010).

The name Kanban is honored by Taiichi Ohno. It was a withdrawal system in Toyota's production system, which denoted "signal card" (Ahmad, Markkula, & Oivo, 2013). Every started production process or operating system is intended to create value for the customer and the possibility of greater flexibility. There are no identical companies, and workflows are arranged and designed. Kanban is not a regular procedure, and it is not structured, but it is conformable and adjustable to the final product. The method is scheduled differently compared to the plan, it is reshaped to procedures and structure. This indicates that procedures are shaped based on the desires of the company. The entire concept according to the authors (Leopold, 2017) is created by the following rules:

- Begin on performance,
- Track the generative development, and
- Encourage direction at each stage in development and organization.

Operating with Kanban inside the procedures is to obtain worth and reach the aim. For establishing the procedures, authors (Leopold, 2017) propose six rules:

- Visualize Workflow,
- Limit Work-in-Progress,
- Manage Flow,
- Make Process Policies Explicit,
- Implement fast feedback loops, and
- Initiate improvements based on methods and models.

The basic principles of Kanban are (Burrows, 2014):

- Start at any stage of the project,
- Commit to finding advancement modifications,
- Initially respect current roles, responsibilities, and job titles, and
- Encourage accountability and leadership at all levels in the company, from individuals to the management.

In the adoption of the Kanban method or transferring from traditional to Kanban, firstly, it is necessary to clarify and demonstrate why transition is essential and demanded (Diebold, Theobald, Wahl, & Rausch, 2019). Then, already acquired knowledge and experience people gained from traditional methods, the processes that are known should be balanced and modified slowly for better adaption to the different Agile methods. Kanban is a method where work tasks in progress are completed before the new one is started. Before starting new work tasks, the ones that are in progress should be finished, in this way, the number of tasks that are in progress will be limited which reduces the time and getting

comments from customers. Such work organization ensures a beneficial work-life balance for the employees as well (Anderson, 2010).

4.1   Visualize Workflow

The first of the rules in Kanban is to visualize workflow (Alaidaros, Omar, & Romli, 2018) so the procedures function better and meet the customer's desires and requirements, therefore it is necessary to enhance parts of the system that is in stagnation. In this systematic process, it is sometimes easy to notice the moment of stagnation if it is physically visible, but many times it depends on the knowledge of individuals involved in the process. This leads to the obligation to mark the completed parts of the process to see the improvements. If procedures are visible and clear, greater opportunities will arise, and it is defined which person is responsible for what (Leopold, 2017). On the Kanban board, some cards contain all the work that needs to be done, some additional requests from superiors, auxiliary work and more with brief descriptions. Work tasks go through the workflow and show progress for each card. On the card, it is a visible concise description of the user story with the name and description of the task with an order of codes, the agreed target time for completion of the order, the size of the task, and the type of the task shown to team members. Kanban board is shown in Figure 7.

Figure 6: Example of Kanban board

Source: Mahnic (2014).

The appearance of the board itself can be improved with cards of various colors (Murino, Naviglio, & Romano, 2010) that are agreed upon in the timeline for completing the task. That is how the task is visible to team members. Teams can write down the reasons for delays and bloats in work, but also their indicators of progress. It is possible to have timestamps on the cards that can help in the realization of job-tracking metrics. Based on this, the team can observe the situation and make modifications throughout the work as well as the completion of the scheduled tasks (Anderson, 2010).

4.2 Limit Work-in-Progress

Progress systems can work without any problems in situations when starting up a work process and at the same time, it is restricted. A simple workflow constraint is achieved when all individual activities are presented as a single item in the procedure. The system works properly even when a new stage of the system procedure begins before its completion. Kanban is based on the expression "Terminate with a beginning, emerge completion!" (Leopold, 2017). This leads to the conclusion that one completed item is worth more than multiple items that are not fully developed.

The scope of work is based on performing all work tasks and delivering them to the customer of the intended product. The finished product must be tested before delivery (Kniberg & Skarin, 2010) for a confident response to the correctness of the delivered product. The workload limit is the ability to perform multiple work tasks simultaneously recorded in each column on the Kanban board. A new task starts only in situations where the number of cards in the next column is less than the work volume limit. This means that if multiple tasks are processed at the same time, more processing time will be required, which is proven in John D.C. Little's theorem as shown in equation 1. (Little & Graves, 2008).

Equation 1: John D.C. Little's theorem

$$L = \lambda \times W \qquad\qquad (1)$$

When limiting WIP, the average number of objects or tasks in queuing system L equals the number of arrivals λ in the system multiplied by the waiting time W (Simchi-Levi & Trick, 2011). According to this theorem, the smaller the WIP constraint, the shorter the time required to pass the workflow. Therefore, it represents how much work it is possible to have at once in development, it is often more than desired. Usually, time is the main limitation for creating a task from the idea to the delivery of the finished product to the client. The total value of the WIP constraint is approximately the same at the beginning and the end of the observed interval. If the cards go through the workflow and the WIP limit is lower, it reduces the required time which increases Agility. This authorizes the delivery of requests expeditiously, and at the same time, the return of comments from customers and the possibility of removing the mistakes. The team adheres to the limitations of the WIP, therefore, when the limit is reached, the team and its members do not immediately take on new tasks, respectively, the team helps each other to complete and fulfil the tasks. If the limit is reached, it shows that there is a delay, and it is possible to regulate the process by limiting WIP (Ahmad, Markkula, & Oivo, 2013).

4.3 Manage Flow

Managing flow begins with item visualization (Senapathi & Drury-Grogan, 2021) and concludes with the creation of practicability and value to the customer. The aim is to make

progress by advancing from the beginning, respectively, shifting from one activity step steadily to another one and without being overburdened with tasks within the procedure. It is necessary to optimize the work procedures as well as to create a more reasonable working strategy for every team member in the procedure to bring the product to final status and achieve value for final users. A strategy to provide team members with little time and space in procedures to direct and regulate work will lead to confidence, achievement of the aim, and worth for the customer. In this part of the procedure, it is crucial to organize and control the procedure, and not team members (Leopold, 2017).

Improving and managing the flow is possible after analyzing the flow and its visualization that detects congestion and its removal. WIP limits affect the proper flow of work, therefore, if this constraint is low, then a reduction in time is present, work tasks are passing faster, and the team is well-organized and productive. This WIP limit must be balanced (Sjøberg, 2018) throughout the flow. If the team does not reach the task pass throughout the progress flow, the WIP limit should be moderated. WIP limit can be controlled by the right ratio of fast task and resource transfer. When it comes to organizing limits, it depends on the development team, the proportions of the task, and the advancement of the organization. Limitation of proportions of the work leads the team overload and inability to improve the work. Therefore, the team should find a proper measure to complete the work and contribute to the working procedures. Work tasks are divided according to task class and determined limit. When errors occur, there must be additional work and a supplementary WIP limit. Work tasks are generally divided into smaller tasks (Alaidaros, Omar, & Romli, 2018) so that the work process can run smoothly. The flow can be improved through a properly planned procedure, using cause analysis, enlarging solutions for the client, a well-organized development team, and determining regulations as well as communicating and finding the best options for all problems at daily meetings. By using retrospective meetings, the procedures are enhanced, and it is easier to find a solution to apply to the procedures before the next meeting (Leopold, 2017).

4.4   Make Process Policies Explicit

The real work procedures have certain rules and implementations that are followed. They allow team members to eliminate problems with the possibility to customize and change which includes collaboration within the team to ensure joint achievement of enhancement. Enhancing the procedures implies changing the rules in the working procedures involving everyone (Kniberg & Skarin, 2010) in introducing new suggestions to upgrade and enhance the procedures. Kanban relates to strategy when the existing rule is not contributing to positive results and does not comprehend, it is necessary to modify or replace the rule. When rules are correctly followed, then it is possible to determine and solve the issues that arise inside the procedures. It is completely normal to modify the rules, otherwise, it will be difficult to enhance the procedures and work. Another positive

side of modifying rules is the cooperation with the focal point on communication and observing the issues and possible positive ways of unravelment. Likewise, these procedure rules lead to transparency avoiding altercations and transferring responsibilities to other team members (Leopold, 2017).

Improving the current work through discussing (Shafiq, Inayat, & Abbas, 2019) and resolving conflicts, based on the data and results shown by the visualization of the flow and clearly defined principles in the procedures. The team may solve all the issues that might occur, like lack of information, at daily meetings. It is compulsory to interpret the standard and criteria for entering and exiting tasks, as well as to present all that on the board. Therefore, work tasks are not transferred for testing if all team members had the chance to review them. Transparent and understandable principles authorize team members to make decisions on their own and control the procedures (Leopold, 2017).

4.5   Implement fast feedback loops

For further modifications to become improvements, it is necessary to have a comment from the customer (Ahmad, Markkula, & Oivo, 2013) about the procedures that are developed. Kanban is a good method to track and record all the modifications, nevertheless, it is a faster and more efficient way to have a conversation and interchange opinions and ideas with team members at stand-up meetings, as well as replenishment and retrospective meetings. To speed up the working procedure, estimation and measuring of the duration of a part of the procedure may also be applied, which is another way of obtaining feedback and opinions. The feedback from a customer that is provided regularly, gives a visible improvement within the development process. Likewise, with well-organized comments, it is possible to see and improve problems in the early stages rather than in the later stages (Leopold, 2017).

Planning is the first activity (Mojarro-Magaña, Olguín-Tiznado, García-Alcaraz, Camargo-Wilson, López-Barreras, & Pérez-López, 2018) that is necessary to always deliver on time despite constant demands, which means not too early or behind the schedule. It is consistently worth knowing what the team is going to do, therefore, the more work tasks the team has the more plans are needed and the greater the limit of the WIP team. This means that tasks run slower, and the team requires more time for the procedures, which increases costs. If a team wants lower costs, it is possible to use guided planning based on events in the procedures that give a signal to include new activities that are preliminarily planned. Giving priority to work tasks (Ahmad, Kuvaja, Oivo, & Markkula, 2016) is of great importance as well as the order in which they will be performed, and the rhythm itself determines the progress towards the goal. Assessing the weight of the user story is the moment of completion of the functionality and the effort invested to complete it (Leopold, 2017).

4.6 Initiate improvements based on methods and models

Kanban is one of the methods to improve the procedures of creating value for the customer by using sticky notes on the wall. Kanban is not only a method of improving teams and optimizing people, but also enhancing the company's organization and structure in creating value for customers (Leopold, 2017).

Continuous improvement represents several methods for the development and introduction of practice into the process using the experience and acquired knowledge of all team members in the company. Daily meetings of the team members enable the improvement of the process (Singh & Strobel, 2022) and the analysis of the causes that lead to a problem. By discovering the problem and solving it, the set goal of completing the task is to be achieved. This leads to the success of the team, its appreciation, and respect, as well as professionalism and the desire for greater success. This creates a positive atmosphere in the team and motivation to learn and work. Teams are constantly educated and encouraged to improve their process with knowledge using various models (such as Lean Thinking) (Leopold, 2017).

5 SCRUMBAN

The Scrum method with all its hybrids is one of the most popular Agile methods. One of the authors of the Scrum method, Ken Schwaber, presented to everyone that the majority of companies use Scrum but are not satisfied with the results achieved. Scrum has the potential to identify all the shortcomings and restrictions in product development transparently and at the same time provide the possibility of solving and eliminating (Schwaber, 2010). Therefore, many organizations resort to changing the Scrum method in which good practices can always be used. The Scrum method has gaps in which best practices can be implemented because the method shows how such an approach can be improved (Reddy, 2015). The Scrumban uses Kanban's principles and practices in the existing Scrum by using scientific theories to manage administration and knowledge. This allows teams to mature and make the best use of their knowledge in the exploration of better and more successful methods. When teams decide to use Scrumban, they usually keep applications, time limits, daily meetings, and retrospectives, which are a part of Scrum products and functions. This is the first step of the principle "start at any stage of the project" of Kanban in a Scrum environment, followed by visualization of the work and the establishment of clear rules in the process (Ladas, 2009).

Therefore, the sprint is defined with a new visualization of the work, and the Scrumban represents former events with a new visualization. This ensures time consumption and avoids repetition, the technique of withdrawing the work, and assigning new demands. After adding new requests, it practically inserts a new column from the list of sprint tasks. This created an opportunity for the team to adjust the amount of work according to the

available capacity to complete the task before starting a new one. The process becomes brief, clear, and more efficient with the possibility to apply a reduction of the list of tasks in the sprint, and thus it becomes possible to plan the entire iteration. Limiting the list of tasks in the sprint to the optimal number leads to reducing costs and planning activities. Also, the remaining time is invested in standard supervision of tasks mentioned as "ready tasks". Then, in the process, it proceeded to the Kanban method of management (Ladas, 2009).

The success of Scrumban was shown in a study by Siemens. The company was using the Scrum method when there occurred problems with the delivery on time despite hard work and great commitment, as well as story planning and finishing the story in a sprint. The team took on new tasks before the previous were completed. Monitoring team speed did not give a real situation, however, with the instruction of the Scrumban and its implementation, the process became more productive and stable, and problems were solved without blockages and delays (Vallet, 2014).

Table 3: Comparison of Scrum and Kanban methods

Scrum	Kanban
More restrictions	Fewer restrictions
The scope of work is indirectly limited at the iteration level	The scope of work is limited directly to each condition separately
Self-organized team	The development team is authorized to make its own decisions
Iterations are equally long	Different rhythms can be leaded
Prescribed assessment of the difficulty of the user story	Evaluation is not mandatory, but it is useful
The development team consists of experts from all fields	It can cover individual area specialist
New team structure and new three roles	No new prescribed structures and roles
The basic metrics for improving procedures are team speed	Basic metrics for improvement of the process are time-consuming
Do not accept a new task in the middle of an iteration	Can accept a new task right away when the team have free capacities
Use own terminology	Existing terminology is used
Work is divided into smaller parts according to the power to work in a sprint. The size of the story is limited by the length of the sprint	Division of work is not necessary; however, it is desirable
The board is deleted at the beginning of each sprint	The board is constant
The list of sprint requests belongs to only one development team	Kanban board can be used in multiple teams
User stories in the backlog request list should be sorted by priority	Prioritization is not mandatory or required

(table continues)

Table 3: Comparison of Scrum and Kanban methods (cont.)

The development team is committed to the scope of work which is implemented in iteration	The obligation is not prescribed
The use of a drop-down diagram is envisaged	No metrics are specifically prescribed
Daily meetings are prescribed	Meetings are not prescribed; however, they are useful.

Source: Pham & Pham (2012).

According to the author (Sahota, 2010), Kanban is created to assist team members with exceptional titles, support numerous interventions, and various group of abilities. Also, it is good for the work to be frequent and it needs re-doing. In addition, Kanban is suitable for reducing expenses owing to functioning correctly with sizeable teams due to good collaboration with other team members. Otherwise, Scrum is demonstrated as superior where extensive teamwork, cooperation, and establishing new functionalities are needed for the project. For Scrum, it is more acceptable to work in compact and interventional teams that support people with competency in various fields. The author, Kniberg, believes that visible dissimilarities between these two methods are in how work is structured and done, how many iterations are needed, the schedule, dividing the work between team members, and how WIP limits are structured (Kniberg & Skarin, 2010).

6   EMPIRICAL WORK

The aim of my master's thesis is the possibility of the transition from the traditional method to Agile, the way it is implemented in the process, and the experience gathered. As a method for my research, I used interview questions for Project managers or Product Owners, and Scrum Master that are high-ranking officials responsible for the process and functioning inside a company.

6.1   Methodology

Firstly, I studied the theory about the topic, which relies on the scholarly works of literature, books and educational articles, related to Agile methodology, intending to learn more and comprehend the topic better. The purpose is to understand the transition from traditional to Agile, the experiences, and the benefits that are achieved. Based on the literature review, I identified five key concepts related to transitioning from traditional to Agile methods (Experiences; know-how and knowledge; implementation; change management/transformation; organizational opportunities; and Management). These concepts are presented more deeply in the section 6.2. I developed the interview questions regarding each concept and analyzed each of them for a better understanding of the core process, experiences, transition, and company perspectives (see section 6.4).

Having identified the five core concepts, to understand Agile, I organized interviews with three different companies that are using Agile methods in their daily activities and operations. Questions for the interviews have been aligned with all five identified concepts aiming to explore those concepts from a practical perspective. Interviews were conducted online through the Zoom platform, where we discussed the questions with persons that are in high positions inside the company and are actively involved in the development process and Agile teams. Likewise, I interviewed the Scrum Master in two companies and the Product Owner in one company. The implementation of interviews took three days for approximately 2 to 3 hours per day because of the overcrowded schedule and lack of time in the managers' busy schedule. The interview consisted of open questions from each concept to gather extensive responses from the interviewees. At the beginning of the interview, I provided compatible information about the topic, and explained the concepts and what information will be collected, to receive honest and accurate responses. Likewise, for the misunderstanding of the questions, discussion and further explanations are provided. Also, I explained that the interview and answers gathered will be used only for the research, so the data will not be misused or revealed to any third party. In addition, I tried to create a safe and positive environment for the respondents to feel respectable and comfortable.

Based on acquired detailed theoretical knowledge, the identified five concepts with topics that should help understand the process and answer research questions consisted of eight to ten questions per concept. Questions were designed to cover all required topics for complete gathering and understanding of the information. Answers were recorded by taking detailed notes while respondents explained their internal processes, and practices and answered the questions. Between the questions, I asked further questions that should have helped me understand how their process was organized. After receiving answers and explanations, I analyzed questions by comparing the companies, their practices, and ways of handling certain problems and difficulties. Each received question is compared for all three companies to identify differences, good practices, and natural processes.

6.2   Identification of concepts

As described in previous section 6.1. Methodology, the concepts related to transitioning from traditional to Agile methods were identified based on a critical literature review and then further studied via interviews with the experts from the practice. Each concept identified based on a critical literature review is presented in the continuation.

6.2.1   Concept 1: Experiences, know-how, and knowledge

The first concept relies on experiences and adjusting processes in companies related to transitioning from traditional to Agile methods (Burga, R., Spraakman, C., Balestreri, C., & Rezania, D., 2022). The idea in this concept is to comprehend techniques, tools and training procedures in adapting the overall process of transitioning to Agile methods and to

understand experiences with Agile as a method, transition process, adaptation, challenges and positive sides of Agile. In addition, this concept anticipates acknowledgement of organization roles like Product Owner, Scrum Master and their experience background (Hukkelberg, I., & Berntzen, M., 2019). A Product Owner is usually a person that understands businesses, processes, and ability to lead the team to deliver a quality product and reach the satisfaction in customers (Fowler F. M., 2019) and background, and it is followed with questions about overall thinking about Agile methods and techniques or practices that are used (Sunner, D., 2016). A Scrum Master is an important role in the team whose responsibilities are to encourage and adjust the team to the transition. Also, he/she is responsible for eliminating obstacles and motivating the development team (Shastri, Y., Hoda, R., & Amor, R., 2021). Scrum practices are confirmed by the theoretical literature as applicable, valuable, and helpful methods in developing software that will provide better standards in the delivery (Hron & Obwegeser, 2018). The purpose of this concept is to gather information about the experiences with Agile, their roles, responsibilities of each role, techniques used and possible training before starting with the transition.

6.2.2   Concept 2: Implementation

This concept relates to the actual transition to Agile methods, the timeline of the transition, where for each transition there is an essential strong effort, exceptional desire, and authority for the successful implementation (Ciric, D., Lalic, B., Gracanin, D., Tasic, N., Delic, M., & Medic, N., 2019). After a long period of working in an environment that is traditional with formed stages, transitioning to the Agile method brings certain challenges (Rasheed, A., Zafar, B., Shehryar, T. Aslam, N.A., Sajid, M., Ali, N., Dar, S.H., & Khalid, S., 2021). This concept aims to understand what the challenges are and how companies solve potential issues. Likewise, to understand what companies learned from their experience (Pócsová, J., Bednárová, D., Bogdanovská, G., & Mojžišová, A., 2020) and what could be done differently regarding the implementation. Further, this concept emphasizes the application of team roles and how the selection process is realized (Jovanović, M., Mas., A., Mesquida, A. L., & Lalić, B., 2017). Additionally, to research and comprehend organizations hiring internal or external training, which is demanding and implies a lot of money to be spent. However, it supports companies to overcome issues and achieve accomplishments (Gandomani, T. J., Zulzalil, H., Ghani, A. A. A., Sultan, A. B. M., & Parizi, R. M., 2015). In this concept, the focus is on creating questions with the aim of practically understanding transition, positive and negative sides of Agile as a method, training, team and responsibilities.

6.2.3   Concept 3: Change management/transformation

This concept implies questions regarding understanding what the reasons for the change of traditional working method are (Gren., L., & Lenberg, P., 2020), how team members adjust to the change, how to track the improvement (Verbruggen, F., Sutherland, J., van der Werf, J. M., Brinkkemper, S., & Sutherland, A., 2019) and measure if it has a positive impact on

the organizational process. In addition, understanding the Agility inside the company is an important process that reaches the adaptability to fast-changing requirements and environments (Ćiric, D., Lalić, B., Gračanin, D., Tasić, N., Delić, M., & Medić, N., 2019). On the other side, team members are a vital part of the company and development process, so recognition of their motivation and communication is valuable (Rasnacis, A., & Berzisa, S., 2017). Literature is proposing four main areas where it is possible to measure performance. Those areas are the parts to measure and acknowledge the quality of the software, and customer demands in the productive processes and development teams (Korpivaara, I., Tuunanen, T., & Seppänen, V., 2021). Change management concepts should help in understanding why organizations decide to transfer to Agile methods, and how they measure the performance of the team and team members.

6.2.4   Concept 4: Organizational opportunities

This is the concept that includes recognition of organizational structure, which parts and roles changed after implementing Agile methods (Arokodare, M.A., & Falana, B.R., 2021) and whether Agile is implemented in all sectors and processes or just in certain ones. Further, the focus of the concept is on awareness of roles in the company (Jovanović, Mas, Mesquida, & Lalić, 2017), the clarity of responsibilities, new role replacements inside the organization due to the acceptance of the Agile method (Lueg & Drews, 2021). Because of the change, team members can feel like they have undetermined roles, a different way of thinking and a combination of development processes (Patanakul, P., & Rufo-McCarron, R., 2018). Also, the focal point is to perceive the transition's positive sides and advantages that improve organizational performance and productivity (Darino, Sieberer, Vos, & Williams, 2019). This concept is identified because it is important to understand the opinions of every individual and to acknowledge what will be changed inside the company.

6.2.5   Concept 5: Management

The management concept focuses on the communication inside the team, with other teams, with managers, Scrum Master, and Product Owner (Hess, Diebold, & Heyff, 2019). Also, it includes improvements inside the company after implementing Agile methods (Van Ruler, 2019) and the awareness of what is happening inside the team. The attention is on comprehending communication that is based on direct and indirect channels (Salman, Jaafar, Malik, Mohammad, & Muhammad, 2021), and how those channels transfer information from one person to another. Direct channels imply face-to-face communication or communication that requires speaking and verbal dialogue. On the other side, indirect channels include written communication like emails or documents (Hummel, M., Rosenkranz, C., & Holten, R., 2015). The goal of this concept is to comprehend communication after the implementation of the new method, potential misunderstanding and how work is done with other teams. The management concept is for acknowledgement of reasons for selecting the Scrum or Kanban framework and the knowledge a team

gathered throughout working with other teams, team members, Product Owners and Scrum Masters (Khalil & Khalil, 2020).

6.3   Interviews implementation

Following all the gathered literature data and knowledge about the topic and identifying concepts that will support the empirical part of the thesis, I decided to use interview as a research method to explore the transition from traditional to Agile project management into details. The interview is face-to-face communication between two individuals that met to discuss unique motives (Stenzel & Krumm, 2020). One of the individuals is providing the questions and another individual is responding to the interview. The interview is selected as a method because it is most appropriate for this research since it provides the availability of respondents, possibilities for additional questions for a better understanding of the response, as well as clarification of the meaning of the question (Mann, 2016). Likewise, an interview allows better response rate, completeness in answers received and better control over the interview environment (Ivey, 2022). Furthermore, during interviews, it is possible to observe non-verbal behavior (Foucault, Sun, Miller, 2022) that relates to quality and truthful answers, and the possibility to obtain original and unique data (Holter, 2022). The interview is performed among the high-level representatives inside the companies.

To explore the nature and the insights of identified concepts, I interviewed a Scrum Master in one company and Product Owners in the other two companies. In one company, I decided to interview a Scrum Master because it is a high-responsibility position that requires involvement in important daily activities within the teams and development process. In the other two companies, there was no actual role of "a Scrum Master", nevertheless, there was a Product Owner role with extensive responsibilities to cover the responsibility and role of a Scrum Master.

After their acceptance and agreement of being interviewed with the purpose of research for the thesis, interviews were organized at different times and days according to their schedules and availability. Because of the active virus Covid-19, we agreed to organize online meetings via the Zoom platform. This way of communication should substitute face-to-face interviews as we can hear, visually see each other, and conduct a standard interview about the topic. The meetings were arranged for 2-3 hours per day for 3 days because of a large number of questions and a complete understanding of internal procedures. Every interviewee received enough information about the research and purposes of the interview via email. Further, all required additional explanations were provided online at the beginning of the meeting. Likewise, respondents were assured that all the received data will remain confidential and only be used for the research. A list of the questions per identified concepts is provided in Appendix 2.

6.4   Analysis of the interviews

The analysis of the interviews by the beforehand identified concepts is presented in the continuation.

6.4.1   Concept 1: "Experiences, know-how, and knowledge"

This concept refers to the experience and know-how that a company needs to move from a traditional to an Agile project management approach. In this concept, the questions are grouped around the first idea of changing and transforming to a new approach, such as the question "What is your role, background and experience in agile framework and method?" where I tried to understand the background of the Project Manager, Product Owner, and Scrum Master. The answer to the question taken from the interview is that the Product Owner and Scrum Master are persons with previous experiences, and years of working in the same position and constantly learning, either through official certifications or learning from other external consulting companies specialized in helping other companies in adaptation and implementation of the agile framework. Regarding the role they perform, a Scrum Master defines the vision related to the product and classifies the priorities. Besides, it is his/her responsibility to harmonize the expectations of the team members and organize the tasks in the product backlog. On the other side, in the second company, a Product Owner is responsible for organizing the team workers, coaching, introducing the role and working methods, removing possible process obstacles, leading them during the development process and helping with process functionalities. In the interview, the Scrum Master is a person that has been working for 10 years in the field of agile methodologies, more precisely in Scrum. The Scrum Master is obliged to attend the scrum master classes, to be certified in that field, and to obtain theoretical knowledge and practical experience. In the third company, a Scrum Master does not have formal certificates in Agile or any of the Agile frameworks, but he/she does have previous practical experience regarding the implementation of the Agile frameworks, exactly in implementing and adopting Scrum in working teams.

The second question regarding this concept is "What kind of training have you had in Agile software development? Do you feel you need more training?" - the idea was to understand whether they had previous internal or external training (other companies that provide help and consultations) regarding the implementation of a new method of working. In case they did not have this type of help, whether they think they need additional training? In the first company, the current Scrum Master started by reading books about Agile, reading online and later by attending the online classes and courses organized by World Official Organization named Scrum alliances to get the certificate. In the named courses, they learn from educated and certified lecturers and shared the acquired knowledge with team members which was necessary for passing the official test for a Scrum Master. In the second company, the Product Owner explained that the company had 3 to 4 events organized as workshops for top management of the company where it was

exemplified how Agile can help the team, what Agile is, why it is better to transfer to the Agile framework, and how the company will benefit from implementing Agile. In addition, they engaged another consulting company that was present in the daily meetings and instructed the Product Owner regarding the next phases and parts of the project. Also, Product Owners from the company are now enrolled in courses to get official certificates, learn more about what their obligations are and guide other team members that are depending on them. The Scrum Master defined a problem as not having many and constant workshops, educational training, and conversations which might help in further implementation. Additionally, he described that he would like to gain new and fresh ideas about improving current procedures in the company, to listen to experiences from other companies and good practices that can help in learning what is contributing to harmonious work.

The third question in this concept is "What is the overall thinking of transformation to Agile methods?" which helps to acknowledge the opinions inside the company, and their attitude towards the implementation of the new method. In the first company, the idea was to meet customer desires, where they agreed to change the company's method of working to be closer to customers, to understand them better, to fulfil their needs and be suitable to the customers. With Agile they always have the working software, constant communication, and interaction with the ability to respond to customer-changed requests. Earlier, with the Waterfall method, they faced various problems, for example, not being able to meet the needs of the customer because the software, using this method has been fully developed, a closed cycle. Another problem is spending plenty of financial resources and time for any new change on the previously agreed functionalities. Now, they see that each sprint is better, the improvement is visible, more discussions with customers and they gather more information. In the second company, they realised that work inside the team was not progressing well, they did not respond quickly, they were not able to complete the work and the team was very slow. Another reason is the changeable environment, which the Waterfall method is not enough to work with, it does not fulfil the requirements in the best possible way. All these reasons are leading to misunderstanding, repeated work, and the need for much more financial resources. The third reason is that customers wanted to be involved, to share their desires and opinions with the developing team. The third company from the research explained that Agile as a method in their company is very well accepted, it is easy for managers and contributors to adopt the behaviour, but on the other side, the transition is quite difficult which includes overcoming the years of patterns building, transforming the relationships, and changing common ways of working deriving from company culture.

The aim of the question "Are the following roles and their responsibilities clear: project manager, scrum master, product owner?" is to justify understanding the responsibilities of the very important roles in an Agile team. In the first company, they defined the roles and their responsibilities. Also, they have a daily meeting each day with all the team members where everyone is allowed to raise their hand, ask questions, and inquire about further

information or explanation. Product owners from each team are at that meeting available to explain all that is needed. All the responsibilities are defined and assigned to each team member, so they know what is expected from them. The second company is similar, they all get requirements and tasks from the Scrum Master, and they have reached the point where everyone is aware of how the process is working and what is expected from them. In the third company, all the responsibilities are known and clear, but they need some formal alignment in organizational structure which refers to not having a formal job title Scrum Master.

Further, the question "Which are Scrum practices that are the best for the team, or which Scrum practices does your team use?" aims to get to know the best practices from Agile and their beneficial practices. The first company follows all the procedures from Scrum practices like daily meetings, defining tasks for each sprint, development time, using Jira as a good tool for supporting Scrum methodology, clarifying what is necessary to create, in which status the task is, etc. The second company is focused on the following "by the book" system where they try to stay focused on how Agile is described in the book, where they organize all the processes, sprint tasks, and daily meetings to discuss what is done the day before and what is in a plan to do today. Furthermore, at the meeting, each team member is allowed to express the problems that are arising. In the third company, the best practice is Kanban where they have more success and understanding. With Kanban, it is discussed what is done, how successful the development process in one sprint is, and there is an opportunity to ask for help from any team member or Product Owner.

The question "Which are the most important techniques or tools that you use in agile methods?" focuses on understanding tools that are commonly used in Agile methodology. As a technique, the first company gives attention and appreciation to constant communication inside the team and with customers. As a tool, the most used is Jira, where they note all that needs to be done, create each task, define the tasks for sprints, log the working hours, and follow the statuses of each task and possible problems. The second company also said that for the company the crucial part is good communication. Besides, they use Google jam board as a tool to determine every task for the developer, to create and organize all electronic business, and to distribute the work among the team members. They also use Microsoft Teams for communication, daily meetings and brainstorming to find the best possible solutions. The third company is using Trello which is similar to Kanban for organizing tasks, making lists of responsibilities, and representing the statuses of the tasks (to do, doing, done). Also, Retromat generates plans for Agile and Microsoft Teams for constant communication with other team members.

Answering the questions "How do you get the requirements from customers or companies that want to use your services/workshops/ professional advice? How is that process organized from beginning to end?" the first company explained that customer is in constant communication with Product Owner and they discuss what the requirements are and what can be done in which schedule. Then, the Product Owner uses Jira as a tool to create all the

tasks that are required from the customer and assign them to developers. In addition, the Product Owner creates user stories and determines the priorities. On the other side, the customer is allowed to create new bugs, tasks and change requests. In the second company, if the customer needs consultations, they contact the marketing department and then agree to a meeting with the appropriate person. The second method is continuous communication between the Product Owner and customer where they agree on which functionalities will be developed. Also, the responsibility of the Product Owner is to think about every requirement from the customer and to process whether it is possible to develop it, how it can look like, to find and propose a better solution. The focus is on meeting multiple times with customers and discussing what is done and how to move forward, for example, the customer is not allowed to write or report new tasks or bugs in Jira. The third company have an internal customer that is constantly present inside the team and works within it.

Another question from this concept is "Define and explain an example of a positive Agile process. In which situation did agile help?" - the aim is to get to know the positive practices of Agile. In the first company, the most positive side of working using Agile is the frequent meetings with the customer, where each meeting creates its value; it is true for they can see the improvement of the work done. The retrospective is used to discuss and agree on things that are not working well. Review is for representing to stakeholders what is done and delivered in one sprint. Additionally, stakeholders are adding comments which need to be accepted and improved in the next sprint. In the second company, the best practice is the collaboration between team members and the possibility to discuss and help each other in the development process. In the third company, the main advantage gathered from using Agile is mitigating the request from stakeholders that always want everything to be done as soon as possible, and Scrum helped them to set the expectations right.

6.4.2 Concept 2: "Implementation"

This concept refers to the actual process of transferring and implementing Agile methodology. The first question from this concept is "Explain the timeline of the transformation? How long does the implementation take (in time)?" where the goal is to understand how long it takes to completely transfer to the new methodology. The interviewee from the first company explained that the team needed more time to adapt to the change and new methodology. Product Owners arranged the meeting inside the company and explained where the change will be and why it is necessary. Team members had one month to adapt, half of them were ready for the change, and the other half were against any change and were struggling to adapt. This all lead to difficulties which were caused by people that were not willing to adjust and change their way of working. This resulted in a couple of them leaving the company. A respondent from the second company said they needed almost one year to adapt totally to Agile methodology. At the beginning of the transition, they created two larger teams where every team member brought and contributed to the company value but still, they were not able to deliver every sprint. Teams contained people from different fields because they needed various views from each

team member. Later, the number of team members changed, they were changing teams and people from the team intending to find the perfect composition of the team. Teams were guided and redirected by two Product Owners and supported by Teach lead persons who assisted other developers and took care that all the processes were going as planned. The focus was to do everything as defined in the book, but practice proved the need for improvements and their own opinions. In the third company, they needed two to three months to adapt to the new methodology with initial training and sprints where they were learning how the process will go. In this company, the Product Owner believes that transition is an ongoing process and not everything can be changed fast.

Additionally, on the question "What are positive and negative challenges in using agile methods? How are these challenges solved?" the Scrum Master from the first company explained that the positive sides are the meetings where everyone can ask for help and discuss potential problems and improvements in the processes. On the other side, the negative point of view is a challenge with delivering new functionalities for each sprint. The second company described the transition from the Waterfall method to Agile as a challenge because the traditional method was rooted and used for a long period. The second problem is that with the Waterfall method everything was planned and described when it will be done, but in the Agile, however, the team does not know if they will manage to deliver functionalities on time, when another change will be required from the customer, and how transparent tasks are. The problem arises when the Covid-19 pandemic happened and everyone was working from home, but they needed to work together, help each other, and define work schedules. The positive sides are meetings where it is possible to discuss any task and priorities and provide support. Also, they consider how to become better, how to evolve and meet all the customers' needs. The third company said that the negative side is time management because people are not used to the volume of meetings, and encounters and why meetings like retrospectives are necessary. The key role of a Scrum Master is to be capable to keep the structure, adding value and continually explaining to its time why they need to be dedicated and deliver within the deadlines. Also, he/she shall support the team members and advise them to advance. This contributes to being competitive in the market. The software is developed faster, the product has better quality, and everyone acts upon the responsibilities and assigned duties, they know what is to follow.

Furthermore, answering the question "What would you have done differently? How?" the first company explained that it would not change much because Scrum is not a problem if you have distributed team, teams in another country, but it is a problem when the time zone is different. Also, an agreement between team members on what will be done in which sprint and what can be improved is really important. The Product Owner from the second company said that the beginning of the transition did not involve every team member, and did not give them time to adapt, it was mostly how Product Owners decided without questions from any team member. In addition, Product Owners organized teams and team members without anyone having the right to suggest anything. The second problem is the

non-involvement of people that are from the beginning of the development of the product with managers who can help and provide some advice. Team members were struggling and that turned out to be negative practice. The Product Owner from the third company described that she wishes she started with multiple teams at a time and established a community out of practice.

The next question is "How did companies make a selection and decision on who would be the scrum master, product owner and project manager?" where interviewee from the first company said that in their company, the Scrum Master is the same person as the Project Manager which means that she got the role of a Scrum Master automatically. On the other side, the Product Owner is nominated by the customer. In the second company, their previous Product Owner left the company and they agreed internally with the top management who will take over the role. For the role of a Scrum Master, they agreed to be a person that is certified for the role. In the third company, the Product Owner explained that after a course launched by a group company, they decided to start a Scrum team with the help of an external Agile coach.

Answering the question "Do you see the benefits of roles "Scrum master" and "Product Owner"?" the first company explained that the benefits of those roles are visible and that a Scrum Master is a person motivating team members, helping them to deliver, to solve problems and taking care of their development. On the other side, a Product Owner is responsible to define from the content perspective how to deliver and define priorities. In the second company, both roles are very important. The Product Owner chooses and consolidates tasks, and Scrum Master is taking care of units, teams, and the development process, prioritizes tasks and assigns responsibility to team members. A Scrum Master is the representative of the team who helps improve the processes and takes care of communication outside the company. The Product Owner monitors what has been done and helps others understand what needs to be done, and what the customer requests, and finally presents the developed product. In the third company, the Product Owner explained that she sees the positive sides and benefits of implementing Scrum Master and Product Owner roles inside the company because teams work much better, with more understanding and availability of people that can lead and help.

The next question regarding this concept is "What do you think about hiring an internal trainer? Would you hire an internal trainer? If yes, please explain it, if not, explain what kind of trainer you had and how it helped?". The first company described that they do not need an internal trainer because the team is already working well with Scrum and experienced Scrum Master. The second company's Product Owner explained that they do not have internal trainers, but they had hired an external company to guide them and help with the transition. The problem arises when they do not know how to proceed and then they contact an external company. That company should help them by giving ideas, and explaining what is necessary to succeed, but it does not solve their problems, they are the

ones that need to find together the best possible solution. The third company said that they have a set of internal trainers that deliver training in Agile techniques and methods.

Answering the question "About the team: team size, what does the team do, what is the mutual collaboration?" the Scrum Master explained that they have a team of 8 persons, mostly developers, 1 Scrum Master, 1 Product Owner and testers. The second company said they have two teams consisting of 10 people that internally collaborate. Also, all the team members have brainstorming meetings where they all think about all the possible solutions. On sprint review, every team represents what has been done. Grooming includes what they planned to do, who will do it, and who is responsible for what. On sprint, the review team shows what is done in the past two weeks. Additionally, they have a third team which consists of software architects and technical leads that do not work on sprint, but they help with potential problems in the core system. The third company described that they have 7 team members of which 1 Product Owner, 1 Scrum Master, 3 developers, 1 integration specialist and 1 person accountable for the communication with the management.

Furthermore, answering the question "What is the length of each iteration? What are your opinions regarding the length of iteration?", the Scrum Master from the first company said that one iteration is three weeks long and cannot be shorter because the testing cycle cannot be closed. She thinks that the length of iteration is how it is supposed to be because they tried the iterations of 2 weeks, and it did not work. In the second company, the length of iteration is 2 weeks, which is enough. Sometimes it happens that they do not manage to deliver some tasks in 2 weeks, so they consider and decline the length of iteration. The Product Owner from the third company explained that the iteration in their company is 2 weeks long where they keep the structure and adapt only in time of holidays where iteration is extended to 3 weeks.

The next question is "What are the responsibilities of the Product Owner?" where the Scrum Master explained that the Product Owner is responsible for organizing tasks and deciding on priorities. The second company said that the responsibility is to be in constant communication with customers, organize tasks and break the requests down into smaller tasks, get feedback and explain the team what needs to be done. The Product Owner from the third company said his/her responsibilities are to help the team remove obstacles, cooperate with stakeholders, make design decisions, and prioritize tasks.

Answering the question "How long does it take to implement the agile methods in the organization?", the Scrum Master from the first company explained they needed 1 year to transfer from traditional to Agile methods. The Product Owner said they needed a year and a half to transfer and still need time after one year and a half because not everyone is adapted to a new way of working. The third company said that transition is an ongoing process where they need more time, but they needed half a year to start adapting to the new methodology.

6.4.3 Concept 3: "Change management/transformation"

This concept refers to actual transformation and the company's reasons to change the methodology. Answering the first question from this concept "What are the reasons for starting the transformation (use of agile methods)?" the first company explained the reasons they have better communication with the customer, availability to adapt to customer change requests, and improved working software. The second company said it is because of the changing business environment, frequent change of opinions by a customer, faster response, easier delivery, lack of understanding of the Waterfall method, and the possibility for a customer to be involved. The Product Owner at the third company said that the reasons are faster development process and software delivery, alignment between several different teams involved to build the right product, where multiple teams work on the same product and boost team morale which means constant support to other team members and communication.

Answering the question "Which consequences do you find at work by using Scrum or Kanban?" The Product Owner explained that the team is under the pressure because of deadlines and the short time for development. The second company explained that limitations on each task are consequences for developers that did not want to accept the time limit. Because of this, development time lasted longer than estimated. In the third company, the Product Owner said it helps with boosting team morale, task clarity and time-management risks.

Answering the next question "What do companies usually plan to change or improve?" the first company explained that they wanted to improve the communication with the customer and inside the team. With Agile they are capable to discuss more and find many alternatives and possible solutions, intending to improve their processes and deliver better solutions. The second company wanted to improve the internal delivery time and improve solutions. Also, they wanted to get rid of longer processes with mistakes and lack of communication. In the third company, the Product Owner explained that they wanted to improve the communication with the customer and have better understanding.

Furthermore, answering the question "How did you measure the change? What exactly did you measure? How does this change look according to your measurements?" the first company said they measured time spent to develop functionalities and response time to the customer. The Product Owner from the second company explained that the important part for the company was the organization inside the company, feeling that everyone understands what is expected from them, what they should focus on, the tasks are clearer, other sectors of the company are also involved and understand the processes. On the other side, they measured the time spent on each task, financial resources, comparison of activities and error rate between Agile and Waterfall. At the beginning of the transition to Agile, when they had training, the error rate was higher because most people did not understand what and how it should be done. Now they are doing better and trying to find

the best way to create higher efficiency. In addition, they measure the team operating speed, development time, and complexity of the tasks. The third company said they measured employee and customer satisfaction and the time they need to go on the market.

Answering the question "How exactly has Agile transformation affected the roles and responsibilities inside the company?" the Scrum Master from the first company said that responsibilities are known, and every team member knows what needs to be done. The Scrum Master and Product Owner are aware of what responsibilities and further processes are. In the second company, the change was in the role of the Product Owner and Scrum Master because earlier they did not have this role. They had a Product Manager and Project Manager. The next change is high requirements and expectations for the team members where not all understood the change. Also, the part of responsibilities from the previous roles in the company was transferred to new roles. The Product Owner from the third company explained that they did not have many organizational changes. They just added responsibilities to already existing roles, meaning that the developers working on projects do not necessarily report to their managers.

Answering the next question "In which way did employees accept or not accept the change, transformation, or transition to agile methods?" the first company teams accepted Agile as a method well, however, it did happen that some of the team members could not fulfil all the estimated work, so they had to change the team. In the second company, the team first had to earn the trust of the teams to transition to Agile. Another problem is not understanding what the change will bring, what needs to be done and how, so they complained at first and did not accept the change. When team members realized the value that Agile brings, the customer feedback and satisfaction they recognized the transition as valuable and beneficial, so they agreed and accepted it well. In the third company, team members accepted the change and different ways of working very nicely and fast.

To the concept question "What are your thoughts regarding the implementation and success of agile methods in the company?" the Scrum Master from the first company answered that transition was necessary because the old way of working did not bring the benefits, and now they contribute very well. In the second company, the change was required because of a lack of communication, collaboration, and delivery time. Now they improved the processes and communication and work better. In the third company, the Product Owner said that success depends on expectations. Companies usually want a fast fix, so they do Scrum. First employees need to learn how to plan, iterate, and pitch at the review meeting and need to believe that this is the best way of working.

Answering the next question "What are the results that the company gathered from agile methods? Is it more profit, better communication, etc.? How would you describe the benefits of agile?" the first company said that transparency of work, every minute customer knows in which stage of the process the task is, collaboration and communication between customer and developer are improved, Product Owner is always available to help and

advice when some functionality is developed then testers test the change and say what needs to be improved. The second company confirmed transparent work as a benefit, where the customer knows when activity is done and when something needs more development. Also, they ensure smooth running, respond faster to the customer, provide greater support inside the teams and have better communication. In the third company, the benefits are better communication, faster time to market, and accomplishment of stakeholder expectations.

The concept question "What advice would you give to the companies that are thinking about implementing agile methods?" encourages to have the Product Owner on the customer side and to have smaller teams as Agile methodology is proposed because it is easier to work and agree on something. The second company recommended they needed to give time to transition and understand it is something that needs to be done from the inside of the company and teams. Team members need to trust the process and join the changes where top management should suggest the change and team members should be willing to learn. In the third company, the Product Owner proposes hiring an expert or engaging an Agile coach internally. In addition, set the right expectations and keep asking yourself why you decided to go Agile. Based on the above, set KPIs and act.

6.4.4   Concept 4: "Organizational opportunities"

This concept refers to the organization itself and the roles inside. The first question in this concept is "Has agile helped in solving the issues? How?" the first company said that Agile helped in solving issues with the customer, better understanding, and collaboration. The Product Owner from the second company said it did help up to a certain extent. The biggest challenge was that in specific situations, they did not have the right answer when customers require something, they were not sure if they worked properly. The third company considers that Agile did help them, especially in team cohesiveness. Developers learned how to work together and learned about each other pace and capabilities.

Answering the next question "How is a company organized?" the first company said there are 30 people that are divided into 4 teams consisting of developers and testers. Also, they have 2 Scrum Masters and 2 Product Owners for those teams. The director from the second company leads all teams in 4 departments (HR, IT, Marketing, and Sales Department). They have 2 teams of 13 people, 2 Product Owners and 1 Scrum Master. All team members report to their Product Owner. The third company has four board members monitoring 16 sectors where sectors are divided into departments and some departments are divided into teams.

To the question "Which roles do you currently have in your company?" the first company said they have Scrum Master, Product Owner, testers, developers, tech lead, junior developer, senior developer, junior tester, and senior tester. The second company has

Scrum Master, Product Owner, developers, and testers. The third company consists of Scrum Master, a Product Owner, developers, testers, and an Agile coach.

Further, an interviewee from the first company answered the question "Are roles clear in the company? Are there challenges that roles in the company face or need improvement regarding their application?" confirming they had defined clear goals and roles in the company, so they do not feel like improvement is necessary. The second company explained that they sometimes lack happiness in the office, but responsibilities are divided and assigned, so it does not lead to any problems. For example, when a developer deals with a problem with some activity, there are Product Owners that can help and explain. The Product Owner from the third company said the roles are clear but they need formal alignment in the organizational structure, for example, a scrum master does not have a formal job title, a Scrum Master).

Answering the next question "Would you describe the organizational structure as "good enough" or is there a need for additional changes? Would you plan the implementation of new or additional changes in organizational structure?" the first company said that based on the current setup, the plan is to split the team members into more teams because it is too much to have more than 7 members in one team and it is more difficult to work. In the second company, the current teams are okay, they function and cooperate well. The only thing that would be nice to improve is to involve and develop more products, not just one. In the third company, the organization is good right now because it allows roles to transition and the creation of a fluid Agile team.

Answering the question "Did you identify certain overlapping of organizational roles or is it clear who should do what?" the first company said it is clear who does what, and all the roles with certain responsibilities. The second company said that it can happen that someone does not understand their responsibility, so the work is shifted to another team member. The third company said it did not happen, everyone understands and knows their roles.

Additionally, answering the question "Are there organizational roles in the company that existed before the transformation?" all the companies agreed that their team changed only the role of Scrum Master and Product Owner. All other roles in the team remained the same.

Answering the next question "What do you measure in the company (performance, results etc)?" the first company said the focus was on working as a team, all together and performing as a team and not as an individual. In the second company the Product Owner development process, number of completed tasks, number of tasks currently actively working on, number of bugs, overall success in the development process, the satisfaction of the customer, etc. Overall, they measure everything that was measured also with the

traditional Waterfall method, the crucial indicators for success. The third company measures performance, results, employee engagement, and net promoter score.

"Do you use agile methods in all processes in the company or just for some processes?" is the question where companies agreed that only development sectors of the company transited from traditional to Agile. All other departments like Human Resources, Marketing and Sales departments are currently working with traditional methods. In addition, there is a possibility in the future to implement Agile methods in other departments.

Answering the question "What do you think about the suitability of agile methods for the company? What are the benefits, and challenges? Did opinion regarding agile methods change after the implementation?" the first company said the expectation is high and pressure to transfer was high, but they managed to accept new methodology. The second company explained that in the beginning, the excitement about the transition to Agile was high, so they wanted every process and part to be done in Agile. The result of this is low productivity because the transition is an extensive process that needs time and willingness to learn. Further, because of the poor acceptance and low productivity, they agreed to hire an external trainer to help them with the implementation of Agile. Now, they work regularly and opinions about Agile have changed. In the third company, they fit well when delivering products to internal customers but there are always rising challenges.

6.4.5   Concept 5: "Management"

This concept refers to the inside of management and the communication. The first question from this concept is "What are the reasons for selecting Scrum or Kanban method?" - the first company said that Scrum is used for developing and delivery of a product, increment, and new versions. The second company explained that they use primarily Scrum as a method for development but at the same time, they use Kanban for help desk and support. Also, Kanban is used for determining the priority of tasks, availability for the customer to report any bug, regulating tasks between team members, and visibility of tasks in progress and activities that are finished. The Scrum for defining the functionalities that will be developed within the sprint as bigger epic tasks and divide epic into multiple smaller tasks. In addition, stories were determined, and a sprint backlog was created. The Scrum created two swimming which means one is for priority functionalities (critical) and the second is for regular tasks. In the third company, the reasons are task visibility, continuous feedback from stakeholders, and team cohesiveness.

The next question is "What is communication inside your team like? Is it good, bad, okay, or needs some improvements? How would you improve the communication in the team?" the first company explained that communication is very good, on a satisfying level, and they discuss potential improvements at each retrospective meeting. In the second company, from time to time, they have problems with communication where if it is not a priority task

it is planned to be discussed later at the meeting for possible improvements. The best communication is non-formal which includes lunches on the daily basis, going for a drink, socializing after working hours, membership in sports associations, movies, picnics, and team buildings. In the third company the communication is on the correct level but there is always space for improvement. For example, they are not very active at retrospective meetings.

Further, answering the question "When and how do you communicate with other teams?" the first company said they communicate and agree on the meetings unless it comes to overlapping the tasks with another team. The second company said communication is done at daily meetings where they speak about potential problems and responsibilities. Active communication is also in other meetings like retrospectives and reviews. The third way of communication is non-formal between team members. In addition, they organize brainstorming for the exchange of ideas and opinions. The usual daily communication inside the third company is through Scrum Master and Product Owner.

The next question is "Do you know enough about what is happening in the other teams/elsewhere in the project? Is there anything that you would need to know more about? What? Why?" the first company Scrum Master said it is always good to hear other team practices, but it is not necessary. In the second company, the Product Owner explained that they are aware of what is going on in another team because they receive enough information about it and that for now are informed. The third company said that they are good and know enough about another team.

Answering the question "What is working well in your team/company regarding the practices? What should be improved and how?" the first company explained they had daily meetings so that everyone could express their opinion, be involved and draw attention. The second positive practice is a retrospective meeting where everyone writes anonymously suggestions and what can be improved. In the second company, there is always room for improvement in every segment. Backlog helped in distinguishing what is important and distributing responsibilities. If any doubt arises, a Product Owner or Scrum Master shall provide support. In the third company, the relationship with stakeholders can be improved because they are not used to giving constructive feedback, they expect too much from the team. In addition, it is hard for a Product Owner to meet all the expectations and Scrum Master to keep the structure because practices have not yet been spread throughout the company.

Answering the next question "Is there anything to be improved in the team or company?" they said they would create smaller teams for faster and better communication. In the second company, the improvement would be to show each upgrade at the meetings so everyone can be informed because sometimes they fix the upgrade outside the meetings. In the third company, they would create more Agile teams to accept more of the new methodology and transition.

Answering the question "How would you do the improvement?" the first company would organize the meeting and create one more team for the beginning. In the second company, the improvement will be to hold two review meetings to keep pace with what is done and act promptly if any problem arises. In the third company, the Product Owner said they have started with an Agile transformation project in one of the sectors for the period of one year so that they will work on projects requiring an iterative approach, feedback sessions, planning, and reviews. The structure is scaled Scrum.

The next question is "How good is the communication in the company, team, between the product manager and product owner/scrum master etc?" The first company said the communication is good and they are satisfied with the current setup. The second company support presence at every meeting with the team and top management where they explain at which point the processes are developed and communicate with the team on daily basis. Overall internal communication is frequent and on a high level.

7   DISCUSSION

The results gathered in the previous chapter are based on knowledge from the theoretical part of the thesis and interviews with practitioners. In this chapter I will elaborate on the thesis findings, provide concise answers to all research questions, and emphasize the limitations for further research. One of the main contributions of this master thesis is that it identifies the concepts related to transition from traditional management to Agile. Furthermore, it is offering a better understanding of Agile principles, roles in teams, way of working, experiences in adapting Agile, communication with customers and team members, differences between Scrum and Kanban, and to understand economic reasons for transferring from traditional to Agile methods. Moreover, it verifies the theory with insights from practice confirming that the findings from literature are aligned with the findings from practice.

7.1   Main findings

The main purpose of this master's thesis is to understand the transformation from traditional to Agile project management. Moreover, to investigate how and to what extent Agile methods are used to help companies deliver sprints and final products to the customer. With the help of collected data, I managed to answer my research questions formed at the beginning of the thesis.

In my master thesis, I analyzed traditional methods and companies' way to transit to Agile project management. After studying professional and scientific literature and books exploring the theory on one hand and implementing the interviews with entities from practice on the other, it can be confirmed that the existing theory more or less supports the software development project management implementation in practice. However, there is a

difference between theory and practice in terms of the size of the Agile teams. While the theory states that the Agile teams should be as small as possible to allow for better communication and easier work, in practice teams are usually larger. Consequently, companies are facing challenges arising from larger teams that needs to be solved on a daily basis, such as the productivity of individuals going down and lack of communication.

RQ1. How well does the company accept Agile methods when transitioning from traditional methods?

Companies are generally conscious of a fast and highly uncertain environment where traditional methods are no longer able to meet the requirements of the customers. On the other side, companies struggle to adapt to the new method after a long time of operating with traditional methods (Dingsøyr, Moe, Fægri, & Seim, 2018). Companies can inquire for additional help in the form of hiring an internal person or professional company that will help and guide them through the process of transition. Another practice is to do workshops where team members are educated about Agile, how it can help, what are the benefits etc. It is important to how the transition will be represented because team members had the same daily routines for many years, and it is difficult to adapt to a new method of working. Researched companies do confirm examples where employees resisted adapting to the new method and left the company. Usually, the resistance is captured in sectors where high positions are, like managers or leaders that worked in companies for multiple years and got used to traditional methods. Other team members do struggle to adjust only because of a lack of knowledge about the processes that are required in Agile methods. Experience from companies does validate that after a certain adaptation time, team members have easier accepted Agile methods, communicating more and working better together. Overall, companies do not have many problems in adapting and accepting the Agile method, nevertheless, they need good organization, schedule, and time.

RQ2. What is the experience a company acquires when transitioning from traditional to Agile methods and what activities need to be undertaken to satisfy customers' needs?

When it comes to experience a company acquire, some companies do have positive opinions and experiences with Agile. Also, some companies struggle with transition and require more time to understand the change and adapt to the new way of working (Lappi, Karvonen, Lwakatare, Aaltonen, & Kuvaja, 2018). Overall, researched companies do not have negative experiences and opinions about Agile, because of recognition and actual awareness that environments are changing. Furthermore, disagreement and rejection of Agile will not assist them in reducing repetitive work, building strong relationships with customers, being more competitive in the market and saving unnecessary outflow of financial resources. Likewise, companies learned that for transition, it is essential to maintain and nurture constant communication between team members and customers. Besides, it is very important to educate employees about the change, hire professional help if required, include every team member in the discussion, define the roles and

responsibilities in the beginning and create smaller teams for easier organization of work. As a good practice, companies acknowledge constant communication that is done inside the teams and through daily meetings and retrospectives where they discuss what has been done, what needs to be done and potential problems. Recommended activities for reaching the satisfaction of customers are better organization inside the team, constant involvement of customers in every sprint or part of the process where work is transparent, with the possibility for customers to know in which stage work needs to be done.

RQ3. What are the key company challenges towards reaching their goal of becoming Agile, and being competitive in the market?

Regarding reaching the goal of becoming Agile companies encounter several challenges that may postpone the transition process and decrease productivity (Hidalgo, 2019). Nevertheless the fact of Agile strengths and advantages is that it requires a huge transition and affects human factors inside the company the most (Pinton & Torres Junior, 2020). I have learned from the researched companies that they have met the challenges throughout the process of transition with positive and negative experiences, and based on answers gathered, agreed that the key challenges they came across are insufficient knowledge about Agile that leads to not knowing what is necessary and expected to do in the company. The second challenge is pressure for change that is pushing every team member to adapt instantly. Another challenge is lower productivity at the beginning of the transition as a result of the pressure changeable environment and lack of knowledge. The fourth challenge is poor acceptance from team members because of their previous routines while working with traditional methods. The next challenge is no capability to transit all sectors in the company. Currently, only development sectors can use Agile methods, while other sectors like Human Resources, Sales and other are still operating in traditional methods. Furthermore, companies recognized that one role fulfilling two roles at the same time is a challenge. As an example, the Product Owner is also doing the role of a Scrum Master. Additionally, the transition to Agile at the beginning after years of working with traditional methods resulted in not meeting the high requirements and expectations of customers. Likewise, time limitations and delivering new functionalities each sprint is also a challenge for teams that are pressured to deliver high quality in a short period. Lastly, too many team members in each team are a challenge because it leads towards misunderstanding and disagreements. Researched companies agreed that it is better to have more teams that consist of a smaller number of team members. Likewise, they will be able to understand each other well and avoid misunderstanding and lack of organization.

7.2   Limitations and further research

Every research comes with advantages and imperfections, as well as this thesis has certain limitations for further research that should be taken into consideration when analysing the results and reviewing the conclusion. First, the limitation is the possibility for respondents

to be biased, which can lead to not being completely honest when answering the question. Also, that means respondents are trying to unconsciously or on purpose represent their company in the best possible way, perfect working atmosphere, where everyone is willing to help and without any possible issues and disagreements. This leads to respondents not being willing to share potential struggles and difficulties. The second limitation is the sampling frame, which relays on IT companies, that are involved in this research. This means that each company has different and unique processes that are modified to their internal processes. Not all organisations share the same number of teams and internal processes, so the difficulties they had will not necessarily arise in other organisations. The third limitation is the number of interviews, where there could be more respondents (companies) which would help in gathering more information and the right data, to answer the questions, understand the defined concepts and correct comparison of multiple organizations. Although that would help the research, I did not manage to receive positive feedback and willingness from other companies to participate in my research. The fourth limitation is related to the time of the interviews, which was limited according to the busy schedules of company managers, with numerous obligations during the day where the entire team depends on them and needs guidance. In addition, some of the respondents had a feeling like they were investigated and asked in details about the internal processes, types of work, their daily activities, and ways of handling the problems. This led to possible uncomfortable feelings with respondents and resistance to providing more detailed explanations about the topic in the determined concepts. The scope of the topic of the research in my master's thesis can be extended to encompass a wider range of samples and knowledge. Likewise, further research can include more respondents that will provide answers for a better understanding and organization of the topic. In addition, it can include questionnaires to verify the interview answers which can be forwarded to many respondents inside the company that operates with Agile methodologies. Besides, there may be difficulties to arrange, scheduling and organizing time with respondents and the research process due to possible lack of time. In addition, it is necessary to organize better the research process with respondents because of possible misunderstandings, to gather the right respondent data and ensure good quality of answers.

CONCLUSION

Each project is unique, however, the application of the project management concept and in general changes and risks can increase the success of implementation, reduce the time of execution, carry out the project within the stipulated time, reduce costs or prevent budget overruns (Wideman, 2022) as well as motivate stakeholders to work in teams and avoid conflict, reduce resistance to change, enable optimal growth and improve company efficiency (Rahman, Fatema & Ali, 2019). Like all organic systems, things, or phenomena, the project has its lifecycle and developmental stages. The project lifecycle helps determine which work activities should be done in each of the phases of the project, who performs those activities according to the phases and determines the time of completion of

the project (Vuorinen & Martinsuo, 2018). The lifecycle of the project is taking into consideration the entire project management. One of the very important steps in the further successful implementation of the project is to understand and consider the causes of possible project failures (Hughes, Rana & Simintiras, 2017). The default goal is realized after the efficiency assessment of the project, and its positive or negative sides, where all the criteria are determining the fact that a project will be conducted. With a brief and clear definition of the aims on the one side and management support on the other, it is important to be aware of the project's complexity and possible impacts from the outside environment (Dao, Kermanshachi, Shane, Anderson & Hare, 2017). Besides, there are various environments like social, political, economic, and technological factors that can influence the realization of the project.

With the desire to create a flexible and innovative company, it is important to manage projects and business procedures inside the company that is capable to respond to real-time customer needs. Following the requirements of the customer, it is necessary to create a business system that sets high priorities and standards in quality that can be competitive on the market with other companies. There should be a simple strategy to manage changes and risks. In addition, it is crucial to create value for customers and quality in the company (Mahajan, 2020), to reduce costs, and increase productivity and potential inside the team. Management concept modifications, project, and development procedures complement each other as complementary segments of the entire business. Fundamentally, it is obligatory to consider organizational structure, as well as the application of knowledge with adequate methods in project management.

Companies are facing a growing number of challenges today. As one of the tools to overcome these challenges, organizations emphasize the importance of project management. Project management is showing a difference between agile and traditional models (Heagney, 2016), and the recently increasingly popular hybrid project management approach, combines both approaches. For projects, an agile approach is mostly used because the current market is dynamic, competitive, and changing, and on the other side, projects are risky, unique, and complex (Balaban & Đurašković, 2021). Due to those characteristics, companies have been making decisions to adapt and implement the agile methodology, and the commonly used agile method for the development of software is the Scrum project management framework (Dhir, Kumar, & Singh, 2019). Scrum consists of a set of guidelines based on which companies adapt and manage projects to achieve the desired goal.

Nevertheless, the Scrum framework varies and differentiates between theory and actual implementation known as practice. Scrum is presented as a simple and uncomplicated method for implementation, however, in a real working environment, there are challenges as resistance from team members that are familiar and habituated with the traditional method having been used for many years (Morandini, Coleti, Oliveira, & Corrêa, 2021). In this situation, denying and refusing to follow the Scrum framework guidelines occurs.

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Another reason not to accept the Scrum method in the company is related to the financial status of the company where it is normal to have a project manager and not accept to use financial resources for implementing new roles inside the team as Product Owner and Scrum Master (Alsaber, Al Elsheikh, Aljumah, & Jamail, 2021). The next reason to accept Scrum as a framework is a desire to be a "modern" company and not the right reasons known as adequacy and appropriateness. In adopting the agile method, the project team needs to track and manage projects despite modifications that arise by implementing a new framework that was not well-known before (Fuchs, 2019). For achieving the goal of the project, it is essential to follow the guidelines of the Scrum framework, to keep adapting despite resistance, and to adjust the agile project management framework according to individual projects.

From the point of Kanban as an agile methodology, it is considered a very popular method that does not require changes in the previous organization framework and for that reason, Kanban is regarded as a simple, straightforward, and efficient method for implementation (Zayat, & Senvar, 2020). Kanban supports the main idea of not beginning a new work process until the previous one has been completed since it might bring about work overload and non-efficient operation. The crucial part is on organized task solving, good division of duties and involvement of other team members in the process of improving development and delivering processes from one side, and the entire company on the other. Successful implementation of the Kanban framework should lead to well-organized plans, reduced lead time, an increase in the quality of delivered products, and the ejection of surpluses. Kanban is a framework that is implemented once and lasts continuously.

In connection with this research, five concepts can be identified within this topic: experience, know-how, knowledge perspective concept, implementation concept, change management/transformation perspectives concept, organizational opportunities/perspective concept and management concept. One of the key conclusions is that companies require education internal or external, as well as a person that will guide them throughout the complete transition process. In addition, not providing enough information and knowledge to the team members and not involving company team members in discussions and decisions can lead to resistance from their side and disagreement. In the researched companies, it is visible that it can lead to the company discharging of managers because of their strong attitude regarding the changes and Agile transition. Further, from the research interview and answers received, I can conclude that the main problems were high pressure to transit to Agile methods, lack of time for the transition process and implementation, disagreement and not understanding responsibilities and their obligations within the process. Likewise, team members from the researched companies struggled to deliver in two-week time, which lead to poorly developed functionalities and higher error rates. On the other side, the implementation of Agile methods brought better communication, the collaboration between the teams and customers, transparency of work and customer satisfaction. A recommendation for companies that are considering the transition to Agile methods is to first investigate, learn and increase their knowledge about Agile and the

processes. In addition, it provides time for the team members to adapt to a new way of working and to ask them for opinions where communication is crucial for success. Also, optimizing team size that implies fewer team members with better productivity and communication. And finally, it is important to motivate team members and encourage the Agile mindset to efficiently transform from traditional to Agile project management in the organization.

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APPENDICES

Appendix 1: Povzetek (Summary in the Slovene language)

Pri razvoju programske opreme se vedno bolj uveljavljajo agilne metode, ki organizacijam omogočajo uvedbo novega načina poslovanja z novimi metodami. Agilna metodologija je ogrodje, ki pomeni ''razmišljanje izven okvirjev'', kjer je zelo pomembno, da so projekti, ki se razvijajo, hitri, interaktivni, da imajo dobro komunikacijo s člani ekipe in komunikacijo s strankami. V praksi se vedno pogosteje uporablja več agilnih metod, kot sta Scrum in Kanban. Scrum je interativen in inkrementalen proces, ki temelji na product backlog-u, ki je namenjen upravljanju projektov programske opreme, ki je sestavljen iz zaporedij časovnih blokov, imenovanih sprint. Kanban je sistem kartic za sledenje razvojnemu procesu, ki vključuje šest načel: vizualizacija poteka dela, omejevanje dela v teku, upravljanje poteka procesa, pripraviti eksplicitne pravilnike procesa, implementacija hitrih povratnih zank, in proženje izboljšav na podlagi metod in modelov. Te prakse se večinoma uporabljajo v IT podjetjih, pri razvoju programske opreme. Magistrsko delo je osredotočeno na organizacije, ki uporabljajo agilne metode in so že pridobile določene izkušnje z agilno metodo, z namenom, da definirajo in bolje razumejo agilne principe, vloge v timih, način dela, izkušnje pri prilagajanju agilnosti, komuniciranje s strankami in člani ekipe, razlike med Scrum-om in Kanban-om, ekonomske razloge za prehod s tradicionalnih na agilne metode in v kolikšni meri se te metode uporabljajo.

V empiričnem delu magistrske naloge in preučene teorije o temi, ki se opira na strokovno literaturo, knjige in izobraževalne članke, povezane z agilno metodologijo, s ciljem, da bi izvedeli več in pridobili razumevanje, sem identificirala pet ključnih konceptov o temi, kjer sem razvila vprašanja v zvezi z vsakim konceptom in analizirala vsakega od konceptov za boljše razumevanje osrednjega procesa, izkušenj, tranzicije in perspektive organizacije. Namen je razumeti prehod s tradicionalnega razvoja na agilni, izkušnje in koristi, ki so dosežene.

Prvi koncept, ki je identificiran, se nanaša na izkušnje ter perspektivo znanja, ki se nanaša na razumevanje izkušenj in znanja, ki jih je organizacija zbrala za prehod s tradicionalnega na agilni pristop vodenja projektov. Drugi koncept se nanaša na dejanski prenos in implementacijo agilnih metod. Tretji koncept je upravljanje sprememb in perspektiva transformacije, kjer organizacija pojasnjuje, kaj so razlogi za transformacijo, kaj je v organizaciji izboljšano in kako merijo spremembe. Četrti koncept se nanaša na organizacijske perspektive, peti pa bi moral pomagati pri razumevanju vodstva in njihovih razlogov za začetek z agilno metodo. Organizacije so se za prehod s tradicionalne na agilno metodo odločile z namenom hitrejše, kakovostnejše dostave razvite programske opreme in njenih funkcionalnosti, izboljšane komunikacije s stranko o tem, kaj je potrebno narediti in doseči. Zaradi pomanjkanja znanja o agilni metodi so nekatere organizacije najemale tretjo osebo ali podjetje, ki ima izkušnje s prehodom in prilagajanjem na novo metodo. Te organizacije imajo dovolj znanja in izkušenj pri vodenju skozi celoten proces prehoda in pomagajo pri razumevanju, zakaj je sprememba potrebna. Raziskave kažejo, da ima vsaka organizacija svoje načine prilagajanja agilnim metodam, izobraževanja svojih

zaposlenih in vključevanja v reševanje problemov. V magistrski nalogi bom pokazala rezultate primarno zbranih podatkov, ki so bili opravljeni z anketiranjem visoko pozicioniranih ljudi, kot so Scrum Managers, managerje in Product Owners v treh organizacijah. Osrednja točka magistrske naloge je odgovoriti na raziskovalna vprašanja o tem, kako dobro podjetje sprejema agilne metode pri prehodu s tradicionalnih metod, kakšne so izkušnje, ki jih podjetje pridobi ob prehodu na agilne metode, katere aktivnosti je treba izvesti, da bodo potrebe strank zadovoljene in kateri so ključni izzivi podjetja pri doseganju cilja postati agilen in konkurenčen na trgu.

Appendix 2: Questions for the interview

1.Experiences, know-how, and knowledge

- What is your role, background and experience in agile framework and method?
- What kind of training have you had in Agile software development? Do you feel you need more training?
- What is the overall thinking of transformation to Agile methods?
- Are the following roles and their responsibilities clear: project manager, scrum master, and product owner?
- Which scrum practices are the best for the team, or which Scrum practices does your team use?
- Which are the most important techniques or tools that you use in agile methods?
- How do you get the requirements from customers or companies that want to use your services/workshops/ professional advice? How is that process organized from the beginning to the end?
- Define and explain an example of a positive Agile process. In which situation does agile help?

2.Implementation

- Explain the timeline of the transformation. How long does the implementation take (in time)?
- What are the positive and negative challenges of using agile methods? How are these challenges solved?
- What would you have done differently? How?
- How do companies select and decide who would be the scrum master, product owner and project manager?
- Do you see the benefits of roles "Scrum master" and "Product Owner"?
- What do you think about hiring an internal trainer? Would you hire an internal trainer? If yes, please explain more about it, if no, explain what kind of trainer you had and how he/she helped.
- About the team: team size, what does the team do, connections to other teams?
- Which is the length of each iteration? What are your opinions regarding the length of iteration?
- Which are the responsibilities of the product owner?
- How long it takes to implement the agile methods in the organization?

3.Change management/transformation

- What are the reasons for starting the transformation (use of agile methods)?
- Which consequences do you face at work while using Scrum or Kanban?
- What do companies usually plan to change or improve?

- How have you measured the change? What exactly did you measure? How does this change look according to your measurements?
- How exactly has Agile transformation affected the roles and responsibilities inside the company?
- In which way do employees accept or not accept the change, transformation, and transition to agile methods?
- What are your thoughts regarding the implementation and success of agile methods in the company?
- What are the results that the company gathered from agile methods? Is that more profit, better communication etc? How would you describe the benefits of agile?
- Which advice would you give to companies that are thinking of implementing agile methods?

4.Organisational opportunities

- Have agile helped in solving the issues? How?
- How is the company organized?
- Which roles do you currently have in your company?
- Are roles in the company clear? Are there challenges that roles in the company are facing or need improvement regarding their application?
- Would you describe the organizational structure as "good enough" or is there a need for additional changes? Would you plan the implementation of new or additional changes in organizational structure?
- Did you identify certain overlapping organizational roles, or it is clear who should do what?
- Are there organizational roles in the company that existed before the transformation?
- What do you measure in the company (performance, results etc)?
- Do you use agile methods in all processes in the company or just for some processes?
- What do you think of the suitability of agile methods in the company? What are the benefits, and challenges? Do opinions regarding agile methods change after implementation?

5.Management

- What are the reasons for selecting Scrum or Kanban method?
- How is communication inside your team? Is it good, bad, okay, or needs some improvements? How would you improve the communication in the team?
- When and how do you communicate with other teams?
- Do you know enough about what is happening in the other teams/elsewhere in the project? Is there anything you would need to know more about? What? Why?
- What is working well in your team/company regarding the practices? What should be improved and how?
- Is there anything to improve in the team or company?

- How would you improve? How good is the communication in the company, team, between the product manager and product owner/scrum master etc?