MPM - Master of Project Management

The Scrum Master's Responsibilities in Distributed Work

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THE SCRUM MASTER'S RESPONSIBILITIES IN DISTRIBUTED WORK

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ABSTRACT

Agile methods have recently been popular by software development teams, with Scrum being the prominent process over the last decade. In Scrum, the Scrum Master serves the developers, the Product Owner, and the organization by coaching, leading, mentoring, planning, removing impediments, etc. Additionally, the Scrum Master is accountable for establishing the developer's effectiveness.

The global pandemic of Covid-19 has changed the world unexpectedly in well over a year. Work has mostly shifted to a remote setting, and meetings have mostly transferred to being remote. People have had to adapt to these new circumstances worldwide.

This research aimed to explore the changes that Scrum Masters and their teams have had to face through the last year by increasing distributed working and the changes in the Scrum Master's responsibilities.

The results indicate that the most significant change has been decreasing communication with stakeholders since working distributed. Additionally, not meeting socially, as the teams did before, has been a big challenge for the Scrum Teams.

1. INTRODUCTION

The work environment of many professions has undergone many changes since early 2020 worldwide. People have been working from home a lot more with different circumstances. Some have their spouses also working from home and children taking their school lessons through virtual tools. Some people must do their work from their kitchen or their bedrooms with different equipment and privacy standards which can, depending on circumstances, affect people's focus on work routines.

According to the annual State of Agile Survey, 95% of organizations surveyed practice Agile development. Of all the Agile frameworks and methodologies, Scrum is the most popular method or used by 58% of organizations. The same survey informs that 81% of organizations have Agile teams where all the team members do not work at the same location. Distributed teams may become a "new normal" due to the current worldwide health crisis (VersionOne, 2020).

In Scrum methodology, a Scrum Team consists of three different roles: one Scrum Master (SM), one Product Owner (PO), and a team of 10 or fewer developers. The PO is accountable for maximizing the value of the product resulting from the work of the developers. His/her focus is on building the right product. The developers have the skills required to deliver the business value requested by the PO. Their focus is on building the product right (Rubin, 2012) (Schwaber & Sutherland, 2020).

Cohn describes the Scrum Master as both a Servant Leader and someone with no authority over the other Scrum Team members. However, he/she has authority over the process. That gives him/her the control to make decisions when the team does not decide independently. The Scrum Master is there to help the team in its use of Scrum. The attributes of a good Scrum Master are to be responsible, humble, collaborative, committed, influential, and knowledgeable (Cohn, 2009).

The scope of this paper is the change that Scrum Masters and their teams have had since being entirely or partially co-located to being a fully distributed team. The focus is on the role of the Scrum Master, whose responsibilities change during distributed work. Distributed work entails that all team members are working from different locations. The rationale behind the selection of focus is that the Scrum Master acts as a bridge between the developers and the Product Owner and therefore is aware of the changes that have impacted the Scrum Team since working from home.

The research question is:
What changes does distributed work entail for the responsibilities of the Scrum Master role?

2. LITERATURE REVIEW

This section reviews the literature on Scrum, the Scrum Master's responsibilities, and related work in the field of Scrum in a distributed work environment.

2.1 Scrum Methodology

Scrum is an agile approach for developing innovative products and services (Rubin, 2012). It was defined in 1986 by Takeuchi and Nanaka while studying methods to create new products (Takeuchi & Nonaka, 1986). Ken Schwaber and Jeff Sutherland developed Scrum as it is known today in the early 1990s. They presented it first at the OOPSLA conference in 1995 (Schwaber & Sutherland, 2020).

At the beginning of a project, the Product Owner creates a product backlog in collaboration with the other Scrum Team members and stakeholders. The backlog is a prioritized list of features and other capabilities needed to develop a successful product. It is a constantly evolving artifact (Rubin, 2012).

The work within Scrum is in iterations that are called sprints, which are fixed lengths of events of one month or less. A new sprint starts immediately following the conclusion of the previous sprint. Within each sprint, there is Sprint Planning, Daily Scrums, Sprint Review, and Sprint Retrospective. Sprint Planning is for laying out the work in the upcoming sprint and can take about four to eight hours, depending on the length of the sprint. Daily Scrum is a 15-minute event for the Developers of the Scrum Team. The primary purpose is to inspect progress within the sprint and adapt the sprint backlog, as necessary. Sprint Review is to examine the outcome of the sprint and determine future adaptations. The Scrum Team presents the work and progress for the stakeholders. The last event of each sprint, the Sprint Retrospective, is to plan ways to increase quality and effectiveness. The focus is on continuous process improvement to help Scrum Teams become great (Rubin, 2012) (Schwaber & Sutherland, 2020).

2.2 The Scrum Master's Responsibilities

The Scrum Master is responsible for the Team's effectiveness while serving the Scrum Team and the larger organization (Schwaber & Sutherland, 2020). He/she makes sure that all the pieces of the Scrum process come together and work as a whole (Schwaber, 2004). The Scrum Master does this by helping everyone to understand and embrace the Scrum values, principles, and practices (Rubin, 2012). He/she conducts daily coordination meetings and removes any impediments that the team encounters (Schwaber & Beedle, 2002). An online survey from 2019 revealed that 91% of IT professionals with Scrum experience think that the Scrum Master is important for the success of Scrum methodology (Ereiz & Mušić, 2019).

Table 1 summarizes the literature on the Scrum Master's responsibilities. These responsibilities are defined as follows:

   Coach involves coaching the team members in self-management and cross-functionality (Schwaber & Sutherland, 2020).
   A Servant Leader is a leader for the Scrum Team who ensures the highest priority needs are met (Rubin, 2012).
   Process Authority involves the Scrum Master ensuring that the team enacts and adheres to the Scrum values, principles, and practices, along with the team's specific approaches (Rubin, 2012).
   Interference Shield involves protecting the developers from outside interference to remain focused on delivering business value at every sprint (Rubin, 2012).

Impediment Remover is removing all impediments that inhibit the team's productivity (Rubin, 2012).

Change Agent involves helping others understand the need for change (Rubin, 2012).

Scrum Events involve ensuring all Scrum Events occur and are positive, productive, and kept within the timebox (Schwaber & Sutherland, 2020).

Table 1 - The Scrum Master's responsibilities according to literature (Rubin, 2012) (Schwaber & Sutherland, 2020) (Cohn, 2009) (Sochova, 2016)

Responsibilities	Rubin	Schwaber & Sutherland	Cohn	Sochova
Coach	X	X	X	X
Servant Leader	X	X	X	X
Process Authority	X	X	X	X
Interference Shield	X			X
Impediment Remover	X	X	X	X
Change Agent	X			
Scrum Events		X		X

According to table 1, the authors agree that part of the Scrum Master's responsibilities is to be a Coach, a Servant Leader, Process Authority, and an Impediment Remover. Schwaber & Sutherland additionally mention the service the Scrum Master brings to the organization as leading, training, and coaching the organization in its adoption of Scrum, planning, and advising implementations of Scrum within the organization (Schwaber & Sutherland, 2020).

Noll et al. did a systematic review to identify activities performed by Scrum Masters. These activities were process facilitation, ceremony facilitation, and impediment removal (Noll et al., 2017). Bass's study of Scrum Master reveals the six most common activities (Bass, 2014). These activities are process anchoring, stand-up facilitating, impediment removing, sprint planning, Scrum of Scrum facilitating, and integration anchoring.

2.3 Related Work
At the time of this data gathering, the Covid-19 pandemic has been active for over a year. People in software development (among others) have had to work a lot more from home. There have only been a few studies about the effect of the pandemic on working according to Scrum methods, but there has been a lot of research done on using Scrum in distributed teams.

The most common challenges found while using Scrum in distributed teams have been issues with synchronous communication. Other issues have been collaboration difficulties, communication bandwidth, tool support, large teams, and office space (Hossain et al., 2009). In more recent years, the most common issue encountered by distributed Scrum Teams has been communication, especially among stakeholders (Wu & Wang, 2020).

Recent studies have shown that Scrum Teams can adapt to distributed software development projects (Faniran et al., 2017). The new circumstances caused by Covid-19 do not significantly impact the projects (Marek et al., 2021).

Work Environment and Procedures
Before the pandemic, distributed teams usually consisted of people from different countries or regions, whereas now, former co-located teams have had to work

more hours from home than in the office. For teams that were co-located before the pandemic, it was easier to plan meetings when everyone was at the office. Some people stopped working 9-5 since they started working from home (Connor et al., 2021). People tend to work more flexible hours, while some team members prefer to work from home because of those flexible hours, fewer interruptions, and having all the tools needed (Badiale, 2020).

The reduction of social time during working hours is often passively factored into project and release plans. Therefore, the workday is closer to contracted hours while working from home, magnifying intensity to the workday that workers have not experienced before. This increases the risk of fatigue and burnout, impacting the overall team, and the product may suffer (Griffin, 2021).

The whiteboard is used by Scrum Team members while working co-located, for example during Sprint Retrospective meetings, solving issues, or planning a sprint. However, it has not effectively been transferred into a remote work setting (Connor et al., 2021).

Meetings and Scrum Events
A recent study revealed that since the pandemic started, more meetings are within teams, and they last longer than before (Connor et al., 2021). The most common issues in meetings encountered by distributed Scrum Teams in the past were people going off-topic, together with lack of involvement or low enthusiasm for participation for some team members (Wu & Wang, 2020). The solutions suggested by Wu & Wang are designed to control the rhythm to ensure that meetings do not deviate from the subject and, for participation issues, to consult colleagues or discuss in informal meetings.

There have been increased distractions from instant messaging since the pandemic, which leads to more challenging context switching (Connor et al., 2021). The same also applies to emails that can be distracting when everybody is on their computer during meetings, resulting in a lack of focus within teams (Griffin, 2021).

Some challenges can occur with Daily Scrums while working in a remote setting. When co-located, problem-solving after the meeting could contain a quick chat after the daily stand-up while remotely, everyone logs out after the meeting (Connor et al., 2021). Extending the meeting from 15 minutes to 30 minutes with the second half blocked for problem-solving could solve such a problem (Comella-Dorda et al., 2020). Another suggestion for Daily Scrum to go smoothly in a remote setting is encouraging teams to use video to keep them engaged and focused (Comella-Dorda et al., 2020). Daily Scrum can also be performed through instant messaging application for consumption by the team at their own pace to reduce waste (Griffin, 2021)

Since Sprint Planning can go on for four to eight hours, it is easier to achieve engagement for a more prolonged period when held in person than when working from home. Griffin suggests breaking Sprint Planning down into smaller, consumable pieces (Griffin, 2021). Other suggestions are to encourage prep work ahead of time and agree on what to achieve offline (Comella-Dorda et al., 2020).

For Sprint Review, there are suggestions to keep presentation content crisp and concise and to integrate content in one place with one person (Comella-Dorda et al., 2020). Griffin also suggested having pre-recorded demos so the team can consume their own time (Griffin, 2021).

Communication and Social Interaction

Good communication in Scrum Teams is essential. The team members exchange valuable information that needs to be transparent to provide a clear understanding which avoids surprises and helps build trust among the team members (Rubin, 2012).

In the review literature of challenges of distributed Scrum Teams by Wu & Wang, one of the most significant issues was a lack or difficulty of synchronous communication. Synchronous communication is necessary to improve mutual understanding. Other issues were inefficient or ineffective communication due to a lack of suitable communication tools and insufficient network bandwidth. However, the most common issue encountered by distributed Scrum Teams is communication with stakeholders (Wu & Wang, 2020).

When it comes to communication, body language can tell us a lot about people's feelings and behavior. Understanding body language and behavior changes during distributed working can be a challenge (Connor et al., 2021). This challenge increases for those who do not have a web camera or have it turned off. The human aspect is absent, such as facial expression, body language, and tone of voice, which produces a loss of communication (Badiale, 2020).

A recent study of distributed software development teams conducted that the Covid-19 pandemic influenced communication to some extent since the office interactions are not present (Badiale, 2020). For hybrid teams before the pandemic, the fully remote work improved communication since all communication transferred online. (Marek et al., 2021)

While working remotely, there is a reduction of social time with team members and other co-workers. There are no common coffee breaks, corridor chats, and watercooler conversations, resulting in issues not being revealed as quickly as before. There could be regular social meetings for Scrum Teams (Connor et al., 2021). For instance, online virtual coffee breaks increase online communication and interactions (Badiale, 2020). Social meetings can also be hosted, such as virtual parties or games for distributed team members (Hossain et al., 2009).

Productivity

There have been different results from studies on whether co-located teams or distributed teams are more productive. For example, Teasley et al. performed a study which resulted in co-located teams being more productive than distributed teams, even when distributed in the same building (Teasley et al., 2000). In contrast, Stanford professor Nicholas Bloom performed a study that showed that working in a remote setting can lead to a 13.5% performance increase (Bloom, 2014).

A recent study since the pandemic has indicated that there has been increased response time between Scrum Teams which causes delays (Connor et al., 2021). And some team members in a recent case study felt that the situation with the pandemic is affecting their availability and productivity to work (Badiale, 2020).

3. RESEARCH METHOD

With this research, the aim was to explore the changes that distributed work entails for the Scrum Master's responsibility compared to working at the office. These changes are working methods, Scrum Events, communication, meetings, and productivity in the last 12 months compared to the preceding 12 months.

That comparison can show the changes, since all participants had to turn to distributed working due to Covid-19.

A qualitative method was conducted in the research using semi-structured interviews with the opportunity to ask supplementary questions. The qualitative method was more suitable than quantitative for data collection in this study in order to gain an in-depth and contextual understanding of the impact of working primarily from home during the pandemic in the Scrum environment.

3.1 Participants
The participants were selected from seven different types of companies to gather different views. Those companies were either in the software industry or had software departments, all of which worked according to the Scrum methodology.

Eight interviews took place with nine participants, five of whom were men and four women. One interview was conducted with two interviewees at the same time from the same company. This resulted in two different views, since their teams are separate, and they work on different projects. They answered the questions in turn with different results.

The participants were all either active in the Scrum Master role or comparable roles with Scrum Master responsibilities. Seven of them had completed a Certified Scrum Master course. Six of them had other responsibilities: two were project managers, two were quality assurance testers, one was a director, and one was a CTO.

All the participants had years of experience working in the software industry, the average being 17 years. They also had years of experience working in Scrum before and during the pandemic, which was essential to get their views and expertise in shift changing to a distributed working environment. Each of them is responsible for one to three teams.

3.2 Interviews
All the interviews took place online using Microsoft Teams since all the participants worked from home or an empty office because of the Covid-19 pandemic. The interviews were all recorded and documented, and the scheduled timing of the interviews was based on the participant's available hours. Each interview lasted approximately 20-30 minutes, with the exception of the interview with the two participants that took 55 minutes. The conduct of the interviews took place in early April 2021 (April 6th – 14th). Before the interviews started, the participants were informed about confidentiality and anonymity in the information process.

The question list had 22 open questions that were asked during each interview for the answers to be comparable. The questions were divided into three categories, as seen in table 2. The actual interview questions can be seen in the Appendix. The interview questions were designed to answer the research question on the changes that distributed work entails for the responsibilities of the Scrum Master role. Therefore, the focus of the questions was on the changes the Scrum Masters and their teams had experienced the last 12 months since working in a distributed work environment.

Table 2 – Overview of the questions submitted in the interviews.

Category	Types of questions	Number of questions
General	Job, experience, responsibilities, projects, teams	8
Changes in the last 12 months	Work environment, work procedures, Scrum Events, communication, sprints, productivity	8
Scrum experience in distributed working	Challenges/obstacles, went well, went badly, communication importance, learning outcome	6

3.3 Data Analysis

The data analysis was conducted after all interviews had been taken. After each interview, the researcher listened to each of the recordings and documented the answers quite thoroughly to ensure consistency. Then the researcher compared the responses to each question from all the participants to analyze the similarity between the answers. The results were categorized into five themes:

1) Work environment and procedures, 2) meetings and Scrum events, 3) communication and social interaction, 4) productivity, and 5) future.

The themes contain the results from the corresponding interview questions as seen in table 3.

Table 3 – The result themes with corresponding question categories.

Theme	Changes in the last 12 months	Scrum experience in distributed working
Work environment and procedures	X	
Meetings and Scrum Events	X	
Communication and social interaction	X	X
Productivity	X	
Future		X

4. RESEARCH RESULTS

All the participants that were in the Scrum Master role or in comparable roles marked which of the Scrum Master responsibilities analyzed from theory, they perceived as their responsibilities. As seen in table 4, five of the participants perceived that they had all the responsibilities listed to be included in the Scrum Master role. On the contrary, four interviewees had perceived their responsibilities differently. Participant C and E, who both regarded themselves as project managers, shared the same responsibilities. Neither of them is responsible for the Process Authority aspect nor the Scrum Events. Participants B and D are both in the Scrum Master role as well as being Quality Assurance Testers. Still, their responsibilities vary, except neither of them is has the responsibility of being a Change Agent. Participant B declared that the Product

Owner is responsible for what was lacking in her Scrum Master role responsibilities in her work. All the participants agreed that being an Impediment Remover was a part of their responsibilities. Eight of the informants also had the responsibilities of being a Coach, a Servant Leader, and an Interference Shield. Seven of the informants had the responsibilities of called: Process Authority, Change Agent, and Scrum Events.

Table 4 - The participants' responsibilities

Responsibilities/Participant	A	B	C	D	E	F	G	H	I
Coach	X		X	X	X	X	X	X	X
Servant Leader	X	X	X		X	X	X	X	X
Process Authority	X	X		X		X	X	X	X
Interference Shield	X		X	X	X	X	X	X	X
Impediment Remover	X	X	X	X	X	X	X	X	X
Change Agent	X		X		X	X	X	X	X
Scrum Events	X	X		X		X	X	X	X

Work Environment and Procedures
All participants and their teams have had to work most of the last 12 months or longer from home since the Covid-19 pandemic started. In some cases, a few of them have been able to work in the office with strict rules and few employees at a time for a short period. The effect is different between companies and even departments, since there were hybrid teams before the pandemic started for four of the nine participants.

The experience of working from home can be different for different people, but four participants felt it had been successful with few challenges. Two participants said that distributed working suits people in different ways. The people in their teams have different circumstances at home that they must consider.

Most participants did not think that the work procedure had changed since they started working from home, or that there were only minor changes. Four participants noticed that the increasing number of remote meetings and meetings moved to a remote setting. The infrastructure for working in a distributed environment had already been implemented for participant F and his teams before the pandemic started, so there was no big adjustment. For participants B and C, they and their teams needed to make the working procedure better. For example, participant C and his team found a solution to deliver all their projects remotely.

Five participants moved their tablet drawings and post-its to a virtual tool like Miro. One participant made these remarks: "It went well to move things to Miro, and there can be a lot implemented online that is harder to perform in person. The overview is straightforward in tools like Miro."

Meetings and Scrum Events
Five participants had team member(s) from other regions in Iceland or other countries before the pandemic, so their meetings were already remote. Still, the change was that everybody started being online at the meetings, not just the team members from other locations. Before the pandemic, these participants all had their meetings in meeting rooms at the office with co-located members attending while members from different areas connected remotely. Two of the participants said that now that everybody is online during virtual meetings, it makes all team members more equal than before. One participant was happy that

it was a lot easier to reschedule meetings since the necessity of finding a meeting room is not relevant while working distributed.

Two participants mentioned the importance of having the video camera turned on during meetings. They talked about wanting to see people's faces and know they are monitoring the discussion. The discussion about recording meetings also came up with two participants, which they felt was essential as absent team members could then view the meetings later.

The modifications of the Scrum Events in the last 12 months compared to the preceding 12 months were different between participants. For two of them, the Daily Scrums have lengthened since they started working from home, as they added extra time to get the opportunity to discuss things that they usually addressed in the office after the daily meetings before the pandemic. The opposite occurred for another participant: The Daily Scrum became shorter than before due to fewer social discussions. Two participants thought that the Daily Scrums were more efficient done remotely, both because the team members attend simultaneously and because attendance has increased when everyone is working from home.

As for the other Scrum Events, two participants felt that the meetings go on longer without being decided beforehand while being held online. Other participants did not mention the Sprint Review being any different, except for one who informed that the Review is more valuable being presented online versus in a hall filled with people. The Sprint Retrospective has been valuable to three participants since they started to work from home as it highlights problems when working distributed that they can deal with, for example, when there are challenges with working from home or with communication.

According to all the interviewed participants, working from home has not affected sprints, their framework, or their length. One participant felt that she and her team had an easier time planning each sprint while working from home because of their improved work procedure. One participant described how the Scrum layout is helpful in distributed work, while another felt it was impressive how well Scrum fits into distributed working.

Communication and Social Interaction
The communication since working from home has changed so that the Scrum Teams do not have the same opportunity to discuss issues that come up as effortlessly as sitting near each other in the office. According to four participants, the information is not flowing between team members as much as before. If they get stuck, they try for a longer time than when co-located before asking another team member. A few participants remarked on solutions to this problem:

- "There is a bigger need now to ask the team if there is something that stops their work."
- "Everybody can communicate through chat and video calls, but there was much more silence through those channels at the beginning."
- "When a problem occurs that multiple team members need to solve together, they have an open virtual meeting where they can ask or give information if they need to. In the meantime, they work at their computer in silence."

On the other hand, three participants said that their teams were as active in communication as before. Participant H even stated that the communication was better while working from home. However, like participant E, that participant was in a hybrid team before the pandemic. Both experienced that team members

showed more understanding of the original distributed team members since they all had to work distributed.

Communication with the stakeholders seems to be more challenging than within the teams during distributed working. Three of the participants even felt that this was the most significant effect of the pandemic. All the participants except one reported less contact with stakeholders in the last 12 months than in the preceding 12 months. But even that one participant declared the communication was less when first starting to work from home. He stated that now they are using more online tools, so the stakeholders have become more active. According to seven participants, the decreased communication was primarily due to not meeting face-to-face as they could before. Two of them could even walk to their stakeholder's desk to discuss matters while working at the office. Some participants had resourceful solutions:
-   "The communication has improved after holding workshops."
-   "When the need for changes appeared, we held workshops for one to two days with the stakeholders."

One of the most discussed challenges for the participants and their teams while working from home is the lack of social interaction. Seven of them talked about how they missed meeting each other and other co-workers in person, either in the workplace or outside.
-   "People want to get together. It's a challenge not being able to meet and do something fun."
-   "The hardest thing in the last 12 months is not being able to celebrate anything. It's sad not to go out to dinner together or reward the team with a cake when they do a good job."

Participant G informed that a survey in his company showed that loneliness has increased among his co-workers since the pandemic started. That seems to be recurring in other companies too. Participant I felt like it is harder to maintain the team's morale, and participant C felt there appears to be a momentum that needs rebuilding within his company.

The participants discussed various solutions that they or their company had done to minimize the social distance while working from home. Almost half have had successful social meetings (coffee breaks) once a week up to once a day with their team. These meetings contain either chat or playing online games. The solution for one team was to have a social chat channel. Four participants also talked about attending virtual parties held by the company or the department.

Productivity
The participants' opinions varied when asked whether there were any productivity changes while working more distributed. Two participants felt the productivity had decreased, three thought it had increased, three thought it was similar to before, and one participant could not make a judgment. One participant discussed a survey done by his company that showed that people felt they were accomplishing more work while working from home. Three participants felt like they get more privacy at home to focus better on their work. And three others said their teams had a longer workday from home than in the office, especially at the beginning of the pandemic.

Future
Four participants felt like work should be in a more hybrid environment in the future, with people having the freedom to choose their work location. Two participants hoped to work less in a remote setting in the future. The participants

had a few comments about their take on how they hope meetings will evolve after the pandemic:
- "I would like to keep on having remote meetings even if part of the team is in a meeting room. Then those people can have the video camera turned on and only one microphone."
- "I would like to keep the meeting culture in a remote setting, so everybody is equal."
- "I hope that after the pandemic, we can bring back face-to-face meetings with the customers."

5. DISCUSSION

Since the Covid-19 pandemic began reaching people worldwide, many have had to work from home for the last year or even longer. The effect that working distributed could have on the Scrum Master's responsibilities was the aim of this research. The changes that affect working distributed according to Scrum the most are that all Scrum Events and meetings were moved to a remote setting.

The results in this study are based on interviews with nine participants who either have the role of Scrum Master or have similar responsibilities. It is not easy to generalize results based on interviews. Still, the results give reasonable indications for the changes for Scrum Masters and their teams when moving to a distributed environment from co-located.

The participants' responsibilities seem to be similar to what the literature suggests as the responsibilities for Scrum Masters, where authors agree that responsibilities consist of coaching, being a Servant Leader, Process Authority, and removing impediments. All participants are responsible for removing impediments, eight of the nine are Coaches and Servant Leaders, while seven Process Authority.

Previous research on working with Scrum in a distributed setting claims that the most common issue is communication with stakeholders (Wu & Wang, 2020). This is in line with the results from this study that indicate that the main issue for Scrum Teams since the participants started working from home is less communication with stakeholders. The reason behind that was that they could not meet their customers face-to-face as they did before the pandemic. Few participants felt it was more formal to email the stakeholders than walk to their desks as they could while working at the office. The possible effect for Scrum Masters and their teams of less contact with stakeholders could be a decrease in the quality of their product or an increase in waiting time, leading to less productivity. However, that needs to be researched further. According to Ahmad et al., customer communication and close collaboration are crucial for the development team and project success, but this becomes more complex in distributed teams (Ahmad et al., 2018).

The results show that the communication within the Scrum Teams has decreased for half of the participants. So, the effect of less communication is not as crucial as with the stakeholders. However, those participants informed that their team members were not as quick to ask for assistance or discuss issues as they did while sitting near each other in the office. As a result, they tend to try solving issues by themselves before asking other team members. Thus, the possible effect for the Scrum team can halter the project success, which could be researched further. A recent study done a few months into the pandemic showed that communication was influenced by working from home since office interactions are not present (Badiale, 2020). As for teams that were hybrid before

the pandemic, the communication improved (Marek et al., 2021). This corresponds with the view of the participants in this study who were in hybrid teams before the whole team became distributed.

In their study, Connor et al. pointed out that one of the challenges while working in a distributed Scrum Team is failure to incorporate co-located social constructions of time into Covid-19 distributed working (Connor et al., 2021). In this study, most participants felt social interaction was a big challenge. They had various solutions, for example taking virtual coffee breaks, playing online games, and having virtual parties.

Since distributed working began in earnest, all meetings that were at the office before the pandemic are now virtual. Hybrid teams usually had virtual meetings even though co-located team members attended meeting rooms. Connor et al. said that since the pandemic started, there have been more meetings, and they last longer than before (Connor et al., 2021). Only one participant in this study had that experience, but he was unsure if it had to do with working from home or the changes in his company.

Since this shift in the working environment, Scrum Team members tend to work more flexible hours and even have a longer workday than before (Connor et al., 2021) (Badiale, 2020). Few of the participants in this study mentioned that this was the case, especially early on. Connor et al. also discussed that the whiteboard had not been effectively transferred to a remote work setting (Connor et al., 2021). That issue seems to be resolved by using a tool like Miro, which is done by just over half of the participants in this study.

The results indicate that working from home does not seem to affect the Scrum Events for most of the participants. The Daily Scrum is now longer for two of the participants for the team in order to discuss issues that they previously addressed in the office. Comella-Dorda et al. suggested extending the Daily Scrum from 15 minutes to 30 minutes, with the second half blocked for problem-solving (Comella-Dorda et al., 2020). The sprints tended to stay the same for all the participants in this study while working from the office.

There seems to be a difference in the productivity changes for Scrum Teams since they started to work from home, but participants had different opinions on that. However, Badiale and Connor et al. indicate that there has been a decrease in productivity for Scrum Teams since the pandemic started (Badiale, 2020) (Connor et al., 2021).

This situation has revealed that some people like working from home and would like to continue to do so, especially for one or a few days a week. And the meeting culture might be here to stay, since so many are happy with the setting.

The results in this study are based on interviews with nine participants in the Scrum Master role or having Scrum Master responsibilities, even though the informants did not all have that title. One of the limitations of the study is that not all participants worked entirely as Scrum Masters. Future studies might include more Scrum Masters or include looking at perspectives of other Scrum Team members, like the Product Owner role or the Developers. Future research studies could also include studying the effect of less communication on the project and productivity, especially with stakeholders while working distributed after the Scrum methodology. It would also be useful to study the long-term effect of following the Scrum process in a distributed work environment since this research took place only a year into the Covid-19 pandemic.

6. CONCLUSIONS

In this project I have studied what changes are reported on the responsibilities included in the Scrum Master role in distributed work in the last year. The results show that the main changes are that all the Scrum Events are now virtual along with all communication and meetings. Some of which have been demanding for the Scrum Masters while others became easier.

Previous studies on working in Scrum projects since the Covid-19 pandemic started have shown that there is an indication of a decrease in productivity, longer workdays, and more and longer meetings. These studies were conducted only a few months into the pandemic. In contrast to previous studies, this research was conducted after the participants had been working from home for over a year.

The results from this study do not show that productivity has decreased, and only a few participants tended to have longer workdays but only in the first months of the pandemic. In addition, there was no change reported in the number and duration of meetings during the period of the study except for one participant.

Additionally, the results indicate that the main issue for Scrum Masters and their teams when moving from co-located to a distributed work environment is less communication with stakeholders. The lack of communication within the teams did not seem to be as much of a problem, though half the participants said the flow of information between team members was not as much as before. Another issue that most of the participants discussed was the lack of social interaction within the teams. Some of them felt that the most challenging thing about working from home was not meeting each other.

Moreover, the results show that working from home does not seem to affect the Scrum Events for most of the participants. It would mainly be the Daily Scrum that was in a changed format for some of the informants. But the sprints stayed the same in length for everyone. Most of the participants felt that following the Scrum process while working from home was easy.

7. ACKNOWLEDGEMENT

8. REFERENCES

Ahmad, M. O., Lenarduzzi, V., Oivo, M., & Taibi, D. (2018). Lessons Learned on Communication Channels and Practices in Agile Software Development. *2018 Federated Conference on Computer Science and Information Systems*, 929–938.

Badiale, M. E. (2020). *The dynamics of communication in global virtual software development teams: A case study in the agile context during the Covid-19 pandemic*(Dissertation). Retrieved from http://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-413832

Bass, J. M. (2014). Scrum Master Activities: Process Tailoring in Large Enterprise Projects. *2014 IEEE 9th International Conference on Global Software Engineering*, 6–15.

Bloom, N. (2014). To Raise Productivity, Let More Employees Work from Home. *Harvard Business Review*, *January-February*, 28–30.

Cohn, M. (2009). *Succeeding with Agile: Software Development Using Scrum*. Pearson Education.

Comella-Dorda, S., Garg, L., Thareja, S., & Vasquez-McCall, B. (2020). Revisiting agile teams after an abrupt shift to remote. *McKinsey & Company*. Retrieved from https://www.mckinsey.com/business-functions/organization/our-insights/revisiting-agile-teams-after-an-abrupt-shift-to-remote

Connor, M. O., Conboy, K., & Dennehy, D. (2021). COVID-19 affected remote workers: A temporal analysis of information system development during the pandemic. *Journal of Decision Systems*, 1–27.

Ereiz, Z., & Mušić, D. (2019). Scrum Without a Scrum Master. *2019 IEEE International Conference on Computer Science and Educational Informatization (CSEI)*, 325–328.

Faniran, V. T., Badru, A., & Ajayi, N. (2017). Adopting Scrum as an Agile approach in distributed software development: A review of literature. *2017*

1st International Conference on Next Generation Computing Applications (NextComp), 36–40.

Griffin, L. (2021). Implementing Lean Principles in Scrum to Adapt to Remote Work in a Covid-19 Impacted Software Team. *Lean and Agile Software Development*, 177–184.

Hossain, E., Babar, M. A., & Paik, H. (2009). Using Scrum in Global Software Development: A Systematic Literature Review. *2009 Fourth IEEE International Conference on Global Software Engineering*, 175–184.

Marek, K., Wińska, E., & Dąbrowski, W. (2021). The State of Agile Software Development Teams During the Covid-19 Pandemic. *Lean and Agile Software Development*, 24–39.

Noll, J., Razzak, M. A., Bass, J. M., & Beecham, S. (2017). A Study of the Scrum Master's Role. *Product-Focused Software Process Improvement*, *10611*, 307–323.

Rubin, K. S. (2012). *Essential Scrum: A Practical Guide to the Most Popular Agile Process*. Addison-Wesley.

Schwaber, K. (2004). *Agile project management with Scrum*. Microsoft Press.

Schwaber, K., & Beedle, M. (2002). *Agile Software Development with Scrum*. Prentice Hall.

Schwaber, K., & Sutherland, J. (2020). *The 2020 Scrum Guide*. The Scrum Guide. https://scrumguides.org/scrum-guide.html

Sochova, Z. (2016). *The Great ScrumMaster: #ScrumMasterWay*. Addison-Wesley Professional.

Takeuchi, H., & Nonaka, I. (1986). The New New Product Development Game. *Harvard Business Review*, *64*(1), 137–146.

Teasley, S., Covi, L., Krishnan, M., & Olson, J. (2000). How does radical collocation help a team succeed? *Association for Computing Machinery*, 339–346.

VersionOne. (2020). *State of Agile Survey*. The 15th Annual State of Agile

Survey. https://stateofagile.com/

Wu, L., & Wang, Z. (2020). *Understanding and managing the challenges of*

distributed scrum teams (Dissertation). Retrieved from

http://urn.kb.se/resolve?urn=urn:nbn:se:bth-20622

9. APPENDIX: INTERVIEW QUESTIONS

General
- For how many years have you worked in a paid job connected to software development?
- For how long have you been a Scrum Master?
- How would you describe your job as a Scrum Master?
- As a Scrum Master, what responsibilities do you have daily/weekly/monthly?
- Is the Scrum Master role your only job, or do you have other subjects at work?
- How many teams are you a part of, and how many people are on the teams?
- What kind of projects are you mainly working on now?
- What kind of projects have you mainly worked on in the last two years?

Changes in the last 12 months
- What changes have been made within your company (or department) in the last 12 months within the work environment?
- What changes have you made to your work procedures the last 12 months compared to the preceding 12 months?
- What changes have been in your team's work procedures the last 12 months compared to the preceding 12 months?
- Was there any change in Daily Scrum, Sprint Planning, Sprint Review, or Sprint Retrospective in the last 12 months compared to the preceding 12 months, like their number, length, and efficiency?
- Was there any change in the communication within your team(s) during the last 12 months compared to the preceding 12 months? *(and if so, then in what way, more, less, other hours, was everybody as active)*
- Was there any change in the communication with other stakeholders in the last 12 months compared to the preceding 12 months? *(product owner, users, customers)*
- Was there any change in the length of the sprints or their design in the last 12 months?
- Can you evaluate if there has been any difference in productivity over the last 12 months compared to the preceding 12 months?

Scrum experience in distributed working
- What are the main challenges/obstacles you and your team(s) have encountered in the last 12 months?
  - Did you come up with any solutions?
- What went well for you and the team(s) (gave you the most accomplishment) in the last 12 months?
- What went badly for you and the team(s) during the previous 12 months?
- What is essential to have in mind in your opinion when it comes to communication during distributed working?
- What would you like to keep going, stop doing, and start anew in the next six months, building on your experience during the last 12 months?
- Is there anything you would like to add about your experience working in Scrum over the previous 12 months?