

Agile Virtualization – The importance of Scrum framework in creating synergies in global organizations

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<p>To succeed in the evolving business markets, companies must continuously consider new strategies and implement new ways of working. Organizational transformation must be done in a pace that would respond to fast changing environments, while avoiding disruption of the current operations. To enable prompt responses to permanent customer demands, agile organizations employ iterative practices like Scrum framework. Virtualization is increasingly a reality at the workplace, and under the impact of external factors this trend has been accelerating in the past two years. Organizations need to adapt, as teams are forced to work remotely for extended periods of time. Agile practices applied in distributed environment must ensure the activities are performed with the same efficiency as they were originally defined for co-located teams.</p> <p>The research is studying the phenomenon of Scrum framework applied in distributed environments. The objective of this thesis is to provide a set of recommendations for the organizations and their members involved in software development using Agile methodologies in distributed teams. The theoretical framework conceptualized how agile organizations respond to virtual transformation megatrend and what are the key areas where they should focus in the transformational process.</p> <p>The selected strategy was traditional qualitative research, and the methods employed for data collection included semi-structured interviews conducted in September 2021, observation as participant and secondary data from trusted global surveys and reports.</p> <p>The findings of the research show that Scrum framework is suitable for distributed environments. Scrum knowledge must be supplemented by proficient use of collaborative information technology (CIT). Organizations must provide integrated processes and tools to facilitate communication and participation of all the stakeholders involved in the co-creation processes. E-leadership, with indirect reference to Scrum Master and specific set of skills, emerges as a critical role in the agile organizations. Organizations must provide learning opportunities for their members. Importance must be given to human perceptions and the well-being of the workforce impacted by extensive remote working.</p> <p>The outcome of the thesis is a collection of observations and recommendations for applying Scrum in distributed environments. An example is presented of how a Scrum certification programme could enhance the synergies and benefits for all the participants to the co-creation</p>	
Keywords Scrum framework, distributed environments, e-leadership, learning path	

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1 Introduction

To succeed in the evolving business markets, companies must adopt new strategies and implement new ways of working. Organizational transformation must be done in a pace that would respond to fast changing environments, and at the same time in a rhythm that would not disrupt their current operations. Agile organizations apply iterative practices that enable them to respond timely to ever-changing customer demands. COVID-19 pandemic forced the Agile teams to work remotely. They must ensure that Agile practices are as efficient as they were originally defined when the teams were co-located.

In the past few decades, the global business environment experienced a series of unprecedented transformations. A new normal has been defined by trends like globalization, digitalization, outsourcing and remote working. Virtual organizations emerged as products of these transformations. Economical, socio-political, and technological forces (Martinelli, Wadell & Rahschulte 2017, 8.) are driving the organizations to find new strategies and adopt new practices in response to the continuous changes impacting their businesses. The virtual transformation accelerated in the past two years, due to the impact of COVID-19 pandemic. The global workforce has become increasingly distributed and - as a survey published by Digital.ai in July 2021 shows -, there is clear indication that the move toward remote work will not see a complete reverse soon (State of Agile 2021, 4).

The pace of technological change has been continuously increasing and product development has continuously become more complex. Competence development and trainings for the organization members must be done, to address the changes to product and service deliveries. The virtual organizations need to quickly identify the missing skills and fill the gaps to be able to be effective and provide qualitative products and services to their customers. The speed of adopting new practices, processes and technologies is becoming a definitory attribute of a successful organization. Virtual team practices must be perfected with processes that would ensure the business continuation in case of inherent changes. (State of Agile 2021; Pries & Quigley 2011, xxiii).

Agile software development emerged in the mid 1990's as a methodology able to help companies to improve the quality of their software, reduce the time-to-market (Stellman & Green 2015, 15; Woodward, Pries & Quigley 2011, 15) and provide a better response to customers' frequent requirement changes in comparison with the linear and rigid approach of the Waterfall methodology (Surdek & Ganis 2010, xxv; Pries & Quigley 2011, 95; Stellman & Green 2015, 15). Scrum framework has been confirmed over the years as the most popular Agile methodology (State of Agile 2021, 13.) Scrum was also impacted

by the challenges generated by the virtual transformation: collaboration within global organizations had to be redefined. Originally established for co-located teams (Maximini 2018, 214; Agile Alliance 2021) Scrum framework is nowadays increasingly applied to virtual organizations and distributed teams (Woodward, Pries & Quigley 2011, 5; State of Agile 2021, 4).

1.1 Research background

In this thesis I aim to understand the impact that teleworking has on the Scrum framework and what are the elements that must be considered for effectively applying Scrum in distributed teams. The theoretical framework presents how Agile organizations are responding to virtual transformation megatrend and what are the key areas where they should focus in the transformational process. Remote working is dependent of technology, and the use of collaborative tools must supplement the Scrum knowledge. E-leadership concept is detailed in the results of the research, as well as the importance that must be given to human perceptions and the impact extended remote working may have on well-being.

The purpose of the research is to get an improved understanding of the challenges and benefits implied by adoption of Scrum and Agile practices in distributed environments. The focus will be on the importance of communication and collaboration in distributed environments and how adoption of Agile practices can support the organizational transformation. Attention will be given to learning processes in distributed environments and importance of Scrum framework apprehension by all the participants involved in the co-creation processes. The outcome of the thesis is a collection of observations and recommendations for applying Scrum in distributed environments.

This research was not formally commissioned by any company, even if there were benefits shared with the companies that are referred in this material. For this reason, to keep the confidentiality, in the next chapters of this thesis I will refer the main participants and subjects to the study as follows: customer organization, provider organization, educational institution, consultants. A brief description of this entities is presented below:

- **Customer organization** – global engineering and service company with 60000 employees worldwide; workplace for myself and the participants to the interviews at the time of this study
- **Provider organization** – IT branch of a global professional resourcing company
- **Educational institution** – generic term to refer the universities of applied sciences
- **Consultants** – employees of the provider organization.

The research is studying the phenomenon of Scrum framework applied in distributed environments. With focus on the customer organization, the provider organization and the

consultants employed by the provider organization, the study explores the complex synergies between them. Global research data and statistics according to their relevance to the selected case study – Scrum framework applied in distributed environments.

1.2 Objective and demarcation

The objective of this thesis is to provide a set of recommendations for the organizations and their members involved in software development using Agile methodologies in distributed teams. Through presenting the key attributes of Scrum framework and the dynamics generated within, this thesis aims to create a baseline to serve organizations in elaborating viable strategies for applying Scrum to global environments. For the Scrum teams members and stakeholders involved in the software creation this research aims to provide a set of recommendations on how to perform in most effective manner. It has been indicated by studies that teleworking negatively impacts the learning advantages compared to people activating in the same workplace (Frontiers in Psychology 2020, 3). This study is proposing a learning path for the Scrum Master certification (Appendix 4) for the employees of the provider organization.

The main research question (RQ) of this thesis is: “How can Scrum – as Agile methodology – be adapted to support the organization virtual transformation?”

The following investigative questions (IQ) are supporting in answering the RQ:

- IQ1: What are the strengths and weaknesses of Scrum framework applied to virtual environments?
- IQ2: What are the limitations of the Scrum framework in distributed teams?
- IQ3: What should a personal development plan include for people working in global Agile teams?

The thesis objective is to find out best practices and how to create synergies for the parties involved in software creation using Scrum in virtual environments. In scope are the customer organization, the provider organization, and the consultants involved in software development. The definitory elements of the Scrum framework are presented in this thesis, with emphasis on the aspects specific to distributed teams. This research proposes recommendations, to serve in creating synergies for the parties involved in the software creation processes with Scrum. The outcome of this thesis does not intend to be an exhaustive checklist or to provide a complete solution for implementing Scrum to organizations. Scaling Agile from project to organization level brings yet another grade of complexity: this thesis only mentions some of the most recognized solutions in industry, and limits to highlighting their key characteristics.

2 Agile virtualization

This chapter presents the conceptual framework of the thesis and the multiple dimensions that virtual transformation presents in the business environments. The topics in this chapter aim to present how Agile could respond to the virtual transformation, and include descriptions of Agile methodologies and Scrum framework, characteristics of Agile organizations, Scrum culture and possible strategies implying learning and collaborative methods.

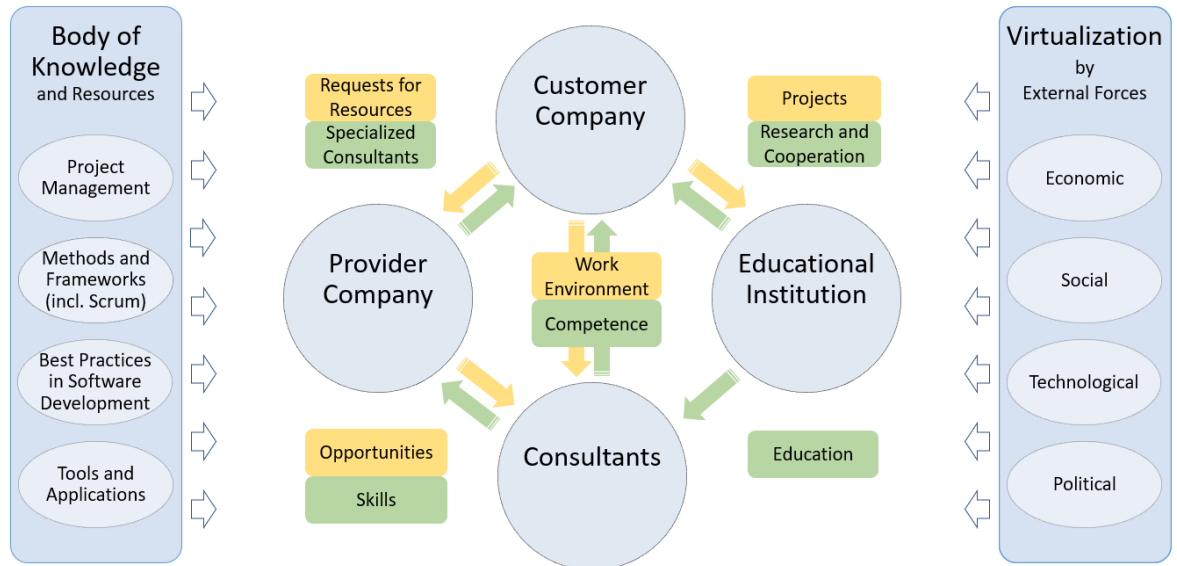


Figure 1. Synergies in distributed environments

Synergies in distribute environments (Figure 1) represent an active and complex communication based on demands and responses between the parties involved in the collaborative processes. These synergies are under the influence of the external forces (economic, social, technological, political) and dependent of the available information and resources (applications, services, competent workforce).

For the case study considered in my research, the customer company would make available the work environment and projects, while asking for resources that can support in development of the applications and implementation of the required solutions. Examples of such applications include configurators that would support sales with automated tendering and ordering processes, e-procurement, billing, reporting and other integrated solutions that would facilitate the customer company global product deliveries and maintenance services. The provider company would respond with specialized workforce and educational institutions would support with educational programmes and knowledge. Consultants would benefit of the opportunities generated and contribute to the effective work, while continuously considering enhancing the competence level through learning.

2.1 Virtual transformation as megatrend

In the landscape of modern businesses of our century, the virtual transformation stands out as a trend that irreversibly changes the approach to work. The global workforce is increasingly distributed and the outburst of COVID-19 pandemic in the early 2020 enforced the organizations to adopt remote working approaches at larger scale. (State of Agile 2021, 4). Workforce planning requires an increasing attention from the employers, to address the disruptions occurring in companies' daily operations (Oxford Economics 2021,1). Multiple challenges are introduced in the markets by the virtual transformation like collaboration dependence on technology, learning at the workplace opportunities limitation which are only partly balanced by the advantages offered by the workplace flexibility and reduced need of commuting to office.

In the past two decades, the virtual transformation megatrend has been in the attention of global research institutions. Some of the studies commissioned by global organizations were looking to optimize their change policies and learn ways to efficiently implement changes to their business processes. Other studies aimed to understand how best practices can help organizations to adapt and implement new ways of working, in response to the conditions imposed by the virtual transformation.

In 2009 NEC sponsored a survey conducted by The Economist Intelligence Unit (The Economist 2009, 1.) looking to reveal the extension of working in virtual teams in several European companies with revenues – at that time – higher than \$100 million. 74% of the business executives included in the survey indicated that they were already working in virtual teams at the date of the survey. The survey did not explicitly mention the ratio of virtual versus co-located mode of working, however it identified that working in virtual teams and implicitly the remote working represents – already in 2009 – an expanding phenomenon. (The Economist 2009, 14.)

In 2014 SAP and Oxford Economics identified in their Workforce 2020 report, a growing trend in the workplace flexibility. 83% of the executive managers that responded to the survey mentioned their plans to extend the use of consultants and fixed term employees in the following years (Oxford Economics 2014).

In 2016 Ernst & Young issued a report where the future of work was listed as a megatrend that is shaping the society and business strategies (EY 2016, 30). According to the mentioned report, the self-employment was on increasing trend, and a later study (Upwork

2021, 15) confirmed that during 2014 – 2020 the number of American workers who freelance steadily increased from 34% to 36% of the total US workforce.

The freelance economy starts to dominate the contemporary labour market: permanent jobs are becoming obsolete and fixed term contracts and freelance work are becoming the new norm (Freelancers Union 2017, 5). It is estimated that by 2027 the majority of US workforce will freelance (Freelancers Union 2017, 3). There is a fundamental shift from the traditional employment mode – where a career would start from school and continue with specialized trainings and increased responsibilities at the workplace – with nowadays workers forced to undergo mid-career job transitions and to respond with a set of already built skills that an employer would leverage (World Economic Forum 2021, 45). In a study commissioned by World Economic Forum in 2020, 41.8% of the companies surveyed expect to increase the use of contractors doing task-specialized work by 2025 (World Economic Forum 2021, 29).

A key finding from several global studies reveals the importance of reskilling and upskilling (World Economic Forum 2021, 45, Upwork 2021) workers must undergo to better respond to the new labour market requirements. Compared to full-time employees, freelancers display a better capacity to adapt to changes (Freelancers Union 2017, 5), however there is a strong feeling that school education should have better prepared them for independent fixed-term mode of working (Upwork 2019). Trainings and continuous skills education are a must for all employees, whether they are employed full-time or on a fixed term. Companies must invest effort in providing employees the tools and means to develop their competencies and consider strategies for increasing the capabilities of their workforce (World Economic Forum 2021, 46).

Remote working is another key aspect of virtual transformation megatrend. Widely applied in the modern businesses during the past two decades, the remote work incidence was dramatically amplified during the global COVID-19 pandemic crisis. Business processes had to be reinvented as the remote work had replaced at large scale the traditional co-located collaboration. There were studies commissioned by global organizations that followed closer the distributed work trend in the past two decades.

Already in 2010, the research led by Emergent Research in partnership with Intuit predicted the increase of global distributed work as cloud and mobile technologies will support the transition from the traditional office spaces to flexible locations and schedules (Intuit 2010, 23-24). Communication technologies will facilitate the collaboration in virtual environments. Creating and maintaining collaborative communities of stakeholders will directly impact the business success of the organizations (Intuit 2010, 13-14).

In 2014 RDA Group conducted a survey on the ideal work environment, involving more than 230000 workers from 31 countries and a multitude of industries. 57% of the respondents indicated that an ideal work environment must be highly collaborative for the cross functional teams involved in the co-creation processes. 54% of the respondents said that an ideal work environment should offer possibility for remote work and flexible schedules. 37% of the respondents saw the virtual teams as key components of an ideal workplace. (Statista 2021.)

In 2017 Regus commissioned a research on flexible work arrangements. The research involved 20000 senior managers and business owners worldwide. 54% of the respondents agreed that they work remote from their main office 2.5 days a week or more (Regus 2017, 8) while 27% of the respondents saw the commuting as an unnecessary time-consuming activity (Regus 2017, 7). Technological advancement was a key enabler for remote collaboration with increasingly performant mobile devices and communication applications and development of more reliable infrastructure (Regus 2017, 2).

In 2018 the World Economic Forum predicted that by 2022, half of the employers would have modified the geographical location of their operations. The use of subcontractors who would perform task-specialized work will increase, together with the number of jobs in project-based fix term roles. Workforce will operate in a more flexible approach, with staff outside physical offices and decentralized operations. (World Economic Forum 2018, 8.)

In 2020 the World Economic Forum survey on the Future of Jobs reveals that 38.3% of the companies surveyed expect to modify the location where they operate by 2025 (World Economic Forum 2021, 29). The report takes a closer look on the remote and hybrid mode of working and the effects COVID-19 pandemic had on the global workforce. "Remote workers" emerges as a distinctive category and includes those people that can do their work remotely and likely keep their jobs. Employees working in IT are part of this remote workers category, as they belong to the industry with the largest opportunity of working from home. (World Economic Forum 2021, 16.)

In 2021 The Economist Intelligence Unit (The Economist 2021, 1) report on reshaping the productivity 66.7% of the respondents believe that the remote work will continue in some form and this way of working would become the norm in future. It is highlighted the important role the technology played in allowing the workforce to connect from home and that organizations should invest in infrastructure and tools to support their employees (The Economist 2021, 19).

2.2 Agile methodologies and Scrum framework

As an external observer in my early ages, and as an active participant during the past three decades, I have witnessed the dramatic evolution and transformation of the software development industry. The companies were forced to employ various methodologies to drive their software development processes to be able to respond to the demanding market requirements – quality, value, time-to-market to name only a few. Development teams must utilize improved collaboration methods and tools to ensure prompt responses to customers' fast changing demands. To operate in the volatile global economy and virtual environments, the organizations aiming to succeed must quickly adjust to customer changing requirements (Tolbert & Parente 2020, 4).

There are essentially two types of models for the management of software development projects: plan-driven models and Agile models. The plan-driven models – including the traditional waterfall methodology – are characterised by clearly defined phases, sequential progress, and comprehensive documentation. The Agile models are incremental, with small and frequent releases, and focused on the features developed rather than extensive documentation. (Dooley 2011.)

There is no single best process to use for software development. Agile and Waterfall are complementary methodologies, and do not exclude each other. The organizations, and software development teams, have the option to select the appropriate framework depending on the specific context: project size, team experience, timeline, project domain (Dooley 2011). Hybrid project management is a recognized approach of combining Agile and traditional project management methodologies for successful software development. In situations where the project is large and complex, parts of it may be suitable for a traditional predictive approach while other parts are more suitable to Agile (Tolbert & Parente 2020).

The waterfall methodology was created in 1970 by Winston Royce (Dooley 2011). The waterfall process model comprises in a sequence of phases starting from concept design and including requirements collection and analysis, architectural and detailed design, code implementation, debugging and control, testing, deployment, and ending with hand-over to maintenance support services. In the initial waterfall model each phase had to be completed before the next phase could start, the sign-off at the end of each phase being accompanied by detailed documentation and reviews. The waterfall methodology works well in stable environments, where the customer requirements are well understood from

the beginning and specifications would not change during the development phases. However, even with a good change management and prioritization processes in place, the waterfall methodology is quite rigid for modern software industry. Any requirement or specification changes that occur during advanced phases of the development process may imply schedule delays and increased costs for the project. (Dooley 2011.)

The Agile incremental models started to be recognized in the beginning of 1986 (Takeuchi & Nonaka 1986, Dooley 2011) as a viable alternative to the rigid plan-driven models. The sequential approach promoted by the waterfall methodology was not providing the speed and flexibility required for software development projects to succeed in increasingly complex and volatile business environments. Agile models require less documentation and process controls, allow fast adjustments to changing customer requirements, and would be able to release new functionalities faster compared to the traditional waterfall methodology (Dooley 2011). Agile comprises in a set of methods and methodologies that would enable a software development organization to improve the thinking, working and decision-making processes (Stellman & Greene 2014, 2).

The foundation of Agile way of thinking was formally set in the beginning of 2001, when a group of 17 front runners in software practices wrote The Agile Manifesto (Agile Alliance 2021a). The mindset shift from traditional to incremental approaches was guided by the four Agile values provided in the above-mentioned declaration (Agile Alliance 2021a):

- Individuals and interactions over processes and tools
 - Working software over comprehensive documentation
 - Customer collaboration over contract negotiation
 - Responding to change over following a plan.
- (Agile Alliance 2021a)

There is value in each side of the four statements of the Agile Manifesto and the items on the left of the above statements do not eliminate the items on the right. However, while assimilating the Agile state-of-mind a team that would use Agile practices would get better results in creating working software through interaction, collaboration, and flexibility, than a team that would solely adopt planning, execution, and documentation practices (Stellman & Greene 2014, 38). The ideas stated in the four Agile Manifesto values are leading to more effective teams (Stellman & Greene 2014, 38):

- The team should focus on its members and their collaboration; the way the team members are using the tools and processes is a secondary priority
- Delivering a software expected by the customers is more important than the specifications accompanying it
- Customers or different teams within the organization should collaborate as a single team; a product owner representing the customer or representatives of various teams within a matrix organization would be considered collaborators belonging to the project team, rather than clients following a negotiated contract or SLA (service-level agreements)

- Project teams should embrace change and respond to the user needs, rather than blindly following a plan based on obsolete requirements or specifications.

The four Agile values are accompanied by 12 principles that Agile practitioners should know and apply in their project work:

1. Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.
 2. Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.
 3. Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.
 4. Business people and developers must work together daily throughout the project.
 5. Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.
 6. The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.
 7. Working software is the primary measure of progress.
 8. Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
 9. Continuous attention to technical excellence and good design enhances agility.
 10. Simplicity – the art of maximizing the amount of work not done – is essential.
 11. The best architectures, requirements, and designs emerge from self-organizing teams.
 12. At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.
- (Agile Alliance 2021b.)

The 12 Agile principles could be seen from different perspectives. A possible view is to group them in four categories (Stellman & Greene 2014, 52) including delivery, communication, execution, and improvement:

- Delivery (principles #1, #2, #3)
- Communication (principles #4, #5, #6)
- Execution (principles #7, #8, #9)
- Improvement (principles #10, #11, #12).

Another relevant grouping of the principles considers three categories (Vendelbo 2019) including quality, collaboration, and balance:

- Quality (principles #1, #3, #7, #11) – focus is on qualities from customer's perspective and focus is on those aspects that would help the team produce qualitative deliveries
- Collaboration (#4, #5, #6, #12) – collaboration with the customer avoids misunderstandings
- Balance (#2, #8, #9, #10) – supply and demand are maintained in balance (change requirements versus team capacity) and by choosing the simplest approach the Agile team prioritizes value creation.

Independently of how the Agile practitioner chooses to understand the best practices and adopt the Agile principles in the project work, there is a consensus in what the 12 Agile principles promote: they motivate Agile teams to create the specific software that the customer needs (Stellman & Greene 2014, 53).

There are several Agile methodologies, and there must be reasoning and context analysis before applying one or another methodology in a software development project. As implied by the 12 Agile principles, the Agile methodologies are collections of best practices that would provide the Agile adopters guidelines for approaching the various stages of a software development project (Stellman & Greene 2014, 42).

Scrum is the most widely used Agile methodology, with an increased ratio of 66% out of the other Agile approaches in 2021, compared to 40% about 15 years ago (State of Agile 2021, 14). Scrum focus is on project management and whether the work deliverables satisfy the customers and stakeholders demands (Stellman & Greene 2014, 315).

XP (eXtreme Programming) is another Agile methodology, with coverage ratio decreased to 1% in 2021 from almost 25% about 15 years ago (State of Agile 2021, 14). XP focus is on software development and developers' practices (Stellman & Greene 2014, 315).

Kanban is an Agile method focused on process improvements (Stellman & Greene 2014, 325). The adoption of Kanban in 2021 is 6% (State of Agile 2021, 13). What is of relevance is that Agile methodologies are widely used in combined approaches, making Scrum and derivations of Scrum (ScrumBan, Scrum/XP) with a total coverage ratio of 81% (State of Agile 2021, 13) among other Agile approaches. Kanban boards are very popular among the Agile practitioners, with 77% global coverage ratio, while Scrum related Agile techniques including daily stand-ups, retrospectives, and Sprint planning having coverage ratios of 87%, 83% and respectively 83% (State of Agile 2021, 13).

Based on the historical increase in Scrum adoption by the global organizations, it is justified reason to believe that the practices implied by the Scrum framework answer the needs of software development teams and are easy to implement. However, like most of Agile methodologies, Scrum was created when the team members were co-located. Remote collaboration in distributed teams adds to the environment complexity. A wrong implementation of the Scrum framework or applying it to unsuitable project may cause negative effects. In the research analysis chapter of this study, we will have a closer look at the benefits and possible pitfalls of Scrum framework applied in virtual environments.

To be able to utilize Scrum framework to the full potential, all those people involved in the process must understand the requirements of this approach and implications and responsibilities it brings to their daily activities.

The Scrum framework was defined in the early 1990s by Ken Schwaber & Jeff Sutherland (Scrum Guides 2020, 1). With its simple structure (Figure 2), the Scrum framework supports teams and organizations to achieve their goals and create value through adaptive solutions for the problems incurred during the project duration. (Scrum Guides 2020, 3.)

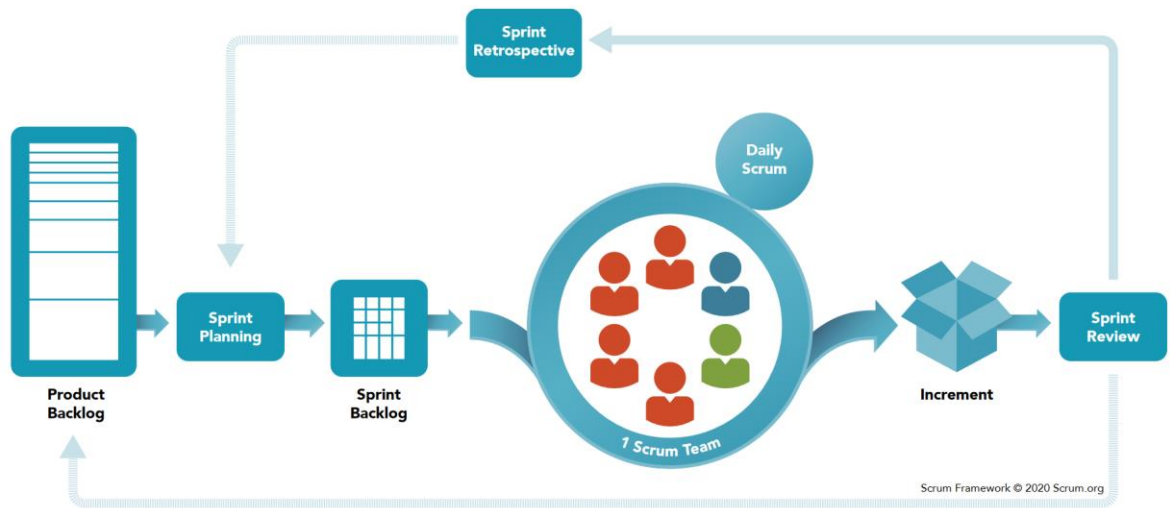


Figure 2. Scrum framework (Scrum.org 2021)

Scrum is based on empiricism where people self-organized in work groups are using experience, lean thinking, and observation to make decisions and deal with unpredictability. The incremental approach supports in solving complex problems and control the risk. Collaboration in Scrum framework is essential and is supported by a set of specific events and artifacts. To support in setting the Agile mindset, Scrum presents a set of values and a clear definition of roles that must be understood and accepted by all the participants to the project (Scrum Guides 2020, 3).

The **roles** in Scrum framework include Developers, Product Owner and Scrum Master. Scrum teams are cross-functional, and self-managed. The size of the Scrum team is typically no larger than 10 people to ensure better communication and maintain productivity. The Scrum Team is responsible for creating useable product increment each Sprint that provides value to the customers. The **Developers** are the team members responsible to create the increment of work. They have the needed competencies for creating the product value. The **Product Owner** represents the interests of external stakeholders and prioritizes the Product Backlog. The Product Owner must ensure that the features and requirements to be built are understood by the team. The **Scrum Master** guides the team through the project within the Scrum framework. The Scrum Master acts as a servant leader for the team and supports the Product Owner in facilitating the collaboration with the team and with the external stakeholders when needed. (Scrum Guides 2020, 5-7.)

Scrum **events** consist in Sprint, Sprint Planning, Daily Scrum, Sprint Review and Sprint Retrospective. The Scrum events are time-boxed and aim to create consistency while minimizing the need for additional meetings not defined in the Scrum framework. The **Sprint** contains all other Scrum events, and it is of fixed length of four weeks or less. Each Sprint may be considered as a small project, and the next Sprint starts immediately after the completion of the previous one. The Sprint contains all the necessary activities (Figure 2) to achieve the Sprint Goal. (Scrum Guides 2020, 7.)

The events within a Sprint are also known as Sprint ceremonies. The **Sprint Planning** is where the Sprint Goal is defined by selecting and prioritizing the items from the Product Backlog and the work is planned by the Developers. The **Daily Scrum** – or daily stand-up – is a 15-minute daily event held during a Sprint that supports self-management and quick decision-making. It focuses on daily progress towards the Sprint Goal, actions for the next day and identifies the possible obstacles. The **Sprint Review** is a working session where the Scrum Team presents the results to the key stakeholders. The Product Backlog may be adjusted. The **Sprint Retrospective** is where the Scrum Team reflects on how to improve its effectiveness through reviewing what went well, what problems were faced and how they were handled. (Scrum Guides 2020, 8-10.)

The Scrum **artifacts** represent the actual work or value created. They include the Product Backlog, Sprint Backlog, and the work Increment (Figure 2). The **Product Backlog** is a developing list of prioritized items required to improve the product and represents the unique source of work for the Scrum Team. The Product Backlog contains the Product Goal, the long-term objective of the Scrum Team. The **Sprint Backlog** contains the Sprint Goal, the work items selected from the Product Backlog to be developed by the Scrum Team during the Sprint. The **Increment** is the usable product of work. The Definition of Done is the description of quality requirements that qualifies a product of work as Increment that generates value to the customers. (Scrum Guides 2020, 10.)

Scrum is founded on three empirical pillars. **Transparency** requires that the process and work results must be visible for the Scrum Team and for the stakeholders. **Inspection** allows – through Scrum events – frequent inspection of the Scrum artifacts and the progress. **Adaptation** states that a Scrum Team should adapt based on learnings from inspection process and adjust as soon as the issues are identified. (Scrum Guides 2020, 3-4.)

Trust is built when the three empirical pillars of Scrum are recognized in everyday practice, and when the Scrum Team is acting according to the five Scrum values (Scrum Guides 2020, 4, Stellman & Greene 2014, 104-108). The Scrum Team must be **committed** to achieving the goals and **focused** on the Sprint work and goals. The Scrum team members should **respect** and see each other as competent people and show **courage** in project work approach. The Scrum Team and the stakeholders must **openly** discuss about the project work and possible challenges. (Scrum Guides 2020, 4.)

2.3 Agile organizations

Organizations consist in groups of people working together for a shared purpose (Cambridge Dictionary 2021). Contemporary organizations may be complex structures, their members could belong to diverse cultures and have various competencies and skills. To be able to perform their tasks and collaborate, the organization members utilize various tools and services. Suitable tools and processes must be in place to support collaboration and enable the delivery of qualitative and valuable products. The governance of activities is guided by established rules, with each organization member having clearly defined roles and responsibilities. Internal and external communication is maintained with all the stakeholders involved in the co-creation processes. The work environment consists in material and human resources that are often allocated to multiple tasks and projects and distributed to multiple geographical locations.

To stay competitive in the markets, organizations are continuously expanding through strategic alliances, mergers and acquisitions, separation of businesses, or outsourcing of services. The virtual transformation megatrend enforces organizations to run international projects that imply remote working and distributed resources across geographical and political boundaries. The tools, methodologies, processes, must be adapted to support the virtual management. (Martinelli & al. 2017, 10.) Leaders of international organizations must build relationships, simplify complexity, and establish processes that would faster respond to customers' changing requirements. Organizations must shift from transactional culture based on rigid rules and structures and adopt a transformational culture. That will provide flexibility, support for change, encourage innovation and implicitly increase employees' level of commitment and motivation (Rijal 2016, 18). Organizations must become Agile.

An Agile organization is built on a people-centred culture, with teams operating in fast learning and decision-making cycles enabled by technology and is driven by the goal to co-create significant value for the stakeholders. In contrast with non-Agile (traditional) organizations built on hierarchic structures and linear processes, the Agile organizations can

quickly adapt their strategies, structures, and processes for creating the competitive advantage in volatile, uncertain, complex, and ambiguous (VUCA) environments. (McKinsey & Company 2018, 3.)

As opposed to the non-Agile organizations – with their rigid hierarchical structures where teams are working in silos following detailed instructions – the Agile organizations have a flat structure capable to quickly respond to changes, and flexible resources grouped in cross functional teams. Leaders’ role limits to show direction and facilitate action, while teams are fully entrusted and accountable for their work. (McKinsey & Company 2018, 3.)

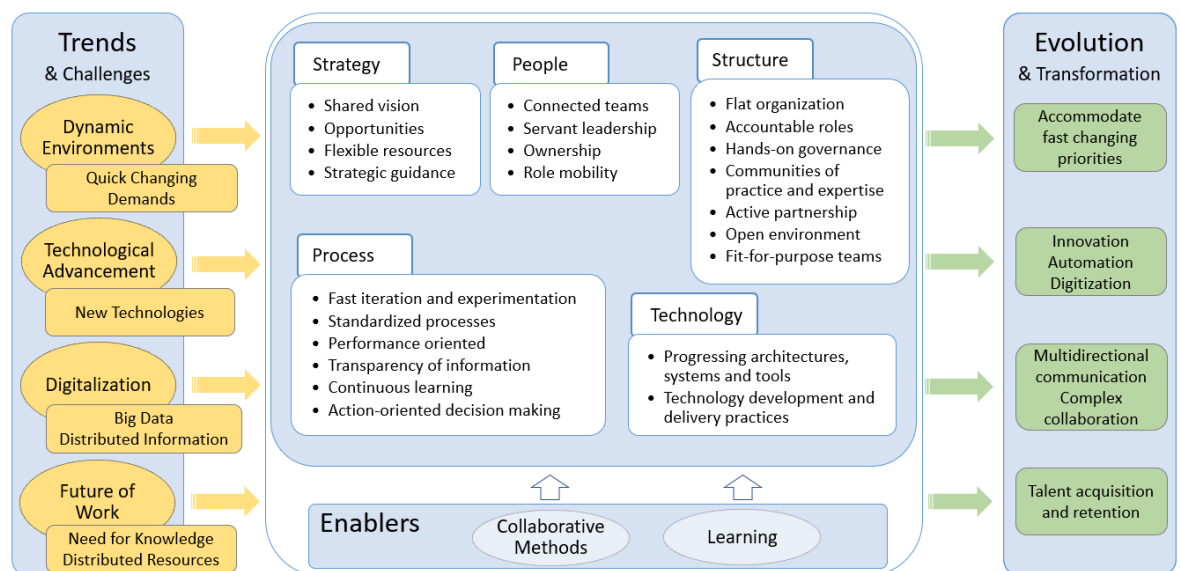


Figure 3. Characteristics of Agile organizations (adapted from McKinsey & Company 2018, 5-7)

The Agile organizations share a set of common characteristics (Figure 3) that allow them to answer with appropriate actions to the challenges raised by the influencing trends. New best practices emerge due to people mindset changes.

Strategically, an Agile organization is customer focused. People across the organization are receptive to changes in customer preferences and stakeholders are involved in the co-creation processes. Leaders provide strategical guidance, ensure that the participants in the co-creation processes are focused, and entrust the teams to work autonomously towards the goals (McKinsey & Company 2018, 9).

In Agile organizations the hierarchical structures are replaced with a scalable network of teams and a flat structure. Roles are clearly defined; people are encouraged to collaborate and share the knowledge and best practices. Collaboration is extended to external

providers, Agile organizations having access to best talent through meaningful relationships. This is applicable to the case study addressed by this research, where the provider organization is offering professional resources to the customer company. Work environment foster transparency and communication between the cross functional and self-managing teams within the Agile organization (McKinsey & Company 2018, 10-11). Transformational leaders establish meaning and purpose for each member of their team, through fostering collaboration, establishing trust, team identity and integration of work (Martinelli & al. 2017. 118). These are also characteristics that Scrum Master role must incorporate.

Processes in an Agile organization target performance and allow fast iterations through implementing standardized ways of working (i.e., Scrum framework). Processes support efficient decision-making and promote continuous learning (McKinsey & Company 2018, 13-14).

People across an Agile organization share a common work culture and leaders empower people through building competencies that would help them take the ownership of the team goals, decisions, and efficiency of work (McKinsey & Company 2018, 15).

Agile organizations are actively renewing and rethinking the technologies supporting their processes, enable digital transformation in their system architectures and improve the effectiveness of product creation and service support activities. Integration of new technologies in the production systems will increase the competitiveness of their business and improve the quality of deliveries. Resulted products and services would better meet the customer expectations (McKinsey & Company 2018, 16).

2.3.1 Strategies for evolution and Scrum culture

To be able to address its long-term direction, an organization must understand own strategic position, assess the strategic choices, and decide how to implement the selected strategies in practice. These fundamentals are relevant to any organization; however, their applicability is dependent on organizational context. (Whittington & al. 2020, 22.) Strategic agility gives an organization the ability to detect fast and respond easily to opportunities and changes. Agile organizations are often based on project, matrix multinational structures (Whittington & al. 2020, 454). Project-based structures are flexible, and teams have clear tasks, accountability, and control. Teams are cross-functional, and knowledge is exchanged between the specialists and consultants. The team members usually belong to different specialisation departments and possibly working from different geographical regions. Due to continuous breaking and restarting different projects, the resources turnover

is high, and the maintenance of knowledge requires careful management (Whittington & al. 2020, 444).

Agility requires investment in people and competence development. Processes within the Agile organizations need to support clear role definition and responsibilities must be well understood and have standardised repeatable activities. The members of Agile teams must have a growth mindset and take the ownership over their work and actions. The processes must enable collaboration, transparency, and offer the organization the possibility to exploit the existing capabilities while exploring new ones. The share of the common vision and increased trust are direct consequences of the key stakeholders' involvement in the co-creation activities. Strategic concept of resource-based view (RBV) presents the impact of resources and capabilities over the competitive advantage of the respective organization (Whittington & al. 2020, 95). However, it is essential that the organization is providing the suitable support – systems, applications, processes, specific competencies – to its unique resources and capabilities (Whittington & al. 2020, 102).

To be able to apply the Scrum framework in efficient and effective ways, all the stakeholders involved in the co-creation must have an understanding on the concept, adopt the right mindset and adhere to the Scrum framework practices.

2.3.2 Learning dimensions

Megatrends like digitalization and virtualization are determining companies to adopt changes in the strategies and operational approaches in running their business. During the past two years the COVID-19 pandemic ignited an unprecedented phenomenon, causing the global workforce to adapt their work style to remote practices and shift from the traditional office presence and face-to-face interactions. Some workers and some organizations may have seen this a difficult change, others may have adapted easier to the remote way of working. Arguably, a practitioner of Agile methods or an Agile organization would adapt easier and accept changes as natural responses to an evolving, dynamic, and volatile environment.

People and organizations need to continuously learn during their evolution to be able to efficiently perform in the increasingly complex environments. Learning is not only about the acquisition of skills and knowledge, but also about capacity to select the important information from the abundance of irrelevant data in the working and living environments we perform. Like Scrum theory is founded on empiricism and lean thinking (Scrum Guides 2020, 3), an individual should accumulate knowledge by study, experience or being thought, but keep focus on essentials and protect himself or herself of unnecessary loads

of useless information. Agile organizations must recognize the skills demands and while learning to transform their processes and adapt their operations they should also provide the support for the employees and collaborators to develop themselves. Fast paced production cycles entitle companies to use specialised task force and fixed term consultants employed for the duration of specific projects. However, there should always be available a knowledge database accessible for workers within the organization that would allow them to comply to the approved processes, efficiently collaborate and support them in choosing or pursuing a career development path.

Organizations must create and maintain environments that would facilitate learning, including courses and learning programmes, systems for work and innovation. Organizations must support the knowledge management by enabling clear processes to create, store and find the materials and documentation. With even higher importance, organizations need to maintain the tacit knowledge built within the organization by retaining individuals that have the required skills and experience to ensure the continuation of work (Wang 2017, 23).

Workplace learning is an effective way for people belonging to the respective organizations to acquire skills and work-related knowledge and for organizations to maximize their performance (Wang 2017, 13). By doing we learn, and often the best learning progress happens through participation in daily activities. Workplace contexts shape the learning at work. Some workplaces create and provide learning environments – from formal trainings to problem solving of daily tasks – while others are more restrictive and limit the opportunities for learning (Research Gate 2021, 5). Learning should be regarded as a process of participation and transformation supported by the organization resources, and not only an “acquisition” of qualifications. This approach should enable organizations to redefine their work processes and set development plans for the employees that would support the business strategies (Research Gate 2021, 5). In Agile organizations workplace learning offers autonomy and empowers employees to design, execute and evaluate the work activities and processes in an atmosphere of trust. This will encourage employee collaboration, flexibility, creativity, involvement in decisions, and development of communities of practice. At the opposite end there are those organizations looking for predictable, repeatable, and limited work tasks that would exclude the employees from decision making and thus imply a low level of trust in work relationships. (Research Gate 2021, 8-9). Organizations and entities involved in the co-creation process must invest in courses, plan and implement training programmes that would both increase the technical skills of the participants and influence their attitudes (Maximini 2018, 72). Scrum trainings should not limit to

the members of the Scrum team but include all the stakeholders that would directly or indirectly contribute to the value creation during the entire development project life cycle (Maximini 2018, 101).

Organizations must understand that introduction and application of Scrum is a fundamental change (mindset, values, processes) and trainings for all employees involved should be valuable investments rather than expensive costs (Maximini 2018, 76). Delaying trainings would generate mistakes, process misunderstandings and possible skills lack. Scrum development demands more from the team compared to traditional approaches, and technical debt mount could generate costs that would heavily impact the allocated budget (Maximini 2018, 101).

Individuals must observe the continuous evolution of the organizations and adapt their learning approaches. In this way employees would contribute to their organization success and at the same time develop new skills and assimilate new knowledge that would support personal career development. In the context of Scrum framework and self-managed teams within an Agile organization, the participants should have a proactive attitude and identify the areas of personal development. The learning of an Agile organization member is often self-directed and characterized by independence and freedom of choice in setting the learning needs, plan and implementation of learning activities, concrete experience, reflective observation, active experimentation. Learners must monitor and evaluate their learning progress, search for support when required and find the motivation in the process. (Wang 2017, 17-19).

To increase motivation, companies provide career paths for their employees. Since there is no clear career model for Scrum Masters and Product Owners, in Agile organizations titles like Junior Scrum Master or Senior Scrum Master would mostly motivate the member to use his or her skills productively and not represent decision power, or any hierarchic role change in the organization (Maximini 2018, 74).

2.3.3 Synergy through collaboration

Consistent success achievement is an implicit target of any organization. It is a shared responsibility across the members of an organization to ensure the projects execution success, and effective collaboration is a key contributing factor. The virtual environments add an increased level of complexity to collaboration, and organizations must adopt effective and repeatable processes, involve the right competencies, and use the most suitable new technologies to support the communication. (Martinelli & al. 2017, 103). The time spent in collaborative activities is directly influenced by the number of team members working for

common goals. One research published in 2016 by Harvard Business Review observes that during the past years there is an increase in the time allocated by the employees to collaborative activities. Some companies reported that their employees could spend 80% of their time in communication related activities, leaving little time available for individual work (Harvard Business Review 2016).

Scrum framework recommends limiting the number of people in a Scrum Team to maximum 10, since smaller teams are more productive, and communication is less complex. When the Scrum Teams become too large, they must reorganize in multiple Scrum Teams that would continue to share the Product Goal and Product Backlog and follow the priorities set by the Product Owner (Scrum Guides 2020, 5). In virtual projects the lack of physical interaction requires managers to facilitate the participation of the team members located in different geographical regions and establish the suitable communication and collaboration processes. Virtual team managers must select the appropriate applications and services and teach their team members how to use them (Martinelli & al. 2017, 212). Collaborative information technology (CIT) tools must support both synchronous and asynchronous communication and information sharing between the members of distributed teams (Marion & Fixson 2019, 219). At the same time, the teams must be empowered, and team members accept the accountability for their individual work and for taking the relevant decisions (Martinelli & al. 2017, 126-127). Communications must be kept clear, concise, correct, coherent, and courteous, especially in distributed environments with team members relying solely on written and verbal communication in a non-native language (Martinelli & al. 2017, 144-145).

The leaders of virtual organizations must identify the virtual execution barriers, define the strategy, and facilitate the implementation of the appropriate changes required. A flat Agile organization structure would better support the collaborative team dynamics of a virtual project and drive cross-discipline collaboration, compared to a rigid hierarchical structure where resources are contained in functional silos (Martinelli & al. 2017, 201-202). Stakeholders' involvement in co-creation processes is better supported in Agile organizations. Business strategies and goals are visible to the organization members through ensuring a collaborative agreement between the organization leaders and the virtual teams (Martinelli & al. 2017, 201-202). In Scrum framework the Product Owner is representing the interests of the stakeholders in the Product Backlog that is continuously referred by the Scrum Team (Scrum Guides 2020, 10).

The development models must support a highly collaborative environment where interdependent activities of distributed teams can be accomplished in a rapid pace. In rapid delivery models – like Scrum framework – the work output consists in small deliverables, and the incremental process provides the team the possibility to test the assumptions fast and reduce the amount of rework. The Agile processes force the team members to collaborate on a continuous basis and on a lean manner throughout the project life cycle. The Agile methodologies, even if they were originally designed for co-located teams, are highly effective and became a new standard in virtual projects (Martinelli & al. 2017, 205, State of Agile 2021, 4).

Collaboration in virtual environments must also address the human perceptions of the participants to the co-creation processes: trust, isolation, and presence (Rose 2016, 111). In self-managed teams like Scrum Teams, handling these human perceptions may be especially difficult unless there are clear practices applied that would support collaboration, transparency, and open communication.

Trust defines the commitment and connection people have with their organization and its members (Rose 2016, 58). Compared with a traditional way of working where co-located people working to a common project would have the possibility to build relationships through face-to-face interactions, in virtual environments people must rely on different ways than social bonding to build trust. Leaders of virtual organizations, Scrum Master in case of Scrum frameworks applied, must create and sustain such an environment where people would be encouraged to act with integrity, communicate honestly, focus on the shared goals, treat every team member as equals and have a consistent behaviour (Martinelli & al. 2017, 110). Often in Agile projects and virtual environments the teams are created, disbanded, and recreated in short periods of time and there is no time to build interpersonal relationships. Members of virtual teams must rely on the swift trust concept where trust is initially presumed, and trust beliefs are later verified and adjusted during the process (Rose 2016, 61). Agile transformation should come with responsible understanding of the complex human behaviour and volatile composition of temporary Scrum teams. Employees must be evaluated not only from their skills and capabilities and allocated from team to team as interchangeable resources. They must also be understood as members that establish emotional bonds in the co-creation processes. If the composition of a Scrum team is frequently changed the members may build distrust against an arbitrary management and result in decreased motivation (Maximini 2018, 78-79). Trust must be mutual between the team and the management.

Isolation is a person's perception of solitude, connection, or attachment. In distributed environments, or when working from remote locations for extended period, a person may feel isolated from the team or organization. Isolation may be perceived even in situations when the person is near the colleagues or the stakeholders, but they lack to share common beliefs and there is a lack of attachment to the organization's culture or mission (Rose 2016, 77). Agile processes should provide the means to ensure the distribution of tasks and priorities to all the team members and maintain continuous communication with the remote members. It is equally the responsibility of individuals to keep connected with the other team members and understand other's beliefs and priorities (Rose 2016, 77). Regular events and ceremonies in the Scrum framework provide the base for sustaining open and regular communication with the team members and stakeholders. Managers involved in co-creation processes in virtual environments must ensure personal touches with the individuals (Rose 2016, 92) and encourage flexible work approaches to ensure the people are connected to the organization's mission.

Another important human perception which manifests in work environments is presence. Individuals tend to identify themselves with the environment where they are working and grow a sense of belonging (Rose 2016, 95). Maintaining the sense of belonging may be difficult in virtual work environments and distributed teams. Remote working conditions force individuals to find ways to create presence that would give them the feeling they are at work. Some people connect from home office, others from coffee shops or other locations where they can feel the presence of other people. (Rose 2016, 95.) Telepresence in virtual work environments is achieved by applying technology. This allows the participants to be present even if they are remotely connected to the respective event. Communication is possible across boundaries in real time, however more coordination is expected for the activities compared to co-located teams. (Rose 2016, 101.) Organizations and projects must use processes and CIT tools that would promote presence and involvement of all virtual team members in the team activities and do not allow situations where an individual would separate from the colleagues. (Rose 2016, 108.)

A typical Sprint timeline followed in Agile projects conducted in the customer organization is presented in Appendix 6. Appendix 7 presents the most frequently used CIT tools by the virtual Agile teams of the customer organization.

3 Conducting the research

Qualitative research is the applied methodology for this study. The methodology selection originates from the interpretive position (Saunders, Lewis & Thornhill 2019, 149) I have adopted as a direct participant in Agile virtualization and remote working processes. With focus on the chosen case study – Scrum in distributed environments – I was using an inductive approach (Saunders & al. 2019, 153) to find deeper understanding on the impact that shifting from co-located to remote teams has on the participants involved in Agile software development and their organizations. Data collection was realized through semi structured interviews. The sample selection included participants activating in the customer company organization and covering various roles in software development processes with Scrum. Additional criterion I have considered was that the participants have all been in the past employees of the provider company. Where relevant, secondary data obtained from trusted sources was considered in interpreting data analysed or referred in the conclusions of the research.

3.1 Research strategy

This research is an intrinsic continuation of a previous study I have made in the field of virtual project management and distributed environments (Pop 2019). My personal beliefs and assumptions have been crystallized on the subject and the selection of the new research topic and questions have been decided already in the beginning of the research process. However, to maximize the value of the study outcomes, I considered relevant to adopt a reflexive attitude at own views on development of knowledge and thus identify the appropriate research philosophy (Saunders & al. 2019, 130).

HARP – Heightening Awareness of Research Philosophy (Saunders & al. 2019, 161) tool supported me to get an indication on where my views would belong according to the five major philosophical traditions in business and management: positivism, critical realism, interpretivism, postmodernism and pragmatism (Saunders & al. 2019, 144). The scores obtained (Appendix 3) indicate an inclination to pragmatism and interpretivism. The research strategy was shaped based on the HARP scores indication.

Pragmatism emphasises that concepts are only relevant when they generate practical consequences and support action. Starting from a problem or an experience, a research based on pragmatism would aim to contribute with solutions. (Saunders & al. 2019, 151.)

Interpretivism asserts that humans create meanings, thus they are different from physical phenomena. Depending on the circumstances and time, different people may have different experiences and interpretations of reality, like within an organization members part of different groups would have different experiences at the workplace. (Saunders & al. 2019, 149.)

Ontologically there are similarities between interpretivism and pragmatism, both philosophies accepting that reality is complex and rich and there are multiple ways in interpreting the world. (Saunders & al. 2019, 145.)

Epistemologically the interpretivism and pragmatism complement each other in what regards their positions in what constitutes acceptable knowledge. Interpretivism states that the richness of the world, in its complexity, cannot be fully captured in concepts and theories while pragmatism focuses on problems, problem solving and practical meaning in specific contexts. (Saunders & al. 2019, 145.) Symbolic interactionism is an interpretive philosophy derived from pragmatism which regards meaning as result of interactions between people. In studying of an organization, symbolic interactionists would make use of observation and analyse the interactions between people as they would develop during conversations, meetings, or teamwork. (Saunders & al. 2019, 149.)

Axiologically, in both interpretivism and pragmatism, the researcher adopts a reflexive attitude. As social actor integrated in the researched environment, the interpretivist would seek to understand how reality is experienced by the other social actors involved in the study. While being empathetic to others' experiences, the interpretivist's own values and beliefs would shape the research process and outcomes. (Saunders & al. 2019, 137.)

Complementarily, pragmatist's own principles and beliefs would drive the inquiry process, from the identified problem to the solution and practical outcomes of the research, through collecting reliable and relevant data. (Saunders & al. 2019, 151.)

The methodological choice for this study is qualitative approach. The qualitative research methodology applies to both interpretivist and pragmatist positions adopted by the researcher (Saunders & al. 2019, 179). Qualitative researchers are integral part of the phenomena studied, and their interpretations of reality are usually context and time specific and may not be generalised (Lapan, Quartaroli & Riemer 2011, Saunders & al. 2019, 149). Qualitative researchers base their meanings on non-numeric data like words, images, video or audio materials, instead of numbers. Other definitory approaches of qualitative research include non-random sampling techniques, unstructured or semi-structured

data collection methods, classification of non-standard data in categories to support the data analysis (Lapan & al. 2011, Saunders & al. 2019, 180).

The strategies associated with qualitative research include action research, grounded theory, ethnography, case study research and narrative inquiry (Saunders & al. 2019, 180). This thesis is a case study research. A case study research is an in-depth inquiry into complex phenomena, employed to generate new and richer understanding of the phenomenon studied (Lapan & al. 2011, Saunders & al. 2019, 196).

Research methods utilized in this thesis include observation, semi-structured interviews, thematic analysis and examination of secondary data. From this perspective, the chosen methodology of this research is a multi-method qualitative study (Saunders & al., 179). Detailed description of the above-mentioned techniques is presented in the Data collection and Data analysis chapters of this thesis.

The interpretivism – as business and management philosophy – is usually associated with qualitative research (Saunders & al. 2019, 179). An interpretivist researcher would take in account the complexity of the reality, and in my role as observant and participant I was collecting relevant data based on common experiences for all the participants involved in this case study.

3.2 Research process

This thesis is a case study research on the software development process transition from co-located to distributed teams, with focus on the application of Scrum framework. The study of this phenomenon is limited to the environments and organizations where I activate (the customer organization, the provider organization, Haaga-Helia University of Applied Sciences) and to the people involved (colleagues, consultants) in the co-creation processes. The transition of Scrum framework application from co-located to distributed teams was accelerated during the past two years by the impact COVID-19 pandemic. During this time there were extended periods when the global workforce was required to work remotely due to imposed social-distance rules. I was looking for answers to the situations generated by the extended teleworking period, that would offer valuable guidelines and solutions to the involved entities mentioned above.

The research process of this thesis (figure 4) is presented as a linear progression – from the topic selection to the report submission – however the written material was permanently reviewed and updated as result of continuous reflection and critical review of the literature, in repeated iterations. The research process includes the following five phases:

selection of the research topic and delimitation, understanding of the research philosophy and design selection, data collection, data analysis and results reporting.

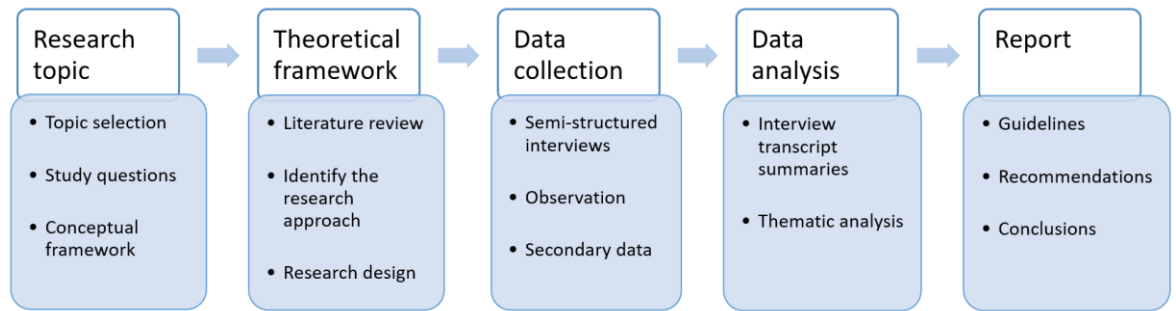


Figure 4. The research process of the thesis

Part of the research topic phase I evaluated a suitable topic that would interest me – virtual environments, project management, business transformation. Once the topic was selected, the conceptual framework was defined, and the research questions were formulated.

Theoretical framework phase included the review and collection of literature on Scrum and distributed environments subject and identified the research approach for this study. In this phase I reflected on the interactions existing between the customer and provider organizations and their employees and considered how Scrum best practices and learning may improve the synergies within this complex ecosystem. Trusted literature sources were identified and subjects relevant to the Scrum framework applied in distributed environments were reviewed.

Data collection phase included the semi-structured interviews realised in September 2021, and the assembly of data from observation and from secondary sources throughout the duration of the research.

Data analysis phase consisted in applying thematic analysis to the information collected from the interviews. Data from the transcripts was coded, patterns identified, and themes reorganised according to the relationship between them.

Report is the final phase where the results of the research were presented in detail. The report phase concludes with my reflections and suggestions for further studies.

3.2.1 Data collection

The data collection methods selected for this study include semi-structured interview, observation, and examination of secondary data. This chapter presents the definitions of the above-mentioned data collection techniques according to the literature, and my considerations and practical details on each of the method used. The choice of the methods was based on the extend they support in investigating the topic of this thesis.

The research interview is a dialogue between two or more people through which the interviewer – role usually associated with the researcher – will be able to gather relevant data to the research topic (Saunders & al. 2019, 434). The researcher could identify himself as an essential media for data collection, as he serves as an information exchange mean between the people interviewed and the research setting (Lapan & al. 2011). The interview approaches can be objective – when the interviewees witness a reality they simply contemplate from outside, or subjective – when the interviewees are active participants in the world they are constructing (Saunders & al. 2019, 436). Independently of the interview approach – objective or subjective – the researcher should constantly follow to reduce bias in data collection and interpretation, minimize own perceptions of the reality and enhance the opinions of the respondents. I consider the minimization of my personal influence over respondent opinions very important, especially given the interpretivist philosophy adopted. While using my own beliefs as a platform for building the entire research, I permanently maintained an empathetic attitude towards the respondents and ensured that bias will not distort the collection and interpretation of the study data. According to their structure, number of participants and the mode of conducting them, there are several types of research interviews.

Structured interviews are based on standardised questionnaires that consist in a set of predetermined questions. The responses provide a collection of quantifiable data; therefore, the structured interviews are also known as quantitative research interviews (Saunders & al. 2019, 437). Often associated with surveys, questionnaires are used to identify attitudes, opinions or explain the cause-and-effect relationships (Saunders & al. 2019, 505).

Semi-structured and unstructured interviews belong to a different category: qualitative research interviews. These are non-standard interviews (Saunders & al. 2019, 437) and give the interviewee more liberty in constructing the dialogue and contributing with relevant information outside the borders set by a questionnaire.

Unstructured interviews, also known as in-depth interviews, do not include any predetermined set of questions or themes to guide the dialogue. This type of interviews aims to discover which themes emerge from the data collected. The person interviewed is usually leading the proceedings during an in-depth interview. The unstructured interviews are used to gain in depth understanding in an area of interest for the researcher with focus on interviewee perceptions (Saunders & al. 2019, 439). Semi-structured interviews are conducted based on a set of predetermined themes, and the dialogue is established in a manner adapted to the researcher's philosophical assumptions. For example, in interpretivist approach the researcher is more flexible in the way the predetermined themes are handled, compared to a realist approach where more structure and consistency would be expected (Saunders & al. 2019, 437-438). Semi-structured interviews are applicable when the research aims to understand the perceptions of a group of people towards a topic or phenomena that impact their community (Lapan & al. 2011). The semi-structured interviews are used to collect data which is analysed qualitatively as part of a case study (Saunders & al. 2019, 442).

3.2.2 Semi-structured interviews

Semi-structured interview was the main technique used in this study for collecting the primary data. One-to-one interviews were arranged, where discussion was guided by the predefined themes and supporting topics. With this approach I intended to create a better personal bonding with the person interviewed and – with the risk of leaving some of the predefined themes out of discussion – allow the participants to open subjects significant to the research objectives that had not originally been considered.

The selection of the participants was based on non-probability sampling considerations. The participants must have experience in working in Agile environments where Scrum framework was applied in software development projects. Their experience with Scrum framework should extend over several years. Especially important for the research scope was that the participants activated in software development projects with Scrum framework before and during the COVID-19 pandemic. In line with the conceptual framework of this thesis, all the participants had to be familiar with the working environments of the customer and provider organizations. The number of participants was influenced by this purposive sampling approach (Saunders & al. 2019, 321), as I had a limited population size to select from the people that would best support the research scope. At the time of the interviews, all the participants were operating within the IT department of the customer organization.

The sample included five participants having diverse functions within the IT department of the customer organization and covering – throughout their career – various roles in software development with Scrum framework (Appendix 5). I have considered the sample size is large enough given the restrictions implied by the purposive sampling approach and the fact that at the end of the fifth interview there were no additional themes emerging from discussions (Saunders & al. 2019, 315, Saldaña 2011, 34).

The interviews took place during September 2021, in customer organization office premises or online via Microsoft Teams. The duration of the interviews varied between 45 and 60 minutes.

During the interviews, I paid special attention to establish a rapport of respect with the participants, and to ensure an atmosphere of comfort where the interviewees would be encouraged to share their experiences freely. The recording data approach was done in a completely transparent manner, the interviewer taking written notes in front of the interviewee. For the online sessions, the notes were shared in real time on the screen. With this approach I was able to give the participants the possibility to react if some written data had to be corrected or some responses complemented with clarifications, and thus achieve a high level of validity and credibility (Saunders & al. 2019, 451). I considered taking written notes a way to demonstrate to the interviewee that responses are important for the research topic (Saunders & al. 2019, 461).

Prior to the interviews, the participants were informed about the themes of the interview. An interview template (Appendix 1) including the guiding questions and support topics was distributed in advance, together with the invitation to the interview. Reliability was promoted by allowing the participants to acknowledge the research topic in advance and prepare for the interview. This enabled a focused discussion during the interviews.

The following guiding questions were included in the interview framework:

- How did previous knowledge and application of Scrum framework support your organization in adapting to remote mode of working?
- Does remote collaboration require more specific actions from the managers compared to collaboration within co-located teams? What specific actions would be expected from the Scrum Master, Product Owner, team members, organization?
- How well is the virtual environment supporting the three pillars of Scrum (adaptation, transparency, inspection)?
- What attributes would get valued, and what skills should be enhanced to increase the efficiency of projects while working in Agile mode?
- What tools and applications are you using for virtual collaboration?
- How can Scrum framework support to maintain and increase motivation, trust, inclusion in a virtual team?
- What are the limitations of Scrum framework in distributed teams?

- What are the recommendations for applying Scrum framework in virtual environments?

After each interview, to avoid biased or wrong interpretation, I have presented my written notes to the interviewee for review, allowing him or her to validate the recorded data and correct the notes where required (Saunders & al. 2019, 461).

Ethical aspects were closely observed during the interview process. The people who agreed to take part in the research had at any moment the possibility to withdraw. The interviewees were informed in advance that their identity will not be revealed in the study and the analysis of data and the research outcome will be confidential. Objectivity was maintained in the data collection process, and the information provided by the interviewee was recorded in full without selectivity. (Saunders & al. 2019, 268-270.)

3.2.3 Observation

Guided by the symbolic interactionist research philosophy I have adopted, observation was another technique used for collecting the primary data. Observation – traditionally linked with ethnographic research (Saldaña 2011, 46) – involves a systematic monitoring, analysis, and interpretation of people's behaviour in a given context. Relevant for a qualitative study are participant observation and Internet-mediated observation. (Saunders & al. 2019, 378). Participant observation enables the researcher to capture people's actions and social interactions and understand their attitudes in a certain environment (Saldaña 2011, 46). For this study, I was interested to observe the behaviour of the participants – informants (Saunders & al. 2019, 380) – in response to the virtual transformation phenomenon. The observation was focused on the impact virtual transformation has on Scrum framework application in software development. In this role as complete participant (Saunders & al. 2019, 385) I have been an insider to the proceedings of current software development activities with Scrum framework in distributed environments. The observation was unstructured and informal, and the process took place over a period of several years. I also had the possibility to reflect on my previous work experience from the past two decades. The topic of the research emerged as a comparison I could make between the periods when the Scrum framework was applied to co-located teams, versus the contemporary distributed work environments. Thus, the participant observation was a prelude to the interviews (Saldaña 2011, 46) where I was looking for a confirmation – or correction – of my original beliefs. Observer potential bias in interpreting the behaviours in the observed environments was minimized through this informant verification process (Saunders & al. 2019, 397).

Having the role of complete participant during the observation process, I had an insider position within the organizations I activated during the research duration. Observation of the work activities was done from the perspective of co-worker belonging to the same organizations as all the other participants. Ethical dimensions were followed, trust was maintained, and no negative feelings were generated as result of the observation process. The identity of the other people involved is not presented in this study, and all the informants are kept anonymous.

Throughout the observation process, I have explored how can Scrum framework be adapted to support the organization virtual transformation. Observing the informants' activities within the target environments (customer company, provider company, Haaga-Helia university of applied sciences) I was continuously looking for answers to the investigative questions of the study:

- What are the strengths and weaknesses of Scrum framework applied to virtual environments?
- What are the limitations of the Scrum framework in distributed teams?

Secondary data was collected from media materials available in internet, with special attention to the reliability of the publisher. Reports and statistics from trusted sources were reviewed and data suitable to the research topic was analysed and presented in the respective chapters of this thesis.

3.2.4 Data analysis

Thematic analysis is the method used to analyze the data. This method provides a systematic and flexible way to analyze qualitative data. Whether it is used to analyse large or small qualitative data sets, Thematic Analysis provides a logical approach to analyse the data and obtain relevant descriptions and explanations that would support the theoretical conclusions of the research. Thematic Analysis is not tied to any research philosophy or theory approach development; therefore, it offers a flexible way to use and interpret the data. (Saunders & al. 2019, 651.) For the inductive approach adopted based on my interpretive position for this research, the Thematic Analysis supports with finding themes based on my research interest without imposing a strict framework (Saunders & al. 2019, 652). However, Thematic Analysis provides a selection of essential steps to be considered in practice when analysing the data. These steps occur in a concurrent and recursive manner rather than a linear one and include (Saunders & al. 2019, 652):

- Becoming familiar with the collected data
- Coding the data
- Searching for themes and recognising relationships
- Refining themes and testing propositions.

Transcript summaries (Appendix 2) were created based on the notes from the interviews. The transcript summaries facilitate identifying the principal themes for the research and the relationship between them. Coding was used to arrange the data in categories with related meanings and relevant to the research questions. The codes reveal the occurrence or absence of a phenomenon and are subject to a continuous update or re-coding process following the re-reading of the data transcripts (Saunders & al. 2019, 655).

The next stage in the data analysis is finding the themes, patterns, and relationships in the research data. A theme is a larger category incorporating several related codes and reveal an aspect relevant to the research questions (Saunders & al. 2019, 657).

A final stage in Thematic Analysis is refining themes and the relationships between them. This is a developmental process as data is re-read and reorganised, having as outcome a coherent set of themes that would provide a structured framework to serve in data analysis (Saunders & al. 2019, 658).

4 Results of the research

The results of the empirical research are based on the data collected from five semi-structured interviews, from the examination of secondary data and from my own observation as participant to Scrum framework processes applied in practice.

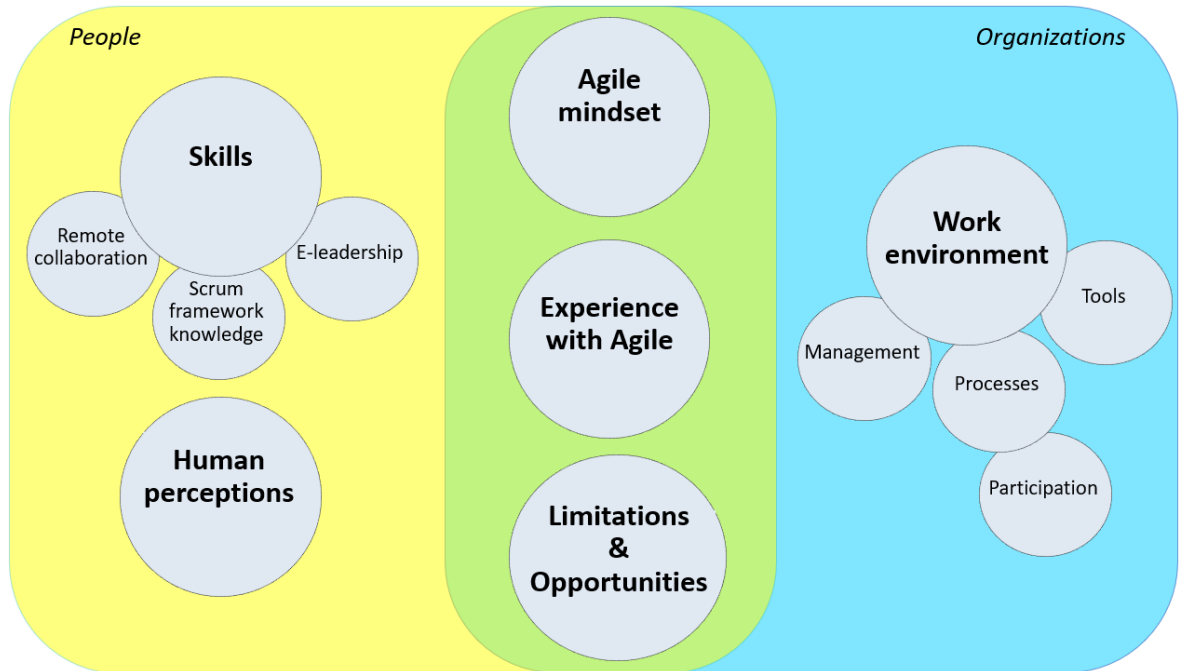


Figure 5. The main themes identified

The participants to the semi-structured interviews were selected based on a set of common criteria: at the date the interviews took place they were all having active roles in Scrum processes as part of their daily activities in the customer company organization. Additionally, the participants have all been in the past – some currently still are – employees of the provider company. With focus on individual experiences, I was looking to collect information that is meaningful for the research participants (Saunders & al. 2019, 155). Starting from own beliefs and experiences regarding Scrum framework, I applied an inductive approach (Saunders & al. 2019, 153) to explore and get better understanding on how people and organizations adapt to remote way of working and applicability of the Scrum framework in distributed environments.

The case study – Scrum in distributed environments – presents a complex view in interpreting the synergies created between the customer, provider, and educational organizations. An orthodox approach was followed in the research design (Figure 4) of this case study. During the data analysis phase, interview transcripts were used to summarize the topics approached and data was coded. Common themes were identified based on the

emerged patterns and refined according to the relationships between them. The themes emerged during the study are presented in Figure 5.

4.1 Experience with Agile (in Distributed Teams)

At the beginning of each interview, I asked a series of questions that would allow to understand the experience the interviewees have with Agile practices and Scrum framework, what roles best describe their participation in the Scrum projects and if the organization supported adoption of the Scrum framework in distributed environments. With this set of initial questions my target was to:

- Formally validate the experience and credibility of the participants to the study
- Identify the setting; focus on participants as active players in the work environments
- Present the scope and borders of the study, while giving the liberty to the participants to express their beliefs built on personal experiences.

All the people interviewed demonstrated several years of experience with Scrum practices. An important finding was that all the interviewees have applied Scrum practices in distributed team already before the start of COVID-19 pandemic. When asked if the transition from local to remote Scrum process was difficult, for some participants this almost came as a surprise since they have “always applied Scrum practices in remote environments” (Project Manager), “always worked in distributed and global teams” (Senior Business Analyst) or “mostly worked with distributed teams” (Solution Design Owner 2) in their career. This was a moment in the beginning of the respective interviews that relaxed even more the dialogue atmosphere and encouraged the participants to express their views openly and beyond a formal answer to my guiding questions. This finding proves that the COVID-19 pandemic found the interviewed professionals well prepared for handling remote communication within their teams and organizations, and aware of the specifics that distributed teams imply for Agile methodologies. For all the professionals interviewed as part of this study, application of Scrum framework in distributed teams proved to be rather a natural and gradual adaptation in response to the global virtualization megatrend, than an enforced procedure applied in response to a shock from external social and economic forces.

A relevant observation emerged from the dialogues is that all interviewees covered – at one point in their career – several roles as described by Scrum: “Scrum Master and Product Owner” (Solution Design Owner 1), “Product Owner and member of Development team” (Project Manager, Senior Business Analyst), “Product Owner and Scrum Master” (Solution Design Owner 2). However, for a certain project run in Agile mode one interviewee would not have double role, and responsibilities would be clearly allocated to the

team members according to the roles' allocation in the respective projects. In some situations, the participants represented business stakeholders (Senior Business Analyst, Project Manager) thus having a non-strictly Scrum role in the respective situation. Above outcomes enhance even more the importance of understanding the Scrum processes in a global organization where business and development stakeholders interact in a complex manner for the realization of the desired outcome.

Regarding the organization experience with Agile methodology and Scrum framework, the interviewees agreed that even if the customer organization is "not an IT company" (Service Design Owner 2), "Scrum ceremonies supported with organizing the teamwork and reduced the need for many additional meetings" (Project Manager). In the customer organization "a hybrid approach is applied" (Project Manager) since "pure Agile is difficult in distributed teams" (Head of Quality IT). However, the interviewees agreed that "waterfall does not support requirements collection and development process" (Senior Business Analyst) and "cannot imagine how waterfall methodology would work well" (Solution Design Owner 1) in distributed environments. "Using a mix of Scrum and Kanban" (Solution Design Owner 2) proved to be a good approach and widely applied in the customer organization for the projects conducted remotely which I have observed for my research. Daily stand-up was unanimously considered by the interviewees as one of the key events in the Scrum framework applied in distributed environments. "Grooming and daily stand-up ceremonies help the team cohesion in general" (Solution Design Owner 2), "Scrum ceremonies supported with organizing teamwork and reduced the need for many additional meetings; daily meetings really helped to cope with the virtual setup" (Project Manager) and "daily meetings were mission critical once COVID started; every day sharing info brings a needed level of formalization" (Senior Business Analyst).

4.2 Agile mindset

Agile mindset is another theme that can be associated both with people and with organizations (Figure 5). For an organization to have an Agile mindset implies the ability to adapt the business processes through effective utilization of resources, while shifting from traditional to incremental working models and practices. A set of questions in my interviews aimed to understand how the previous knowledge and application of Scrum framework in practice helped with the adaptation to incremental approaches in remote mode of working.

Overall, the participants to the interviews agreed that it was an advantage that the Agile processes were established before the COVID-19 pandemic started, however there are

areas that require attention for more effective implementation of processes. It was remarked that remote work has impact on Agile practices and co-located teams are more productive since the feedback loop is shorter than in distributed teams. For a non-IT company, the customer organization adapted well to the remote mode of working and Scrum framework supports the teams to understand and work as a team to accomplish the common goals. Agile implementation within the customer organization several years back has been considered a successful initiative, the Agile methodology and Sprints helped with tasks prioritization and distribution of work. Even if the customer organization was considered “not fully prepared” (Head of Quality IT) for adopting Agile practices, the fact that Agile implementation started before COVID-19 was an important success factor especially in continuous development projects where “everybody knew each other before COVID-19” and “it was easy to keep the processes running” (Senior Business Analyst) by applying the Scrum framework.

As the roles within an organization must be understood and accepted by all the members, also the processes adopted by an organization must be understood by all the participants. An important aspect emerged from the interviews related to organizational Agile mindset, is the involvement of business stakeholders in the product development processes. Knowledge of Agile methodology and Scrum framework is essential for the business stakeholders. They must accept the working practices are realized in a disciplined incremental way. “For business stakeholders an Agile mindset has to be built” (Solution Design Owner 2). “Business stakeholders must have an understanding of Agile methodologies, improve understanding of what is expected from them and how to collaborate” (Project Manager). “In my project, business stakeholders are part of the team; all the project participants benefit from understanding the Agile ways since business and IT are on the same team” (Senior Business Analyst).

A clear definition of roles enables the members of Agile teams to take ownership over their work and actions. Roles description as defined by Scrum framework should also be accepted and adopted by the organization. The most important role in Scrum, as seen by most of the interviewees, is the Scrum Master. “Scrum Master is the most important role” (Senior Business Analyst), as (s)he needs to “keep people engaged and focused” (Head of Quality IT). In some projects of the customer organization was considered important that an external Scrum Master facilitated the ceremonies and coached the team from a neutral position that allowed him to “observe, propose and open people’s minds” (Project Manager). The importance of Product Owner role was discussed, since (s)he represents the interests of external stakeholders and must bring “clarity and transparency to the team” (Solution Design Owner 1) on the features and requirements that have to be built.

4.3 Skills

This is a theme that was getting a special attention during the interviews. In my view an Agile mindset must be supported by good knowledge of the methodologies, real life experience through participation in Agile projects and proper trainings that would facilitate learning. As an outcome of this study, I have proposed a training programme for Scrum Master certification for the consultants employed by the provider organization and suggested that educational organizations could introduce the students in Agile methods with specific emphasis on Scrum framework. It was discussed during the interview the importance that courses and trainings would be available also for the clients to “encourage them to discover together” (Solution Design Owner 2).

4.3.1 Scrum framework knowledge

A series of questions directly asked what are the skills that would help increasing the efficiency while working in Agile mode.

For the Scrum Master, the interviewees considered important to have “facilitation skills” (Solution Design Owner 1, Solution Design Owner 2), know “Agile techniques that create the feeling of inclusion” (Head of Quality IT), display good “communication skills and tool knowledge” (Head of Quality IT) and proof of “certification, knowledge of Scrum guide” (Solution Design Owner 1).

For the Product Owner, the interviewees also considered important to have good “communication skills and tool knowledge” and know “Agile techniques” (Head of Quality IT) and “certification” (Solution Design Owner 1).

Developers, and all other participants to Scrum processes “must be aware of the tools, especially the collaboration tools” (Solution Design Owner 2).

4.3.2 e-leadership

One topic approached during the interviews was the impact remote collaboration has on management style and involvement, and if any specific actions would be expected from the Scrum team members. A characteristic of an Agile organization leadership style is servant leadership. The servant leader would put the followers’ interest first, empower them and support their development (Northhouse 2013, 219). Furthermore, teleworking brings new dimensions on how a leader would facilitate work and keep the followers motivated toward achieving the goals. Such an e-leader (Frontiers in Psychology 2020, Martielli & al. 2017, 119) must develop a distinct set of abilities to support the organization

function in virtual work environments. It may be regarded as a paradox, that in teleworking the leaders and managers influence is even more present (Frontiers in Psychology 2020, 4) while Scrum framework is characterised by autonomous and self-managed teams (Scrum Guides 2020, 5-7). However, at the micro level of e-leadership applied to managing virtual teams, the above statements are compatible: the Scrum Master is guiding the team, and the Product Owner is prioritizing the work. A set of competencies that an e-leader should possess, include communication skills, social skills, team building skills, change management skills, technological skills, trustworthiness (Frontiers in Psychology 2020, 6).

The theoretical aspects presented above were also identified in the outcome from the interviews. The remote collaboration “does not require more involvement from managers” (Solution Design Owner 1, Project Manager, Solution Design Owner 2, Senior Business Analyst) and “there is no need for additional control” (Solution Design Owner 1), rather it requires “a different set of skills” (Solution Design Owner 2). In terms of management controlling there were different opinions: “sometimes we experience lack of controlling, not enough info is gathered during the daily ceremonies” (Solution Design Owner 1), and in some situations business stakeholders are “functional experts that expect someone tells them what to do” (Project Manager). These observations collected from the interviewees may be due to incomplete role description or coverage of roles’ attributions. The use of a RACI responsibility matrix that could well complement the Scrum framework practices.

One important aspect related to controlling is that “the metrics have to be well defined and used, because in co-located teams you see what is happening around you, but in remote teams just metrics are visible” (Head of Quality IT). The statement “sometimes managers interfere negatively with the process” (Senior Business Analyst) is confirming what studies revealed that both leaders and followers must facilitate the monitoring, alignment of work and trust building. They must avoid the risk of overload and use of control mechanisms that would unnecessarily increase the efforts of the employees (Frontiers in Psychology 2020, 4).

4.3.3 Remote collaboration

Scrum framework already comes to support collaboration through recommended practices and ceremonies applied with regularity during the incremental development process. Collaboration is also supported and facilitated by the tools and processes provided by the organization. However, collaboration, and especially remote collaboration became in recent years a valuable set of attributes that a member of a global organization should possess.

Collaboration is paramount in distributed environments, and any process, methodology or framework that would facilitate collaboration must become a standard procedure in the product development. This is valid within an organization, and in the cooperation between various organizations engaged to work towards common goals. The members of a global organization must have good collaboration skills, or at least understand the importance of collaboration skills in remote environments and strive to improve it: whether through learning at the workplace, through trainings or through observing the best practices and apply them to their work environment. “If the company goes Agile way, it needs to ensure supporting material and methodology” (Project Manager).

Measuring a project’s success strictly by the achievement of scope, on-time delivery and within the planned budget is only providing a limited view of success when the work is performed in distributed environments. The human element must also be considered when we evaluate a project’s success, and especially the level of human interaction and how well the distributed team members are able to share information, coordinate their activities and overcome the challenges as a team. (Martinelli & al. 2017, 175.) In virtual environments the human interaction has to be facilitated almost exclusively by the use of tools. To enable communication and collaboration for their teams, the organizations must select and provide technology solutions and implement processes that were proved successful for the industry leaders. Managers must have possibility to select from their organization portfolio those technologies that would best meet the needs of the virtual teams they lead, while always considering that communication is the most critical factor in determining a project’s success (Martinelli & al. 2017, 176).

The proposed learning programme for Scrum Master certification is one action this thesis proposes as means to improve the synergies through education. Own initiatives then are encouraged for the organization members to pursue, and improvements in any of the areas encompassed by the collaboration set of skills would be a step forward for personal and organizational performance: clear communication, coaching, technological knowledge, trust, honesty, discipline, change management, integrity.

The interviews revealed that in interviewees’ opinion the remote collaboration does not require more specific actions from the managers compared to co-located teams. Sometimes “personal touch is missing” (Solution Design Owner 1) however the Scrum ceremonies like retrospectives and daily stand-ups are helping with personal bonding when the participants are remotely connected.

Managers must ensure that collaboration is a productive mean to deliver project outcomes through the use of technology and processes. In selecting the collaboration tools and processes they must consider the team tasks, project workflow and the workspace (Martinelli & al. 2017, 179). Appendices 6 and 7 present examples of CIT tools and processes used in Agile projects conducted with Scrum framework in the customer organization.

4.4 Human Perceptions

As part of the interviews, I wanted to understand how the participants are perceiving the Scrum framework as a means of maintaining and increasing members' motivation. Organizations and team leaders must monitor and harness employees' individual needs and turn the perception of teleworking from a constraint to a benefit. Human perceptions like trust, isolation, and presence (Rose 2016, 111) are directly influencing the employees' motivation, and indirectly their capacity to perform.

4.4.1 Trust

Regarding trust, there was an unequivocal consensus among the participants opinions: Scrum framework is increasing trust perception of the team members. "Daily Scrum involves members and encourages communication" (Head of Quality IT), "the backlogs belong to development team together – communication has to work well" (Project Manager), "people must have an Agile mindset" (Solution Design Owner 2).

4.4.2 Inclusion

Regarding inclusion as human perception, Scrum framework is encouraging it through "some techniques applied by the Scrum Master" (Head of Quality IT) that would involve everybody in the collaboration. "Scrum ceremonies promote inclusion, and it is very important that all ceremonies are attended by all" (Project Manager) and team members are kept "engaged" (Senior Business Analyst).

4.4.3 Presence

Extended social isolation may result in employees' alienation, with effects on individuals' performance and motivation (Frontiers in Psychology 2020, 3). People identify themselves with the workplace environment and develop a sense of belonging (Rose 2016, 95). Presence – or telepresence – in distributed work environments is realized using technology, which makes real-time communication possible across boundaries. However, certain processes must be established since the related activities would need more coordination compared to traditional co-located teams. (Rose 2016, 101.) Implementation of Scrum framework and a routine of regular ceremonies (Appendix 6) could enable organizations

to create a level of presence that would engage the virtual team member and limit those situations where the individual would feel separated from the group (Rose 2016, 108).

4.4.4 Motivation

Even though the Scrum framework was seen by the participants to the interviews a suitable way to improve the team members human perceptions, implementing and applying the Scrum practices alone would not directly generate an increase in motivation. The opinions were divided: “Scrum processes may be felt heavy because of their frequency and repetition” (Solution Design Owner 1) and not motivate the team members. Motivation could be found while achieving a goal as teamwork, “if roadblocks have to be removed” (Project Manager) and give the team a sense of accomplishment. “Due to engagement” (Senior Business Analyst) the motivation can increase while part of a Scrum team.

Motivation is an important factor for success, in any domain of activity. Maslow’s hierarchy of needs (Jordan & al. 2008, 156) is more actual than ever when considering the pressure teleworking puts on individuals’ work routines and personal life. Arguably, Scrum framework would not provide enough extrinsic factors that would increase one’s team member motivation. Therefore, focus should be on increasing the intrinsic motivation which is more effective and permanent compared to the extrinsic motivation (Jordan 2008, 158). Increasing self-esteem through improved competences or supporting self-actualization through learning at the workplace or through dedicated trainings are just a few ways to raise motivation. An organization that would support such development for its members would eventually benefit of resources that would be more engaged in activities and self-directed, with an experience that would make them more efficient and competent (Jordan 2088, 158). Lifelong learning is an individual choice to stay competitive and motivated, however organizations must create environments that would facilitate the learning. In this way the organizations would continuously learn and adapt by creating, transferring and retaining knowledge.

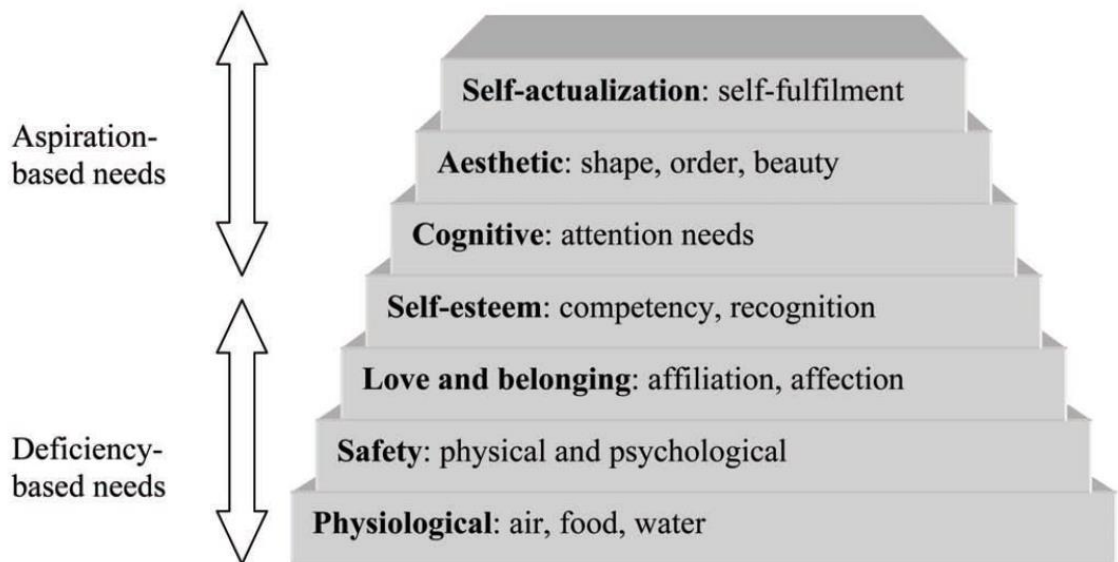


Figure 6. Maslow's hierarchy of needs (Jordan & al. 2008, 156)

4.5 Work Environment

Virtual projects are more complex than traditional projects since they are relying on inter-connectivity of organizational, human, and technological networks (Martinelli & al. 2017, 11). The level of ambiguity (Frontiers in Psychology 2020, 8) is increased in distributed environments as decision making is decentralized, feedback loop is slower and sharing the information can only be done electronically (Martinelli & al. 2017, 14).

The answer to complexity can be simplicity and clarity. Standard processes and procedures must be implemented within the organization, clear goals and roles must be easily shared and acknowledged by the members of a virtual teams. Team members must be empowered, and the documentation should be kept in common shared places and maintained to the practical level to avoid overburden and distortion of information.

Scrum provides such a framework that would bring clarity in managing changing priorities, visibility and alignment between business and IT (State of Agile 2021, 9). Based on my observation, Scrum processes are better suited for longer-term and continuous development projects and an organization should choose the practical approach and methodology in managing the work. However, the more employees and project stakeholders are familiar with the Scrum framework the faster the adoption of the practices in real work and realization of efficient deliveries.

For my interviews I was mainly interested if the Scrum framework must be adapted or changed if applied in distributed environments compared to co-located teams. Processes,

tools, and management are the themes that emerged from the discussions with the participants in the interviews.

4.5.1 Processes

The governance framework of virtual projects includes the same functions as a traditional project with co-located team members: set and maintain the project objectives and ensure they are linked to the organization's strategic targets, ensure the resources are able to achieve the project goals, monitor and conduct work to realize the business benefits (Martinelli & al. 2017, 77). During project execution phase the tasks of the managers become more challenging in distributed environments due to complex interdependencies generated by project activities and distribution of work between team members separated geographically or by different time zones (Martinelli & al. 2017, 74). Monitoring and control are functions that require a special attention in the governance of virtual projects.

Progress monitoring must be supported by tools that would provide structure and transparency. For a local team, burndown charts or dashboards including key performance indicators may be informally displayed on the walls of the project room where the Scrum events regularly take place. Team members and any stakeholder that would pass by that project space could immediately see the progress of the project in an ad-hoc approach.

In distributed environments, inspection can only be achieved by accessing specific tools like Azure DevOps or Atlassian Jira (Appendix 7), and it is usually done as part of formal periodic events (Appendix 6). The dashboards provide data needed to ensure the project is on track and allow business stakeholders to make informed decisions. In the customer organization the implementation of Agile methodologies "started in IT department, but not companywide" (Solution design Owner 2).

The interviewees agreed that there is no need to redesign the Scrum ceremonies when Scrum practices are applied in virtual environments. However, "until the process is defined, feedback is needed" (Head of Quality IT) to ensure the correct methodology implementation in practice and suitability to the respective virtual project. Regarding the need for complementary ceremonies "the team should be asked and decide, as it depends on team to team" (Head of Quality IT, Solution Design Owner 1) if additional events need to be included in the Sprint process (Appendix 6).

The "Scrum Master should not change the approach in conducting ceremonies" (Solution Design Owner 1) however (s)he "must ensure more coordination and bridging between

the teams” (Head of Quality IT). Projects – whether they are Agile or traditional – periodically require outsourcing work to external consultants, or teams with specific expertise from the global matrix organization. Due to distribution of work in virtual environments some additional coordination elements are expected from the managers. These may include providing detailed specifications, integrating the external activities in the project execution plan, constant monitoring of the outsourced work (Martinelli & al. 2017, 85). An important aspect to consider is that cross-team connections develop slow and additional effort is required from virtual team managers to establish the cross-team communication and collaboration (Martinelli & al. 2017, 16).

The participants to the interviews did not see a “need for double daily stand-ups” (Solution Design Owner 1, Solution Design Owner 2) if the members of distributed teams are geographically located in different time zones, however “some demos part of Sprint reviews could be done separately” (Solution Design Owner 1) if the increment of work is relevant only for certain stakeholders that could be separately informed. This situation occurred in deployment programs within the customer organization where business stakeholders were situated in different time zones and had specific requirements that would not directly concern the other internal customers., “hand-over call can take place, at least two hours overlapping time proved good for handling priorities” and “hubs are created with one team member in each country” (Solution Design Owner 2). In this context, for an Agile project having members distributed geographically across multiple time-zones, hub means the forum consisted of key players from each area that would represent their colleagues in Scrum events. This is an analogy to scaled Agile practices where in the Scrum of Scrums the Scrum Masters from various teams would connect and share information to complete the Sprint work in an efficient way. It is essential that these hubs and key players exist for ensuring the stability of the complex organizational networks of the virtual projects.

Additional reflections from the interviewees on the relevance of more events in Sprint due to distributed work included: “there could be more frequent retrospectives” (Head of Quality IT), “more frequent backlog grooming may be good, just to reduce the backlog” (Solution Design Owner 1) and “forum for validation is reserved for 20 minutes after the daily stand-ups in case clarification is needed” (Solution Design Owner 2).

To ensure transparency in distributed environments, the interviewees have seen necessary that the metrics are available in easily accessible and visible tools. “Real data must exist” (Head of Quality IT) and be up to date in the supporting tools, and up-to-date documentation must be in place as it is “essential for the knowledge transfer when new members join” (Solution Design Owner 1). “Work on guidelines and documentation would be

better used if planning would be done two-three Sprints ahead” (Solution Design Owner 1).

Regarding inspection empirical pillar of Scrum, the interviewees observed that in DevOps burndown charts could be even more effective than in local environment, because during the daily stand-up every member of the team reports how many hours they burned down on their task from the previous day. Tasks are reviewed systematically one-by-one in the online tool (Appendix 7) and the Scrum master can update the burndown chart as a simple step in the process. If daily stand-ups would take place locally in a project room the burndown chart could be updated on the visual boards set in the room, but there will be additional steps required from the Scrum Master to record the updates in the project tools or materials.

The proficiency in using the tools and close follow-up of Scrum practices could be improved. The interviewees remarked that the “KPIs are not always followed” (Head of Quality IT), “burndown chart is not in focus, not easy to follow, and not checked every day” (Senior Business Analyst, Solution Design Owner 1) and “attention is paid to the spikes” only (Solution Design Owner 1).

The participants to the interviews appreciated the utility of online tools (Appendix 7) to support the Scrum practices in distributed environments. “Demonstrating the increment of work and feedback collection work ok” (Solution Design Owner 1, Solution Design Owner 2) and “if good communication tools are used i.e., Teams or Zoom with recording functionality remote meetings can be even better than co-located ones” (Solution Design Owner 2) because transcripts from the calls or meeting recordings could be later shared and replayed. Recordings could also be useful when demonstrating the increment of work during the Sprint reviews with remote participants: to avoid technical problems generated by connectivity or communication equipment some presentations can be recorded, stored in the common project repository and shared in advance with the stakeholders.

4.5.2 Participation

Sense of belonging and perception of presence can be enhanced only by participating to the processes agreed and established within the organization. In distributed environments “the personal touch is missing and ceremonies like retrospectives help, as a team, to look back together without judgement and get more personal bonding” (Project Manager). “Engagement from business side is important and would be required more frequent participation from business stakeholders; they must be included in the Scrum ceremonies” (Head of Quality IT). “Business and development must stay connected” (Solution Design Owner

1). “Cooperation is crucially needed” (Project Manager), “attendance to ceremonies is essential” and “during Sprint review presentations must make sure that everybody is on the same line and business stakeholders are there” (Senior Business Analyst). Simple things like “open the cameras in live meetings” (Senior Business Analyst, Solution Design Owner 2) would increase the personal bonding while working in Agile mode with distributed teams.

4.5.3 Tools

Teleworking offers flexibility to employees to contribute to work processes without being limited by time or location. However, teleworking is highly dependent on technology, the effective use of information and communication are directly impacted by the quality, reliability, security and UX design of the applications and services selected to be used. In the interviews I was looking to understand if the participants find the tools promoted by the customer organisation suitable for Agile and Scrum framework practices, if there are guidelines available and if there are any limitations in collaboration generated by the customer organization policies.

Technology can enable virtual project teams to eliminate the communication barriers created by geographical distance and different time zones. Effective use of technology ensures the success of the projects. It is important for overall performance of virtual teams to select the technology based on how well are facilitating communication and collaboration processes (Martinelli & al. 2017, 176). Organizations must prevent technology overload and align the technology selection with the needs of the virtual project teams (Martinelli & al. 2017, 197).

Trainings and learning materials must be provided to all members of the organization involved in the co-creation process when new technology is deployed. Situations must be avoided when new technologies are pushed to virtual teams without proper training on how to use the respective technologies effectively (Martinelli & al. 2017, 197).

The tools that are used in distributed environments must enable communication and collaboration. Their primary role is to overcome the challenges created by distance, time-zones, projects complexity and the diversity of the participants (Martinelli & al. 2017, 18). Communication technologies may include email, phone, video conferencing and collaboration technologies may include white boards, team spaces, data repositories (Martinelli & al. 2017, 196).

The tools that stand-out from those mentioned by the interviewees as the most used and best in supporting the collaboration and product development with Scrum are Jira by Atlassian, Teams and Azure DevOps by Microsoft (Appendix 7).

The list of tools used in virtual collaboration by the interviewees includes:

- Miro – online collaborative whiteboard used for supporting the workflow in Agile projects and for planning
- Skype – communication tool used for chat, online meetings and video conferencing
- Zoom – communication tool used for chat, online meetings and video conferencing
- Slack – collaborative tool used to organize work and keep the communication focused
- Apptio TargetProcess – solution that enables scaled Agile, used by distributed teams to plan, monitor and improve processes and products
- Mural – online collaborative whiteboard used for brainstorming and planning
- Menti – used to create presentations and interactive polls to engage the audience
- PlanITPoker – online Sprint planner used by Agile teams to estimate effort.

One interesting note collected from the majority of the participants to the interviews was that using the tools is either “learn by doing” (Project Manager) or the knowledge must exist beforehand, because “the tools are not well promoted by the customer organization” (Project Manager, Senior Business Analyst) and “there are not many guidelines about the tools and those are not easy to find” (Solution Design Owner 1, Senior Business Analyst). Due to these facts, “practical experience and previous participation in Agile projects is essential” (Project Manager) to maximize the usage of the tools in product development projects.

There was no concrete outcome from the interviews if the company security policies impose a limitation in the tools to be used, however “roadblock appear if i.e. a license is needed for certain tools” (Solution Design Owner 2) or “the tool is not in company’s portfolio” (Solution Design Owner 1) situation in which the license “has to be paid by the respective project, as the customer company security policies are more strict from projects perspective” (Solution Design Owner 2).

4.6 Limitations and Opportunities

In asking the participants to the interview if they see any limitations of Scrum framework in distributed teams, there was unanimous understanding that there are no practical limitations, except the restriction on having face-to-face meetings that “may have dependence of the laboratories where physical presence is needed” (Head of Quality IT), for the team buildings and for the “personality part of it” (Senior Business Analyst).

The recommendations collected from the participants to the interviews revolved around several common topics including communication, tools and learning opportunities. Organizations “must invest in virtual collaboration tools” (Solution Design Owner 2) and “the

communication tools have to be utilized at their best” (Head of Quality IT). People “must be trained” (Head of Quality IT) to use the tools, “Agile training and coaching should happen” (Solution Design Owner 1), “the provider organization must be interested in course options, development path for its employees and opportunities to learn about DevOps, Jira and other tools, learnings about overall Agile methodology” (Project Manager), “read the Scrum guide, know about it” (Solution Design Owner 2). “The grade of applying Scrum framework in virtual environments depends on strategy of the team, facilitation skills and means on communicating and connecting with the people in the team and organization” (Solution Design Owner 2).

4.7 Scrum Master certification

A major subject discussed in every interview was the importance of the Scrum Master in facilitating the process and coaching Agile teams. A common conclusion received from all the participants was that Scrum team’s effectiveness relies on the capacity of the Scrum Master to enable work and remove the roadblocks that may occur during the iterations. Developing the competences required to successfully fill such a demanding role becomes an important target for every current or aspiring Scrum Master.

People working – or going to work – for certain organizations need to maintain and enhance their competence and at the same time look for ways to improve their career prospects. In addressing their long-term direction, organizations must assess own strategic position, the strategic options, and the ways to implement the selected strategies in practice (Whittington & al. 2020).

There can be several parallels made between a company’s growth strategy (Chron 2020) and an individual’s career planning:

- Market penetration strategy can mean for a company a series of actions including price adjustments, advertising, product improvements to increase the company’s impact in the current market while for an individual would mean continuous development, learning and acquiring new certifications to support better performance in their current organizations.
- Market expansion strategy means for a company finding new markets and new utilizations for their products, while for an individual may mean finding a new position in a new organization or employing recruitment agencies to find new employers.
- Product expansion strategy means for a company development of new products or new functionalities, while for an individual means developing new skills, achieve certification and deepen the expertise in certain domains.
- Growth through diversification strategy means for a company development of new products and finding of new markets, while for an individual would mean learning new skills that would give options for career change or new employment where the new skills are required.

- Merge and Acquisition strategy means for a company expansion of its operations, while for individuals could mean assimilation of existing or new processes and utilization of existing or new tools that would enhance their value and performance at work.

In the summer of 2021, my manager from the provider organization asked my support in defining a learning path for the consultants employed by the provider organization and working in the customer organization. A formal commissioning was not accepted; however, I was interested to assimilate this as a topic in my research and part of this study find alternative ways to enhance the synergies in distributed environments through learning programmes.

The key milestones and the outcome are presented in the Appendix 4 – Scrum Master certification programme for the consultants employed by the provider organization. The courses were already available in the learning portal of the provider organization; however, they were not structured in a way that would facilitate the selection based on relevance. The learning programme I proposed suggests a sequence in which those courses should be approached. It recommends three distinct knowledge levels for those consultants interested to get certified in Scrum: Agile foundations, Scrum Master practitioner and Scrum Master advanced. For each level there is a suggested order of the materials to be studied, and an electronic exam that would certify the progress (Appendix 4).

The main steps followed during the service design process are presented in Figure 7.

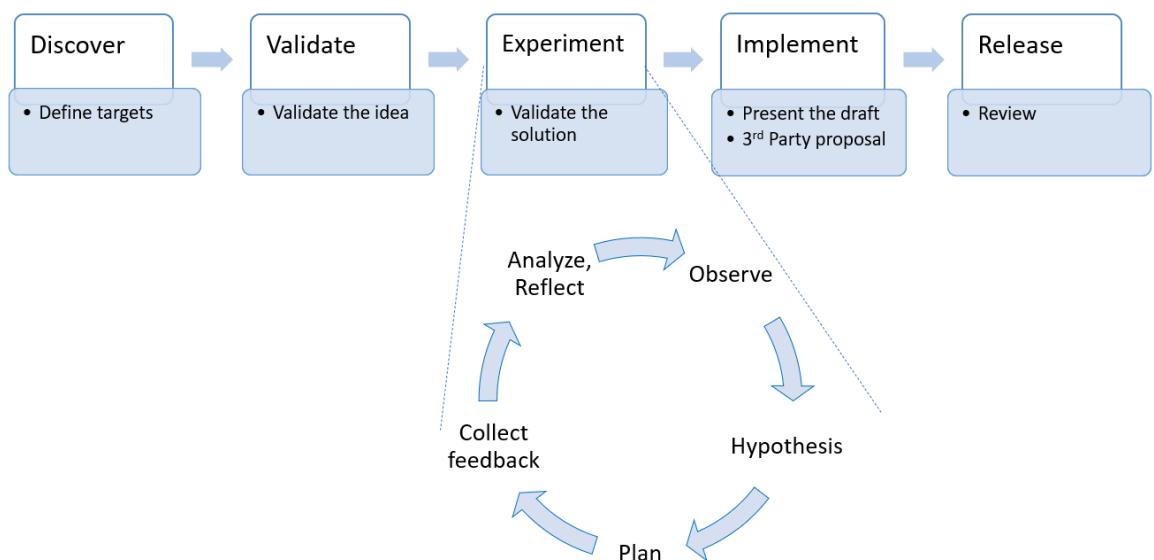


Figure 7. Service Design for the Scrum Master programme (adapted from Rissen 2019)

Discover phase helped to understand the entities involved in product development: organizations, people, and skills. During this phase there were identified the expectations of the

customer company, available resources and capabilities, the expertise of the consultants, the availability of learning materials and Scrum certification courses.

Validate phase confirmed the customer company goal to enhance the operational efficiency, identified the suitability of a Scrum Master certification programme for the consultants and how the provider company would benefit from realization of such a focused learning programme. Focused Agile practices training materials and courses available for the consultants would increase their level of expertise and value contribution to the organizations where they are employed. The development idea was aligned with the companies' objectives, and the change impact was evaluated as minimal to no-impact to current activities.

Experiment phase engaged the key stakeholders in the co-creation process, as a repeated process of observation, understanding the available learning materials, suggestions of suitable sequence of courses based on their content, reviews with the key stakeholder from the provider organization. External materials were analysed and reflected upon the best practices and learning processes in Agile and Scrum Master competence development and certification.

Implement phase included the proposal of a draft solution, agreement on change implementation and provider company actions in preparing the change with the support of an external 3rd party company. The solution was implemented in the official learning centre site of the provider company during November 2021 – January 2022.

Release of the Scrum Master certification programme was realized at the end of January 2022 and the selection of courses was shared with the consultants for review and for effective use.

5 Conclusions and recommendations

This chapter summarizes the findings of the study according to the primary data collected from the interviews, secondary data obtained from reliable surveys and studies realized by various global organizations and my personal observations as an active player integrated in the researched environment. These findings together with the key themes presented in the previous chapters of this thesis are collected in a set of guidelines and best practices for the benefit of the participants to Agile transformation and applicants of Scrum frameworks in distributed environments. To confirm my original beliefs and understand how the reality is experienced by the other social actors involved in the study, I have opposed these findings against the research questions:

- IQ1: What are the strengths and weaknesses of Scrum framework applied to virtual environments?
- IQ2: What are the limitations of the Scrum framework in distributed teams?
- IQ3: What should a personal development plan include for people working in global Agile teams?

The following subchapters include my personal reflections and considerations for further studies.

5.1 Main findings of the study

I have started this study with personal belief – built over more than 20 years of activity in IT and software development industries – that **Scrum framework is well suited for distributed environments** even if initially was designed for co-located teams. If correctly applied Scrum framework would enhance team performance and the individual state of the remote members. It came as no surprise that also for the professionals interviewed as part of this study the application of Scrum in distributed environments proved to be a natural adaptation to remote ways of working and not an enforced process in response to the shock propagated in society and economy by the COVID -19 pandemic.

Remarkable increases in Agile adoption were indicated both within software development teams – from 37% in 2020 to 86% in 2021 – and in non-IT businesses which doubled the Agile adoption from 2020 to 2021 (State of Agile 2021, 5). With Scrum and its derivations representing 81% of the overall Agile approaches (State of Agile 2021, 13) it is clear indication that Scrum frameworks have been increasingly adopted by IT and non-IT organizations in the recent years based on its suitability to distributed environments.

5.1.1 Strengths of Scrum framework applied to virtual environments

Virtual team practices must adopt processes that can ensure business continuation in case of changes. Scrum framework offers a simple structure with clear roles responsibilities, specific events and artifacts that can be uniquely identified and reproduced, independent of where in the organization the Scrum framework is transported or implemented. Scrum targets performance and allow fast iterations through implementing standardized procedures.

Agile methodologies are adopted by businesses to enable fast responses to continuously changing customer demands. The change management process in virtual projects must benefit of a team platform where communication can be performed fast and efficient (Martinelli & al. 2017, 87). A change management system in distributed environments must be able to record the collected requirements and offer transparent processes and clear protocols for the remote participants to planning, executing and delivery activities. Distributed team members must all have visibility to the tasks that individually are performed in remote locations and a formal change communication must be established (Martinelli & al. 2017, 87). Scrum framework using specific applications like Azure DevOps or Atlassian Jira supports the integration of distributed work and provide the much-needed transparency and visibility across the distributed team and business stakeholders.

Independent of the geographical locations the team members are working, they have clear accountability and control on their tasks. Scrum culture is based on cross-functional teams and knowledge exchange is encouraged between team members.

The virtual environments add an increased level of complexity to collaboration and Scrum framework offers an effective and repeatable process. Scrum supports a highly collaborative environment where interdependent activities of distributed teams can be accomplished in a rapid pace.

Scrum provides the platform for continuous communication between the team members and stakeholders, through regular events and ceremonies. Attendance of the daily Scrum meetings or regular Sprint planning, review and retrospective events may help maintaining a sense of belonging that would be otherwise difficult to address with distributed team members in virtual work environment. This routine of attending the regular Scrum ceremonies can create a level of presence that would engage the remote participants and avoid situations where an individual could feel separated from the team.

Teleworking is adding pressure on people work and personal life, and Agile values like “working software over comprehensive documentation” bring a welcome level of common sense in where the efforts should be focused.

5.1.2 Weaknesses of Scrum framework applied to virtual environments

Virtual work environments imply a series of generic shortcomings and risks that are independent of the processes and practices applied.

Learning benefits are limited when people are not working in the same workplace. Since employees are physically separated from their colleagues, they are not actively participating in information sharing and co-learning. Employees may not have immediate or direct access to their supervisor or colleagues to ask support in problem solving, as they would have if they were present in the same office (Frontiers in Psychology 2020, 2).

Workers experience social and professional isolation and develop increased concerns on career prospects due to feeling less visible within their organizations and outside of those. Due to flexibility of teleworking motivated individuals may work extended hours and reach exhaustion, which may impact their performance. Information overload and work mix with domestic daily errands. (Frontiers in Psychology 2020, 5).

There are weaknesses characteristic for Agile methodologies when applied in distributed environments, especially when organizational culture and Agile values are not aligned. Some key weaknesses are mentioned in the following paragraphs.

The Scrum guide comprises in no more than 20 pages and can be read in less than one hour. Scrum experience instead, can only be accumulated through practice, participation and learning during several years. Every participant involved in Scrum must have Agile education.

Development of Agile knowledge and collaboration in virtual environments rely heavily on the tools and processes provided and promoted by the organizations. Teleworking is highly dependent on technology, the quality, reliability, security and functionality of integrated applications and services directly impact the performance of the team and the quality of the deliveries.

Lack of experience with Agile methods, insufficient training and education, non-integrated applications are among the significant barriers to adopting Agile practices (State of Agile 2021, 12) especially in the period when work is realized remotely.

Project-based structures are flexible, and the resource turnover is high due to continuous breaking and restarting of various projects. In Agile projects and distributed environments, the teams are created, disbanded, and recreated in short periods of time and there is no time to build interpersonal relationships. If the composition of an already distributed Scrum team is frequently changed the members may build distrust against an arbitrary management and lose motivation.

Scrum practices alone do not generate an increase in motivation, since in distributed environments there may be more need for control and the frequency of Scrum ceremonies may require additional efforts from the participants.

5.1.3 Limitations of Scrum framework in distributed teams

Scrum is suitable for distributed teams. This was my original belief that was confirmed throughout the research by the participants to the interviews, and secondary data from global statistics. During 2021 has been observed an abrupt increase in Agile adoption, while global workforce had to find proper practices to support the remote way of working (State of Agile 2021, 4) in response to restrictions imposed by COVID-19 pandemic. There are virtually – if I am allowed this play on words – no limitations to use Scrum framework in virtual environments.

Restriction – or impossibility – to have face-to-face meetings has been considered by the participants to the interviews one of the main drawbacks of Scrum applied in distributed teams. Compared to co-located projects, the participants to distributed projects are not all available at the same time due to geographic and time zone separation limits. Relationship building and interaction between co-workers require additional efforts from the Scrum Master who must rely on technology to facilitate communication and collaboration (Martinelli & al. 2017, 54). The type of communication must be adapted and for example use synchronous communication methods like video conference, instant messaging, online whiteboards for brainstorming, planning, problem solving or decision making and asynchronous communication methods like email when the exchange of information does not have to be done in real time (Martinelli & al. 2017, 177).

As also mentioned in the previous chapter, the learning benefits and possibilities are diminished in distributed environments compared to people sharing experiences in the same workplace.

The success of Scrum practices applied in distributed environments is highly dependent on technology, Agile education and compliance of the participants and the processes established within the organizations.

5.1.4 Personal development plan for people working in global Agile teams

In the current economy where workforce is increasingly distributed and employment of consultants for fixed term periods becomes the new norm, the organizations must ensure the continuity of work and invest in applications and learning opportunities for their employees. At the same time, organization members must identify the areas of personal development and have a proactive attitude in initiating or finding learning opportunities that would both increase their performance and the future career prospects.

Including this Scrum Master certification programme in the development plan for the consultants employed by the provider company would increase their motivation and performance, with direct benefits for their success as professionals. Scrum is a framework that can be applied in any industry. A good knowledge of the Scrum practices would expand the career options for the consultants. At the same time, the employers of these consultants will benefit having work being performed by experts. This would enable a higher quality of product development, facilitate the implementation of efficient processes that would increase the competitiveness of the companies in the markets.

For myself, the benefit of creating this programme was that I had to thoroughly study the available materials in the provider company learning portal, expand my knowledge in Agile practices and as a result becoming Scrum Master certified.

5.1.5 Recommendations for applying Scrum in virtual environments

The agility of global organizations to adopt suitable practices, processes and technologies is key for the business success in complex contemporary markets. Scrum provides a framework that – if not completely replace – would well complement the existing product development practices in modern organizations that need to adopt fast change management in response to changing customers' requirements and expectations.

It is essential that all stakeholders involved in the co-creation have a good understanding of Scrum concept and Agile methods. Learning solutions, info sessions, active promotion and coaching should accompany adoption of Scrum and Agile practices within an organization.

The Scrum framework would not completely replace the traditional practices in project management and product development, therefore there must be done a thorough analysis of existing processes and identify the types of projects and activities that would benefit from Scrum. Implementing consistent processes and practices across the teams within an organization and development of skills in Agile methods must precede Scrum adoption and scaling of the Agile practices.

The tools should be integrated and practical to support the collaboration in virtual environments. Fragmented and isolated services and applications would be serious obstacles in adoption of Scrum framework. Tools streamlining, integration and transparency is a factor for success. User guides and support materials should be available and easy to find in the intranet pages of the respective organizations.

Communication tools must be utilized effectively, and synergies maintained between Scrum teams and business stakeholders. The participants involved in co-creation activities must get familiar with visual management and the utilization of virtual whiteboards for Sprint planning or design sessions. The regular Scrum ceremonies must become standard virtual routines that every team member should attend. The exchange of information is effective when everybody who needs to be involved participates, and redundant activities are in this way avoided.

The roles and responsibilities must be well understood and accepted by all the participants to the activities implied by Scrum framework. Scrum framework practices are simple and easy to implement, however they require a certain discipline from the participants. Managers should consider if Scrum practices could be complemented with the use of RACI matrices that would clearly underline the responsibilities of each participant to a project. Failure to comply to Scrum and Agile values and guidelines would generate negative effects in every aspect from collaboration to quality and schedule of the deliveries.

Managerial skills for the Scrum Master should extend further than to only cover the procedural aspect of the framework. Competence should include social skills, communication skills, coaching skills, change management skills, technological skills. Relevant trainings and learning materials should be actively found and attended by those who would conduct product or service development with Scrum.

5.2 Reflections on the research results

The main research question (RQ) of this thesis was: “How can Scrum – as Agile methodology – be adapted to support the organization virtual transformation?” The outcomes of

the research proved that the Scrum framework is well suited to be applied in virtual environments.

An organization virtual transformation is essentially a matter of mindset change. It is the subtle difference that one could find by asking himself “**What do I need to succeed?**” instead of “What’s in it for me?”. Finding the way to success can be more rewarding than strictly looking for opportunities and benefits. Organizations adopting an Agile mindset find the ability of adapting their business processes through effective utilization of resources, while shifting from traditional to incremental working models and practices. Organization members build an Agile mindset while supported by good knowledge of the methodologies and learning at the workplace.

There is no exclusive use of Agile methodology, and traditional processes like waterfall will continue to play an important role in product development. Organizations would always need to select the suitable approach depending on the size of the project, the phase in the product development, available resources and external dependencies and stakeholders. Scrum framework may be one of the most suitable processes to be used for product development in virtual environments, however organizations must identify the strengths and situations where Scrum framework should apply, as well as understanding weaknesses and situations where Scrum approach should be avoided. It takes to know a process to adopt it or not into use.

“What do I need to succeed?” must become the driver for every participant in the modern economy. Attributes like self-directed, self-managed, self-guided, self-employed, self-actualization are increasingly becoming associated with the contemporary workforce. They can be translated in independence and proactivity, and these are elements around which Scrum framework was built.

It is not about adapting Scrum to virtual environments; it is more about adopting Scrum principles to be able to succeed. Consultants must identify their knowledge gaps and ask what they need from the stakeholders and influencers. Organizations must provide trainings, learning materials, access for consultants to the courses and instructions how to use the tools and apply the processes. Motivation – so deeply impacted by enforced remote working during the past years – can be increased when line managers would get involved and support the employees’ development.

Coaching and tutoring in fast-paced industries and businesses should be more than theoretical concepts, and their utilization should not limit to the studies duration in educational

institutions. Instead, these concepts translate in self-coaching, self-tutoring, and life-long learning. The key role educational institutions have in the development of those who would become consultants in the modern industries and self-esteemed professionals is further increased. In creating the synergies, educational institutions should extend their influence from students' education to cooperation in developing organizations' strategies.

5.3 Suggestions for further study

This study is a continuation of my bachelor thesis, part of which I have studied the success factors in virtual project management. Already then, I stated my intention to continue my studies on virtual project management and closely follow the trends shaping the future of work. My interest in learning, virtual management and distributed environments continues.

In addition to my contribution to the Scrum Master programme I would support enhancing the learning site of the provider organization with further programmes. One programme would be targeted to the tools to be used for collaboration and Agile practices. Another programme would address the skills that a manager would need to have to effectively lead distributed teams and organizations.

Role of a line manager in distributed environments is becoming more complex and a new set of skills must complement the leadership education. The role of line managers would not limit to resources allocation but also include coaching and development of their team members – key activities that require a proper education.

Analysis and understanding of human perceptions in virtual work environments would be another topic of interest for my future studies – the remote work phenomena is on the rise, and the long-term effects on the workforce are yet hard to anticipate. Exhaustion and alienation are just some perceptions an individual may experience after extended enforced teleworking from home. Return to office and alternate periods of remote working could have also prove benefits and flexibility in how the workers would balance their personal life and work.

For educational institutions I would study how to introduce Scrum framework in their curricula. Possible this already exist as specific topic in project management related courses. I would recommend a dedicated course to Agile practices. This would be studied in the first years by the students, and it could serve as a practice to apply in the group assignments for the other courses, in the same way – for example – as problem-based learning method. Good knowledge of collaboration tools and specific applications like Atlassian

Jira or Azure DevOps could be early learned by the students that would at graduation be already prepared for future employment and work in global organizations and distributed teams.

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Appendices

Appendix 1. Interview framework

<p>How long have you been working with Agile methodologies and Scrum framework?</p> <ul style="list-style-type: none">– Local teams– Distributed teams
<p>What role best describes your participation in Agile projects?</p> <ul style="list-style-type: none">– Scrum Master– Product Owner– Member of development team– Indirect participant (i.e. Business stakeholder)
<p>How did previous knowledge and application of Scrum framework, in the organization you activate, support the organization in adapting to remote mode of working?</p> <ul style="list-style-type: none">– Ability to adapt to fast-changing business environments is a source of competitive advantage for the respective organization. In the past two years we have witnessed a shift from co-located to remote mode of working.
<p>Does remote collaboration require more specific actions from the managers compared to collaboration within co-located teams? What specific actions would be expected from the Scrum Master, Product Owner, team members, organization?</p> <ul style="list-style-type: none">– Adopting an Agile framework like Scrum is both a procedural change and an organizational cultural shift that would require time and dedication. Leaders need to adopt a servant leadership approach and empower their team member to self-manage.– Presence of Lean/ Agile coaches?
<p>How well is the virtual environment supporting the three pillars of Scrum (adaptation, transparency, inspection)?</p> <ul style="list-style-type: none">– Adaptation<ul style="list-style-type: none">○ Do you think that Scrum ceremonies must be redesigned to support the remote collaboration? (Sprint Planning, daily Scrum, Sprint Review, Sprint Retrospective)○ Would complementary ceremonies be necessary? (i.e., double backlog grooming sessions, duplicate daily stand-ups to accommodate different time zones...)○ Should the Scrum Master change the approach in conducting the Agile ceremonies in virtual environment compared to co-located teams? Who else should adopt changes?– Transparency<ul style="list-style-type: none">○ Should the documentation be more structured and stored in a common shared place (as a single source of truth)?○ Are all the stakeholders sharing the same understanding on the product? Can the team get the clear understanding of the value they are delivering?– Inspection<ul style="list-style-type: none">○ Daily Scrum – burndown chart○ Sprint Review – how easy is for the development team to demonstrate the increment of work to the customer and receive feedback in virtual mode?
<p>What attributes would get valued, and what skills should be enhanced to increase the efficiency of projects while working in Agile mode?</p> <ul style="list-style-type: none">– Development path elements for Scrum Master, Product Owner, team members, business and other stakeholders.
<p>What tools and applications are you using for virtual collaboration?</p>

<ul style="list-style-type: none"> - Are they promoted by your organization? - How easy is to use these tools? - Do you know where to find guidelines regarding the appropriate tools? - Is there a limitation of the tools to be used due to company's IT security policies?
<p>How can Scrum framework support to maintain and increase</p> <ul style="list-style-type: none"> - the motivation in a virtual team? - the trust in a virtual team? - the inclusion and sense of belonging in a virtual team?
<p>What are the limitations of Scrum framework in distributed teams?</p> <ul style="list-style-type: none"> - What should always be done virtually? - When are face-to-face meetings essential?
<p>What are the recommendations for applying Scrum framework in virtual environments?</p> <ul style="list-style-type: none"> - Building a knowledge base within organization? - Employees' trainings sustained by Personal Development Plan? - Utilize Lean/ Agile coaches? - Other ...

Appendix 2. Interview transcripts summary

Topics	Answers and opinions
How long have you been working with Agile methodologies and Scrum framework?	<ol style="list-style-type: none"> 1. Experience with Scrum practices in distributed teams before and after COVID-19 2. Several years, and already using remote approach before COVID-19 pandemic 3. Several years, always remote 4. Several years, always in distributed global teams 5. Several years, mostly distributed and using a mix of Scrum and Kanban
What role best describes your participation in Agile projects?	<ol style="list-style-type: none"> 1. Development team 2. Scrum Master, Product Owner 3. Product Owner, Development team, Business stakeholder 4. Product Owner, Development team, Business stakeholder 5. Product Owner, Scrum Master
How did previous knowledge and application of Scrum framework, in the organization you activate, support the organization in adapting to remote mode of working?	<ol style="list-style-type: none"> 1. Remote work has impact on Agile practices; co-located teams are more productive; the feedback loop is longer in distributed teams; pure Agile is difficult in distributed teams; the customer organization is flexible but not fully prepared 2. Always used Agile Scrum, cannot imagine how waterfall methodology would work well in distributed environments 3. External Scrum Master coach facilitated; in our organization hybrid approach applied (Configuration Owner, Solution Owner involved with MuleSoft and SAP integration); Scrum ceremonies supported with organizing team work and reduced the need for many additional meetings; daily meetings really helped to cope with the virtual setup 4. yes; it became even more important (during and after COVID); daily meetings were mission critical once COVID started; every day sharing info brings a needed level of formalization; Agile implementation: all positives; before there was no applicable methodology (waterfall did not support requirements collection and the development process); Sprints and prioritization help with divisions of tasks per period 5. yes, considering the customer organization is not an IT company; the previous company I worked for was always distributed; everybody works towards the same goal; grooming and daily stand-up ceremonies help the team (cohesion) in general
Does remote collaboration require more management from the leaders compared to collaboration within co-located teams? What specific actions would be expected from the Scrum Master, Product Owner, team members, organization?	<ol style="list-style-type: none"> 1. Metrics to be well defined and used (in co-located teams you see what is happening around you, in remote teams just metrics are visible) 2. Sometimes we experience lack of controlling, not enough info is gathered during the daily ceremonies; not requiring more effort from Scrum master, but mainly PO issue if (s)he needs to know more

	<ol style="list-style-type: none"> 3. Personal touch is missing; retrospectives help, as a team look back without judgement -> more personal bonding; for IT people – no need for management control, it is self-enabled team; for business side – much more challenging, topics were more different, functional experts that expect someone tells them what to do 4. no need for more specific management actions, sometimes managers interfere negatively with the process; in the transition, in the absence of managers the work continues as usual with Product Owner, development team, Scrum Master (backlog refinements ongoing process) 5. not more specific management actions required, but mainly a different set of skills
<p>How well is the virtual environment supporting adaptation?</p>	<ol style="list-style-type: none"> 1. Until the process is defined, feedback is needed; there could be more frequent retrospectives, however regarding the need for complementary ceremonies the team should be asked and decide – depends on team to team; the Scrum Master must ensure more coordination and bridging between the teams 2. No need to redesign Scrum ceremonies; no need from Scrum Master to change the approach in conducting ceremonies; need for complementary ceremonies depends on the team – sometimes they are self-organized, no need for additional control; sometimes some demos – part of Sprint review – may need to be done separately, but no double daily meetings required 3. If the company goes Agile way, it needs to ensure supporting material and methodology 4. Because business priorities are checked weekly, more frequent backlog grooming may be good, just to reduce the backlog 5. Scrum ceremonies do not have to be redesigned; it is just a level of attitude; no need for double daily stand-ups, as hubs are created with one team member in each country; when broader scope: hand-over call take place (i.e. team members are located in Finland and United States of America); at least two hours overlapping time proved good, for handling the priorities; forum for validation after the daily stand-ups; 20 minutes after the daily stand-ups are reserved in case clarification is needed
<p>How well is the virtual environment supporting transparency?</p>	<ol style="list-style-type: none"> 1. Metrics must be available in easily accessible and visible tools; real time data must exist; engagement from business side important – more frequent participation and business stakeholders to be included in the ceremonies 2. Documentation, when new members join, is essential for the knowledge transfer, and this can require time and effort; documentation includes user stories, user journey, development related docs; planning in ideal world should be done two-three

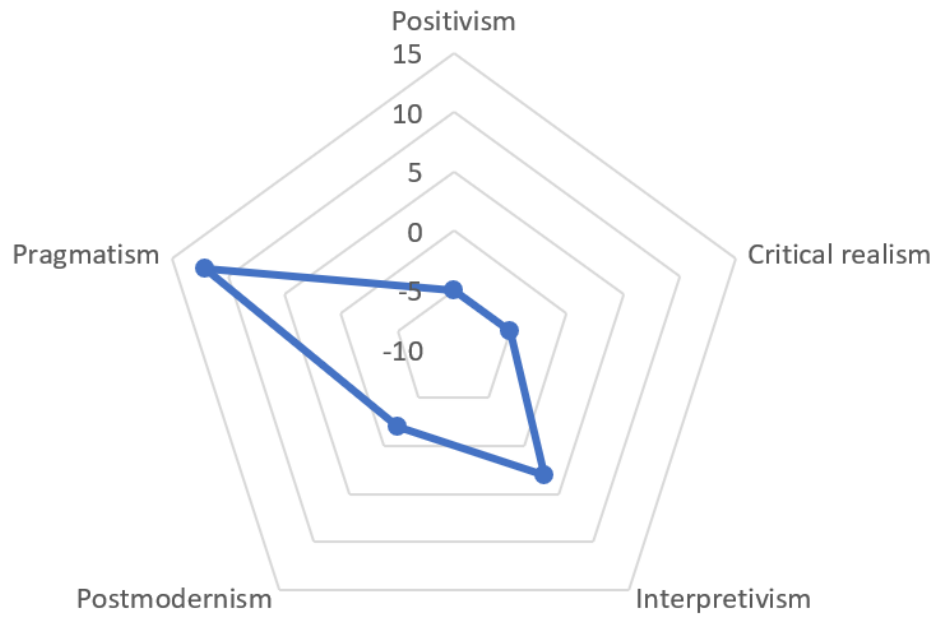
	<p>Sprints ahead, in this case work on guidelines and documentation would be better used. Related to common stakeholders' understanding – most people working in Agile got used to this; especially when multiple stakeholders, it is unlikely that businesspeople share 100% the same understanding – this is as it is in Agile</p> <ol style="list-style-type: none"> 3. Personal touch missing, lack of engagement; in IT the Product Owner and Solution Owner are hands-on with development...; in Business they mainly head priorities.... Cooperation is crucially needed, timely decisions on scope priorities and avoid last minute changes but allow flexibility; flexibility is appreciated by business, too 4. Documentation is in place; Sprint reviews presentations make sure that everybody is on the same line and business stakeholders are there 5. There are many tools...; the team must use one single tool where everything is discussed
<p>How well is the virtual environment supporting inspection?</p>	<ol style="list-style-type: none"> 1. KPI's are not always followed 2. Burndown chart is not checked every day, but it is visible in the board – attention is paid to the spikes; demonstrating the increment of work and feedback collection work ok; time may be a limitation sometimes, but this is not due to the virtual mode of working 3. In DevOps burndown chart even more effective than in co-located environment 4. Burndown chart not in focus, and not easy to follow; this is not done in daily Scrum meetings and not shown to the team; Sprint reviews help in getting better estimates 5. For demonstrating the increment of work, if good communication tools are used (i.e. Teams, Zoom) with recording functionality remote meetings can be even better than co-located; for cadence – book the Sprint reviews in advance i.e. every 2nd Thursday
<p>What attributes would get valued, and what skills should be enhanced to increase the efficiency of projects while working in Agile mode?</p>	<ol style="list-style-type: none"> 1. Scrum Master and Product Owner should know (Agile) techniques that create the feeling of inclusion, how to keep people engaged and focused; communication skills; tools knowledge 2. Scrum Master – facilitation skills; Product Owner – clarity and transparency to the team 3. Scrum Master – Scrum guide, practice tests, certification; Product Owner – certification; business stakeholders – understanding of Agile methodologies, improve understanding of what is expected from them and how to collaborate 4. Scrum Master is the most important role; always relevant what to say in the daily meetings (what did, what do, obstacles); in my project, business stakeholders are part of the team; all benefit from understanding the Agile ways since business and IT are on the same team

	<p>5. Scrum Master – facilitation skills; for business stakeholders an Agile mindset has to be built, as it is easy to avoid change if not a specialist; people have to be braver (i.e. open the cameras in live meetings); consultants must be aware of the tools, especially the collaboration tools; courses and trainings to be provided to the clients also; encourage to discover together</p>
<p>What tools and applications are you using for virtual collaboration?</p>	<ol style="list-style-type: none"> 1. DevOps, Jira, Miro; must search (in intranet and internet) to find guidelines about the tools 2. Skype, Zoom, Slack, Teams; the tools are promoted in the weekly info-sharing sessions; not that many guidelines can easily be found; tools usage limitations are mainly due to company's tool portfolio, not due to security policies 3. DevOps, Jira; the tools are not well promoted by the customer organization; for using the tools – learn by doing; the Agile coach supported with levels in DevOps (epics, features, etc); practical experience (previous participation in Agile projects) is essential 4. TargetProcess; tools are not well promoted, not easy to use and not easy to find guidelines; there is a limitation due to company security policies in the tools to be used; no link between Remedy Force (i.e. Service Requests) and TargetProcess, many manual updates required due to user access to the tools (i.e. businesspeople have no access to TargetProcess – but they have access to Remedy, resulting in additional emails exchange with manual work (copy snapshots, etc.) 5. Slack, DevOps, Jira, Mural, Miro, Menti (for facilitation, workshops), PlanIT poker; from the customer organization there is guidance to use Microsoft applications: MS Team, planning...; Agile started in IT, but not companywide; there are several roadblocks, i.e. if license is needed for certain tools it has to be paid by the respective project; the customer company security is more strict from projects perspective
<p>How can Scrum framework support to maintain and increase motivation, trust, inclusion in a virtual team?</p>	<ol style="list-style-type: none"> 1. Trust - daily Scrum to involve members and encourage communication; inclusion - some techniques applied by the Scrum Master 2. Motivation – no, Scrum processes may be felt heavy because of their frequency and repetition 3. Motivation – not; depending on frameworks, if roadblocks have to be removed then a focused teamwork will achieve the goal; Trust – the backlog belongs to development team together – communication has to work well; Inclusion – Scrum ceremonies promote inclusion, and it is very important that all ceremonies are attended and by all 4. Motivation – yes, due to engagement; Trust – yes; Inclusion – yes due to engagement 5. Yes to all; people must have an Agile mindset

<p>What are the limitations of Scrum framework in distributed teams?</p>	<ol style="list-style-type: none"> 1. None really...; face-to-face meetings may have dependence of the laboratories where physical presence is needed 2. no practical limitations 3. Scrum works well with remote teams 4. Face-to-face meetings are good for personality parts of it; in my project – this is a continuous development project – everybody knew each other before COVID-19, it was easy to keep the processes running, this is why it works so well 5. None; face-to-face meetings for team buildings
<p>What are the recommendations for applying Scrum framework in virtual environments?</p>	<ol style="list-style-type: none"> 1. Communication tools, to be utilized at their best; use communication and graphical applications to facilitate info sharing; tools must be in place for virtual teams and people trained to use them; address the cultural dimensions; use the phone when possible, to replace the lack of physical contact; feedback loop should be kept low; avoid misunderstandings; set daily targets Challenges: culture, training, tools (communication tools), control and monitoring must be well defined. 2. The most beneficial part of applying Agile is moving businesspeople to this framework; business and development must stay connected; Agile training and coaching should happen for business as well; business must be included when company wants to apply Agile Cultural dimensions – sometimes a problem and requires understanding and improvement 3. For the customer organization – utilization of an external Agile coach (neutral to the team, to observe, propose, open people’s minds); for the provider organization – it must be interested in course options, development path, opportunities to learn about DevOps, Jira and other tools, learnings about overall methodology (Agile) 4. Getting the Scrum framework setup is very important – after that, the process is going, even if team members change; cameras should always be on (if bandwidth allows); attendance to ceremonies is essential (everybody shows up every day); time zones are not an issue (in my project) business is represented by Product Owner in the same time zone with the rest of the Scrum team 5. Try to meet people you work with once-a-year face to face (i.e. in team building, quarterly planning...); read the Scrum guide, know about it; invest in virtual collaboration tools (Microsoft cannot cover all); applying Scrum framework in virtual environments depends on strategy of the team, facilitation skills and means of communicating and connecting with the people in the team/ organization.

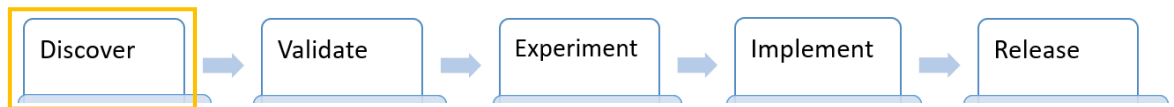
Appendix 3. HARP scores – Mihail Pop

Radar chart with HARP scores I have obtained according to the HARP quiz (Saunders & al. 2019, 161) completed during the research process.

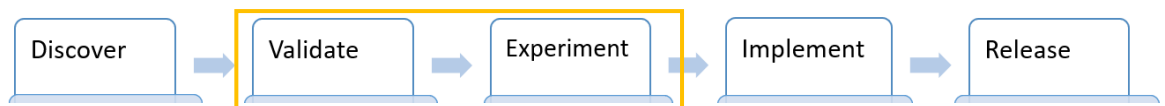
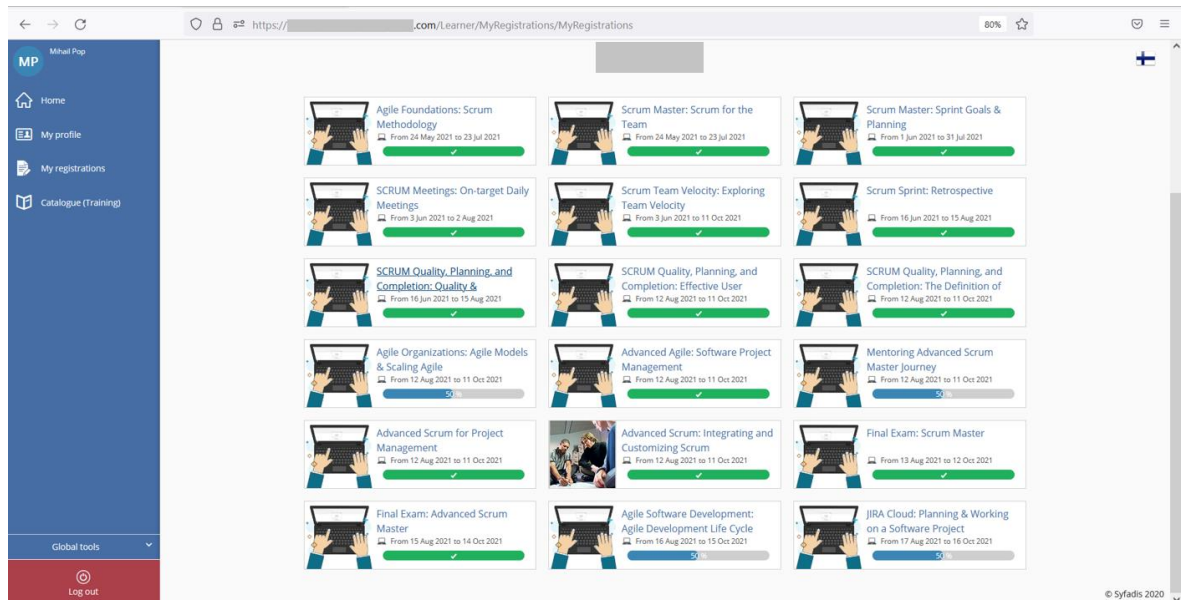


Appendix 4. Scrum Master certification programme

Milestones in the evolution of the Scrum Master certification programme during the service design process.



Good learning materials were available in the learning portal of the provider organization, however there was not a clear structure and sequence in which these should be covered.



Identified the suitability of a Scrum Master certification programme for the consultants. The learning materials were reviewed and grouped based on their content and expected preliminary base knowledge required. There were several iterations, part of the experimentation process, where the proposals were reviewed with my manager from the provider company.

From: [redacted].com>
Sent: 23 August 2021 09:23
To: Pop Mihail (EXT) <mihail.pop@kone.com>
Cc: [redacted]@kone.com>
Subject: RE: My recommendations on Scrum Master trainings

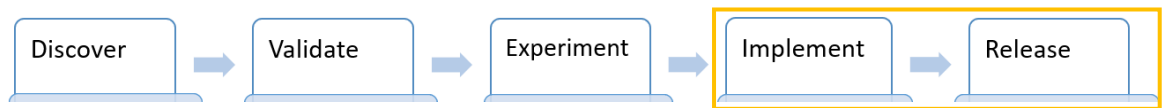
This message is from an external sender. Be cautious, especially with links and attachments.

Hi Mihail,

super, thank you! [redacted]. I appreciate very much your effort and try to push this whole matter to new person, who is taking responsibility about [redacted] portal.

The initial draft proposal included a series of tool related e-learning materials as part of the Scrum Master certification programme, but during the later reviews in the experiment phase of the service design those were excluded. Those – applications used in Agile – may be considered for a future learning programme.

	Day 1	Day 2	Day 3
Foundations	Agile Foundations: SCRUM Methodology		
	JIRA Cloud ... series		
Practitioner	Scrum Master: Sprint Goals & Planning		
	Scrum Master: Scrum for the Team		
	Scrum Meetings: On-target Daily Meetings		
	Scrum Sprint: Retrospective		
		SCRUM Quality, Planning, and Completion: Quality and Productivity	
		SCRUM Quality, Planning, and Completion: Effective User Stories	
		SCRUM Quality Planning, and Completion: The Definition of Done	
		Scrum Team Velocity: Exploring Team Velocity	
		Final Exam: Scrum Master	
Advanced			Advanced Scrum for Project Management
			Advanced Scrum: Integrating and Customizing Scrum
			Advanced Agile: Software Project Management
			Agile Organizations: Agile Models and Scaling Agile
			Final Exam: Advanced Scrum Master



The solution was implemented in the official learning centre site of the provider company during November 2021 – January 2022.

From: [redacted].com>
Sent: 21 October 2021 14:40
To: [redacted]@kone.com>; [redacted].com>
Subject: [redacted] enhancements and new Training [redacted]

This message is from an external sender. Be cautious, especially with links and attachments.

Hi,

[redacted] is a huge e-learning environment, available for all [redacted] consultants. [cut]

During next few weeks we are also developing/piloting "[redacted] Agile Programme", which is easier user interface to agile and Scrum Master courses. Our consultant Mihail Pop has studied several courses and gave me tips about relevant/good/excellent ones. Thank you Mihail sharing valuable information.

[cut]

The Scrum Master certification programme was released at the end of January 2022.

The screenshot shows a web application interface for Scrum Master certification. The page is divided into three main sections, each with a representative image and a list of topics:

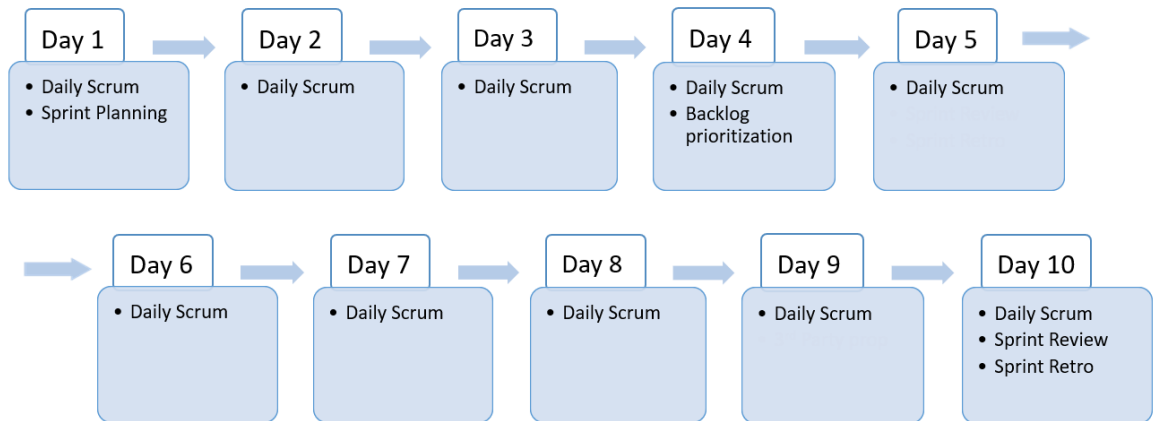
- 1 - Foundations:** Introduction to Agile, Agile Foundations: Scrum Methodology, Agile Foundations: Fundamentals, Final Exam: Agile Foundations.
- 2 - Practitioner:** Scrum Master: Sprint Goals and Planning, Scrum Master: Scrum for the Team, Scrum Meetings: On-target Daily Meetings, Scrum Sprint: Retrospective, Scrum Quality, Planning and Completion: Quality and Productivity, Scrum Quality, Planning and Completion: Effective User Stories, Scrum Quality, Planning and Completion: The Definition of Done, Scrum Team Velocity: Exploring Team Velocity, Final Exam: Scrum Master.
- 3 - Advanced:** Advanced Scrum for Project Management, Integrating and Customizing Scrum, Advanced Agile: Software Project Management, Agile Organizations: Agile Models and Scaling Agile, Final Exam: Advanced Scrum Master.

Appendix 5. Interviews date, mode, duration and the roles of the participants

Interview date	Interview mode	Interview duration	Participant roles (Scrum framework)	Participant role in the customer organization
8 th September 2021	Face-to-face	45 min.	Development team member	Head of Quality IT
13 th September 2021	Online	60 min.	Scrum Master Product Owner	Solution Design Owner
15 th September 2021	Face-to-face	60 min.	Product Owner Development team member External stakeholder	Project Manager
15 th September 2021	Face-to-face	60 min.	Product Owner Development team member External stakeholder	Senior Business Analyst
22 nd September 2021	Online	60 min.	Product Owner Scrum Master	Solution Design Owner

Appendix 6. Sprint timeline example

This example is based on real agile projects conducted in the customer organization and presents the Sprint ceremonies, the participants and the collaboration tools used during a two-week length Sprint.



The Sprint events repeat regularly at the same time, every Sprint.

Event	Duration	Participants	CIT tools
Daily Scrum	15 min.	Developers, Scrum Master, Product Owner	Azure DevOps MS Teams
Sprint Planning	90 min.	Developers, Scrum Master, Product Owner	Azure DevOps MS Teams
Backlog Prioritization	90 min.	Developers, Scrum Master, Product Owner	Azure DevOps MS Teams
Sprint Review	90 min.	Business Stakeholders, Scrum Master, Developers, Product Owner	Azure DevOps MS Teams
Sprint Retrospective	15 min.	Developers, Scrum Master, Product Owner	Azure DevOps MS Teams

Appendix 7. CIT tools examples

The following examples present the most frequently used CIT tools for project and team collaboration for the actual Agile projects conducted in the customer organization.

Microsoft Teams

Microsoft Teams supports projects and teamwork by enabling the communication and collaboration in distributed environments. It provides the possibility for the remote team members to meet across desktop, mobile or via web browser. Teams ensure secure communication through integrates meetings, messaging, and calling services. Remote team members have the possibility to share files and to create dedicated groups and private channels of communication for the specific teams or projects. (Microsoft 2022a.)

Azure DevOps

Azure DevOps offers a suite of solutions for software development teams that enable collaboration, planning, creation, and deployment of the applications. The integrated features provided by Azure DevOps include Azure Repos for source control of the code, Azure Pipelines for integration and delivery, Azure Boards for agile projects, Azure Test Plans for testing and Azure Artifacts for package sharing integration from public and private sources. Azure Boards is the solution used in the customer organization for conducting software development projects with Scrum framework. Azure Boards enable configuration of project iterations in Sprints, team backlog administration, Sprint implementation, track team capacity, display of team velocity and work effort prediction. (Microsoft 2022b.)

Atlassian Jira

Jira provides services for Agile work management that allow teams to collaborate. Jira products include Jira Software for Agile teams to plan, monitor and deliver applications, Jira Service Management for support services, Jira Work Management for business projects and Jira Align for enterprise scaled agile platform. Jira Software is the solution used in the customer organization for Scrum projects and supports Sprint and release planning, project backlog and issue management. Jira Software provides transparency and visibility across the distributed team and various stakeholders through Scrum and Kanban boards. Monitoring and progress tracking is realized through burndown charts, Sprint reports or velocity charts. (Atlassian 2022.)