

Leiden University

ICT in Business and the Public Sector

A deeper understanding of pandemic programming

A thorough analysis of the effects of a sudden shift to working digitally on software development teams, development team members and cross team collaboration.

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1 Abstract

Background

The pandemic has forced software development teams to make a sudden shift to working from home. This impacted the way of working of individual team members, the way they worked together as a team and the way they collaborated with other teams. In this thesis, the data set from the 'pandemic programming' paper by Ralph et al. [89] is analysed and supplemented with qualitative interviews in order to explain the quantitative findings. Besides the experiences from the view point of individual developers, that were discussed in the paper by Ralph et al., we also researched the effects of the pandemic on development teams and cross team collaboration.

Aim

The purpose of this thesis was to provide a deeper understanding of the effects of working from home, as a result of the Covid-19 pandemic, on software development teams.

Method

A mixed methods approach was applied in which the raw data set from a survey of 2.225 software developers, was analysed to get a quantitative insight into the effects of forced working from home on individual software developers. After that, 10 people involved in software development teams were interviewed about their professional experiences during the pandemic, in order to qualitatively interpret the effects of forced remote work on development teams, individual team members and cross team collaboration. The 6 categories of the Teamwork Quality Model by Hoegl and Gemuenden [53] were used to analyse the effects of working from home on collaboration within teams. The 3 coordination mechanisms to the 'Big Five' core teamwork components, defined by Salas et al. [92] were used to analyse the effects of working from home on collaboration between different teams.

Results

The concentration, performance and way of working of individual development team members were impacted by having to work from home, but the extent to which they were impacted was, among other factors, dependent on their level of experience in software development and their previous experience with working from home. Collaboration within development teams was made harder by working from home, mostly due to issues related to communication. Mutual support within teams was negatively impacted by working from home, because less experienced team members found it more difficult to ask for help and more experienced team members found it harder to see who needed help. Collaboration between teams was more challenging when working from home. Most of these challenges were related to communication as well.

Conclusions.

The findings contribute to research in the field of working from home, specifically for software development teams. By analysing the effects of forced remote work on software development teams, this thesis provides practitioners with the knowledge and recommendations to more effectively manage the transition to working from home, when the next pandemic takes place. The research builds on the 'Pandemic Programming' paper by Ralph et al. [89] by providing a qualitative context to their survey data on the effects of the pandemic on individual software developers and organisational support measures. The research also provides structural insights into the effects of working from home on software development teams and cross team collaboration. The effects of the pandemic on development teams are researched through the application of Teamwork Quality Model by Hoegl and Gemuenden [53]. The effects of the pandemic on cross team collaboration are researched through the application of the coordination mechanisms to the 'Big Five' core teamwork components, defined by Salas et al. [92].

2 Introduction

The Covid-19 pandemic has heavily impacted the lives of people all over the world. Walker [101] states that, as a reaction to the Covid-19 pandemic, many countries have implemented social distancing through control measures on many aspects of society. Among other societal aspects, these measures had a significant impact on mobility. According to Waizenegger et al. [100], the Covid-19 pandemic has forced many people who were previously working at the office, to work remote. A survey by Gartner showed that, by March 2021, 88% of organisations had asked their employees to work from home as a result of the Covid 19 pandemic [44]. This greatly impacted their personal lives and the way they worked. Workers, now had to use digital tools and technologies to work together and communicate with co-workers. On top of that, some people had to work in environments that were not suited for work [100]. People had to combine working from home, with teaching their children and nursing sick relatives. Savic wrote that organisations, that weren't prepared for this situation, were caught off guard by the sudden shift to remote work and the corresponding digital transformation [95].

Just like all other kinds of teams, software development teams had to switch to working from home as a result of Covid-19 measures. Despite the fact that Lund et al. [67] found that interacting with computers is one of the activities that has a high potential for remote work, the new reality forced software development teams to make large adjustments in the way they communicated and cooperated as a team. Morrison-Smith and Ruiz state that virtual teams face challenges with regard to cooperation, communication and trust [76], and Dube et al., Lipnack et al. and Olson et al. stated that virtual teams encounter challenges in collaboration that could make them less successful than co-located teams [37, 65, 78]. Specifically about software development teams, Espinosa et al. state that the large amount of people that are involved in large-scale software development projects and the complex task dependencies make coordination important [40]. As a result of the negative effects of working from home on coordination, it would be hard for development teams to keep functioning when coordination is hindered by having to work from home.

Researching the impact of the forced shift to working from home, in a Covid-19 context, on software development teams will expose the effects on this unprecedented global event on software development team members, software development teams and collaboration across teams. It will enable organisations to learn from the experiences of software development teams during the pandemic and help them to be prepared for the next government imposed remote work situation. By analyzing the effects of forced remote work on development teams in the Covid-19 pandemic, researching what measures were taken by organisations to mitigate these effects and analyzing the effectivity of these measures, this thesis will help organisations to be better prepared for the next pandemic, enabling them to mitigate the negative effects of forced remote work and harness the advantages in future lock downs and other forced remote work situations.

2.1 Problem statement

Walker states that, as a reaction to the Covid-19 pandemic, many countries have implemented social distancing through control measures on many aspects of society. Among other societal aspects, mobility was highly affected [101]. In many countries people had to work from home as much as possible and many organisations implemented 'working from home' policies. According to Waizenegger et al., the Covid-19 pandemic has forced many people, that previously worked at the office, to work remote. Workers, now had to use new tools and technologies to do their jobs and communicate with coworkers. On top of that, some people had to work in environments that were not suited for work [100]. People had to combine their 'normal' jobs, with teaching their children and nursing sick relatives. Savic wrote that organisations that weren't prepared for this situation were caught off guard by the sudden change and the corresponding digital transformation [95].

Rysavy and Michalak, wrote about how they used various tools to work remotely as a team, because they already used digital tools, they did not consider the transition to working remote very disruptive [91]. Kramer and Kramer stated that there is a difference between people with occupations that had little previous experience with working from home, such as teachers, and people with significant experience with working from home, such as translators. People with more 'working from home' experience will have a smoother transition than people with less experience with remote work [61]. Lund et al. found that interacting with computers is one of the activities that has a high potential for remote work [67]. On the other hand, Espinosa et al. state that the large amount of people that are involved in large-scale software development projects and the complex task dependencies make coordination important [40]. As a result of the negative effects of working from home on coordination, this would make it hard, especially for software development teams, to keep functioning when coordination is hindered by having to work from home.

Working remote, due to a government imposed remote working obligation is a completely new phenomenon, which has heavily impacted teams around the world. Development teams could experience the effects of working from home during the Covid-19 pandemic differently than other types of teams, which makes the effects of working from home on Development teams even more interesting to investigate. In the past two years, a number of researchers have investigated the effects of the pandemic on knowledge workers and software developers in particular. However, most of this research was aimed at the effects of the pandemic on individuals and their well being [89, 75, 80, 88, 99]. The effects of working from home in the pandemic on the aspects of teamwork models, such as the Team Work Quality model by Hoegl and Gemuenden [53] and the Coordination Mechanisms to the 'Big Five' Core Teamwork Components, defined by Salas et al. [93] have not yet been explored. Therefore, exploring the effects of working from home in the Covid-19 pandemic on the aspects of these models will be a valuable addition to existing literature on the subject of working from home during the pandemic.

2.2 Research questions

The impact of the Covid-19 pandemic has been felt by development teams all over the world. In order to enable informed future practice when the next pandemic takes place, practitioners need to understand the effects of forced remote work on software development teams. This leads to the following research question:

RQ: "How were software development teams affected by suddenly having to work from home as a result of the Covid-19 pandemic?"

In order to be able to answer this question, the impact on individual software developers, the impact within software development teams and the impact on collaboration with other teams needs to be researched. In order to understand how organisations can help their software development teams when they suddenly have to work remotely, the effectivity of organisational support measures should be researched. In order to answer the research question, 3 sub questions were defined, that will be answered in order to be able to answer the main research question:

SQ1: "How did working from home during the pandemic impact individual software development team members?"

SQ2: "How did working from home during the lock downs impact software development teams?"

SQ3: "How did working from home during the lock downs impact cross team collaboration, from the perspective of software development teams?"

SQ4: "Which mitigating measures or preventive actions can be taken to alleviate the impact of the pandemic or help development teams to be better prepared for the next pandemic?"

2.3 Scope

The research is aimed at the effects of working from home on software development teams. Because of the broadness of this subject, a clear scope is needed in order to keep the research structured and goal oriented. In order to understand the effects of working from home on software development teams this thesis focuses on the effects on individual team members, teams and cross team collaboration.

Regarding the effects on individual team members, the research focuses on the challenges and benefits of working from home during the pandemic and the most notable effects of working from home on software development team members. The analysis of the pandemic programming survey and the analysis of the qualitative interviews showed that the effect of the pandemic on concentration, time spent on not- work related activities, quality of work and production were most notable and thus fall within the scope of this thesis. The measures that organisations took too support their employees when working from home and the expectations of software development team members for the future after Covid will also be in scope.

Even though, the effects of the pandemic on the well-being of software developers could be significant, these effects were already thoroughly researched and described by, among others, Ralph et al. [89] and Butler et al. [23], and will be out of scope for this thesis.

In order to be able to better understand the effects of working from home during the pandemic on software development teams, the research within this area followed the lines of the Team Work Quality model by Hoegl and Gemuenden [51]. Interviewees were also asked about about the general effects of working from home during the pandemic on their teams, but their answers all fit within one or more of the aspects of Teamwork Quality from the Teamwork Quality Model. Therefore, these aspects (communication, cohesion, cooperation, balance of team member contributions, mutual support and effort) [51]. Other aspects of teamwork, fall outside the scope of this research.

In order to understand the effects of working from home during the pandemic on cross team collaboration the research focused on social structures throughout the organisation, cross team collaboration and contact with colleagues from other teams. In an effort to research these effects in a structured manner, the coordination mechanisms for team collaboration (mutual trust, shared mental models and closed loop communication), described by Salas et al. [93], were used. Table 1 shows which subjects fall within the scope of this thesis.

subject	In scope	Out of scope
Pandemic effects on individuals	Benefits Challenges Concentration Time spent on not- work related activities Quality of work Productivity Organisational support measures Post-pandemic expectations	Personal health Economic effects Personal well being
Pandemic effects on teams	Communication Cohesion Cooperation Balance of team member contributions Mutual support Effort	Other aspects of teamwork
pandemic effects on cross team Collaboration	Social structures throughout the organisation Contact with colleagues from other teams Mutual trust Shared mental models Closed loop communication	Other aspects of cross team collaboration

Table 1: research scope

2.4 Relevance

In this section, the relevance of this research in both the academic field and in practice will be explained.

2.4.1 Academic relevance

According to Waizenegger et al., the existing literature on working from home is mostly aimed at employees, which are voluntarily working from home and that existing literature on the subject of working from home does not explain the effects of forced remote working. They also state that it will be essential to understand the experiences of knowledge workers, who had to work from home during the pandemic [100]. This research, into the experiences of software development team members during working from home as a result of the pandemic, helps in filling the gap described by Waizenegger et al. Waizenegger et al., state that there has been little empirical research on digital work in pandemic [100]. Agerfalk et al. also state that not much empirical research has been performed on the behavioural, societal and organisational sides of Covid and IT [1].

The empirical approach in this research will be a valuable addition to existing research in the field. Waizenegger et al. also stated that there were little studies on working from home during the pandemic [100]. Despite the fact that, since then, various authors have written about this subject [89] [23]. No publications have discussed the effects of working from home in relation to the Team work Quality model by Hoegl and Gemuende [51], No publications have discussed the effects of working from home in relation to the coordination mechanisms for team collaboration described by Salas et al. [93] and Ralph et al. who researched the effects of the pandemic on individual software developers, state that they hope that more research will be performed on how software development is affected by crises such as the Covid-19 pandemic [89].

2.4.2 Practical relevance

According to Waizenegger et al., the development where working from home becomes mandatory for everyone impact employees that never wanted to work from home or never even were able to work from home [100]. Ralph et al show that software developers are impacted by working from home due to Covid. Specifically regarding their concentration, the time they spend on non work related activities during office hours, their productivity and the quality of their work [89]. According to Agerfalk et al., whole organisations are forced to work fully remote as a result of the pandemic. They find that it is essential to understand how employees can face the challenges that come along with forced remote work and how businesses can keep up performance. They state that research should be performed into how teams and organisations can develop the required practices to stay afloat in this changing landscape [1].

This research will further the understanding of the effects of forced remote working as a result of the Covid-19 pandemic. It will show how software development teams were impacted by having to work remote, which conditions were relevant for the extend of the impact. This research will explain how software development teams managed to continue their operations despite the challenges that arose as a result of the pandemic and which benefits they experienced. It will provide organisations with an analysis of the experiences of software development teams during the pandemic and help them to learn how to combat the adverse effects of force remote work and be better prepared for future pandemics.

2.4.3 Approach and timeline

Our research started in February 2021 and ended in January 2022. Over these 12 months, we went through seven research phases. In the first phase, a research objective was defined and the research questions were formulated. In the second phase, an initial literature review was performed. In the third phase, a the data set from the Pandemic Programming paper by Ralph et al. [89] was quantitatively analysed. The fourth phase involved the preparation, execution and analysis of our interviews with software development team members. In the fifth phase, the literature review was concluded, answering the new questions that had arisen in the third and fourth phase. In the sixth phase the discussion section was written, in which the findings were discussed in the context of existing literature. In the seventh phase, the thesis was finalized, and the research questions were answered leading to the conclusion. The seven research phases and the timeline are depicted in figure 1. Our research method is more extensively explained in the 'Methodology' section.

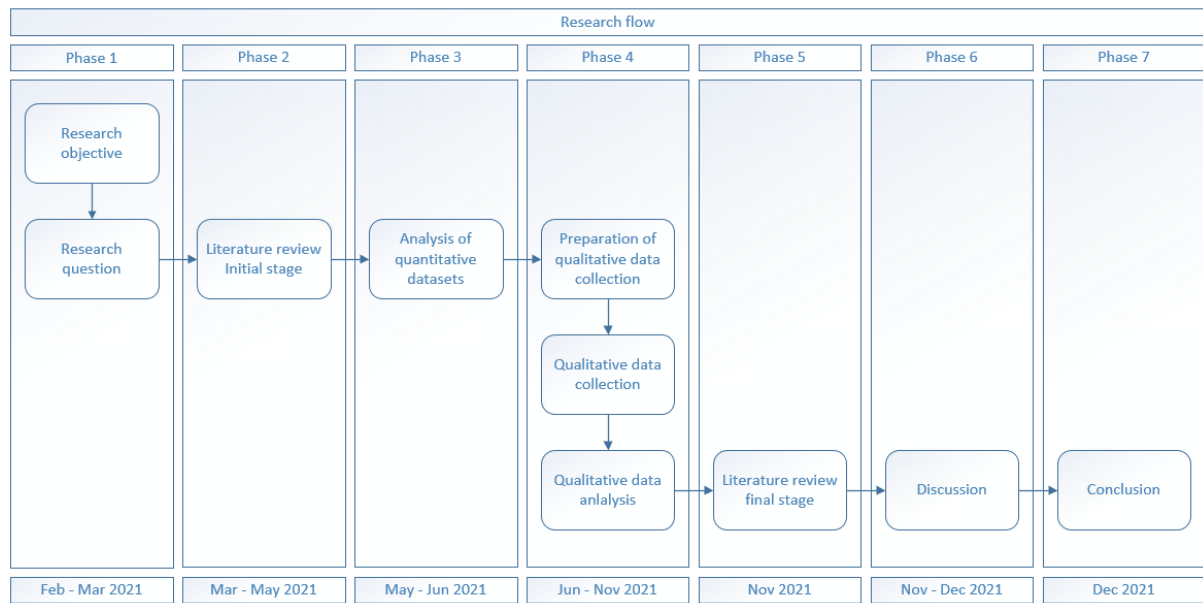


Figure 1: Research flow

3 Background

In this section, the existing literature, related to the impact of working from home on software development teams will be discussed. The section will cover the effects of working from home on individuals, on teams and on cross team collaboration, and the measures that organisations took to support employees who were working from home. The models that were used to get a structured understanding of the effects of working from home on teams and cross team collaboration will also be covered.

3.1 Teamwork and digital teams

This section will cover existing literature on concept of teams and the concept of Virtual teams. Specifically, this section will look at the advantages and disadvantages of working in digital teams. Table 2 shows the aspects of teamwork and digital teams, which will be discussed in this section and the sources which were used to explain them.

Subject	Source
Defining teams	McIntyre and Salas [73] Salas et al. [92]
Defining virtual teams	Morrison-Smith and Ruiz [76]
Key success factors for virtual teams	Bergiel et al. [12]
Challenges for virtual teams	Lipnack et al. [65] Olson et al. [78] Dube et al. [37] Morrison-Smith and Ruiz [76] Kraut et al. [62] Armstrong et al. [3] Peñarroja et al. [81] Blaskovich et al. [16] Carte et al. [26]

Table 2: Sources about teamwork and virtual teams

3.1.1 The concept of teams

Teams are described by McIntyre and Salas as a set of two or more individuals that have specific roles and interact adaptively, interdependently, and dynamically towards a common goal [73]. According to Salas et al., all team members have their own specific functions and roles, teams exist for a limited time period and can be characterised by three characteristics, Team members have to be able to work interdependently with each other and coordinate their actions to fit the requirements of the other team members, team members have to communicate and share information and resources with other team members, and teams exist for a limited amount of time, in which they work in order to realize a shared vision by working towards a common goal [92]. In this thesis, teams can be described, partly by the definition of Salas et al., but because standing teams are also part of this research, people working together in a fixed composition for an undefined period of time will also be seen as teams.

3.1.2 Virtual teams

Teams that are not co-located, which means that they are not working on the same physical location, are described as virtual-, remote- or digital teams. Because this thesis is aimed at teams, from which the members are working remote, the teams, which will be discussed in this thesis will be virtual teams. Morrison-Smith and Ruiz describe that working with virtual teams has certain benefits such as allowing an organisation to put their best people into a team, regardless of their locations, and reducing the need for travel, which reduces travel time, cost and stress [76]. Advantages of virtual teams, according to Bergiel et al. are reduced travel cost, reduced travel time, the opportunity to recruit talent from different area's, creativity sparked by diversity and heterogeneity, equality, because everyone has the same level of access to the workplace, and reduced discrimination on age and race because performance evaluation is based on productivity alone.

Key success factors for virtual teams are, according to Bergiel et al., trust, communication, leadership and appropriate levels of technology [12]. The reduced travel cost, more honest performance evaluation and location independence are also applicable to teams that became virtual due to the Covid-19 pandemic, but the advantages related to diversity and being able to recruit from different places are not applicable, because team members were hired on the assumption that they would be working co-located.

Despite the advantages of virtual teams, they face many challenges that do not affect co-located teams. Morrison-Smith and Ruiz also mention that virtual teams face certain challenges regarding cooperation, communication and trust [76]. Dube et al., Lipnack et al. and Olson et al. stated that virtual teams encounter challenges in collaboration that could make them less successful as teams that are working from one location [37, 65, 78]. Olsen et al. stated that members of virtual teams could be less motivated because some people work harder when they are with others [79]. Kraut et al. mention that many difficulties, faced by virtual teams, are caused by the fact that they have little opportunities for unplanned, non work related conversations [62] and according to Armstrong et al., virtual team members are less likely to make informal observations that allow them to be aware of what is happening in their teams [3].

Peñarroja et al. state that the lack of visual observations causes team members to fall back to assumptions which could make them negatively biased about the performance of their team mates [81]. Blaskovich et al. state that virtual team members are more likely to disengage from their team because the social bonds are less strong in virtual teams [16]. Participation in digital teams can, according to Carte et al., also decrease because team members feel isolated [26].

All of these challenges are applicable to software development teams that became virtual due to the Covid-19 pandemic because they face the same problems. However, because many of these teams had already been working together in co-located teams before the started working from home, interpersonal trust and relations could have already been built and might be impacted less by the distance that was created by working remote.

3.1.3 Applied teamwork models

In order to assess the effects of working from home during the pandemic on collaboration within teams, the 6 categories of the teamwork quality model by Hoegl and Gemuenden [53] were applied. In order to assess the effects of working from home during the pandemic on collaboration across teams, the 3 coordination mechanisms to the 'Big Five' core teamwork components, defined by Salas et al. [92], were applied. In this section, we provide background information about the models that were applied in this thesis to discuss the effects of working from home on teams and cross team collaboration in the interviews with software development team members are covered. Table 3 shows the aspects of the applied teamwork models and the sources which were used to explain them.

Factors	The Big five	Coordination mechanisms to the big five	Team work quality model
Team leadership	Salas et al. [93]		
Mutual performance monitoring	Salas et al. [93] Strode [98]		
Backup behaviour	Salas et al. [93] Strode [98]		
Adaptability	Salas et al. [93]		
Team orientation	Salas et al. [93]		
Mutual trust		Jones et al. [57] Serva et al. [97] Weber [103] Mayer et al. [72] Bandow [5] Salas et al. [93] Butler [24] Peterson et al. [82] Edmondson [38]	
Shared mental models		Mathieu et al. [71] Rouse et al. [90] Salas et al. [93] Johnson-Laird [56] Strode [98]	
Closed loop communication		Salas et al. [93]	
		McIntyre and Salas [73]	
Communication			Hoegl and Gemuenden. [52]
Coordination			Hoegl and Gemuenden. [52]
Balance of team member contributions			Hoegl and Gemuenden. [52]
Mutual support			Hoegl and Gemuenden. [52]
Effort			Hoegl and Gemuenden. [52]
Cohesion			Hoegl and Gemuenden. [52]

Table 3: Aspects of applied teamwork models

The Big five

Salas et al. identified 5 aspects of teamwork, which they called the 'Big five' in teamwork. The aspects, identified by Salas et al., are 'team leadership', 'mutual performance monitoring', 'backup behaviour', 'Adaptability' and 'team orientation'. According to Salas et al., with the 'big five', they are offering a practical overview of the most vital parts of teamwork [93]. They state that the components in the 'big five' promote team effectiveness. They also acknowledge that not all teams have the same ability to engage in the core components that they defined. They also explain that the impact of coordinating mechanisms will develop over time, based on the tasks of the team and the team's experience working together [93]. In this thesis, the coordination mechanisms have been used to understand the effects of having to work from home on cross team collaboration. The 'Big five' model is widely mentioned in literature. Strode stated that it was one of the most influential theories about team work [98]. Kay et al. stated that the 'big five' model was well grounded, both in theory and in practice [58].

Team leadership

Salas et al. state that 'team leadership' is about directing and coordinating the members of a team, assessing team performance, assigning tasks, developing knowledge, skills, and abilities, motivating members, planning, organizing and establishing a good atmosphere [93]. The behavioral markers of team leadership are, according to Salas et al. facilitating problem solving, providing performance expectations and interaction patterns, balancing the contributions of team members, providing information, clarifying roles and providing feedback [93].

Mutual performance monitoring

Salas et al. state that 'mutual performance modelling' is about developing common understandings of the context and applying the right strategies to monitor the performance of team members [93]. The behavioral markers of mutual performance modelling, according to Salas et al., are the identification of mistakes from other team members and providing feedback in order to facilitate team mates to correct their mistakes [93]. Strode found that co-location and displaying stories and tasks on a wallboard support mutual performance monitoring [98].

Backup behavior

According to Salas et al., 'backup behavior' is about the anticipation of the needs of other team members through accurate knowledge about their responsibilities including the ability to shift tasks among members to achieve balance when the workload is high [93]. The behavioral markers of backup behavior, according to Salas et al., are recognizing problems with the balance of task distribution and shifting tasks to available team members and completing tasks of other team members [93]. Strode found that backup behavior is supported by displaying stories, tasks and Kanban work items on a wallboard [98]. He also states that communication, which is supported by proximity, contributes to people helping each other, understanding each other and problem solving [98].

Adaptability

Salas et al. define 'adaptability' as adjusting strategies based on context information, using backup behavior and shifting the resources of the team and changing the course and actions of the team when the context changes [93]. The behavioral markers of 'adaptability', according to Salas et al., are identifying context changes, assigning meaning to context changes, adjusting plans in line with those changes, identifying improvement opportunities and being vigilant to changes in the environment of the team [93].

Team orientation

Salas et al. define 'team orientation' as the taking they behaviour of others into account when interacting with the group and prioritizing team goals over the goals of individual team members [93]. The behavioral markers of 'team orientation', according to Salas et al., are taking into account the input and proposed solutions of team members in deciding on the correct approach and increasing task involvement, sharing information, strategies, and participation in determining team goals [93].

Coordination mechanisms to the 'Big Five'

Salas et al. stated that the 'Big Five' core teamwork components are in need of coordination mechanisms in order to ensure teamwork effectivity [93]. These coordination mechanisms, proposed by Salas et al., are 'shared mental models', 'mutual trust' and 'closed loop communication' [93].

Mutual Trust

According to Jones et al. the concept of 'trust' is commonly described as "an expression of confidence between the parties in an exchange of some kind" [57]. This entails, according to Jones et al., confidence that one will not be harmed or exploited based on their vulnerabilities by the other party [57]. Serva et al. found that trust at the team level works in the same way with regard to antecedents and consequences as it does at the interpersonal level [97]. Weber found that trust is a critical factor in an effective team climate [103].

Mayer et al. proposed a model of trust that shows that the propensity of one party to trust the other party is based on three factors of perceived trustworthiness [72]. The first factor, according to Mayer et al. is the perceived ability of the trustee. Ability is, in this context, seen as a collection of skills, competences, and characteristics to have influence in a certain domain [72], and thus domain specific. The second factor, in the model, proposed by Mayer et al. is the perceived benevolence of the trustee, which signifies how much a trustee wants to act in the interest of the trustor, independent of their own personal motives [72]. The third factor is the trustees perceived integrity, which Mayer et al. define as the extend to which the trustor believes that the trustee follows principles that are acceptable to the trustor [72]. Based on the conclusions of Serva et al., these factors, would also apply to cooperation within teams. Bandow states, about the impact of trust within teams, that the lack of trust within a group can negatively impact how effectively an individual can contribute to the team [5].

Salas et al. define 'mutual trust' as "the shared belief that team members will perform their roles and protect the interests of their teammates" [93]. Behavioral markers of mutual trust are, according to Salas et al., the extent to which information is shared, the willingness to admit mistakes and the willingness to accept feedback [93]. With regard to information sharing, Butler found that trust expectations show a significant association with knowledge sharing and that the quantity of shared information partially mediated the relationship between trust expectations and the trust climate [24]. This supports the theory that the extent of information sharing is a behavioural marker of trust within teams. Peterson et al. found that teams have to establish trust before negative feedback is received in order to limit the risk of a relationship conflict [82]. This supports the positive relation between the willingness to accept feedback and mutual trust. Edmondson found that psychological safety, distinguished from the related construct of interpersonal trust, results in the willingness to be vulnerable to others and thus the willingness to admit mistakes [38]. This supports the fact that willingness to admit mistakes is a behavioral marker of trust within a team.

Shared mental models

According to Mathieu et al. mental models are structures of knowledge based on which individuals can interact with their environment [71]. Rouse et al. defined shared mental models as the way in which people describe the goals and form of a system, explain how a system functions and assess the current and future states of a system [90]. These definitions of mental models fit with the simplified definitions of mental models by Salas et al., who define shared mental models as "an organizing knowledge structure of the relationships among the task the team is engaged in and how the team members will interact" [93]. The extent to which team members are anticipating and predicting each others needs and the ability of the team to identify changes in the team, task or teammates and adjust the strategy accordingly are seen as behavioral markers of shared mental models by Salas et al. [93].

The fact that Salas et al. see extent to which team members are anticipating and predicting each others needs as a behavioral marker is in line with the definition of Rouse et al. which includes expectations for what is likely to occur next [71]. According to Johnson-Laird, mental models help people to experience events, understand them, predict outcomes and take action accordingly [56]. This aligns with the second behavioral marker, proposed by Salas et al., about the ability of the team to identify changes in the team, task or teammates and adjust the strategy accordingly [93]. According to Strode, shared mental models can be created in meetings such as specification meetings, scrum planning meetings and daily stand-ups [98].

Closed loop communication

Closed-loop communication was defined by Salas et al. as information exchange between the sender and receiver of a message regardless of the communication medium [93]. Behavioral markers of closed-loop communication, according to Salas et al. are the extent to which individuals are following up with intended receivers of a message to ensure message was received, the extent to which individuals acknowledge that they received a message and the extent to which individuals clarify that the message that was received is equal to the message that the sender intended to convey [93].

McIntyre and Salas state that closed loop communication has three steps. In the first step, one person sends a message, in the second step, another person receives the message and, in the third step, the sender assures that the message was received by the intended receiver and that it was understood [73]. This definition corresponds to the first marker, defined by Salas et al. about following up that a message was received [93]. The definition also implicitly covers the second marker about the acknowledgement that a message was received, because the receiver will have to acknowledge that the message was received in order to make the follow up successful. 'clarifying that the message received, is the same as the intended message' is not the same as 'checking whether the message was understood'. However, in order to check whether a message is understood, one implicitly checks whether the message is the same as the message that was sent. Taking that into account, the behaviour makers, defined by Salas et al., are in all covered by the definition of McIntyre and Salas.

The Team Work Quality model

Hoegl and Gemuenden conceptualized Team Work Quality as a multifaceted higher order construct that models the quality of interactions between teams [51]. They assume that Team Work Quality facilitates the efficiency and effectiveness of leadership processes and task activities within a team [51]. According to Hoegl and Gemuenden, there are six concepts that can describe the quality of collaboration in teams [51]. In the Team Work Quality construct, conceptualized by Hoegl and Gemuenden, the collaborative work process of teams can be indicated by communication, coordination, balance of member contributions, mutual support, effort and cohesion. For all of the facets, they listed variables, which indicate a team's performance regarding these six facets [51].

Communication

Regarding communication, Hoegl and Gemuenden, found that teams should ensure that they communicate frequent enough. Team members should have enough direct- and open- and informal communication. They state that communication is the most elementary component of Team Work Quality. Communication frequency refers to the amount of time spent on communication. Direct communication is important, because it is faster than communication through mediators and leaves less room for information to be passed on incompletely or incorrectly. It is important to communicate openly, because that helps the team members to be integrated and to use each other's experience and knowledge in tasks. Hoegl and Gemuenden make a distinction between formal communication, which takes preparation and planning, and informal communication, which is spontaneous. Informal communication is important to share and evaluate ideas efficiently [52].

Coordination

With regard to coordination, Hoegl and Gemuende state that the individual efforts of team members should be well structured and synchronized. Within the concept of coordination, it is important that the team members all understand how the contributions of individual team members are related and what the status of those contributions is. Team members must be aware of all sub tasks and the sub tasks should be harmonized. According to Hoegl and Gemuende, for optimal Team Work Quality, there should be agreement regarding the work-down structures, schedules budgets and deliverables [52].

Balance of team member contributions

Hoegl and Gemuenden state that there should be a balance in team member contributions and that all team members should bring value to the team in line with their experience and capabilities. Team members should be able to share their views and ideas and provide input in the decision making process. Therefore, team member contributions should be in balance [52].

Mutual support

For qualitative teamwork, according to Hoegl and Gemuenden, team members should help and support each other in doing their jobs. Hoegl and Gemuende found that cooperation is more helpful than competition when team members have to collaborate intensively. Therefore, team members should respect each other and provide assistance to other members of the team when that is required. The contributions of team members should be respected, discussed and further developed [52].

Effort

According to Hoegl and Gemuenden, team members should put all of their effort into the team in order to reach the highest level of Team Work Quality. The extent to which team members share the workload and assign priority to team related tasks indicate the effort that individual members put into the team. An equal level of effort and the absence of conflict are important aspects of Team Work Quality [52].

Cohesion

Considering cohesion within a team, Hoegl and Gemuenden state that there has to be team spirit and that team members should want to put effort into maintaining their team. In a team with high levels of cohesion, members want to be part of the team. Cohesion can be caused by interpersonal attraction between individual members, commitment to the goals of the team and pride to be part of the team [52].

3.2 The effects of working from home in the Covid-19 pandemic

This section will cover various aspects of working from home and their impact on individual workers, teams and collaboration between different teams. The section will cover the general effects of working from home, as described in literature. The general effects of working from home will be covered, as well as the specific effects on software development teams and the specific effects of Covid-19 related remote work.

3.2.1 The effects of working from home on individuals

From the perspective of individual workers, this section covers the effects of working from home regarding their commute, flexibility, concentration, quality of work and productivity. According to Ipsen et al., most knowledge workers, working from home during the pandemic, found their working conditions to be mostly positively influenced by working from home [54]. 33% of respondents to a survey by Bolisani et al. found their work situation during the pandemic more challenging than the before, 36% reported no difference, and 31% found their situation less challenging than before [18]. This shows that there was a great division in how working from home in the pandemic was experienced by different individual development team members. The effects of working from home on individual software development team members, including the advantages, disadvantages, challenges and benefits, will be covered in this section.

Various advantages and disadvantages of working from home have been mentioned in literature. Advantages of working from home, according to Ipsen et al., are a better atmosphere at home, no need to search for people at the office, less time spent on transportation, a break of routine and the ability to spend time with housemates. Respondents also indicate that they work more efficiently because they can get other work done, have to spend less time on meetings and get more time to focus on work. They also mention that they have more control over their work day because no-one is looking over their shoulder, they can take a break whenever they like and they can eat and drink their own food [54].

Out of the respondents to a survey by Bolisani et al, 93% agreed with the statement that they appreciated that working from home had reduced their transportation time. 77% appreciated that they could eat and drink their own food when working and 69% appreciated that fact that they were able to concentrate better and 66% appreciated that they could be closer to their families. 35% was happy that they had to spend less time in long meetings, 19% indicated that it was easier to get in contact with people and 12% appreciated that no-one was looking over their shoulder when working from home [18].

Disadvantages, according to Ipsen et al., are feelings of isolation caused by, among other things, not seeing colleagues, loss of value of work because work is less interesting at home, difficulty concentrating at home and loss of access to important tools such as physical equipment and documents [54]. The respondents to the survey by Bolisani et al. indicated that feeling tied with their computer (45%), less contact with colleagues and other people in general (37%), missing physical equipment (25%) and not being able to do certain tasks at home (25%) were the most important disadvantages of working from home during the pandemic. Problems with focus were mentioned as well, but only 5% of respondents indicated that they experienced problems regarding their focus [18]. Table 4 shows the effects of working from home on individuals and the sources which were used to explain them.

Effect	General sources	Covid-19 related sources
Commute	Charalampous and Grant [28]	Ipsen et al. [54] Prasad et al. [87]
Flexibility	Atkinson [4] Kelliher et al. [59] Flores [43] Charalampous and Grant [28] Beckmann [8] Petrova [83]	Bolsani et al. [18] Ipsen et al. [54] Hamlin et al. [47] Prasad et al. [87] Caligiuri et al. [25]
Concentration	Charalampous and Grant [28] Belanger and Allport [9]	Bolsani et al. [18] Ipsen et al. [54] Hamlin et al. [47] Wang et al. [102] Prasad et al. [87]
Quality of work	Flores [43] Belanger and Allport [10]	
Productivity	Flores [43] Petrova [83] Marlow et al. [69] Belanger and Allport [11] De Guinea et al. [33]	Bolsani et al. [18] Ipsen et al. [54] Kumar et al. [63] Hamlin et al. [47]

Table 4: The effects of working from home on individuals

Commute

According to Prasad et al., working from home has the advantage that it reduces the time, spent on commute [87]. Even though, working from home helped people to avoid traffic, because they did not have to commute, Charalampous and Grant found that people missed the time they used to spend commuting because it allowed them to relax after a long day of work [28]. Respondents to a survey by Ipsen et al. indicate that the saved transportation time is an advantage of working from home [54]. This advantage might also be applicable to software development team members that had to work from home due to Covid-19 pandemic.

Flexibility

According to Prasad et al. working from home has the advantage of more flexibility in working hours [87]. According to Kelliher et al., Employees, given more flexibility in their working arrangements, were willing to put more effort into their work [59]. According to Flores, more flexible work hours, is seen by remote workers, as the greatest benefit of working from home [43]. According to Charalampous and Grant, the flexibility of working from home helped people in their work life balance and enabled them to better meet the needs of their families. Respondents also indicated that they were able to take a break from work to go to the gym and finish their work later.

A less positive effect of the flexibility that comes with working from home is that it blurs the boundaries between work lives and private lives. People tended to work longer hours because the equipment was already at their homes and they had time to spare because they did not have to commute. This issue did not occur with workers that held a strict routine [28]. The effects on work life balance have not only been positive. According to Caligiuri et al., the involuntary, shift to remote working has increased the risk for employees to experience work-live conflict [25].

Petrova found that flexible work times helped employees to perform their work at the most appropriated times and that remote working technology makes people work more efficiently, both individually and in virtual teams [83]. Beckmann found that autonomy in working time increased the performance of workers and, despite the fact that it increased efforts, working time autonomy will most likely not increase the amount of people being overworked [8]. Atkinson found that flexible working, both regarding time and location, helped to eliminate conflicts between the professional and the personal life of workers [4].

According to Bolsani et al., working from home is seen as a means to improve work life balance, because of the increased flexibility, but also as a factor that increased the intrusion of work in the private lives of employees because the boundaries become more blurry [18]. Respondents to a survey by Ipsen et al., who had to work from home due to the pandemic, indicate that it was an advantage that they were able to take a break when they liked to [54]. Hamlin et al. state that employees working from home experience more personal scheduling flexibility [47].

Working from home in a pandemic does not increase flexibility in work arrangements, regarding work locations, because working from home is mandatory. However, the flexibility that comes with working from home, regarding the layout of a workday, taking breaks, and the chance to start or end a workday earlier are applicable. The blurred boundaries between work lives and private lives are applicable as well, maybe even more than in normal working from home situations, because many activities in the personal life of employees became impossible, leaving more time for work. It can therefore not be predicted whether working from home during the pandemic has improved or worsened that improve the work-life balance. This might also differ from person to person.

Concentration

According to Prasad et al., interruptions are a challenge when working from home [87] and work-home interference is a key challenge of remote work according to Wang et al. [102]. According to Charalampous and Grant People experience less social distractions and more digital distractions, such as emails and direct messages, when working from home. When working from home, employees are better able to cancel out distractions, which helps them to concentrate and get their work done. They also indicated that the fact that they could take a break from their screen once in a while, helped their concentration.

Most respondents thought that working from home increased concentration levels [28]. Remote workers, responding to a survey by Belanger and Allport, indicate that working from home allowed them to be more efficient, because they were less often interrupted by co-workers and had less distractions [9]. Hamlin et al. also state that employees working from home experience less interruptions [47]. An important note, regarding the concentration of people working from home, is that non-Covid related literature on the subject did not take into account that parents of young children were forced to combine parenting with their work, this could have made it more difficult for them to focus on work.

Respondents to a survey by Ipsen et al., who had to work from home due to the pandemic, indicate that it was an advantage that they got more time to focus on work. However, finding it difficult to keep focus was mentioned as a disadvantage as well [54]. According to a survey by Bolisani et al. only 5% of knowledge workers found it difficult to keep focused when alone [18]. No distinction was made based on whether respondents had young children at home. This could have impacted the extent to which they were able to work in concentration during working from home.

Time spent on not-work related activities during working hours

Procrastination is a key challenge of remote work according to Wang et al. [102]. According to Charalampous and Grant, people, who are working from home, can get distracted by tasks around the house during work time. They are tempted to perform those tasks when they are supposed to be working [28]. Respondents in a study by Charalampous and Grant, indicated that they were happy that they could take a break from work and spend some time away from the screen. Temporary switching off from work also helped people to come up with solutions for work related issues [28].

This shows that taking breaks during work time can also have a positive effect on productivity. According to Banerjee, the convenience of working at home can cause people to become less engaged with their work [6] and, according to Prasad et al., some employees won't work when they are supposed to work from home [87]. This shows that working from home can also have a negative effect on productivity. A high workload, according to Wang et al., results in less procrastination [102]. This would mean that people are less likely to not work when they have a lot on their plate. Beckmann found that employees could abuse working-time autonomy by putting less effort into their work, because they are monitored less [8].

The effects of working from home due to Covid-19 pandemic are similar to the effects that could be expected based on existing literature on working from home. More than half of respondents to a survey by Bolisani et al. responded that they were working longer than normally when working from home and only 12% of respondents indicated that they worked less than usual [18]. In a survey by Ipsen et al. 38% of the respondents agree or strongly agree with the statement that they work more hours than normal and 42% of respondents disagree or strongly disagree with that statement. However, respondents to the same survey also indicated that they did not know what kind of work they could do and that there was not enough work to do from home [54].

Quality of work

In a study by Flores, 37% of respondents, named increased quality of work as a benefit of working from home [43]. Remote workers, responding to a survey by Belanger and Allport, indicate that working from home allowed them to do a better job because they could work on their own pace [10]. This indicates that having to work from home does improve the quality of work. However, this could be different in a situation in which the shift to working from home is mandatory and unexpected.

Productivity

In a study by Flores, 53% of respondents, named job productivity as a benefit of working from home [43]. According to Hamlin et al., productivity of employees working from home can increase due to less commuting time and interruptions [47]. This would predict a positive effect of working from home on productivity.

According to Petrova, flexibility in property and working mode increases employee productivity [83]. However, this is not applicable to a forced remote working situation. The working mode is different but the employee has no choice in the matter. Marlow et al. state that due to the effort that is required to communicate, when working remote, more messages are sent, which can negatively impact performance [69]. According to Belanger, in a remote working situation, people experience a decrease in performance and productivity when the communication requirements increase [11] and De Guinea et al. found that digital teams perform less than co-located teams [33]. This shows that communication related issues can negatively influence the effect of working from home in productivity. However, this does not mean that the effect under the line will be negative.

In research, specifically aimed at the Covid-19 pandemic, working from home has a positive effect on employee productivity, even when it is government mandated. Only 13% of the respondents to a survey by Bolisani et al. indicated that they got less work done when working remote [18]. According to a survey by Ipsen et al., under professionals working from home in Denmark during the pandemic, 58% of respondents got more work done than they did before working from home [54]. However, Kumar et al. found that distraction from the family, occupational discomfort, and distress had a large negative impact on job performance during the pandemic [63]. This shows that there is no conclusive view on the effects of the pandemic on performance.

3.2.2 The effects of working from home on teams

In this section, we put literature on working from home into the perspective offered by the six main aspects of the Team Work Quality model by Hoegl and Gemuende, which are communication, cohesion, coordination, balance of team member contributions, mutual support and effort [53]. Table 5 shows the effects of working from home on the six aspects of the Team Work Quality and the sources which were used to explain them.

Effect	General sources	Covid-19 related sources
Communication	Charalampous and Grant [28] Morison-Smith and Ruiz [76] Belanger and Allport [10] Belanger [9] Flores [43] Petrova [83] De Guinea et al. [33] Cundil et al. [32] Marlow et al. [69] Agerfalk et al. [2] Armstrong and Cole [3] Herbsleb et al. [48] Berry [14] Greenhalgh and Peacock [45]	Wang et al. [102] Bolisani et al. [18] Ipsen et al. [54] Hamlin et al. [47] Bulińska-Stangrecka and Bagieńska [22] Prasad et al. [87] Banerjee [6]
Cohesion	Pierik [84] Morrison-Smith and Ruiz [76] Kiesler and Cummings [60] Agerfalk et al. [2] Cooper and Kurland [30] De Guinea et al. [33] Armstrong and Cole [3] Hinds and Mortensen [50]	Hamlin et al. [47] Caligiuri et al. [25]
Coordination	Massey et al. [70] Espinosa et al. [40] Malone and Crowston [68] Hertel et al. [49] Cascio [27] Fiore et al. [42] Espinosa et al. [40] Cooke et al. [29]	Miller et al. [75] Banerjee [6] Berntzen and Wong [13]
Balance of team member contributions	Littlepage et al. [66] Faraj et al. [41]	Miller et al. [75]
Mutual support	Porter et al. [86] Hadjilias et al. [46] Barnes et al. [7] Farage et al. [41] Breuer et al. [21]	Miller et al. [75]
Effort	Kelliher and Anderson [59] Bloom et al. [17]	

Table 5: The effects of working from home on teams

Communication

Regarding the impact of working from home on software development teams, this section covers the effects of working from home on communication. Keeping employees informed about changes and making sure that all team members have the same information is, according to Charalampous and Grant, an important part of the relationship between manager and employee [28]. Morison-Smith and Ruiz found that communication can help virtual teams to increase their performance and increase the commitment of team members [76] and Belanger and Allport state that knowledge workers, who are not working on the same physical site, need to communicate a lot with colleagues and managers in order to do their work [10].

However, communication is, according to Belanger, often seen as an important challenge when working from home [9] and, according to Flores, more than half of the remote workers find communication with others the most challenging aspect of working from home [43]. Petrova also states that poor communication flows are an inhibitor of flexible working [83] and ineffective communication is a key challenge of remote work according to Wang et al. [102]. When teams had to start working from home, it was vital to keep communicating in order to stay effective as a team.

During the pandemic, various methods were used by digital teams to keep their communication on the required level. Bolisani et al. mention that knowledge workers use various digital tools to communicate to each other when working from home. Email was the most commonly used. Other forms of communication that were used are phone calls, video conferences and groupware that combines messaging, video calls and file sharing (such as MS teams). Communication apps (such as Whats App and Facebook) were used less often. Most respondents used various methods of digital communication [18]. Respondents to a survey by Ipsen et al. indicated that they mostly used email (100%), conference systems such as Skype and MS Teams (80%) and messenger systems such as Whats App (40%). They also used their phones, shared online documents and used groupware [54]. For many teams, these solutions seem to have been effective because 77% of respondents to a survey by Bolisani et al., which was executed during the Covid-19 pandemic, indicated that they could keep good relations with their colleagues when working from home. Mostly due to the use of digital communication [18].

According to Banerjee, working from home results in a higher threshold for communication, because people only contact each other when they have something important to share. The step to plan a meeting is higher than to have a short unplanned conversation at the office [6]. According to Prasad et al., employees can have communication problems because of technical difficulties, because they might not speak up in digital group meetings, because they do not participate in scheduled person to person meetings and because decisions are communicated too late [87]. Teams, that are working from home, have to find a way to keep communicating, despite the increased threshold for communication.

Efforts to maintain effective communication in digital teams are not always effective. Charalampous and Grant state that remote workers miss face to face interactions and having someone to bounce ideas off [28] and according to Baerjee, open ended meetings are more directionless in a digital setting [6]. Charalampous and Grant also identified the enormous amount of received emails as an important disadvantage of working from home and found that calling was sometimes way more effective than sending emails [28]. De Guinea et al. found that digital teams experience a lower frequency of communication and less knowledge sharing than co-located teams [33].

Cundil et al. found that face to face interactions enable collaboration in teams [32]. The lack of face to face interaction can be an inhibitor of effective communication in digital teams. Marlow et al. state that face to face meetings at the beginning of a cooperation increase the amount of trust within a team [69]. The teams that were forced to shift to remote work due to the Covid-19 pandemic where already working together, so this will have mostly impacted teams that were formed during the pandemic or team members that joined an existing team when working from home. According to Hamlin et al. the limitations of digital communication can hinder digital collaboration because body language is not always seen and real time feedback is limited [47]. These limitations should be taken into account when teams shift to fully digital communication.

According to Agerfalk et al. informal communication is vital in relation to trust and task awareness [2]. Morison-Smith and Ruiz, found that spontaneous informal communication played a role in team cohesion [76] and Armstrong and Cole found that informal communication can be used to provide feedback to team members [3]. Herbsleb et al. stated that informal communication takes up a significant part of the work day at the office [48]. According to Armstrong et al., the unplanned informal communication that takes place at the office has significant effect on collaboration in teams [3].

When shifting to working from home, it was a challenge to keep the informal communication within teams at the same level as when working co-located because, according to Berry, members of virtual teams have less opportunities to have informal interactions, such as meetings at the coffee machine or in the elevator. Therefore communication in virtual teams is more formal than communication in co-located teams [14]. Belanger and Allport also found that the shift to working from home often results in a decrease in tacit knowledge sharing and direct person to person communication [10] and, according to Bulińska-Stangrecka and Bagieńska, employees can be isolated when working remotely, because the amount of interactions is limited. More specifically the number of interactions, about non work-related issues is lower for remote workers because they have less opportunities to ask colleagues about their personal lives [22]. According to Greenhalgh and Peacock, the lack of informal communication decreases the chances of sharing knowledge [45]. This effect of working from home is expected to negatively impact teams that shift to remote work as a result of the Covid-19 pandemic.

Cohesion

According to Pierik, social cohesion has an impact on the performance of organisations and the work life balance of individuals [84]. It is therefore important to look into the effects of the pandemic on software development teams from a 'cohesion' perspective. Working from home impacts trust, feelings of belonging, cultural cohesion, the on-boarding of new team members and conflicts within teams.

Morrison-Smith and Ruiz state that low trust between team members, caused by distance, can cause members to not feel like they are belonging to a team [76]. The lack of face to face interactions will also decrease the sense of belonging according to Kiesler and Cummings, who state that face to face interaction increases social ties within a team [60]. Social ties, according to Agerfalk et al., help team members to feel like they are belonging to the team [2]. The negative effects of working from home on feelings of belonging are in line with Cooper and Kurland, who state that people working from home experience more professional isolation [30]. This leads to the conclusion that working from home decreases the feelings of belonging by software development team members that have to work from home as a result of the Covid-19 pandemic.

Hamlin et al. state that cultural cohesion can be negatively effected when social interactions such as talks at the coffee machine and social events after work, cease to take place. They state that employees can lose sight of what is happening in their organisation and propose that organisations actively promote their culture and values and behave accordingly [47]. According to Caligiuri et al. the pandemic could have had a positive effect on cross-cultural team cohesion because the Covid related stress was present throughout the whole world [25]. Caligiuri et al. also mention that colleagues were pulled into each other's homes as a result of digital video calls. They mention that this could have caused a greater virtual team cohesion [25]. It can be concluded that working from home has both positive and negative effects on cohesion in teams. The positive effects are most likely to occur in geographical dispersed teams.

Working from home can also affect the extend to which new team members can be integrated into a team. According to Hamlin et al. it can be a challenge to on board new team members and to manage the development and performance of new hires. trough digital means. They state that the difference between good performers and regular performers can become larger when there is no regular in person contact. They propose daily check-ins with supervisors, assigning colleagues to support each other, scheduling time for introductions into the team and providing sufficient information for the on-boarding [47].

Morrison-Smith and Ruiz state that there is more conflict in distributed teams than in co-located teams [76]. De Guinea et al. also found that virtual teams experience more task conflict [33]. Armstrong and Cole, state that mutual trust is an important part of conflict prevention and that conflict in distributed teams is not addressed fast enough and is therefore more likely to escalate [3]. Hinds and Mortensen, state that spontaneous communications can help to control conflicts in remote teams, because it helps to identify and handle conflicts early on [50]. However, during working from home the amount of spontaneous interaction decreases. It can be expected that working from home results in more conflicts in teams and that these conflicts are harder to solve quickly and effectively.

Coordination

According to Massey et al., coordination influences interaction, which in turn influences performance [70] so a decrease in coordination will negatively impact the performance of teams. More specifically aimed at software development, Espinosa et al. state that the large amount of people that are involved in large-scale software development projects and the complex task dependencies make coordination important [40]. This shows a relation between coordination and team performance, especially in large scale software teams.

Berntzen and Wong state that the coordination in a team depends on the interactions between team members [13]. Team coordination was defined by Malone and Crowston as management of dependencies between activities [68]. According to Hertel et al., in distributed teams, coordination relies mostly on electronics [49]. Coordination in digital teams is thus, at least partly, dependent on the interactions between team members and the technical infrastructure of the team.

Coordination is, according to Cascio, a challenge for digital teams [27] and according to Fiore et al., distributed teams will experience more and coordination problems and associated process losses than co-located teams [42]. More specifically aimed at software development teams, Espinosa et al. state that the coordination of distributed software development teams remains problematic, despite improved collaboration tools [40]. The challenges for digital teams, regarding coordination, are expected to be applicable to software development teams that have to work from home due to Covid-19 pandemic and can only be partly mitigated by the use of digital collaboration tools.

Espinosa et al. found that distributed development teams experience more problems with coordination than co-located teams because distributed development team members know each other less well and interact less frequently due to less opportunities for interaction. They conclude that distance negatively impacted coordination for software development teams [40]. Banerjee states that many interactions that would normally have taken place outside of meetings, had to be planned as meeting during working from home. Because of that the amount of meetings has increased [6].

The fuller agenda's and the higher barrier to talk to people because a meeting needs to be scheduled to do that, could prove problematic for the coordination within teams. Miller et al. found the awareness of the work of colleagues decreased 40% when software development teams have to work from home [75]. This makes it more difficult to coordinate the work on interdependent sub tasks. Cooke et al. state that there is no advantage regarding performance or coordination for teams with more experience in high workload situations compared to inexperienced teams [29]. Based on this, an influence of experience level on coordination within digital teams is not to be expected.

Balance of team member contributions

According to Littlepage et al., the performance of a group is dependent on the ability of a team to recognise the expertise of its team members [66]. Littlepage et al. also found that it can be difficult for teams to recognize the potential of team members [66]. Littlepage et al. also found that team members who had experience working together, were more likely to recognise each others potential[66]. Because the teams, which were researched in this thesis, already had experience working together, the recognition of the potential of other team members would not be impacted by working from home.

Faraj et al. state that managing expertise, skills and knowledge, including knowing what the expertise of members of a team is and where that expertise can be applied, is important to use a team to its full potential [41]. Faraj et al. also state that that expertise should then be applied to the right tasks [41]. Miller et al. recommend that managers of software development teams should stay aware of the contributions of individual team members and that they should allow all team members to contribute [75]. This shows that it is important for teams to be aware of the capabilities of team members and to apply them where needed.

Mutual support

According to Porter et al., backup behavior in teams increases performance [86] and Hadjilias et al. found that mutual support positively affects team cohesion and collective efficacy [46]. Barnes et al. state that backup behavior can negatively impact productivity because team members that receive support from their team will perform less work on their next task [7]. Faraj et al. found that informal processes are in need of a supportive environment and content rich informal interactions [41]. This shows that mutual support can positively affect informal processes and knowledge sharing within teams.

Breuer et al. state that trust within a team influences the extent to which team members are willing to ask each other for help, the extent to which team members are willing to provide feedback and the extent to which they want to discuss issues and conflicts [21]. Because trust can be negatively impacted by working from home, mutual support could be negatively impacted as well. On the other hand, Miller et al. found that there was a lot of peer support during the pandemic and that there was increased inclusion of team members and more empathy of other team members [75]. This shows that could be negatively impacted by working from home, but also that co-workers kept supporting each other when working from home during the pandemic.

Effort

According to Kelliher and Anderson, Employees, given more flexibility in their working arrangements, were willing to put more effort into their work [59]. This might be applicable to people working from home in normal situations, but it should be noted that the software development teams that had to work from home during the Covid-19 pandemic, did not experience the same level of flexibility in their working arrangements. They often experienced more flexibility regarding their working times, but they were forced to work from home. Kelliher and Anderson also found that both imposed work effort and voluntary work effort are higher for employees working from home, which was supported by Bloom et al. [59, 17]. Bloom et al. also found that employees working from home outperformed employees that were working at the office, they worked more minutes per shift, because they were sick less often and took less breaks, and they worked harder, more calls per minute [17]. The respondents in the research by Kelliher and Anderson and Bloom et al., were not forced to work from home, so their findings are not directly applicable to the research questions in this thesis. However, the findings do show that working from home on itself, does not negatively impact effort.

3.2.3 The effects of working from home on cross team collaboration

In this section, we put literature on working from home into the perspective offered by the coordination mechanisms to the 'Big Five' core teamwork components, defined by Salas et al. [92], which are mutual trust, shared mental models and closed loop communication. Table 6 shows the effects of working from home on the three coordination mechanisms to the 'Big Five' core teamwork components and the sources which were used to explain them.

Effect	General sources	Covid-19 related sources
Mutual trust	Salas et al. [93] Morison-Smith and Ruiz [76] Cummings and Bromily [31] Pinjani and Palvia [85] De Jong et al. [34] Petrova [83] Bradner and Mark [19]	Hamlin et al. [47]
Shared mental models	Salas et al. [93] Espevik et al [39] Espinosa et al [40]	
Closed loop communication	Salas et al. [93] Marlow et al. [69]	

Table 6: The effects of working from home on cross team collaboration

Mutual trust

Behavioral markers of mutual trust are, according to Salas et al., the extend to which information is shared, the willingness to admit mistakes and the willingness to accept feedback [93]. Trust, in a team context, entails, according to Cummings and Bromily, that a team operates in good faith and in line with agreements, that a team is honest in making these agreements, and that a team does not take advantage of team members [31]. Pinjani and Palvia state that trust is based on confidence between team members [85].

De Jong et al. state that trust has a significant effect on performance [34]. According to Morison-Smith and Ruiz, problems with trust can result in issues with coordination and cooperation, lower willingness to communicate, problems with unstructured tasks and uncertainty, decreased willingness to take initiative, decreased emphatic feelings towards colleagues and a decrease in the amount of feedback that is given [76]. This shows that performance can be negatively effected by a decrease in mutual trust.

Petrova mentioned that mutual trust between all levels is an enabler of flexible working [83]. Morison-Smith and Ruiz see trust as the most important variable of collaboration. They state that trust is especially important for virtual teams because communicating trough computers is more superficial, less personal, less in-dept and less certain than direct face to face communication and because virtual teams have less strong team member relationships than co-located teams [76]. Hamlin et al. state that trust within the organisation can be negatively affected when social interactions, such as talks at the coffee machine and after work drinks, cease to take place. They propose that organisations mitigate this by reexamining and activity communicating their purpose and values to their employees [47]. Based on this and the fact that social interactions were limited during working from home, mutual trust could have been negatively impacted by working from home.

According to Bradner and Mark, the impact of insufficient trust is strongest in the first phase of collaboration and becomes less relevant later on [19]. Based on this, the impact on the trust for existing software development teams that had to switch to working from home is expected to be limited.

Shared mental models

The extent to which team members are anticipating and predicting each others needs and the ability of the team to identify changes in the team, task or teammates and adjust the strategy accordingly are seen as behavioral markers of shared mental modeled by Salas et al. [93]. According to Espevik et al., teams in which members are familiar with each other have faster reaction times, work more accurately and have more success than teams in which members are not familiar with each other [39]. Espinosa et al. state teams coordinate partly through familiarity and shared mental models [40].

According to Espevik et al., teams are able to coordinate activities more efficiently when members of these teams can predict- and anticipate on the needs of their team mates and can identify changes in tasks and compositions which allows them to adjust their strategies accordingly. They state that this is only possible when teams have shared mental models [39]. Espevik et al. state that teams with shared mental models are able to perform with less need for coordination and communication [39]. Specifically aimed at software development teams, Espinosa et al. state that shared mental models positively affected coordination in large scale software development projects [40]. Shared mental models, are thus, important for effective cooperation and coordination.

Espinosa et al. found that many members of distributed software teams, believed that their coordination was partly based on shared mental models of who knew what and being familiar with co-workers. Many software development team members stated that their coordination was partly based on shared mental models regarding knowledge of concepts, products and a shared vision of goals [40]. Espinosa et al. found that more software development team members that were part of distributed teams found shared mental models important than software development team members that were part of co-located teams [40]. Many software development team members, according to Espinosa et al., stated that familiarity with co-workers that worked on other locations helped to solve distance related problems [40]. This shows that the effects of working from home on software development teams are mitigated by having shared mental models.

Closed loop communication

Behavioral markers of closed-loop communication, according to Salas et al., are The extent to which individuals are following up with intended receivers of a message to ensure message was received, the extent to which individuals acknowledge that they received a message and the extent to which individuals clarify that the message that was received is equal to the message that the sender intended to convey [93].

Marlow et al. state that it is challenging for digital teams, that use indirect communication, such as email, to determine whether a sent message is understood by the intended receiver because no non-verbal feedback can be observed. They suggest that virtual teams should apply closed loop communication to ensure that messages are understood in the way that they were meant to be understood and argues that this will increase their performance [69]. This shows that closed loop communication is important for digital teams.

3.3 Organisational support measures

In this section, the applicability and helpfulness of various organisational support measures, which were taken by organisations to support their employees when working remote, are researched. The section covers the existing literature regarding the effect of these measures and policies. The measures are categories into the categories 'Practical support', 'Reassurance, emotional support and health', 'Communication', 'Cohesion', 'Technical capabilities', 'Policies' and 'Personal development'. Table 7 shows the categories of organisational support measures during working from home and the sources which were used to explain them.

Category	General sources	Covid-19 related sources
Practical support		Ralph et al. [89] Charalampous and Grant [28] Przytuła et al. [88] Seethalakshmi et al. [96] Hamlin et al. [47] Trainer et al. [99]
Reassurance, emotional support and health	Blake et al. [15]	Ralph et al. [89] Pacheco et al. [80] Trainer et al. [99] Hamlin et al. [47] Middleton et al. [74] Wang et al. [102] Charalampous and Grant [28] Miller et al. [75] Butler et al. [24]
Communication	Niinimäki et al. [77] Dennis et al. [35]	Ralph et al. [89] Miller et al. [75] Morison-Smith and Ruiz [76]
Cohesion	Jarvenpää and Leidner [55]	Ralph et al. [89] Miller et al. [75] Hamlin et al. [47]
Technical capabilities	Olson and Olson [79]	Ralph et al. [89] Morison-Smith and Ruiz [76]
Policies	Dos Santos et al. [36]	Ralph et al. [89] Miller et al. [75] Butler et al. [23]
Personal development		Ralph et al. [89]

Table 7: Categories of organisational support measures

3.3.1 Practical support

Support measures in the category 'practical support' are 'support measures in the Practical support' category, which include 'Office equipment', 'New equipment', 'Software', 'Internet charges' and 'Activities for children'.

Equipment to work form home

According to Ralph et al., many organisation supported their employees by allowing them to take office equipment from the office or buying new office equipment for their employees [89]. Charalampous and Grant state that good office ergonomics are critical for the health of employees working from home [28]. Because good office ergonomics are critical for employee health, it could be helpful for employees working from home due to the Covid-19 pandemic, to receive office equipment from their employees. Especially for employees that do not have the right office equipment themselves.

Software

According to Przytuła et al., employers seem to be obliged to provide software that employees need to work from home as a result of a psychological contract [88]. Because employees use their own office equipment, electricity and internet for remote working, it is only fair that employers pay for the required software. Ralph et al. found that employers have payed for the software of their employees that needed it to work from home [89]. The fact that many employers payed for the software of their employees, might be caused by they idea that employees need this software to perform their jobs and have no personal incentive to buy it. It could also be goodwill of employees because they feel that is fair to pay for the software that their employees need to work from home.

Internet charges

Seethalakshmi et al. found that many companies pay for the internet of their employees. They also found that the employees that receive compensation for their internet cost are more favorable about working from home than those who don't receive compensation [96]. Hamlin et al. state that many workers, mostly part-time employees and starters have difficulties to work from home in an effective manner, because they do not have a sufficient internet connection. They argue that employees should invest in the required infrastructure, such as fast internet connections [47]. Because bad internet connection hinders the productivity of employees, employers should ensure that their employees have a good connection. Taking away the cost of internet and allowing employees to experience a fast and stable internet connection can also make employees feel better about having to work form home.

Activities for children

According to Ralph et al., employees could be helped by their employer providing activities for children [89]. This support measure is not often described in literature. Most likely because the need to take care of children when working from home was specifically relevant to pandemic related remote work. However, Trainer et al. state that parent of young children experience problems with working from home and taking care of their families [99]. It could help these parents if their employers would organise activities to keep their children occupied during work time.

3.3.2 Reassurance, emotional support and health

Support measures in the category 'Reassurance, emotional support and health' include 'Reassurance about keeping job', 'Reassurance about getting paid', 'Reassurance about time off when sick', 'Understanding that work performance suffers', 'At home exercise programs', 'Checking up on well being' and 'Asking input about problems and solutions'.

Reassurance about keeping job and getting paid

Ralph et al. found that it was helpful for employees to be ensured that they would continue to keep their jobs and get paid during the pandemic [89]. Pacheco et al. state that the economic instability, caused by the pandemic, has led to workers experiencing insecurity regarding their job and income [80]. This negatively impacted employee well being, mostly for those that did not have a lot of job- and social security in the first place. Reassuring these employees that they could keep their jobs and that they would continue to get paid could be helpful in times of a pandemic that sparks a lot of fear and stress regarding job security.

Reassurance about time off when sick

According to Ralph et al., many organisations reassured their employees that they could take time off when they were sick or needed to take care of others [89]. Trainer et al. state that employees, that take care of elderly parents struggle with social distancing and care [99]. Hamlin et al. state that remote working could provide more work-life flexibility and more opportunities to combine a job with care giving [47]. Reassuring employees that they can take time off when they get sick or need to take care of others could be helpful in releasing some of the stress people experience during a pandemic and improving employee well being.

Understanding that work performance suffers

According to Ralph et al., many organisations reassured their employees that they understood that their performance might suffer [89]. According to Hamlin et al., organisations should make every employee feel heard and respected [47]. It is therefore to be expected that talking to employees about the possible negative effects of working from home on their performance will make them feel heard and respected and will therefore be considered helpful.

At home exercise programs

According to Ralph et al., many organisation supported their employees through at home exercise programs [89]. Blake et al. stated that it was important to maintain the health of employees during working from home [15]. Middleton et al. found that tele-health exercise programs could help the physical help of those in need [74], however, this study was not aimed at exercise programs provided by employers. With the reduced access to sport facilities due to the pandemic, this could have helped employees to stay in shape, which could have been helpful.

Checking up on well being

According to Wang et al., social support reduces challenges of remote working [102]. According to Charalampous and Grant, most digital workers believe that their managers should be available and have regular one-on-one meetings with their team, should have open channels of communication with their team members and encourage their team members to contact them for help and guidance [28]. Based on that, regularly checking up on how employees are doing can be very helpful for remote workers.

Hamlin et al. state that coaching and frequent checkups can help employees in their development and helps to identify issues in an early stage [47]. Miller et al. found that members of software development teams appreciated one on one check ins with their managers and team members and that this could be a valuable way to increase the amount of direct communication in the team [75]. In a survey by Butler et al. more than 40% of respondents indicated that they were positive about additional check-ups by their managers about their well being. More than half of the respondents was neutral and less than 5% was negative [24].

Asking input about problems and solutions

According to Charalampous and Grant, managers should encourage their team members to contact them for help and guidance [28]. According to Hamlin et al., organisations should make every employee feel heard and respected [47]. Respondents to a survey by Butler et al. indicated that they found it helpful that their employer asked them about the challenges they encountered. It showed them that their company cared about them [24].

3.3.3 Communication

Support measures in the category 'Communication' category, include 'Continuing to have regular meetings', 'All day open call' and 'Synchronous communication'.

Continuing to have regular meetings

According to Ralph et al., continuing to have regular meetings could be helpful for software development teams that have to work home, due to Covid [89]. Miller et al. also found that continuing to have regular meetings was helpful for software development teams during the pandemic and that these meetings enabled teams to be aware of each others progress and identify and address problems early on [75].

All day open call

Niinimäki et al. state that most software development tasks require one-on-one communication, many-to-many communication is most often used when teams need to find preferred solutions to solve a certain problem [77]. An open video or audio call can work when all-to-all communication is required, but in most cases, one-to-one communication will be required, which is better served with other communication methods. According to Ralph et al., a large number of software developers, was in an open audio or video call with their team during working from home [89]. This could have helped development teams in coordination and communications, but it could also have been a distraction for team members.

Synchronous communication

Ralph et al. indicate that it can be helpful for remote workers to avoid synchronous communication [89]. An advantage of asynchronous communication, according to Morison-Smith and Ruiz, is that it provides the receiver with the opportunity to respond when they want to and to take time to think of the correct response. This makes the communication more focused and efficient [76]. Dennis et al. state that teams with less experience have more need for synchronous communication than more experienced teams [35]. Asynchronous communication can be helpful for remote teams but teams, especially teams with little experience, also need to communicate synchronously.

3.3.4 Cohesion

Support measures in the category 'cohesion' include 'Sending food to staff', 'Virtual social events' and 'Encouraging staff to touch base regularly'.

Sending food to staff

According to Ralph et al., the practice of sending food to staff working from home, was widely adopted by software development teams during the pandemic [89]. This practice could have helped the team members to feel supported and to boost cohesion. That could have boosted morale and productivity of the team.

Virtual social events

According to Olson and Olson, organising non work related interaction between team members can improve the trust in a collaboration [79]. Miller et al. state that teams, working from home should have digital social events, such as online games, but also advice that it would be best to organise these events during working hours [75].

Encouraging staff to touch base regularly

According to Hamlin et al. employers can help to prevent burn outs and other mental health issues, caused by working from home, by encouraging employees to have regular contact with their co-workers [47]. According to Jarvenpaa and Leidner, promoting social interaction, at the beginning of a collaboration can improve trust [55]. Miller et al. state that, during working from home, software development team members should create a culture in which social interactions are promoted [75]. Encouraging staff to touch base regularly, could therefore be helpful for software development teams, working from home.

3.3.5 Technical capabilities

'Work from home infrastructure' is the only researched measure in the 'Technical capabilities' category.

Work from home infrastructure

According to Olson and Olson, a bad technical infrastructure can prove problematic for remote collaboration [79]. According to Morison-Smith and Ruiz, Remote working technology does not succeed when no technical support is available or when inadequate and unreliable technical resources are used [76]. This leads to the conclusion that a good work from home infrastructure is important to successfully work from home.

3.3.6 Policies

Support measures in the 'Policies' category include 'Peer code review', 'Meeting free day' and 'Mandatory pause between meetings'.

Peer code review

According to Dos Santos et al., peer code review can improve the quality of software [36]. They also found that a higher number of developers, locations and reviewers improves the quality of code, but also the duration of the development [36]. If a review takes too long, the developer will be hindered in continuing with his code.

Dos Santos et al. found that peer code review in distributed teams was less effective with regard to duration and participation but more effective regarding contribution [36]. Peer code review, when all team members are working from home, is thus likely to take longer and be done by less people, but the comment density of the the actual reviews is expected to be higher. Miller et al. found that development team members, who are working from home, are less aware of what other team members are doing [75]. Peer code review could be a way to ensure that team members are aware of what their co-workers are working on.

Meeting free day

Butler et al. found that 75% of remote workers, responding to their survey, liked having a meeting free day, 93% indicated that the meeting free day was respected by their managers, 73% indicated that it helped their well being, 77% indicated that it gave them more time to focus on work and 59% indicated that they wanted a meeting free day each week. Other respondents indicated that it caused other work days to be more packed with meetings [23]. This shows that a meeting free day can be valuable for remote workers because it can help to increase their well being and improve their focus. However, a meeting free day can also cause other days to be packed with meetings.

Mandatory pause between meetings

Butler et al. asked respondents about a policy that was implemented in which all 30 minute meetings started 5 minutes later and all 60 minute meetings started 10 minutes later. more than half of the respondents were positive about this policy, approximately one in three respondents was neutral and less than 1 in 10 respondents was negative about having a mandatory pause between meetings [23]. This shows that employees are positive about a mandatory pause between meetings.

3.3.7 Personal development

'Time for professional training' was the only researched support measure in the 'Personal development' category.

Time for professional training

According to Ralph et al., during the pandemic, many organisations encouraged their staff to take time for professional training [89]. This helped software development team members to fill the time in which they could not do other work due to the pandemic.

4 Methodology

The goal of this research is to interpret the impact of a sudden, forced shift to remote digital working on software development teams. Focus area's are the effects of working from home on the work-life of development team members, the measures that organisations took to support their employees, the effects of working from home on Team Work Quality [51] and the effects of working from home on collaboration between different teams. The research methodology is based on the research 'onion' (see figure 2, which was proposed by Saunders et al. [94]).

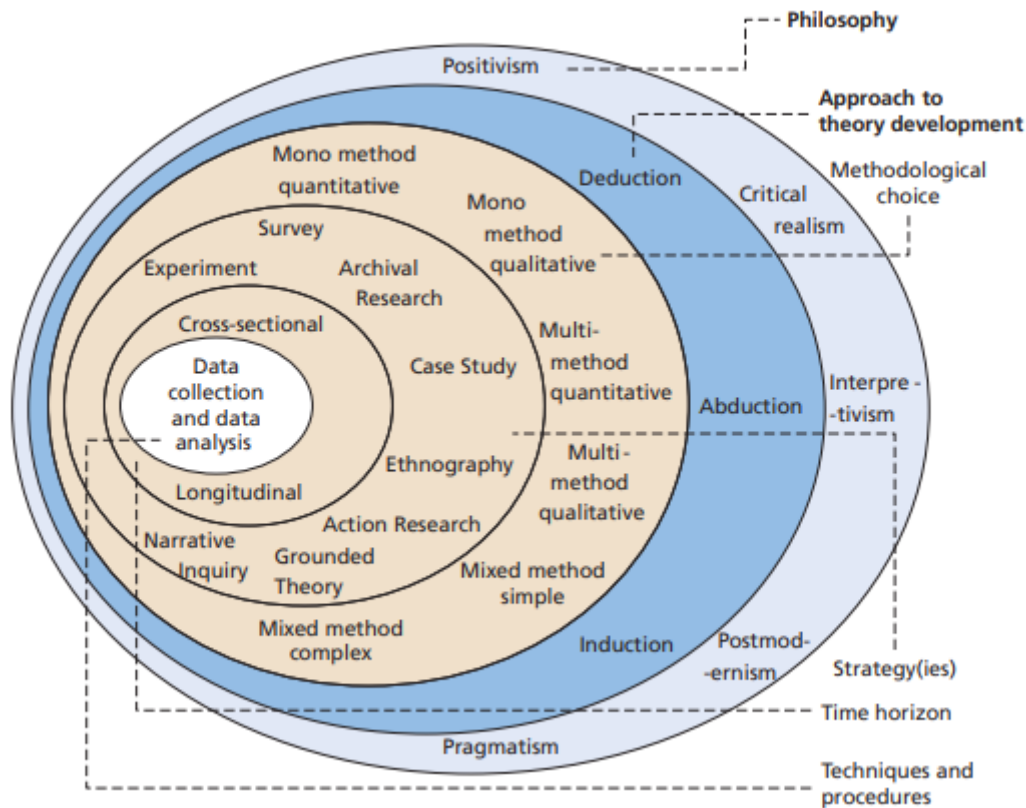


Figure 2: The 'research onion' proposed by Saunders et al [94]

4.1 Research philosophy

According to Saunders et al., A research philosophy is a believe system that includes assumptions about how knowledge is developed [94]. Saunders et al. propose to use onthology, espistemology and axiology a types of assumptions that can be used to determine a research philosophy.

Ontology, according to Saunders et al., can be explained as the assumptions about the nature of our reality [94]. Saunders et al. state that someone's ontological assumptions determine how research objects are perceived and studied [94]. Epistemology, according to Saunders et al., is about the knowledge itself. It is about when knowledge can be considered valid, when knowledge can be considered legitimate and when knowledge is acceptable. It also covers how knowledge can be communicated to others [94]. When it is assumed that objective facts constitute the best scientific evidence and researchers seek for objective findings, the choice for a quantitative research approach would seem logical. When research is aimed at individual contexts and experiences, a more qualitative approach would be preferable. Axiology, according to Saunders et al., is about the role of values and ethics in research [94]. It is important to consider whether one's own values and beliefs should impact one's research [94]. When data is collected through personal interaction, interviews will, often, be the most important data source, or ethnography will be used, instead of focusing on data, collected through an anonymous questionnaire.

Saunders et al. distinguish five research philosophical positions in the outer layer of the research union; positivism, critical realism, interpretivism, postmodernism and pragmatism [94]. Positivism, according to Saunders et al. assumes the ontological position that the nature of a reality or being is real, external, independent, universal, granular and ordered [94]. Epistemologically, acceptable knowledge in a positivism philosophy, comes from scientific methods, observable and measurable facts, law like generalisations and numbers. The philosophy contributes causal explanations and predictions. [94]. Axiologically, a researcher with positivism philosophy believes in value-free research. The researcher should be detached, neutral and independent of the subject and hold an objective stance [94].

From an ontological viewpoint, critical realism, according to Saunders et al., the nature of reality is layered in an empirical-, actual- and real layer. Reality is external, independent, transient, structures are objective and mechanisms are causal [94]. Acceptable knowledge is based in epistemological relativism, knowledge is historically situated and transient, facts are social constructions and the philosophy contributes historical causal explanations [94]. Axiologically, critical realism assumes value-laden research and "Researcher acknowledges bias by world views, cultural experience and upbringing". The researcher is as objective as possible and tries to keep bias and errors to a minimum [94].

The ontological assumption of the interpretivism philosophy is, according to Saunders et al. that the nature of reality and being is complex, rich and socially constructed through culture and language. Things can have multiple meanings, interpretations and realities and there is a flux of processes, experiences and practices. [94]. Epistemologically, the interpretivism philosophy believes that theories and concepts are too simplistic. There is a strong focus on narratives, stories, perceptions and interpretations. The interpretivism philosophy contributes new understandings and worldviews [94]. Interpretivism believes in value-bound research. It believes the researchers to be reflexive and to be part of the subject and therefore subjective. The interpretations of the researcher are important to the contribution [94].

Postmodernism is described by Saunders et al. as a philosophy in which the nature of reality (ontology) is nominal, complex and rich. Reality is socially constructed through power relations and "some meanings, interpretations and realities are dominated and silenced by others". There is a flux of processes, experiences and practices [94]. According to the postmodernist philosophy, epistemologically, truth and knowledge are based on dominant ideologies. The philosophy believes in absence, silence and repression of meanings, interpretations and voices. The philosophy aims to expose power relations, and challenge dominant views [94]. Axiologically, postmodernism believes in value constituted research. The researcher and the subject are both embedded in the researched power relations. Some views are repressed and silenced at the expense of others and the researcher is very reflexive [94].

Axiologically, pragmatism is value-driven and the researcher is reflexive [94]. According to Saunders et al. the ontological assumption of pragmatism is that the nature of reality is complex, rich and external. It sees reality as a practical consequence of ideas and has a flux of processes, experiences and practices [94]. Epistemologically, pragmatism focuses on the practical meaning of knowledge in specific contexts. Theories are correct when they enable successful action. Pragmatism focuses on problems, practices and relevance and contributes problem solving and informed future practices [94].

This research on the effects of suddenly having to work from home on software development teams is based in a pragmatic philosophy. For this research, it is assumed that the nature of the problem is complex and rich, which is in line with the ontology of pragmatism. This research looks into the practical meaning of knowledge about the effects of working from home on software developers in the specific context the Covid-19 pandemic and looks at the effects through the eyes of different types of software development team members. A pragmatic research philosophy looks at the practical meaning of knowledge in a specific context. According to Saunders et al., pragmatic research departs from a problem, and has the goal to find practical solutions that will help future practitioners [94]. This research focuses on the problems that occur and the practices that are used to face those problems. The aim is to contribute by enabling informed future practices when this situation reoccurs in the future, which is also in line with pragmatism.

4.2 Approach to theory development

Saunders et al. discuss three approaches to theory development. When a deductive approach is used, research starts with a theory and the research is aimed at testing that theory. In an inductive approach, research starts by data collection to explore a phenomenon and is aimed at building a theory. When data is collected to explore a phenomenon, identify themes and explain patterns to generate a new or modify an existing theory, and test this through subsequent data collection you are using an abductive approach [94].

For this thesis, the phenomenon of suddenly having to work remote in the context of a software development team was investigated. Themes were identified, patterns were explained and new theory on the research subject was generated. This constitutes an inductive approach to theory development and also fits the statement by Saunders et al. that an inductive approach to reasoning is often aimed at the context of the researched events [94].

4.3 Methodological choice

According to Saunders et al., typical methods for research with a positivism philosophy are deductive and structured, use large samples and quantitatively analysed [94]. A critical research philosophy, according to Saunders et al., typically uses a range of methods and data types which are dependent on subject matter [94]. Methods in an interpretive philosophy are typically inductive, use small samples, in-depth investigations and qualitative analysis. However, according to the interpretive philosophy, a range of data can be interpreted [94]. Postmodern research is, according to Saunders et al., typically, deconstructive. Anomalies, silences and absences are investigated in depth and research is typically qualitative [94]. A pragmatic research method, according to Saunders et al., is based in a research problem and research question. Typical methods are mixed, multiple, qualitative, quantitative and action research. The research has an emphasis on practical solutions and outcomes [94].

According to Saunders et al., when using an inductive approach it is more appropriate to study a small amount of people than to study a large group of people and inductive research is more likely to use qualitative data which is collected through a variety of methods. This helps to look at a phenomena from different viewpoints [94]. As this research follows a pragmatic philosophy, the method follows a research question. The research question is **"How were software development teams affected by suddenly having to work from home as a result of the Covid-19 pandemic?"**. This research focused on practical solutions and outcomes. A sequential explanatory research design was used, which is a form of mixed method research. Firstly, quantitative data was collected and analysed. After that, a qualitative context was added by the collection and analysis of qualitative data.

4.4 Research strategy

For this research a sequential explanatory research design was used, which was executed in 7 phases (see figure 1). In phase 1, the research objective and research questions were developed. In phase 2, the initial literature study was performed in order to gain insight into existing research into the effects of COVID-19 on software developers, the measures that companies took to mitigate the effects of working from home on software development team members and the advantages and disadvantages of working from home, and the effects of working from home on teams and teamwork.

In phase 3, the raw data set from the pandemic programming paper survey, by Ralph et al. [89], in which 2225 software developers were asked about their individual experiences with working from home during the pandemic was analysed. The analysis focused on the performance of software developers, before and during working from home, the amount of time, software developers used work time to do other things than work, before and during working from home, the concentration of software developers, before and during working from home, the quality of the work of software developers, before and during working from home, the applicability of corporate support measures during working from home and the perceived helpfulness of corporate support measures during working from home.

In phase 4, Qualitative data was gathered and analysed. Based on the initial literature study and the quantitative data from the above mentioned survey data set, an interview approach was developed which consisted of a 10 minute pre-interview survey (See Appendix 1), which was used to prepare interviewee specific questions, and a 60 minute structured interview (See appendix 2). 10 interviewees, involved with software development with different roles, experience levels and working for different organisations (see Table 8) were interviewed. The interviewees were selected based on their Linked-In profiles. Criteria were that interviewees had to be members or managers of software development teams, that they had at least three months of experience in software development before the pandemic started and that they had experienced working from home during the pandemic. Interviewees were recruited via Linked-In instant messages, text messages and emails.

In the interviews, the interviewees were asked about the effects of working from home on their work-life, their experience with organisational support measures during working from home, cooperation within their teams during working from home, teamwork quality, in line with the survey about the aspects of teamwork, developed by Hoegl and Gemuenden [51] before and during working from home, the effects of working from home on cross team collaboration and their expectations of their work life after COVID-19. After 8 interviews, saturation started to occur, the answers of new interviewees mostly confirmed, what had already been mentioned by previous interviewees and the interviews yielded little additional information. After 10 interviews, the data gathered in these interviews was analysed. In order to keep the interviews confidential, a code was assigned to each participant. The subjects that were discussed in the interviews were grouped per theme and an overview was made of all gathered information.

Code	Position	Experience*	Pre-Covid work situation**	Organisation type	Organisation size
P1	Business analyst	11 years	Hybrid	IT services and consulting	>1.000 FTE
P2	Integration architect	23 years	In-office	IT services and consulting	>1.000 FTE
P3	Junior software developer	2 years	In-office	IT services	500-1000 FTE
P4	Software developer	7 years	In-office	Web shop	0-25 FTE
P5	Developer	2 years	Hybrid	IT services	0-25 FTE
P6	Developer advocate	6 years	Remote	Technology	>1.000 FTE
P7	software developer	2 years	In-office	Post service	>1.000 FTE
P8	Software architect	7 years	In-office	IT start-up	0-25 FTE
P9	Director expert services	2 years	In-office	Application development	>1000 FTE
P10	Manager data and AI	10 years	In-office	IT services and consulting	>1000 FTE

Table 8: Interview participants

* 'Experience' refers to the years of experience of an interviewee in a job related to software development.

** the 'Pre-Covid work situation' is considered 'in-office' when interviewees work remote for less then 25 % of the time, 'hybrid' for interviewees that work from home 25-75 % of the time and 'remote' for interviewees that work from home more then 75% of the time.

In the final three stages, the thesis was finalized. In phase 5, the literature review was completed by reviewing existing literature in the light of new information that had come to light in the interviews. In phase 6, the findings from the survey data analysis and the interview analysis were critically compared to the literature review and the 'Discussion' section was written. In phase 7, a conclusion was written, in which the most important findings were presented.

4.5 Time horizon

The study was partly longitudinal because survey respondents in the survey from which the data set was used, were asked to answer various questions concerning both the period before working from home and the period during working from home in order to be make a comparison between two different time periods. Also, the interviewees were asked to rate the variables for team work quality concerning the period before- and during working from home in order to be make a comparison between two different time periods. The study was partly cross-sectional because both in the survey and in the interviewees, the respondents are asked to answer various questions about a particular phenomenon at a particular time. This applies to questions about working from home during the pandemic, organisational support measures during the pandemic, teamwork during the pandemic, cross team collaboration during the pandemic and work life after Covid-19.

4.6 data collection and data analysis

Research data was collected from 4 different sources:

1. The data set of the survey that was used for 'Pandemic programming paper' by Ralph et al. [89] (a study on the effects of the COVID-19 pandemic on software developers' well being and productivity)
2. The transcripts of a set of interviews with software development team members.
3. The responses to a set of surveys, filled in by interviewees in preparation of the interviews
4. A literature study on working from home and teamwork in relation to the pandemic.

The following subsections explain how the data was collected which was used to answer the research questions.

4.6.1 SQ1: How did working from home during the pandemic impact software development team members?

In order to gain insight into the effects of working from home on individual development team members during the pandemic, the impact of working from home on software development team members during the pandemic were analysed in the survey analysis and the interview analysis. In the interviews, the expectations of development team members for after the pandemic were discussed as well.

The impact of the pandemic on software development team members

In order to understand the impact of the pandemic on software development team members, the data sets from the survey by Ralph et al. [89] were used to collect the data to perform a quantitative analysis on the impact of the pandemic on the work life of software development team members.

Qualitative context to explain the qualitative findings was gathered through interviews with 10 software development team members. The goal of these interviews, was to understand the impact of working from home on performance, the way software development team members spent their time during working from home, the way they performed their work during working from home and the challenges and benefits of working from home.

In order to ensure that the interviewees spoke about the effects that impacted them the most, open questions were used to ask them about the effect of the working from home on their personal situation, what changed for them in their way of working, the challenges they encountered when they had to start working from home, how these challenges were solved and the benefits they saw in working from home.

Work life post Covid-19

Kramer and Kramer stated that it was likely that the effects of the pandemic were likely to change the ideas of people and organisations about the way they work [61]. Therefore, in the interviewees, software development team members were asked about their expectations for the period after Covid-19. They gave their views on how many days they wanted to keep working from home after the pandemic, the working from home policies of their employers, the lasting impacts of the pandemic on their organisations, the impact of the pandemic on their future work life and what they had learned from the pandemic. Their answers contributed to gaining an understanding of the expectations of software developers for the period after the pandemic.

4.6.2 SQ2: How did working from home during the pandemic impact software development teams?

In order to gain insight into the effects of working from home on development teams, the general effects of working from home on teams during the pandemic and the specific effects on aspects of the Team Work Quality Model, by Hoegl and Gemuende [51] were analysed in the interview analysis.

Team Work during the pandemic

The interviews with people involved in software development, were used to understand the impact of working from home during the pandemic on teamwork in their teams. In order to ensure that the interviewees spoke about the effects that impacted their teams the most, open questions were used to ask them about the effect of the working from home on their teamwork, what changed for their teams with regard to their way of working, the challenges their teams encountered when they had to start working from home, how these challenges were solved and the benefits they saw in working from home with regard to teamwork.

Team Work Quality

A set of survey questions, based on the Team Work Quality construct, facets and variables, developed by Hoegl and Gemuenden [51] were used to ask developers to indicate the changes in Team Work Quality, caused by working from home. The Team Work Quality construct was used to study software developer's in various studies on both traditional- and agile software development teams. Lindsjorn et al. used the Team Work Quality construct [51] to study the effect of Team Work Quality on the performance of agile software teams, the effect of Team Work Quality on team members' success and the difference between agile and traditional teams regarding the effect of Team Work Quality on team performance and team members [64]. Hoegl et al. used Team Work Quality [51] to research the association, impact on team effectiveness between teamwork quality and projects with high task innovativeness (development of new software solutions) and low task innovativeness (software upgrades and customization) [53].

In order to get an understanding of the effect of working from home, on team work quality, 10 people, involved in software development teams, that worked from home during the pandemic were interviewed. In an interview preparation survey, all interviewees were asked to indicate, for 34 statements about variables that compose the 6 facets of Team Work quality, whether they strongly disagreed, disagreed, were neutral, agreed or strongly agreed with the statement regarding the situation in their team in the 3 months before working from home and regarding the situation in their team during working from home.

Because it would take up too much interview time to ask for an elaborate explanation on all 34 statements, the interviews were personalized based on the answers to the interview preparation survey. In the interviews, the interviewees were asked to elaborate on the statements for which their answer, regarding the period they were working from home, differed at least 3 points to their answer regarding the 3 months for the pandemic. This way, the interviewees could elaborate on the variables, that were impacted the most by working from home.

4.6.3 SQ3:How did working from home during the pandemic impact cross team collaboration from the perspective of software development teams?

In order to gain insight into the effects of working from home on collaborating between development teams, the general effects of working from home on cross team collaboration during the pandemic and the specific effects on the coordination mechanisms to the 'Big Five' core teamwork components, defined by Salas et al. [92] were analysed.

The effects of the pandemic on cross team collaboration

In order to get an understanding of the effect of working from home on cross team collaboration, development team members were interviewed. They were asked about the social structure throughout their organisation outside their own team, the impact of the pandemic on collaboration across different teams, the way their team collaborated with other teams during working from home, the measures that helped, or would have helped, to improve collaboration between different teams and the way in which they stayed in contact with colleagues outside their own teams.

Enabling Mechanisms for cross team collaboration

Salas et al. stated that the 'Big Five' core teamwork components [93] are in need of coordination mechanisms in order to ensure teamwork effectivity [93]. These coordination mechanisms, proposed by Salas et al. are 'shared mental models', 'mutual trust' and 'closed loop communication' [93]. According to Salas et al. Information sharing and the willingness to admit mistakes and accept feedback are behavioral markers of mutual trust [93]. Salas et al. also state that extend you were able to anticipate and predicting the needs of other teams and the ability to identify changes in the teams, tasks, or team members and implicitly adjusting strategies accordingly are behavioral markers of shared mental models and that follow up on sent messages, acknowledgement of received messages and validation of the content of these messages are behavioral markers of closed loop communication [93].

These coordination mechanisms were used in the interviews with software development team members to get an indication of the impact of working from home on cross team coordination. The interviewees were asked, for all behavioral markers, whether they were impacted by working from home.

4.6.4 SQ4: Which mitigating measures or preventive actions can be taken to alleviate the impact of the pandemic or help development teams to be better prepared for the next pandemic?

In order to better understand which mitigating measures or preventive actions can be taken to alleviate the impact of the pandemic or be better prepared for the next pandemic. The effects of the pandemic on individuals and teams, and the effectiveness and applicability of organisational support measures during the pandemic were analysed.

Mitigating the effects of the pandemic on individuals and teams

The analyses of the effects of working from home on individual software development team members and software development teams as a whole were researched in order to answer sub research questions 1 and 2. These findings, from the interview analysis and the survey analysis were also used to research how software development teams could mitigate the effects of the pandemic on individuals and teams.

Organisational support

The data sets from the survey by Ralph et al. [89] were used to collect the data to perform a quantitative analysis in the applicability and effectiveness of organisational support measures during working from home. In the interview preparation survey and the interviews, qualitative information about the applicability and perceived helpfulness these organisational support measures was gathered.

In a paper about the effects of the pandemic on the well being and effectiveness of software developers, Ralph et al. state that they were not able to find instruments that measured the degree to which organisations supported their employees in crisis time [89]. Therefore Ralph et al. interviewed software developers, which had worked remote, at the office and in co-located teams, to brainstorm about measures that organisations could take to help. These interviews, in combination with literature on working from home, distributed development and software engineering lead to a set of approaches in the categories equipment, reassurance, connectedness, self care and technical infrastructure and practices, which could be used by companies to support employees when working from home [89].

In a diary study of Microsoft software engineers working from home during the Covid-19 pandemic, Butler et al. [23] used a nightly diary study, in which they 435 participants answered daily questions about their experiences in the first 10 weeks of working from home. Among other things, they measured the impact of three measures, that the company took to address the challenges of working from home. The measures were rated 'positive' or 'neutral/not applicable', by over 90% of respondents [23].

In order to qualitatively interpret the helpfulness of organisational support measures during working from home, 10 interviews that were performed with people, involved in software development teams, that worked from home during the pandemic. In an interview preparation survey, which all interviewees filled in before their interviews, 23 statements were listed about organisational support measures (20 from the pandemic programming paper by Ralph et al.[89] and 3 from the diary study by Butler et al. [23]) and respondents had to indicate whether the statement applied to them and whether it was relevant for them.

A 'not relevant' option was added, because some of the statements, for example about child daycare, would not be relevant for the respondents without children at home. The respondents were also asked to indicate, for every statement, whether they considered it 'very unhelpful', 'unhelpful', 'neutral', 'helpful', or 'very helpful', because this provides more qualitative information than a binary question about whether a measure is helpful or not.

Based on the answers to the interview preparation survey, The interviews were personalized. Because it would take up too much interview time to ask for an elaborate explanation on all 23 statements, Interviewees were asked to elaborate on all of the statements for which they indicated that they considered them either 'very unhelpful' or 'very helpful'. This made it possible to gather detailed information about the support measures, the interviewees felt most strongly about.

5 Results

In this section the results of the Pandemic programming paper data set, provided by Ralph et al. [89], and the results of the pre-interview survey and the interviews that were performed for this thesis will be analysed. In order to lay the foundation for the 'Discussion' section, in which the sub research questions will be answered, this section is divided into three subsections in which the analysis of the results relating to three sub-questions will be performed.

In the first subsection, 'Impact of the pandemic on software development team members', the analysis focuses on the effects of the pandemic on individual team members, the measures that organisations took to support their employees during working from home and the expectations of software development team members for the future post-Covid. In the second subsection, 'Impact of the pandemic on software development teams', the analysis focuses on the general effects of working from home during the pandemic on software development teams and, more specifically on the effects of working from home during the pandemic on Team Work Quality. In the third subsection, 'Impact of the pandemic on cross team collaboration' the analysis focuses on the general effects of working from home during the pandemic on cross team collaboration from the viewpoint of software development teams and, more specifically, the enabling mechanisms for cross team collaboration. An extended overview of the results can be found in *Appendix 3: Pandemic programming data analysis* and *Appendix 4: Interview analysis*.

5.1 Demographics

In order to be able to understand the results in their full contexts, the demographics of the respondents to the pandemic programming survey by Ralph et al. [89] and the demographics of the interview participants should be taken into account.

5.1.1 Pandemic programming survey respondents

The demographic of the respondents to the pandemic programming survey were made insight full based on their gender, age, country, organisation size, experience in software development and experience working from home.

Gender

1800 respondents were male, 394 respondents were female and 31 respondents reported 'other' or did not disclose their gender (See Table 9).

Country	Respondents	%
Male	1800	81%
Female	394	18%
Other/Not disclosed	31	1%

Table 9: Survey respondent genders

Age

The age of 13 respondents (1%) was below 20. 238 respondents(11%) answered that they were 20-24 years old. 610 respondents (27%) fall into the age group 25-29, 475 respondents (21%) fall into the age group 30-34, 419 respondents (19%) fall into the age group 35-39, 272 respondents (12%) fall into the age group 40-45, 95 respondents (4%) fall into the age group 45-49, 59 respondents (3%) fall into the age group 50-54, 28 respondents (1%) fall into the age group 55-59, 3 respondents (0%) fall into the age group 60-64, 3 respondents (0%) fall into the age group older than 65 and 10 respondents (0%) did not wish to disclose their age (see Table 10).

Age	Respondents	%
<20	13	1%
20-24	238	11%
25-29	610	27%
30-34	475	21%
35-39	419	19%
40-45	272	12%
45-49	95	4%
50-54	59	3%
55-59	28	1%
60-64	3	0%
>65	3	0%
Not disclosed	10	0%

Table 10: Survey respondent ages

Organisation size

12 (1%) respondents answered that their organisation had no employees. 98 (4%) respondents work for an organisation with 1-9 employees, 566 (25%) respondents indicated that they work for an organisation with 10-99 employees. 657 (30%) respondents work for an organisation with 100-999 employees, 540 (24%) respondents work for an organisation with 1.000-9.999 employees, 236 (11%) respondents work for an organisation with 10.000-99.999 employees and 116 (5%) respondents work for an organisation with over 100.000 employees (See Table 11).

Employees	Respondents	%
0	12	1%
1-9	98	4%
10-99	566	25%
100-999	657	30%
1.000-9.999	540	24%
10.000-99.999	236	11%
>10.000	116	5%

Table 11: Survey respondent organisation sizes

Country

Most of the respondents come from Germany (23%), Russia (17%), Brazil (12%) and Italy (8%). Other countries from which respondents participated are United States (4%), Korea, South (4%), Belgium (3%), China (3%), Turkey (3%), India (2%), Japan (2%), Spain (2%), Iran (2%), Austria (1%), Canada (1%), United Kingdom (1%), Switzerland (1%), Saudi Arabia (1%), Australia (1%), Netherlands (1%) and France (1%). Belarus, Tunisia, Ireland, Israel, Ukraine, Sweden, New Zealand, Indonesia, Egypt, Algeria, Finland, United Arab Emirates, Poland, Romania, Thailand, Armenia, Libya, Oman, Morocco, Slovakia, Serbia and Montenegro, Latvia, Portugal, Slovenia, Denmark, Lebanon, Nepal, Norway, Mexico, Singapore, Luxembourg, Albania, Russia and Germany, Czech Republic, Cyprus, Ecuador and El Salvador all were responsible for < 1% of the responses. 19 respondents did not disclose their country (See Table 12).

Country	Respondents	%
Germany	505	23%
Russia	366	16%
Brazil	272	12%
Italy	173	8%
United States	99	4%
Korea, South	81	4%
Belgium	77	3%
China	76	3%
Turkey	66	3%
Other/Not disclosed	491	23%

Table 12: Survey respondent countries

Years of experience in software development

The respondents are categorized, based on their experience in software development, 665 respondents (19%) indicated that they had less than 5 years of experience in software development, 591 respondents (17%) had 5-10 years experience in software development. 1094 respondents (31%) had 10-15 years experience in software development, 1090 respondents (31%) had over 15 years experience in software development and 41 respondents (1%) did not disclose their number of years of experience (See table 13).

Years of experience	Respondents	%
<5	665	19%
5-10	591	17%
10-15	1094	31%
>15	1090	31%
Not disclosed	41	1%

Table 13: Survey respondent experience in software development

Years of experience working from home

The survey respondents were asked to answer questions about their experience with working from home. 67 respondents (2%) indicated that they had no experience working from home, 1565 respondents (70%) indicated that they had 0-1 year of experience working from home, 373 respondents (17%) indicated that they had 1-5 years of experience working from home, 58 respondents (3%) indicated that they had 5-10 years of experience working from home, 68 respondents (3%) indicated that they had more than 10 years of experience working from home and 94 respondents (4%) did not disclose their experience with working from home (See table 14).

Years of experience	Respondents	%
0	67	3%
0-1	1565	70%
1-5	373	17%
5-10	58	3%
>10	68	3%
Not disclosed	94	4%

Table 14: Survey respondent experience working from home

5.1.2 Interview participants

10 software development team members were interviewed. The interviewees have different positions, experience levels (from 2 years to 23 years), pre-covid work situations (in-office, hybrid and remote) and they work for different organisation types with different organisations sizes (From 20 FTE to >500.000 FTE). The demographics of the interview participants are shown in Table 15.

Code	Position	Experience*	Pre-Covid work situation**	Organisation type	Organisation size
P1	Business analyst	11 years	Hybrid	IT services and consulting	>1.000 FTE
P2	Integration architect	23 years	In-office	IT services and consulting	>1.000 FTE
P3	Junior software developer	2 years	In-office	IT services	500-1000 FTE
P4	Software developer	7 years	In-office	Web shop	0-25 FTE
P5	Developer	2 years	Hybrid	IT services	0-25 FTE
P6	Developer advocate	6 years	Remote	Technology	>1.000 FTE
P7	software developer	2 years	In-office	Post service	>1.000 FTE
P8	Software architect	7 years	In-office	IT start-up	0-25 FTE
P9	Director expert services	2 years	In-office	Application development	>1000 FTE
P10	Manager data and AI	10 years	In-office	IT services and consulting	>1000 FTE

Table 15: Interview participants

* 'Experience' refers to the years of experience of an interviewee in a job related to software development.

** the 'Pre-Covid work situation' is considered 'in-office' when interviewees work remote for less than 25 % of the time, 'hybrid' for interviewees that work from home 25-75 % of the time and 'remote' for interviewees that work from home more than 75% of the time.

5.2 Impact of the pandemic on individual software development team members

In this section, the date, relevant to the first sub question, "**How did working from home during the lock downs impact software development team members?**", will be analysed. This subsection will focus on the impact of working from home on software development team members and the expectations of people involved in software development for the future after Covid.

5.2.1 Impact of working from home on software development team members

In this subsection, the interview analysis regarding the challenges and benefits of working from home for software development team members will be performed, based on the qualitative explanations of interviewees. The section will also cover the effects of working from home on the concentration of software development team members, the time spent on not-work related activities during working hours, the quality of work and the productivity based on the survey data analysis, the qualitative explanations of interviewees and existing literature on this effect of working from home.

Challenges of working from home

Half of the interviewees indicated that working from home had little impact on their personal situation. The interviewees, for whom working from home did impact their personal lives, reported missing social contact, blurred work life boundaries, loss of job satisfaction and difficulties with children at home as negative working from home effects.

When asked about the challenges of working from home, interviewees named, that it was harder to give feedback, to get to know new coworkers and to keep focus. Some interviewees indicated problems regarding getting the right office equipment, bad internet connection and a changed office dynamic, but all of these issues were only mentioned by one interviewee. The challenge that was mentioned most often was related to communication with colleagues. More than half of the interviewees reported that this was a challenge during working from home.

Benefits of working from home

The interviewees mentioned more flexible work times, which allowed them to spend time on chores and with their pets and the time they won because they did not have to commute anymore as advantages in their personal life as a result of working from home.

Other benefits of working from home, according to the interviewees were better focus, which was also seen as a challenge by some of the interviewees, and location independence. Benefits that were mentioned by only one of the interviewees were that it had become easier to call people and that they experienced less micro management.

Time spent on not-work related activities during working hours

The survey data analysis shows that working from home caused 37% of respondents to spend more time on not-work related activities during working hours. For 46% the amount of time spent on not-work related activities during working hours was not impacted by working from home and for 16%, the time spent on not-work related activities during working hours decreased. The percentage of respondents that never spent working hours on not-work related activities decreased from 20% before working from home to 14% during working from home. The percentage of respondents that indicated that they spent a little of their working time on non-work related activities decreased from 47% to 36%. On the other hand, the percentage of respondents that spent their working time on non-work related activities some of the time increased from 26% to 35% and the percentage of people that spent most of their working time on non-work related activities more than doubled from 5% to 11%. The percentage of respondents that spent all of their time on not-work related activities remained equal at 1%. This shows that the software developers that did spend little to no time on not-work related activities during working hours started to do this more during working from home, but almost none of the developers that did not spend all of their working time on other things started to do that during working from home.

Focusing on the experience in software development, the survey analysis showed that the increase was highest for the respondents with the least experience and lowest for the respondents with the most experience in software development. This shows that less experienced developers are more likely to spend more working hours on not-work related activities during working hours when working from home.

The survey data analysis shows that 38% of software developers with up to one year of experience working from home reported an increase in the time spent on not-work related activities during working hours compared to 35% of developers with between 1 and 5 years of experience working from home and 26% of developers with over 5 years of experience working from home. This shows that developers with more experience in working from home are less likely to show an increase in spending time on not-work related activities during working hours.

The survey data analysis shows that developers working for smaller organisations (1-9 employees), less often reported an increase in time spent on not-work related activities during working hours when working from home (34%) than people working in larger organisations with 10-999 employees (36%) and with more than 999 employees (39-40%). This could be caused by the higher visibility of employees in smaller organisations, which makes it harder to get away with it or with higher loyalty in smaller organisations.

The interview analysis shows that some software development team members spent time on not-work related activities during working hours. Interviewees reported that they could use their time more flexibly to go to the gym or get groceries. This is in line with the results from the survey analysis that show that developers spent more time on not-work related activities during working hours. However, not all interviewees indicated that they actually used working time to do this. One interviewee stated that one of his colleagues spent working time on personal affairs, but most interviewees just talked about a different, more efficient, distribution of their time. Out of the 4 interviewees that saw the increased flexibility as an advantage, 3 had only 2 years of experience in software development. This could be seen as a confirmation

of the survey analysis that shows that the increase in time spent on not-work related activities during working hours was highest for the respondents with the least experience and lowest for the respondents with the most experience in software development. The interview analysis does not show a relation to experience with working from home or organisation size.

Concentration

The survey data analysis shows that working from home caused 28% of respondents to be able to concentrate less on their work. For 49% concentration during working hours was not impacted by working from home and for 23%, the concentration became better. The percentage of developers that was always able to concentrate decreased from 19% to 18% during the pandemic. The percentage of developers that was not able to concentrate a little of the time decreased from 44% to 41% and the percentage of developers that was not able to concentrate some of the time decreased from 28% to 26%. On the other hand the percentage of developers that was not able to concentrate most of the time increased from 7% to 11%. The percentage of developers that never able to concentrate remained equal at 2%. This indicates that concentration was, on average, negatively affected by working from home.

The survey analysis shows that software developers with 0-10 years of experience in software development are more likely to experience a decrease in concentrating when working from home (29-30%) than developers with more than 10 year of experience in software development (24-26%). The more experience in software development the respondents had, the more likely, they were to report that their concentration had improved when working from home. From developers with 0-5 years of experience, 20% reported an improved concentration, From developers with 5-10 years of experience, 22% reported an improved concentration, From developers with 10-25 years of experience, 24% reported an improved concentration and from developers with more than 15 years of experience, 27% reported an improved concentration. The developers with more than 15 years of experience were the only group in which more respondents reported increased concentration (27%) than decreased concentration (24%). This shows that working from home negatively impacts concentration for developers with less than 15 years of experience and positively affects concentration of developers with more than 15 years of experience in software development.

Looking at the experience that respondents have with working from home, the survey analysis does that in the group of software developers with more than 5 years of experience working from home, slightly more people report a positive effect of working from home on concentration (23%) than a negative effect (2%), for the group of respondents with between 0 and 5 years of experience, 23-25% reports a positive effect on concentration and 28-29% reports a negative effect on concentration. This shows that working from home negatively impacts concentration for developers with less than 5 years of experience working from home and positively affects concentration of developers with more than 5 years of experience working from home.

Regarding the relation between organisation size and the effect of working from home on concentration, the survey analysis shows that both the positive and the negative effects of working from home are strongest in smaller organisations (1-9 employees). 27% of respondents from smaller organisation report an improved concentration which is higher than for organisations with 10-99 employees (22%), 100-999 employees (23%), 1000-9999 employees (24%), 10000-99.999 employees (20%) and more than 100.000 (26%) employees. 35% of respondents from

smaller organisation report an decreased concentration which is higher than for organisations with 10-99 employees (26%), 100-999 employees (26%), 1000-9999 employees (31%), 10000-99.999 employees (29%) and more than 100.000 (26%) employees. For all of the organisation sized, the percentage of developers that report a negative effect of working form home on concentration is higher than the percentage that report a positive effect, except for the organisations with more then 100.000 employees where the positive and the negative effect are equal. This shows that software developers in the smallest organisations are, on average, most negatively affected by working from home, despite the fact that many of them reported a positive affect. On the organisation level, the effect of working form home on concentration is negative for all organisation except for the organisations with 100.000 employees.

The, on average, negative effect of working from home seems to contradict with the interview findings, in which 60% of interviewees indicated an improved focus as a result of working from home and only 30% indicated that keeping focus was a challenge. An interviewee that indicated that it was a challenge to keep focus stated that the situation did not improve when she got used to working from home. Interviewees that indicate that they were able to keep better focus during working from home stated that this was caused by the fact that they were disturbed less often.

The negative impact of working from home on less experienced software development team members, which is indicated by the survey analysis is in line with the interview results. The interviewees that indicated that working from home brought challenges regarding concentration had, on average, only 2 years of experience in software development. All of the interviewees with more then 10 years of experience in software development, indicated that working from home helped their focus. This could be the result of them being disturbed less often because less experiences developers, according to the interview analysis, saw a larger barrier to ask more experienced colleagues for help.

Looking at the influence of experience with working from home, the interview analysis does shows that 1 out of 3 interviewees that were working hybrid or fully remote before Covid experience problems with keeping focus, compared to 2 out of 7 that were used to work in office. The interviewees were not asked about the amount of years of experience with working from home, but because non of the interviewees that indicated that they saw keeping focus as a challenge had more than 2 years of experience in software development, it can be concluded that they did not have more than 5 years of experience working form home. This fits with the results from the survey analysis that show that negative effects on concentration are most frequent in the group of respondents with less than 5 years of experience working from home.

Where the survey analysis shows that developers, working for smaller organisations, experience more problems regarding concentration when working from home, the interview analyse does not indicate a clear relation between concentration problems when working form home and organisation size.

Quality of work

The survey data analysis shows that working from home caused an increase in the quality of the work of 26% of software developers. 44% of the software developers that responded to the survey indicated that the quality of their work was not impacted by working from home and 30% responded that the quality of their work had decreased. Referring to the period in which they were working from home, 11% of respondents indicated that the quality of their work was never lower than it should have been, before working from home only 9% of the respondents gave that answer. Before working from home 46% answered that the quality of their work was lower than it should have been a little of the time. During working from home, this answer was given by only 39%. Before working from home 33% answered that the quality of their work was lower than it should have been some of the time. During working from home, this answer was given by 32%. Before working from home 10% answered that the quality of their work was lower than it should have been most of the time. During working from home, this had increased to 14 %. The percentage of people for whom the quality of their work was lower than it should have been all of the time remained equal at 2%.

This shows that the more developers showed a consistent high quality of work during the pandemic but on the other hand, more developers delivered a lower quality of work most of the time as well. The percentage of developers that delivered a lower quality of work a little of the time or some of the time decreased during the pandemic and people that always delivered work of a lower quality did not improve during working from home. Overall the quality of work was more often negatively impacted by working from home because of Covid than it was positively affected.

Developers with 0-10 years of experience in software development more often reported a negative effect of working from home on the quality of their work (32-34%) than a positive effect (22%-24%). On the other hand, respondents with more than 10 years of experience in software development more often reported a positive effect (29-31%) of working from home on the quality of their work than a negative effect (25-26%). This shows that the quality of the work of more experienced (more than 10 years) developers increased during working from home and that the quality of the work of less experienced (0-10 years) developers decreased during working from home. This could be explained by the fact that that working from home negatively affects the concentration of less experienced developers and positively affects concentration of developers with more experience in software development.

The survey data analysis shows that 25% of developers with more than 5 years of experience working from home reported a decrease in the quality of their work during the pandemic. From the developers with 1-5 years of experience working from home 29% reported a negative effect of the pandemic on the quality of their work and from the developers with up to one year of work from home experience 31% reported a negative effect of the pandemic on the quality of their work. This shows that software developers with more experience working from home, experience less negative effect on the quality of their work when working from home. However, the effect of experience working from home is weaker than the effect of experience in software development. The survey analysis did not show a clear relation between the effect of working from home on the quality of work and the size of the organisation for which the respondents worked.

The impact of working from home on the quality of work was not part of the interviews. However the interview analysis could help to explain one of the findings from the survey analysis. The interview analysis showed that less experienced developers saw a larger barrier to ask more experienced colleagues for help. This could have negatively impacted the quality of their work. The fact that more experienced developers were disturbed less, when working from home could have positively impacted the quality of their work.

Performance

In this section, the pandemic programming data analysis and the qualitative explanations of interviewees, regarding the effect of working from home on the performance of software development teams, will be analysed. The survey data analysis shows that working from home caused an increase in the self reported performance of 20% of software developers. 32% of software developers reported that their self reported performance remained equal and 49% reported that their self reported performance had decreased. When comparing the two years before working from home to the period during working from home the average self reported performance rating decreased from 7.8 to 7.0. This shows that working from home had a negative effect on the self reported performance of software developers.

The percentage of developers that reported an increase in productivity during working from home shows no clear relation to the number of years of experience in software development. In all experience levels in our analysis, the percentage of respondents that reported a decrease in productivity was higher than the percentage that reported an increase. However, the percentage of developers that reported a decreased productivity was lower in the group with more than 10 years of experience in software development (45%) than in the group with 0-10 years of experience in software development (51-52%). This shows that the self reported performance of respondents with less experience in software development was more heavily negatively affected than the self reported performance of respondents with more experience.

Looking at the effects of working from home on self reported productivity in relation to the experience of respondents with working from home, the effects are the strongest, both negatively and positively, in the groups with up to one year and 1 to 5 years of experience. The percentage of respondents that report a decrease in productivity in these groups (49-50%) is higher than the percentage of respondents that report a decrease in productivity in the group with more than 5 years of experience (44%). This could be explained by the assumption that people with more experience working from home are less affected by having to work fully remote. The survey analysis did not show a clear relation between the effect of working from home on the self perceived productivity and the size of the organisation for which the respondents worked.

The interview analysis shows that productivity of software development team members was negatively effected by 30% of interviewees, not effected by 30% of interviewees and positively effected by 40% of interviewees. Communication difficulties are mentioned by interviewee respondents as reasons for decreased productivity and more focus as a reason for increased productivity. The survey analysis finding that the self reported performance of respondents with less experience in software development was more heavily negatively affected than the self reported performance of respondents with more experience is, to some extent, confirmed by the interview analysis. 2 of the 3 interviewees that indicated a decreased performance had only 2 years of experience and the 4 interviewees that indicated an increased performance, all

had over 6 years of experience in software developments. However, the other interviewee that indicated a decrease in performance had 23 years of experience. Because of the small amount of interview respondents and the fact that the survey analysis shows that not all experienced respondents reported an increase, this one discrepancy does not need to impact the conclusion.

5.2.2 Post-Covid expectations

In this section, based on the interviews, the expectations regarding working after the pandemic will be analysed.

Working from home

Most interviewees expect that they will be working from home for, at least, part of their work week in the period after the pandemic. For the interviewees that indicated a preferred amount of office days, their preference differs from 0 to 3 days at the office per week. Two interviewees indicated that they had no preference. One interviewee stated that he wanted to work from home on the days he worked half days and another interviewee indicated that he only wanted to work from home when he had to do work that required a lot of concentration.

Most interviewees expect that working from home will be accepted more by their organisations. The expected policies regarding working from home differ from company to company. Examples of policies in the organisations of the interviewees are, Fully remote, remote first, at least two days at the office, at least 2-3 days at the office, at least 3 days at the office and in office first. Some companies leave it up to their employees, as long as needs from projects and coworkers are taken into account and some companies ask their employees to follow the policy of the company where they are seconded. All of the interviewees are content with their organisations (expected) policies regarding working from home after Covid.

Other expectations

Most interviewees expect that there will be little changes in their work life when the pandemic is over. Besides more working from home, interviewees that do expect changes, expect that digital meetings will become more common, work life balance will improve, there will be more flexibility in working times and the improved communication structures will remain in place. An interview also stated that he was worried whether their organisational culture would remain intact when colleagues would go to the office less.

5.3 Impact of the pandemic on software development teams

In this section, the second sub question, "**How did working from home during the lockdowns impact software development teams?**", will be analysed. This section will focus on the effects of working from home during the pandemic on Team Work Quality which are 'Communication', 'Cohesion', 'Coordination', 'Balance of team member contributions', 'Mutual support' and 'effort'.

5.3.1 Communication

Based on the interviews, working from home had an effect on the communication in most teams. For the interviewees that already had a lot of experience with working from home, the effect of the pandemic on communication within their teams was limited, members of teams with less experience, working remote, reported a clear impact of the pandemic on communication within their teams.

Higher threshold for communication

Technical issues with video calls were a barrier for communication at first, but these issues were solved quite quickly. For some interviewees, the fact that people weren't physically in the same space resulted in a higher threshold for communication. The fact that people were more flexible regarding their working hours, and the fact that people could not see whether their colleagues were busy, also made it more difficult to reach colleagues. Interviewees also indicated that junior employees had a higher barrier to ask for help and when they asked for help, some interviewees mentioned that it took longer to get answers to their questions. This caused a loss of efficiency and eventually, for some teams, resulted in a different division of tasks, where difficult tasks were more often given to the more senior team members.

Less communication

Interviewees indicated that the communication frequency in their team had gone down. Because people lost sight of each other, they spoke less and weren't aware of things, they would have been aware of when working at the office. Working from home reduced the frequency of spontaneous communication, because all meetings had to be planned. People talk more often to each other when they are sitting next to each other than when they need to call. The amount of personal communication also declined because digital meetings had to be planned and people don't plan the personal talks they would normally have at the coffee machine. People socialize at the office, so when the offices are closed, there is less socializing. An interviewee did note that his team found it important to plan moments to talk about personal affairs, but this did not happen often. For most interviewees, working from home had little impact on how openly information was shared and whether important information was kept from team members. However, the reduced amount of informal contact did cause people to be less informed than they normally would have been. In a team, where information was already kept from team members, the situation worsened during working from home.

Lower communication quality

Some interviewees indicated that the quality of communication had become lower. Less informal communication and late responses to questions resulted in a lower satisfaction about the timeliness of received information. At some teams the precision of information increased because the limitations of working from home forced them to be more precise, in for example, feature requests. For other teams, the decline in informal communication caused people to be less precisely informed about what was going on. For the teams in which the precision and timeliness of information was negatively affected by working from home. The late, and sometimes incomplete information was less useful. Teams tried to improve communication quality by trying to avoid long emails and long-winded meetings, writing concrete proposals and calling each other personally when email and group meetings did not work. The lower quality and timeliness of communication also resulted in conflicts regarding information flow.

Advantages regarding communication

Some interviewees found that working from home had advantages regarding communication. Digital tools made it easier to work together on one screen. The limited informal communication forced people to write better- and more complete tickets and improve documentation. The restrictions and limitations made good communication very important and also helped teams to learn to communicate better. Some interviewees indicated that they were happy that there were no hybrid meetings because everyone had to call in from home.

5.3.2 Cohesion

In this section, based on the pre interview survey analyses and the interview analysis, the effects of working from home on the cohesion within teams will be analysed. The discussion covers feelings towards the project, feelings towards the team and interpersonal relationships within the team. Overall the situation remained good in the teams that already scored very good regarding cohesion and the situation worsened for teams that scored less well before working from home.

Feelings towards the project

Interviewees were asked about team member's feelings toward the projects they were working on before and during working from home. Overall team members found less important to be part of the project during working from home than they did before working from home. In some teams, it was more difficult for team members to stay in contact, which made them loose their connections. That resulted in them feeling that it was less important to be part of the project. Based on the interview analysis, working from home during the pandemic had very little effect on whether team members saw anything special in the project. The situation did not improve for teams in which the team members did not see anything special in the project and did not worsen for teams in which the team members did see something special in the project. The members of a team that was working on a cool project before the pandemic, kept their enthusiasm during the pandemic. The interview analysis shows that team members that strongly agreed with the statement that they felt strongly attached to their projects before the pandemic, felt the same during the pandemic. For respondents that did not agree strongly with the statement, the situation became worse during working from home. This could, according to one of the interviewees, be caused by the long duration of the pandemic.

Feelings towards the team

Interviewees were asked about team member's feelings toward their team before and during working from home. The integration of team members remained equal for part of the interviewee's teams and decreased for another part. Interviewees indicated that they struggled to digitally integrate new team members. All of teams of the respondents that strongly agreed to the fact that their team was sticking together before the pandemic, remained sticking together during working from home. For half of the teams of the respondents that agreed or were neutral about sticking together before the pandemic, the situation worsened after the pandemic started. A possible explanation, according to one of the interviewees is the fact that team members could not physically meet each other anymore. For international teams, the pandemic could have helped cohesion because all team members had a similar experience because of the global pandemic.

For most teams, working from home did not impact the extend to which team members felt responsible for their teams. However, when team members loose sight of the full picture of what they are working on, their feelings of responsibility towards the team can decline. The interview analysis did not show a clear effect of working from home during the pandemic on the extend to which team members felt proud to be part of their teams.

Interpersonal relations within the team

Interviewees were asked about attraction and conflicts within the team before and during working from home. Working from home did not strongly influence the personal attraction between team members in the teams of the interviewees. Working from home did, according to some of the interviewees, increase the amount of personal conflicts within the team. The external effect of the pandemic on the feelings of team members and the extra barriers regarding getting together and talking stuff out were mentioned as possible causes. Interestingly, for all of the the interviewees that strongly disagreed with the statement that there were many personal conflicts in their teams before the pandemic, that statement was still valid during the pandemic.

5.3.3 Coordination

In this section, based on the pre interview survey analyses and the interview analysis, the effects of working from home on the coordination within teams will be analysed. The section covers the clarity-, comprehensibility- and acceptance of sub tasks as well as the harmonization of work and the conflicting interests regarding sub tasks.

Clarity and comprehensibility of sub tasks

For most teams, the clarity and comprehensibility of sub tasks was not affected by working form home. For a team where sub tasks did become less clear and comprehensible during working from home, this was attributed to the fact that is was harder to digitally explain what people had to do than it was to explain it face to face.

Harmonization, acceptance and and conflicting interests regarding sub tasks

The teams in which the work done on sub tasks was closely harmonized before working from home (the teams from which the interviewees strongly agreed that that was the case), the situation did not change during working from home. For most of the other teams, work on sub tasks became less closely harmonized during working from home. A possible explanation, according to some of the interviewees, is that coordination is more difficult because it is harder to reach people due to flexible work times and that it was harder to see who was busy and who had the time to take on tasks.

In the teams in which interviewees indicated that sub tasks were generally accepted by all team members before working from home (strongly agree or agree), the acceptance of sub tasks was not much affected by working from home. The interviewees from the teams in which the acceptance was lower before working from home reported a deterioration during working from home. A possible explanation, according to one of the interviewees, is that it is harder to ask someone to do something via digital communication than it is when someone is sitting across from you. Based on the interview analysis, working from home did not seem to have a strong impact on whether there were conflicting interests in teams regarding sub tasks.

5.3.4 Balance of team member contributions

In this section, based on the pre interview survey analyses and the interview analysis, the effects of working from home on the balance of team member contributions will be discussed. The section will cover recognition of the potential of team members, the extent to which team members contribute in line with their potential and conflicts caused by imbalance in team members contributions.

Recognition of team member potential

In some teams the recognition of team member potential increased because team members were working more independent. On the one hand this allowed team members to show their potential. On the other hand, this required team leaders to take the skills and capabilities of team members more into account in the division of tasks. There were also teams in which the recognition of team member potential was not affected by working from home.

Contribution in line with team member potential

Overall, the interview analysis shows that working from home did not strongly impact the extent to which team members contributed in line with their potential. In teams where team members were equally personally affected by the pandemic, their balance in contributions remained equal. In teams where some team members were affected more than others, for example because they had to take care of young children, the balance in contributions shifted, but all team members still tried to contribute the best they could.

Conflicts caused by imbalance in team members contributions

Imbalance in team member contributions did not cause significantly more conflict in teams during working from home. In general, team members understood that some colleagues were more affected by the pandemic and were willing to pick up some of their work. In situations where team members contributed less, for no valid reason, that caused conflicts, but that was not directly related to working from home or Covid.

5.3.5 Mutual support

In this section, based on the pre interview survey analyses and the interview analysis, the effects of working from home on the mutual support within teams will be discussed. The section covers the extent to which team members helped and supported each other, how teams dealt with team member suggestions and contributions and how teams handled discussion, reaching consensus and conflict resolution.

Helping and supporting each other

According to the interview analysis, in most team members helped and supported each other less during the pandemic than they did before. A reason for this was the fact that it was harder to see who was in need of help during the pandemic. Some interviewees also mentioned that people waited longer to ask for help than they did when they were at the office. Despite that, there were also teams in which help and mutual support stayed at the same level as before working from home.

Team member suggestions and contributions

Based on the interview analysis, working from home had no significant impact on the extend to which suggestions and contributions of team members were respected. However, working from home did impact the extend to which team member suggestions and contributions were discussed and further developed. In some teams, the extend to which team member suggestions and contributions were discussed and further developed decreased during working from home. possible explanations that were given were cancellation of presentations about improvement proposals and time-boxed digital meetings that left no space to discuss ideas that were brought up during meetings.

Discussion, consensus and conflict resolution

In some teams the tone of discussions became less constructive during working from home. This was, according to one of the interviewees caused by the limitations of digital communication. This makes is more difficult to be nuanced than when you meet face-to-face. Some team tried to adjust the tone of their digital discussions because they were aware that the lack on non-verbal clues made it harder to have a constructive discussion. Therefore their digital communication had a more constructive tone.

In the teams of the interviewees that strongly agreed with the statement that their team was able to reach consensus about difficult issues, this remained the same during working from home. For part of the other teams, it became harder to reach consensus. The state of mind of team members as a result of the pandemic and the limitations of digital communication were named as possible causes.

According to some interviewees, conflict resolution was harder during working from home. Reasons that were given were the fact that digital communication is limited and not always the best way to solve a conflict and that managers can more easily mediate in conflicts that occur on the work floor where they are present. Because digital meetings had to be planned to solve conflicts, the conflicts kept simmering on for longer than they would have when people were sill working at the office.

5.3.6 Effort

In this section, based on the pre interview survey analyses and the interview analysis, the effects of working from home on the effort within teams will be discussed. The section covers to which extend team members pushed, prioritized and put effort in the project and to which extend the effort put into the project by team members caused conflict within teams.

Pushing, prioritization and putting effort into the project

In the teams of the interviewees that strongly agreed with the statement that every team member fully pushed the project, that did not change during working from home. For part of the other teams, the agreement regarding this statement decreased during working from home. A reason that was given for this decline is the fact that team members were less involved with the project because they did not see the whole picture of what they were working one. That caused them to push the project less than they did before working from home. It might also have impacted prioritization of the project, because part of the interviewees reported that that declined during working from home as well.

Some interviewees indicated that team members put less effort into the project during working from home. Possible explanations are that team members felt less connected to their projects because they lost sight of the big picture and that team members had to take care of young children during working hours. In some teams there were conflicts regarding effort, for example because people were less proactive in taking up tasks. Interestingly, the interviewees that indicated that they strongly disagreed with the statement that there were conflicts regarding the effort that team members put into the project before working from home, answered similarly regarding the period in which they did work from home.

5.4 Impact of the pandemic on cross team collaboration

In this section, the data, regarding the third sub question, "**How did working from home during the lock downs impact cross team collaboration, from the perspective of software development teams?**", will be analysed. This subsection will focus the effects of working from home due to Covid-19 on the social structure, cross team collaboration staying in contact with colleagues outside the own team and on the enabling mechanisms for cross team collaboration, which are 'Mutual trust', 'Shared mental models' and 'Closed loop communication'.

5.4.1 Social structure

Digital social events were organised in order to maintain a social structure within the organisation and members of software development teams kept collaborating with colleagues in other teams. The Covid 19 lock downs left organisations with a challenge to maintain a organisation wide social structure when all employees were working from home. Interviewees named digital social events, employees working in changing team compositions, organising challenges for employees and demonstrations in which teams showed other teams what they were working on as initiatives from their organisations to maintain a social structure.

The majority of interviewees mentioned that their organisation had some form of digital social events. Examples of digital social events that were organised are Examples of types of events that were organised are digital cocktail courses, digital escape rooms, digital pub quizzes, digital drinks, digital fitness classes, digital gaming sessions and digital Christmas dinners. Most interviewees for whom digital social events were organized were positive about them or at least acknowledged that they were helpful for other employees. A minority of interviewees found them not helpful.

The two interviewees that mentioned that people in their organisation worked in changing team compositions explained that it was helpful to stay in contact with people outside your own team. The interviewee that mentioned that his organisation organised challenges that employees could do at home was positive about the effect of these challenges on team morale and social cohesion. The interviewee that mentioned that teams gave demonstrations to other teams about what they were working on explained that it helped to let the organisation know what everyone was working on and get input from outside the team.

5.4.2 Collaboration across teams

The interviewees named three specific effects of the pandemic on cross team collaboration. Two interviewees mentioned that digital meetings were long winded. Two interviewees mentioned that working from home forced their organisations to be more structured and to formalize cross team communication. One interviewee mentioned that working from home lead to an unwanted prioritization of teams that were closer to other teams. When asked about staying in contact with colleagues outside their own team interviewees mentioned that they used chat applications, email, video calls and phone calls to communicate. One interviewee mentioned that she connected with other people in her organisations trough a more senior employee that functioned as a mediator. One interviewees mentioned that his team kept in contact with other teams with structural team-team meetings. Two interviewees mentioned that they quickly returned to the office to restore communication and collaboration across teams.

Mutual trust

Behavioral markers of mutual trust are, according to Salas et al., the extend to which information is shared, the willingness to admit mistakes and the willingness to accept feedback [93]. Interviewees were asked about the effect of working from home on these markers.

Sharing information with other teams

Half of the interviewees mentioned that less information was shared with other teams during working from home. reasons for this were the limitations of digital communication and the loss of informal communication. The interviewees that stated that, in their organisations, teams shared more information with other teams explained that this was caused by higher transparency because everyone was in the same boat due to Covid and more complete tickets in order to compensate for the loss of face to face contact. Interviewees that indicated that working from home did not impact sharing information with other teams, mentioned that they were already used to digital communication before working from home.

Willingness to admit mistakes and accept feedback

One interviewee stated that people in his organisation were more willing to admit mistakes and share feedback because communication became more personal due to 'being in each others homes' in video calls. Half of the interviewees indicated that working from home did not impact the extend to which people were willing admit mistakes and accept feedback from other teams. Two of them explained that it helped a lot that there ware set moments to give and receive feedback, which makes it easier to accept. Three interviewees mentioned that the acceptance of feedback form other teams and the willingness to admit mistakes to other teams declined during working form home. Possible explanations were the fact that it is harder to be nuanced in feedback via email and that people had a shorter temper because of the Covid-situation.

Shared mental models

The extend to which team members are anticipating and predicting each others needs and the ability of the team to identify changes in the team, task or teammates and adjust the strategy accordingly are seen as behavioral markers by Salas et al.[93]. Interviewees were asked about the effect of working from home on these markers.

Anticipating on- and predicting the needs of other teams

Most interviewees indicated that the extend to which they were able to to anticipate on- and predict the needs of other teams remained equal during working from home. The other interviewees mentioned that their ability to anticipate on- and predict the needs of other teams became decreased. Two of them explained that this had to do with the limitations in digital communication.

Identifying changes in the teams, tasks, or team members and implicitly adjusting strategies

One interviewee said that his ability to identifying changes in other teams, their tasks, or their team members increased during working from home because some contacts were more often available than before working from home. Most interviewees stated that their ability to identifying changes in other teams, their tasks, or their team members was not affected by working from home because. These interviewees also indicated this already went well before working form home. One interviewee mentioned that his ability to identifying changes in other teams, their tasks, or their team members decreased during working from home because he did not get all the context information he needed.

Closed loop communication

Behavioral markers of closed loop communication, according to Salas et al. are following up with team members to ensure message was received, acknowledging that a message was received and clarifying with the sender of the message that the message received is the same as the intended message[93]. Interviewees were asked about the effect of working from home on these markers.

Following up on sent messages

Most interviewees indicated that they did not follow up more. Explanations that were given are that they already did this a lot before working form home and that it went just as well via digital communication as face to face. The other interviewees said that the extend to which they followed up on sent messages increased during working from home because colleague are less easy to reach and don't react immediately like with direct face to face communication.

Acknowledging that messages were received

Only one interviewee said that the extend to which they acknowledged that messages were received increased during working from home. Most interviewees stated that the extend to which they acknowledged that messages were received remained equal during working from home. One of them explained that he always replied quickly. Three interviewees mentioned that the extend to which they acknowledged that messages were received decreased during working from home. Two of them indicated that they did this less often because they did not want to be disturbed.

Clarifying that the message received is the same as the intended message

Most interviewees stated that the extend to which they clarified that the message received is the same as the intended message was not affected by working from home. One of them indicated that the need for clarification was higher and that his organisation should have done this more. The other interviewees said that the extend to which they clarified that the message received is the same as the intended message increased during working from home. Digital messages can be interpreted wrongly and therefore need to be verified more often.

5.5 Organisational support measures during the pandemic

In this section, the measures that were taken by organisations to support their employees when working from home will be analysed, based on the pandemic programming data analysis and the qualitative explanations of interviewees.

Practical support

The five themes were grouped in the category 'Practical support' and are 'Office equipment', 'New equipment', 'Software', 'Internet charges' and 'Activities for children'.

Office equipment

74% of the survey respondents to the pandemic programming survey indicated that the statement, "I can (or could) take equipment (e.g. monitors) home from my workplace", was applicable to them and 36% of all respondents considered this measure to be helpful. In the pre-interview survey, 60% of the interviewees stated that the statement was applicable to them. 40% of the interviewees stated that they considered the measure to be very helpful, 40% stated that they considered the measure to be helpful, 20% stated that they were neutral about the measure, 0% stated that they considered the measure to be unhelpful and 0% stated that they found the measure very unhelpful. According to an interviewee, one needs a good work spot in order to function. Interviewees that already had equipment at home, mentioned that it was important that the organisation showed that they were willing to support their employees when necessary.

New equipment

62% of the survey respondents to the pandemic programming survey indicated that the statement, "My organization will buy new equipment we need to work from home", was applicable to them and 53% of all respondents considered this measure to be helpful. In the pre-interview survey, 60% of the interviewees stated that the statement was applicable to them. 70% of the interviewees stated that they considered the measure to be very helpful, 30% stated that they considered the measure to be helpful, 0% stated that they were neutral about the measure, 0% stated that they considered the measure to be unhelpful and 0% stated that they found the measure very unhelpful. An interviewee stated that the right equipment helped him to be productive and another interviewee, who already had everything he needed at home, stated that it was very helpful for his colleagues that were in need of new office equipment. Interviewees also mentioned that they were happy about the flexibility of their organisations regarding the kind of equipment that they could buy.

Software

70% of the survey respondents to the pandemic programming survey indicated that the statement, "My organization will pay for software we need to work from home", was applicable to them and 42% of all respondents considered this measure to be helpful. In the pre-interview survey, 50% of the interviewees stated that the statement was applicable to them. 40% of the interviewees stated that they considered the measure to be very helpful, 10% stated that they considered the measure to be helpful, 50% stated that they were neutral about the measure, 0% stated that they considered the measure to be unhelpful and 0% stated that they found the measure very unhelpful.

One of the interviewees explained that he saw the helpfulness for people that needed software to do their jobs. Another interviewee stated that he found the feeling that he was supported by his employer just as important that he got the software he needed.

Internet charges

51% of the survey respondents to the pandemic programming survey indicated that the statement, "My organization will pay for some or all of my internet charges", was applicable to them and 67% of all respondents considered this measure to be helpful. In the pre-interview survey, 30% of the interviewees stated that the statement was applicable to them. 10% of the interviewees stated that they considered the measure to be very helpful, 10% stated that they considered the measure to be helpful, 60% stated that they were neutral about the measure, 20% stated that they considered the measure to be unhelpful and 0% stated that they found the measure very unhelpful.

One interviewee argued that employers should pay for internet cost when they expect their employees to be available all the time. He acknowledges that everyone has internet, whether the employer is paying for it or not, but that internet is mostly used for work related purposes. Because of that, it is only fair that the employer pay for the cost.

Activities for children

50% of the survey respondents to the pandemic programming survey indicated that the statement, "My organization is providing activities to occupy staff member's children", was applicable to them and 69% of all respondents considered this measure to be helpful. In the pre-interview survey, 20% of the interviewees stated that the statement was applicable to them. 0% of the interviewees stated that they considered the measure to be very helpful, 30% stated that they considered the measure to be helpful, 70% stated that they were neutral about the measure, 0% stated that they considered the measure to be unhelpful and 0% stated that they found the measure very unhelpful. This measure was not discussed in dept in the interviews.

Reassurance, emotional support and health

The 8 themes were grouped in the category 'Reassurance, emotional support and health' are 'Reassurance about keeping job', 'Reassurance about getting paid', 'Reassurance about time off when sick', 'Understanding that work performance suffers', 'At home exercise programs', 'Checking up on well being' and 'Asking input about problems and solutions'.

Reassurance about keeping job

72% of the survey respondents to the pandemic programming survey indicated that the statement, "My organization has reassured me that I will keep my job", was applicable to them and 39% of all respondents considered this measure to be helpful. In the pre-interview survey, 70% of the interviewees stated that the statement was applicable to them. 50% of the interviewees stated that they considered the measure to be very helpful, 0% stated that they considered the measure to be helpful, 50% stated that they were neutral about the measure, 0% stated that they considered the measure to be unhelpful and 0% stated that they found the measure very unhelpful.

One interviewee mentioned that he found that employees should keep their jobs in a situation for which no-one is to blame. Another interviewee stated that it was more about the feeling that the organisation is there for you, than about the actual reassurance and one interviewee said that he and his team members believed that the reassurance that there would not be any lay-offs due to Covid was important for the mentality in the organisation.

Reassurance about getting paid

74% of the survey respondents to the pandemic programming survey indicated that the statement, "My organization has reassured me that I will continue to be paid", was applicable to them and 35% of all respondents considered this measure to be helpful. In the pre-interview survey, 70% of the interviewees stated that the statement was applicable to them. 50% of the interviewees stated that they considered the measure to be very helpful, 0% stated that they considered the measure to be helpful, 50% stated that they were neutral about the measure, 0% stated that they considered the measure to be unhelpful and 0% stated that they found the measure very unhelpful. An interviewee mentioned that he found it only logical that employees would continue to get paid in a situation for which no-one was to blame.

Reassurance about time off when sick

72% of the survey respondents to the pandemic programming survey indicated that the statement, "My organization has reassured me that I can take time off if I'm sick or need to care for dependents", was applicable to them and 38% of all respondents considered this measure to be helpful. In the pre-interview survey, 90% of the interviewees stated that the statement was applicable to them. 60% of the interviewees stated that they considered the measure to be very helpful, 20% stated that they considered the measure to be helpful, 20% stated that they were neutral about the measure, 0% stated that they considered the measure to be unhelpful and 0% stated that they found the measure very unhelpful. One interviewee mentioned that he found it very important that his organisation cared for the well being of the employees. Multiple interviewees experienced this first hand, and found that their employers were very flexible about this.

Understanding that work performance suffers

66% of the survey respondents to the pandemic programming survey indicated that the statement, "My organization has reassured me that they understand if my work performance suffers", was applicable to them and 47% of all respondents considered this measure to be helpful. In the pre-interview survey, 60% of the interviewees stated that the statement was applicable to them. 44% of the interviewees stated that they considered the measure to be very helpful, 22% stated that they considered the measure to be helpful, 33% stated that they were neutral about the measure, 0% stated that they considered the measure to be unhelpful and 0% stated that they found the measure very unhelpful. One interviewee stated that his organisation understood that people got crazy from all the digital meetings even though it did not apply to him, because he was already used to them.

At home exercise programs

56% of the survey respondents to the pandemic programming survey indicated that the statement, "My organization is providing at-home exercise programs", was applicable to them and 61% of all respondents considered this measure to be helpful. In the pre-interview survey, 40% of the interviewees stated that the statement was applicable to them. 10% of the interviewees stated that they considered the measure to be very helpful, 40% stated that they considered the measure to be helpful, 30% stated that they were neutral about the measure, 20% stated that they considered the measure to be unhelpful and 0% stated that they found the measure very unhelpful. This measure was not discussed in depth in the interviews.

Checking up on well being

The measure "My manager checks in on my well being more frequently" was not part of the pandemic programming survey. In the pre-interview survey, 60% of the interviewees stated that the statement was applicable to them. 40% of the interviewees stated that they considered the measure to be very helpful, 40% stated that they considered the measure to be helpful, 20% stated that they were neutral about the measure, 0% stated that they considered the measure to be unhelpful and 0% stated that they found the measure very unhelpful. One interviewee already had daily checkups with his manager before the pandemic and one interviewee stated that the frequency of these checkups had increased from once per two weeks before the pandemic to once per week during the pandemic. Another interviewee had a checkup every two weeks.

Asking input about problems and solutions

The measure "My organisation asked me what problems i come across in this new situation and which solutions i deem necessary" was not part of the pandemic programming survey. In the pre-interview survey, 50% of the interviewees stated that the statement was applicable to them. 40% of the interviewees stated that they considered the measure to be very helpful, 50% stated that they considered the measure to be helpful, 10% stated that they were neutral about the measure, 0% stated that they considered the measure to be unhelpful and 0% stated that they found the measure very unhelpful. One interviewee explained that his organisation used a check-in tool to send out a weekly survey in which employees could indicate how they were feeling. Interviewees also indicated that their employers really tried to solve the issues of their employees. One interviewee stated that he spoke less about problems and solutions with his employer during the pandemic and that he would have wanted to do this more often.

Communication

The 3 themes that were grouped in the category 'Communication' are 'Continuing to have regular meetings', 'All day open call' and 'Synchronous communication'

Continuing to have regular meetings

77% of the survey respondents to the pandemic programming survey indicated that the statement, "My team is continuing to have regular meetings (e.g. via video chat)", was applicable to them and 32% of all respondents considered this measure to be helpful. In the pre-interview survey, 100% of the interviewees stated that the statement was applicable to them. 55% of the interviewees stated that they considered the measure to be very helpful, 22% stated that they considered the measure to be helpful, 22% were neutral about the measure, 0% stated that they considered the measure to be unhelpful and 0% found the measure very unhelpful.

One of the interviewees said that regular meetings had become very important because of the loss of unplanned informal meetings and another interviewee mentioned that his team started with daily stand ups and that that helped to keep everything together. Another interviewee mentioned the disadvantage that all of the scheduled digital meetings caused his agenda to fill up very quickly.

All day open call

62% of the survey respondents to the pandemic programming survey indicated that the statement, "For most of the day, I work with an open video or audio call to some or all of my team.", was applicable to them and 52% of all respondents considered this measure to be helpful. In the pre-interview survey, 10% of the interviewees stated that the statement was applicable to them. 10% of the interviewees stated that they considered the measure to be very helpful, 0% stated that they considered the measure to be helpful, 30% stated that they were neutral about the measure, 40% stated that they considered the measure to be unhelpful and 20% stated that they found the measure very unhelpful.

One interviewee stated that she was able to focus more when she was not working alone. she would have liked to be in contact with colleagues during the day and finds it annoying that she, sometimes, has to wait more than an hour to get a reaction to a question. The interviewees that consider this measure to be very unhelpful, name the constant distraction and the feeling of being constantly monitored as the main disadvantage.

Synchronous communication

55% of the survey respondents to the pandemic programming survey indicated that the statement, "My team is avoiding synchronous communication (e.g. video chat)", was applicable to them and 62% of all respondents considered this measure to be helpful. In the pre-interview survey, 0% of the interviewees stated that the statement was applicable to them. 0% of the interviewees stated that they considered the measure to be very helpful, 22% stated that they considered the measure to be helpful, 33% stated that they were neutral about the measure, 11% stated that they considered the measure to be unhelpful and 33% stated that they found the measure very unhelpful.

One interviewee stated that communication was difficult enough and that it would not be helpful to add any more restrictions. This is in line with the opinions of the other interviewees that consider this measure very unhelpful. Interviewee also explained that synchronous communication is faster and that asynchronous communication leaves room for misinterpretation. Synchronous communication can keep someone else from their work, but found that synchronous communication is sometimes needed. one interviewee stated that he was a fan of asynchronous communication, because synchronous communication implies that you have to think about to say on the spot. Synchronous communication also takes up more time.

Cohesion

The 3 themes that were grouped in the category 'Cohesion' are 'Sending food to staff', 'Virtual social events' and 'Encouraging staff to touch base regularly'.

Sending food to staff

47% of the survey respondents to the pandemic programming survey indicated that the statement, "My organization is sending food to staff working from home", was applicable to them and 73% of all respondents considered this measure to be helpful. In the pre-interview survey, 30% of the interviewees stated that the statement was applicable to them. 0% of the interviewees stated that they considered the measure to be very helpful, 30% stated that they considered the measure to be helpful, 50% stated that they were neutral about the measure, 10% stated that they considered the measure to be unhelpful and 10% stated that they found the measure very unhelpful. One interviewee mentioned that she got a lot of food sent to her home and that she liked that a lot.

Virtual social events

71% of the survey respondents to the pandemic programming survey indicated that the statement, "My team is having virtual social events (e.g. via video chat)", was applicable to them and 40% of all respondents considered this measure to be helpful. In the pre-interview survey, 70% of the interviewees stated that the statement was applicable to them. 20% of the interviewees stated that they considered the measure to be very helpful, 50% stated that they considered the measure to be helpful, 10% stated that they were neutral about the measure, 20% stated that they considered the measure to be unhelpful and 0% stated that they found the measure very unhelpful.

The interviewees that considered the virtual social events helpful stated that they worked against loneliness and that they helped to improve work mentality. One interviewee, who found the events very helpful, mentioned that, after a while, the enthusiasm for these events went down for some people, but that others kept participating. Another interviewee, who did not find the virtual social events helpful, considered them to be a waste of time. He likes physical social work events, but believes that it does not work well online.

Encouraging staff to touch base regularly

72% of the survey respondents to the pandemic programming survey indicated that the statement, "My organization is encouraging staff to touch base regularly with each other", was applicable to them and 38% of all respondents considered this measure to be helpful. In the pre-interview survey, 90% of the interviewees stated that the statement was applicable to them. 30% of the interviewees stated that they considered the measure to be very helpful, 70% stated that they considered the measure to be helpful, 0% stated that they were neutral about the measure, 0% stated that they considered the measure to be unhelpful and 0% stated that they found the measure very unhelpful.

One interviewee, who found the measure very helpful, stated that the people most likely would have touched base anyway. Another interviewee stated that it comes across better when it comes from the organisation than when it comes from colleagues.

Technical capabilities

The 'Work from home infrastructure' theme was the only team that fit the 'Technical capabilities' category.

Work from home infrastructure

76% of the survey respondents to the pandemic programming survey indicated that the statement, "My team has good work-from-home infrastructure (e.g. source control, VPN, remote desktop, file sharing)", was applicable to them and 33% of all respondents considered this measure to be helpful. In the pre-interview survey, 80% of the interviewees stated that the statement was applicable to them. 70% of the interviewees stated that they considered the measure to be very helpful, 30% stated that they considered the measure to be helpful, 0% stated that they were neutral about the measure, 0% stated that they considered the measure to be unhelpful and 0% stated that they found the measure very unhelpful.

Some interviewees had difficulties when they started working from home, but eventually everything was fine. One interviewee indicated that problems arose when they switched to a different IT system during working from home. Even though, she understood that the transition could not be delayed until after the pandemic, switching during the pandemic brought practical problems regarding support.

Policies

The 'Peer code review', 'meeting free day' and 'Mandatory pause between meetings' are the teams that fit the 'Policies' category.

Peer code review

72% of the survey respondents to the pandemic programming survey indicated that the statement, "My team is peer reviewing commits, change requests or pull requests (peer code review)", was applicable to them and 39% of all respondents considered this measure to be helpful. In the pre-interview survey, 90% of the interviewees stated that the statement was applicable to them. 50% of the interviewees stated that they considered the measure to be very helpful, 40% stated that they considered the measure to be helpful, 10% stated that they were neutral about the measure, 0% stated that they considered the measure to be unhelpful and 0% stated that they found the measure very unhelpful.

Various interviewees indicate that peer reviewing commits, change requests or pull requests was already important before Covid. Peer code review, according to one of the interviewees, is very helpful because it helps to find stuff that you have missed and because everyone has complementary knowledge. Another interviewee stated that peer code review had become more important when working from home because there was less room to discuss things with each other. According to this interviewee, peer code review happened more, as a result of working from home and this increase remained after going back to the office. Another interview mentioned that peer code review also enables employees to learn from each other and that it results in better code.

Meeting free day

The statement "My organisation has implemented a meeting free day (e.g. meeting free Monday)" was not part of the pandemic programming survey. In the pre-interview survey, 20% of the interviewees stated that the statement was applicable to them. 30% of the interviewees stated that they considered the measure to be very helpful, 0% stated that they considered the measure to be helpful, 40% stated that they were neutral about the measure, 10% stated that they considered the measure to be unhelpful and 20% stated that they found the measure very unhelpful.

One interviewee, who had a working free day and found it very helpful, was positive about the measure because he believes that meetings are often not necessary. Having a meeting free day, or week, allowed people to work on projects that would otherwise not have been done. Another advantage is not being disturbed. Another interviewee indicated that meeting free days worked well in the beginning, but that, after a while, people started planning meetings in those days. An interviewee that would have found meeting free meetings very unhelpful, explained that meeting free days weren't possible in a job where coordination is an important part of the day and even when you plan a meeting free day, the amount of meetings that are needed does not decrease. That results in more meetings on other days. The interviewee found a morning without meetings much more convenient than a whole day because he isn't able to concentrate on his development work for 8 hours in a row, because that would be too demanding.

Mandatory pause between meetings

The statement "My organisation imposed a mandatory pause between meetings (e.g. meetings end at the whole hour and start at ten past)" was not part of the pandemic programming survey. In the pre-interview survey, 30% of the interviewees stated that the statement was applicable to them. 30% of the interviewees stated that they considered the measure to be very helpful, 30% stated that they considered the measure to be helpful, 10% stated that they were neutral about the measure, 0% stated that they considered the measure to be unhelpful and 30% stated that they found the measure very unhelpful.

An interviewee named having time to prepare meetings, to go to the toilet or to shortly stand up between meetings as advantages. She also would like to have time to blow off steam after an unpleasant meeting and to be able to shift to the next meeting. Another interviewee explained that a pause gives you the time to think about something else and shift your focus to your next meeting. Another interviewee states that being in meetings from the start of your day until after lunch does not help productivity and concentration. The interviewees that consider a meeting free day to be very unhelpful say that it would be difficult because everyone has a different schedule, that they do not want their company to impose this, that it would be very difficult to plan meetings, and that, sometimes, you just have too much meeting to schedule a pause.

Personal development

The 'Time for professional training' theme was the only team that fit the 'Personal development' category.

Time for professional training

60% of the survey respondents to the pandemic programming survey indicated that the statement, "My organization is encouraging staff to use this time for professional training", was applicable to them and 55% of all respondents considered this measure to be helpful. In the pre-interview survey, 40% of the interviewees stated that the statement was applicable to them. 20% of the interviewees stated that they considered the measure to be very helpful, 50% stated that they considered the measure to be helpful, 30% stated that they were neutral about the measure, 0% stated that they considered the measure to be unhelpful and 0% stated that they found the measure very unhelpful. An interviewee who found it very helpful did not make use of this himself but did approve that this was encouraged for those for which it was relevant.

6 Discussion

In this section, the analysis of the research data, regarding the three sub-research questions will be discussed in relation to the existing literature on the subject.

6.1 SQ1: How did working from home during the pandemic impact individual software development team members?

Development team members were, in varying degrees, affected by the sudden shift to working remote. Software development team members experienced benefits and challenges as a result of having to work from home during the pandemic. The most important effects of having to work from home were related to flexibility, concentration, productivity and quality of work.

6.1.1 Increased agenda flexibility

The flexibility that comes with working from home, in a non-Covid context, is often described in literature [87, 59, 43, 28, 83]. These authors discussed the positive effect of working from home on the increased flexibility that comes with allowing employees to work from home. The two most important aspects of flexibility, as a result of working from home, are the flexibility to choose to work from home and the flexibility regarding working hours. The flexibility to choose to work from home is not applicable in the context of the forced remote work situation during the pandemic, but the flexibility regarding working hours is.

Many of the interview respondents mentioned this flexibility regarding working hours as an advantage of working from home. They mentioned that, when they were working from home, they had more flexibility to take breaks, do household tasks, like doing groceries or emptying the washing machine, and to going to the gym.

This is supported by Hamlin et al, who stated that employees working from home experience more personal scheduling flexibility, by Charalampous and Grant et al, who stated that remote workers could take breaks from work to go to the gym and finish their work later [28], and by Ipsen et al., who found that people who had to work from home during the pandemic had the opportunity to take a break whenever they liked [54]. The scheduling flexibility, experienced by remote workers is thus supported by existing working from home literature both voluntary- and in forced working from home situations.

This is in line with the results of the pandemic programming survey data analysis, which shows that more than twice as many software developers reported an increase in time spent on not-work related activities during working hours than those who reported a decrease. This effect seems to be most applicable to software developers with little experience in software development and for developers with little experience working from home. The increase was smaller for software developers, working in organisations with less than 1000 employees. This could be caused by the higher visibility of employees in smaller organisations, which makes it harder to escape notice or by higher loyalty in smaller organisations. The time, remote workers, spent on not-work related activities during working hours in relation to their experience with software development, experience working from home and organisation size had not yet been researched on other scientific literature.

A disadvantage of the flexibility that comes from working from home that was mentioned by various interviewees is the fact that work life boundaries get blurred. Because the home office is always near by, the step to perform work tasks after office hours is smaller. This is in line with the statement by Charalampous and Grant, that working from home blurs the boundaries between work life and private life and that people tend to work longer hours because the equipment is already at their homes and they have time to spare because they did not have to spend time on commuting [28]. Specifically regarding forced working from home, Caligiuri et al. confirmed that a long, involuntary shift to working from home could increase the risk for work-life conflict [25]. The fact that working from home can result in blurred boundaries between work life and private life is thus supported by existing working from home literature, both voluntary- and in forced working from home situations.

Many software development team members experienced an increased scheduling flexibility when working from home during the pandemic. This effect was strongest for software developers with little experience in both software development and working from home. This was seen as a positive effect by most, because they were able to use their time more efficiently, however, some experienced a blurred work-life boundary as a result of the flexibility, which disturbed their work-life balance.

6.1.2 Concentration challenges for in-experienced developers and concentration benefits for experienced developers

Existing literature on working from home mentions both the positive- [28, 9, 47] and the negative [28, 18, 87, 54] effects of working from home on concentration. The 'pandemic programming' data analysis shows that working from home caused slightly more respondents to be able to concentrate less than it caused respondents to concentrate more. This indicates that the concentration of software developers was, on average, negatively affected by working from home due to Covid-19 pandemic.

This is in line with the statement by Prasad et al. that interruptions are a challenge when working from home [87] and Ipsen et al. who found that difficulty to keep focus was seen as a disadvantage of working from home [54]. Charalampous and Grant wrote that people, who were working from home, experienced more digital distractions, such as emails and direct messages [28]. This could have negatively affected the concentration of software developers, while working from home during the pandemic.

This seems to contradict with the findings from the interviews with software development team members, in which, more than half of the interviewees, reported an increased focus when working from home. The interview results are in line with Charalampous and Grant's statement that remote workers experience less social distractions from co-workers and on average, report higher levels of concentration when working from home [28] and with Hamlin et al. who state that remote workers experience less interruptions [47].

This could be indicative of a difference between developers and other software development team members regarding the effect of working from home on concentration. All of the interviewees that indicated concentration to be a challenge were working as software developers. The limited negative effects of working from home during the pandemic on the concentration of knowledge workers is supported by Bolisani et al., who found that only 5% of knowledge workers found it difficult to keep focused when alone [18].

The pandemic programming data analysis also showed that the concentration of developers with less than 15 years of experience was more often negatively affected by working from home and that the concentration of developers with more than 15 years of experience was more often positively affected. According to the survey data analysis, working from home during the pandemic more often negatively impacted concentration for developers with less than 5 years of experience working from home and more often positively impacted the concentration of developers with more than 5 years of experience working from home. This is in line with the interview results, in which all of the interviewees that indicated that it was challenging to keep focus, had less than 2 years of experience in software development and less than five years of experience working from home. The concentration of remote software developers in relation to their experience with software development, experience working from home and organisation size had not yet been researched on other scientific literature.

Where existing literature on remote work, in general, often describes positive concentration effects as a result of working from home, the interviews and the pandemic programming paper show that the concentration of software developers was more often negatively than positively effected by having to work from home due to the pandemic. However, a positive effect of working from home on concentration was reported almost as often as the negative effects. Interestingly, the concentration of developers with less experience in software development and developers with less experience working from home, is more often negatively affected by working from home than the concentration of their more experienced co-workers.

6.1.3 Reduced productivity

Existing literature on the subject of working from home, often describes an increased productivity as a benefit of working from home [43, 47, 83]. However, some authors found that working from home negatively effects productivity [69, 9, 33].

The analysis of the pandemic programming survey data shows that the self reported performance of almost half of the responding software developers had decreased when they had to work from home due to Covid-19. Only one in five developers reported an increased productivity when working from home. On average the self perceived performance was rated lower during working from home than in the two years before working from home. This is in line with De Guinea et al. who found that digital teams perform less than co-located teams [33] and with Kumar et al., who found that distraction, caused by family, occupational discomfort and distress, negatively impacted job performance during the pandemic [63]. However, it contradicts the findings of Ipsen et al. and Bolisani et al. who found that productivity was more often positively affected by working from home [54, 18].

Three out of ten interviewed software development team members indicated a decreased performance when working from home. Difficulties regarding communication were mentioned by interviewees as reasons for decreased productivity. This is in line with Marlow et al., who state that productivity decreases when employees have to work remote because more effort is needed to communicate [69] and Belanger et al., who state that productivity decreases when communication requirements increase [9].

Interviewed software development team members, more often indicated an increased performance due to working from home than a decreased performance. This is in line with findings by Ipsen et al. and Bolisani et al., who studied remote work during the pandemic. Ipsen et al. found that more than half of their respondents got more work done during working from home than they did before [54] and Bolisani et al. found that only 13% of respondents got less work done [18].

It does, however, contradict the statement by De Guinea et al. who found that digital teams perform less than co-located teams [33] and Kumar et al., who found that distractions, caused by family, occupational discomfort and distress, negatively impacted job performance during the pandemic [63].

A possible explanation for the mixed results, regarding productivity during the pandemic can lay in the demographic of the respondents. Respondents were living in different parts of the world and these countries were affected by Covid-19 in different ways. This could have led to varying levels of discomfort and distress, which are, according to Kumar et al., causes of decreased performance during the pandemic [63]. It is unclear whether the negative performance effects were related to the pandemic itself or to working from home.

The analysis of the pandemic programming survey data shows that respondents from all experience levels more often reported a decrease in productivity than an increase in productivity. However, the developers with less than 10 years of experience in software development, more often reported a decrease than the developers with more than 10 years of experience in software development. All of the interviewees, who reported an increase in productivity had more than 6 years of experience in software development. An explanation for an increased level of performance when working from home was the fact that working from home allows people to focus better. Because increased concentration levels, as mentioned earlier in this section, are more often reported by more experienced developers, this could explain how the productivity of more experienced developers was less affected.

The analysis of the pandemic programming survey data shows that respondents more often reported a decrease than an increase in productivity regardless of their experience with working from home. However the developers with less than 5 years of experience with working from home, more often reported a decrease than they developers with more than 5 years of experience in software development. This could be explained by the fact that the performance of developers with more experience with working from home is less affected by suddenly having to work fully remote than the performance of developers with less experience working from home.

The productivity of software developers was affected by having to work from home during the Covid-19 pandemic. For some, the productivity decreased, which can be associated with communication difficulties, for some the productivity increased, which can be associated with increased focus. The performance of less experienced developers is more often negatively affected than the performance of their more experienced co-workers.

6.1.4 increased quality of work increase for experienced team members and decreased quality of work for in-experienced team members

The quality of work can be positively affected by working from home as well [43, 10]. This seems to be contradicted by the analysis of the pandemic programming data indicates that the quality of work delivered by software developers who were working from home due to the pandemic was more often negatively affected by working from home than it was positively affected. However, the difference between the number of respondents that reported a positive effect and the number that reported a negative effect is small.

The developers with more experience in software development (more than 10 years) more often reported a positive effect of working from home on the quality of their work. The developers with less experience in software development (less than ten years) more often reported a negative effect on their work quality. This could be related to the difference in impact of working from home on concentration that was discussed earlier in this section.

The interview analysis showed that less experienced developers saw a larger barrier to ask more experienced colleagues for help. This could have negatively impacted the quality of their work. The fact that more experienced developers were disturbed less, when working from home, could have positively impacted the quality of their work.

The survey data analysis shows a weaker relation between experience with working from home and the effect of working from home on the quality of work, but it does indicate that software developers with more experience working from home, experience less negative effect on the quality of their work when working from home.

The quality of the work of software developers has been impacted by working from home. The effects of working from home on the quality of work were mostly positive for developers with higher levels of experience in software development and more experience with working from home and mostly negative for developers with lower levels of experience in software development and less experience with working from home.

6.1.5 Effects on commuting time, social contact, job satisfaction and work-life boundaries

Other effects that were mentioned in the interviews with software development team members were reduced commuting time, missing social contact, blurred work-life boundaries, loss of job satisfaction and difficulties with children at home, but these effects are mostly related to personal well-being, which is out of the scope of this research and will therefore not be further discussed.

6.2 SQ2: How did working from home during the pandemic impact software development teams?

Software development teams were, in varying degrees, affected by the sudden shift to working fully remote. The effect of working from home in the Covid-19 pandemic on software development teams will be discussed in this section. The impact of the shift to remote work on software development teams will be discussed based on various aspects of the Teamwork Quality Model which are 'Communication', 'Cohesion', 'Coordination', 'Balance of team member contributions', 'Mutual support' and 'Effort'.

6.2.1 Communication

Interviewed software development team members indicated that the communication frequency had decreased during working from home. This is in line with De Guinea et al., who found that digital teams experience a lower frequency of communication and less knowledge sharing than co-located teams [33]. Software development team members reported less spontaneous person to person communication, because all digital meetings had to be scheduled. This is in line with the findings of Belanger and Allport, who found that the shift to working from home often results in a decrease in tacit knowledge sharing and direct person to person communication [9].

Less informal communication about personal affairs took place during working from home, because this type of communication normally happens spontaneously when people meet. This confirms the statement by Berry, that members of virtual teams have less opportunities to have informal interactions, such as meetings at the coffee machine or in the elevator [14]. The interviewed software development team members did not experience an effect of working from home, regarding the openness with which information was shared with team members. However, the extent to which the interviewed software development team members felt informed about everything decreased, because the lack of informal communication caused them to miss information. This confirms the statement by Greenhalgh and Peacock, that the lack of informal communication in digital teams decreases the chances of sharing knowledge [45].

Some interviewed software development team members indicated a decreased communication quality. They mentioned that the timeliness of information was negatively affected because of less informal communication and late responses. The decline in informal communication caused some teams to be more precise and complete in their communication. In other teams, the precision of information decreased. That also made information less useful. This sometimes caused conflicts regarding information flow. Prasad stated that the quality of communication can decrease in digital teams due to technical problems [87] and according to Hamlin et al. the limitations of digital communication can hinder digital collaboration because body language is not always seen and real time feedback is limited [47]. This is in line with the interviewees that indicated that they sometimes found it difficult to get the right message across while using digital communication tools.

In the interviews, software development team members indicated that working from home caused a higher threshold for communication because people were not in the same physical space, scheduling flexibility lead to diverse working hours and it was difficult to see whether colleagues were busy. This is in line with the statement by Banerjee that working from home results in a higher threshold for communication, because people only contact each other when they have something important to share [6].

Overall, software development teams, working from home due to Covid-19, experienced a decrease in the frequency of communication, a decrease in the quality of communication and an increase in the threshold for communication.

6.2.2 Cohesion

According to Agerfalk et al., social ties help team members to feel like they are belonging to the team [2]. Overall team members found it less important to be part of the project team during working from home than they did before working from home. Working from home made it harder for them to stay in contact, which made them loose their connections and feelings that it was important to be part of the team. This confirms the statement by Morrison-Smith and Ruiz that low trust between team members, caused by distance, can cause them to not feel like they are belonging to a team [76].

According to the interview respondents, the integration of team members decreased for some development teams. Interviewees also indicated that they struggled to digitally integrate new team members. This is in line with the statement by Hamlin et al. that it can be a challenge to on-board new team members digitally [47]. The interview analysis shows that when team members loose sight of the full picture of what they are working on, their feelings of responsibility towards the team can decline. This is supported by the statement of Hamlin et al. that employees who are working remote can lose sight of what is happening in their organisation [47].

Working from home did not strongly influence the personal attraction between team members in the teams of the interviewees. It did in some teams, increase the amount of personal conflicts. This was, according to the interviewees, caused by the external effect of the pandemic on the feelings of team members and the extra barriers regarding getting together and solving issues early on. This is in line with statements by Morrison-Smith and Ruiz, who state that there is more conflict in distributed teams than in co-located teams [76] and Armstrong and Cole, who state that conflict in distributed teams is not addressed fast enough and is therefore more likely to escalate [3].

Hinds and Mortensen, state that spontaneous communications can help to control conflicts in remote teams, because it helps to identify and handle conflicts early on [50], but, as was discussed earlier in this section, remote software development teams indicated that the frequency of spontaneous communication had decreased. Interestingly, for all of the interviewees that strongly disagreed with the statement that there were many personal conflicts in their teams before the pandemic, that statement was still valid during the pandemic. This could be caused by the fact that the people in these teams trusted each other a lot because Armstrong and Cole, state that mutual trust is an important part of conflict prevention [3].

For teams who experienced high levels of cohesion before working from home the effects were limited. For other teams, in some instances, feelings of belonging to the team and feelings of responsibility toward the team decreased. It was difficult for development teams to integrate new team members digitally, more conflicts arose due to external pandemic related factors and conflict resolution was more difficult, due to extra barriers regarding getting together.

6.2.3 Coordination

According to the software development team members that were interviewed, the impact of working from home on the clarity and comprehensibility of sub tasks was limited. For teams, in which the clarity and comprehensibility of sub tasks was negatively impacted by working from home, this was caused by the fact that it is harder to explain tasks digitally than it is to explain them face-to-face. This is in line with the statement by Brentzen and Wong that coordination in a team depends on the interactions between team members [13] and Espinosa et al., who state that coordination in digital teams is worse due to limited opportunities to interact [40].

In teams were interviewees indicated that they strongly agreed with the statement that sub tasks were closely harmonized before working from home, they remained closely harmonised during working from home. In other teams the work on sub tasks became less closely harmonized. this could have been caused by the fact that coordination was more difficult because it was harder to reach colleagues due to flexible work times and because it was harder to see who was busy. The fact that it was harder to reach co-workers was discussed previously in this section. The fact that developers were less aware of the work of others was described by Miller et al. [75].

In teams were interviewees indicated that they strongly agreed with the statement that sub tasks were accepted by team members, this remained during working from home. In a team, from which the interviewee reported a decline in the acceptance of sub tasks, this was caused by the fact that it is harder to get someone to do a task via digital communication than it is to do it face-to-face. This is supported by Hamlin et al, who stated that the limitations of digital communication can hinder digital collaboration [47].

Overall, coordination was not heavily affected in teams that performed well regarding coordination before working from home. For other development teams, coordination was negatively affected by working from home. This is in line with Espinosa et al. who found that distributed development teams experience more problems with coordination than co-located teams because distributed development team members know each other less well and interact less frequently due to less opportunities for interaction [40] and Cascio, who wrote that coordination is challenging for digital teams [27].

6.2.4 Balance of team member contributions

Littlepage et al., stated the performance of a group is dependent on the ability of a team to recognise the expertise of its team members and that it can be difficult to recognise their potential [66]. Frajaj et al. state that managing expertise, skills and knowledge, including knowing what the expertise of members of a team is and where that expertise can be applied, is important to be able to apply the the required expertise in the right places [41].

The interview analysis shows that, in some development teams, the recognition of the potential of team members improved during working from home. Because developers had to work more independently, their capabilities became more visible and because it was harder for less experienced developers to ask for help, management was forced to know who was able to do what. This is in line with the recommendation by Miller et al., that managers of software development teams should stay aware of the contributions of individual team members and that they should allow all team members to contribute [75].

The interview analysis shows that the pandemic did not impact the extend to which team members contributed in line with their potential and resulting from that, the pandemic did not cause an increase in conflicts caused by in-balance in team members contributions. In general, team members understood that some colleagues were more affected by the pandemic and were willing to pick up some of their work. This is supported by Miller et al., who found that there was a lot of peer support during the pandemic, that there was increased inclusion of team members and that there was more empathy for team members [75]. The balance of team member contributions was, over all, not heavily affected by working from home due to Covid-19.

6.2.5 Mutual support

According to Porter et al. and Hadjielias et al., mutual support positively affects team cohesion and team performance [86, 46]. This shows that it is important for software development teams to keep supporting each other during working from home.

The interview analysis showed that in some software development teams, the extend to which team members were willing to help and support each other was not affected by working from home. Especially for the interviewees that indicated that they strongly agreed with the statement that team members helped and supported each other as best they could, before the pandemic, the level of mutual support remained just as high during working from home. Interviewees mentioned that being in the same boat regarding the pandemic resulted in willingness to help team members that were heavily impacted by Covid-19. This is in line with Miller et al. who found that there was a lot of peer support during the pandemic [75].

The interview analysis also showed that most of the teams of interviewees that did not strongly agree with the statement, experienced a decrease in mutual support when working from home during the pandemic. The decrease of mutual support, when teams have to work remote, is in line with Strode, who states that communication, which is supported by proximity, contributes to people helping each other [98]. An explanation could be that it was difficult to see who needed help. Because team members loose sight of what their co-workers are doing, they do not see who is struggling and where help is needed.

Another explanation that was mentioned in the interviews is that that people experienced a higher barrier to ask for help when working from home. According to Breuer et al., the extend to which team members are willing to ask each other for help, is dependent on trust [21]. Because trust, according to Hamlin et al. can be negatively impacted by working from home [47], this could be an explanation for why working from home had negatively impacted willingness to ask for help. However, trust was not explicitly mentioned as a factor that influenced the willingness to ask for help by any of the interviewees. Interviewees mentioned that, specifically less experienced team members who were in need of support, found it more difficult to ask for help by phone than they found it to ask for help at the office.

In many teams, conflicts that came up during working from home were, according to the interview analysis, were less easily and quickly resolved. Because there were no managers on site that could mediate and directly solve issues and because meetings to solve conflicts needed to be planned, resulting in longer duration of conflicts. This is in line with the statement by Armstrong and Cole that conflicts in distributed teams are not addressed fast enough [3].

In some development teams, discussions and controversies were discussed less constructively and it was harder to reach consensus on important issues due to the limitations of digital communication. These limitations of digital communication were described by Hamlin et al. who state the limitations of digital communication can hinder digital collaboration because body language is not always seen and real time feedback is limited [47]. Some teams managed to mitigate this effect by putting effort into making digital communication more constructive.

For the teams of the interviewees that strongly agreed with the statement that suggestions and contributions of team members were discussed and further developed before the pandemic, the extend to which this happened was not affected by working from home during the pandemic. In some other teams the extend to which this happened decreased. Reasons that were given were the fact that digital meetings are often time boxed and the fact that there were less events aimed at new suggestions and contributions during working from home.

Overall, the mutual support of software development teams was negatively effected by working from home due to the pandemic. This was mostly caused by limitations in the speed and quality of digital communication. The effect of working from home on mutual support was very limited in teams with high levels of mutual support before working from home. In some teams, the feeling of being in the same boat, due to the pandemic, resulted in willingness to support each other.

6.2.6 Effort

Some interviewees indicated that team members put less effort into the project during working from home. This seems to contradict with the statement by Kelliher and Anderson that given more flexibility in their working arrangements, employees were willing to put more effort into their work [59]. Even though working from home did not provide software development team members with more flexibility in the location they had to work from, it did provide more flexibility in the way they filled in their working hours.

That extra flexibility did, according to the interview analysis, not result in more effort. This is not in line with the statement by Bloom et al. that employees working from home put more effort into their work than employees working at the office [17]. The negative effect of working from home on effort is in line with the statement by Banerjee et al. that the convenience of working at home can cause people to become less engaged with their work [6], the statement by Prasad et al. that that some employees won't work when they are supposed to work from home [87] and the statement by Beckman et al. that employees could abuse working-time autonomy by putting less effort into their work, because they are monitored less [8].

A possible explanation of these effects, that was mentioned in the interviews, is that team members felt less connected to their projects because they lost sight of the big picture. This is in line with the statement by Miller et al. that development team members, who are working from home, are less aware of what other team members are doing [75]. This would make it harder for them to see the whole picture. Another possible explanation, is that team members had to take care of young children during working hours. This reason is specific to working from home during the pandemic, because in that period, children could not always go to day-care or school, leaving their remote working parents to take care of them. This is supported by Trainer et al. who state that parents of young children experience problems with working from home and taking care of their families [99].

In some teams there were conflicts regarding effort, for example because people were less proactive in taking up tasks. This is in line with Morrison-Smith and Ruiz, who state that there is more conflict in distributed teams than in co-located teams [76]. The interviewees that indicated that they strongly disagreed with the statement that there were conflicts regarding the effort that team members put into the project before working from home, answered similarly regarding the period in which they did work from home. This shows that teams that did well with regard to effort related conflicts before working from home, did not experience more effort related conflict during working from home.

Overall, work effort in software development teams was negatively affected by working from home. This was caused by the fact that team members lost sight of the big picture and the fact that they were occupied with other tasks like taking care of children who had to stay at home. Some teams experienced more conflicts regarding the effort of team members. Teams that did not experience conflicts about effort before working from home, did not start experiencing these conflicts during working from home.

6.3 SQ3: How did working from home during the lock downs impact cross team collaboration from the perspective of software development teams?

The impact of working from home on cross team collaboration will be discussed along the lines of the social structure and cross team communication in the organisation and the factors that influenced collaboration across teams.

6.3.1 Social structure

The social structure in organisations was maintained with digital social events and digital communication across teams.

Digital social events

Interviewees named digital social events, employees working in changing team compositions, organising challenges for employees and demonstrations in which teams showed other teams what they were working on as initiatives from their organisations to maintain a social structure. The majority of interviewees mentioned that their organisation had some form of digital social events. Most interviewees, for whom digital social events were organized, were positive about them or at least acknowledged that they were helpful for other employees. This is in line with the statement by Olson and Olson that organising non work related interaction between team members can improve the trust in a collaboration [79] and with Miller et al. who state that teams, who are working from home, should have digital social events [75]. A minority of interviewees found them not helpful because they believed that these events did not work or were a waste of time.

Digital communication across teams

According to the interview analysis, development team members used various forms of digital communication such as chat applications, email, video calls and phone calls to communicate. This is supported by Bolisani et al. and Ipsen et al. who mention that knowledge workers use various digital tools to communicate when working from home [18, 54]. According to Bolisani et al. and Ipsen et al., email was the most popular form of digital communication [18, 54]. However, Charalampous and Grant identified the enormous amount of received emails as a disadvantage of working from home and found that calling was sometimes way more effective [28]. Overall, the interview analysis shows that most development team members, whose job required them to stay in contact with colleagues outside their own team, were able to maintain that contact when working from home. This is in line with the findings by Bolisani et al. that most people were able to stay in contact with colleagues when working from home, mostly due to the use of digital communication [18].

6.3.2 Collaboration across teams

Interviewees mentioned that digital meetings with other teams were more long winded than the physical meetings before working from home. This is in line with the statement by Banerjee et al. that open ended meetings are more directionless in a digital setting [6]. The interview analysis shows that working from home forced some organisations to be more structured and to formalize cross team communication. This is in line with the statement by Berry et al., that communication in virtual teams is more formal than communication in co-located teams [14].

Based on the interview analyses, working from home could lead to an unwanted prioritization of teams with better connections to other parts of the organisation. This is supported by Berntzen and Wong state that the coordination depends on the interactions between team members [13]. Teams from which team members have stronger connections to people in other teams will be able to coordinate and cooperate better than teams from which members have limited interaction with members of other teams. In the interviews, the effects of working from home on cross team collaboration were discussed along the lines of the coordination mechanisms to the 'Big Five' aspects of teamwork, described by Salas et al., which are 'mutual trust', 'shared mental models' and 'Closed loop communication' [93].

Mutual trust

The interview analysis shows that in half of the software development teams, from which members were interviewed, the amount of information that was shared with other teams decreased when they switched to working from home. Considering that there is less trust in digital teams, the findings from the interview analysis are line with Morison-Smith and Ruiz, who state that problems with trust can result in lower willingness to communicate [76].

One of the reasons for the decrease in information sharing with other teams, according to the interviewees, was the loss of informal communication. This is supported by Hamlin et al., who state that trust within the organisation can be negatively effected when informal social interactions stop taking place [47], as is the case when working remote. It is also supported by Greenhalgh and Peacock, who state that the lack of informal communication decreases the chances of sharing knowledge [45] and Belanger and Allport who found that the shift to working from home often results in a decrease in tacit knowledge sharing and direct person to person communication [9].

Another explanation, mentioned by the interviewees were the limitations of digital communication. This is supported by Morison-Smith and Ruiz, who state that communicating trough computers is more superficial, less personal, less in-dept and less certain than direct face to face communication [76] and by Hamlin et al. who state that the limitations of digital communication can hinder digital collaboration because body language is not always seen and real time feedback is limited [47]. According to interview analysis, for some development teams, the amount of information shared with other teams increased during the pandemic because transparency increased because everyone was in the same boat due to Covid-19 which increased mutual understanding and trust. This is supported by Miller et al. who state that people felt more connected due to the pandemic, which increased inclusion of team members and empathy [75]. Another explanation, mentioned by the interviewees, is that feature requests contained more information in order to compensate for the loss of face to face contact.

In the teams of half of the interviewees, working from home did not impact the extend to which people were willing admit mistakes and accept feedback from other teams. For some teams, scheduled feedback moments helped to keep providing other teams with feedback and admit mistakes. In some organisations, teams were more willing to admit mistakes and share feedback because communication became more personal due to 'being in each others homes' in video calls. This is in line with the statement by Caligiuri et al. who mention that colleagues were pulled into each other's homes as a result of digital video calls, which could have resulted in more cohesion [25].

In some teams, the willingness to admit mistakes to other teams declined during working from home. One reason that was given in the interviews was the fact that it is harder to be nuanced in feedback via email. This is supported by Morison-Smith and Ruiz, who state that communicating through computers is more superficial, less personal, less in-depth and less certain than direct face to face communication [76]. Peterson et al. found that teams have to establish trust before negative feedback is received in order to limit the risk of a relationship conflict [82], this supports the notion that feedback in digital teams, where trust is lower, will be less easily accepted. Another reason, mentioned in the interviews was that people had a shorter temper because of the effects of the pandemic on their personal lives. This is not directly related to working from home.

Shared mental models

For most interviewed software development team members, the extent to which they were able to anticipate on- and predict the needs of other teams was not impacted by working from home. This could have been caused by the fact that most teams worked in the same physical space before working remote and had already had the chance to get to know each other and develop shared mental models.

The interviewees that mentioned that their ability to anticipate on- and predict the needs of other teams had decreased stated that this had to do with the limitations in digital communication. This is supported by Hamlin et al., who state that the limitations of digital communication can hinder digital collaboration [47]. The decreased ability to anticipate on- and predict the needs of other teams could also have been caused by the fact that remote teams are less aware of what others in their organisation are working on. Digital communication methods leave little room for informal communication and, according to Agerfalk et al., informal communication is vital in relation to task awareness [2].

Most interviewees stated that their ability to identify changes in other teams, their tasks, or their team members was not affected by working from home. These interviewees also indicated this already went well before working from home. This could indicate that they already had strong shared mental models before working from home and that these stayed intact during working from home. A factor that, according to the interview analysis, could decrease the ability to identify changes in other teams, their tasks, or their team members during working from home is the fact that the lack of informal communication reduces the amount of context information that is shared between teams.

This is in line with Belanger and Allport, who found that the shift to working from home often results in a decrease in tacit knowledge sharing and direct person to person communication [9], Berry, who found that members of virtual teams have less opportunities to have informal interactions [14] and Armstrong et al., who state that the unplanned informal communication that takes place at the office has significant effect on collaboration [3].

Overall, the interview analysis shows that shared mental models between teams were not heavily affected by having to work from home. Espinosa et al. found that many members of distributed software teams, believed that their coordination was partly based on shared mental models of who knew what and being familiar with co-workers and that familiarity with co-workers that worked on other locations helped to solve distance related problems [40]. The observation that the shared mental models remained mostly intact during working from home could be caused by the fact that people in the organisation knew each other and were working in close proximity to each other before working from home. Shared mental models already existed before working from home and helped to enable remote cross team collaboration.

Closed loop communication

The interview analysis shows that, for most development teams, the pandemic did not impact the extend to which team members did follow up on sent messages to see whether they were received. Some development team members indicated that the frequency did not increase because they already followed up on messages a lot and that it was just as easy to do this digitally as it was to do this face to face.

According to the interview analyses, in some teams, members increased the extend to which they followed up on sent messages. This could, according to the interviewees, have been caused by the fact that colleagues were less easy to reach, and the fact that colleagues did not react immediately, which is in line with the statement by Morison-Smith and Ruiz et al that asynchronous communication, such as email, enables receivers to not react immediately [76].

In most development teams, according to the interview analysis, the extend to which team members acknowledged that messages were received remained equal during working from home. In some development teams the extend to which team members acknowledged that messages were received decreased. An explanation for this decrease, according to the interview analysis, is that developers did not want to acknowledge that messages were received because they did not want to lose focus. This is also in line with the statement by Morrison and Ruiz that asynchronous communication enables receivers to not react immediately [76].

According to the interview analysis, for most development teams, the extend to which they clarified that the message received is the same as the intended message was not affected by working from home. The teams, from which members did clarify that the message received is the same as the intended message more often, an explanation was that digital messages can be misinterpreted therefore need to be verified. This is supported by Marlow et al., who state that the use of indirect communication, such as email, poses challenges for digital teams with regard to whether a sent message is understood by the intended receiver because no non-verbal feedback can be observed [69].

6.4 SQ4: Which mitigating measures or preventive actions can be taken to alleviate the impact of the pandemic or help development teams to be better prepared for the next pandemic?

The mitigating measures or preventive actions can be taken to alleviate the impact of the pandemic will be discussed along the lines of organisational support measures and recommendations to manage the negative effects of the pandemic.

6.4.1 Organisational support measures

The analysis of the Pandemic Programming paper data set [89] shows that there is no measure that is helpful to all development team members. In this section, the helpfulness of the most (52%) - and the least (23%) helpful organisational support measures will be discussed in relation to their applicability and the experience levels of team members in software development.

Measures which were most often considered to be helpful

In this sub section the measures that were considered to be most helpful by the respondents to the Pandemic Programming paper, 'paying for internet charges', 'Providing equipment that employees need to work from home' and 'Encouraging staff to use this time for professional training' will be discussed.

Paying for internet charges

A very helpful measure, according to the respondents to the Pandemic Programming survey, was paying for the internet charges of employees. more then half of the respondents considered this measure to be helpful. A reason for this measure to be helpful, mentioned in the interviews, is internet in a working from home setting is mostly used for work and therefore it is only fair that the employer pays for it.

This is in line with statements by Seethalakshmi et al., who found that employees that receive compensation for their internet cost are more positive about working from home [96] and Hamlin et al., who found that that many workers, mostly part time workers and starters do not have a sufficient internet connection. They argue that employees should invest in the required infrastructure, such as fast internet connections [47]. The fact that starters are more likely to experience problems with their internet connection can be an explanation for the fact that this measure is considered to be helpful by 57 % of team members with less then two years of experience.

Only 25% of survey respondents that indicated that this measure was applicable to them, considered this measure to be helpful. 55% of respondents, to whom this measure was not applicable would have considered this statement to be helpful. This shows that organisations that pay for internet cost, are not necessarily the organisations in which employees consider this measure to be help full. In many organisations that did not contribute to the internet cost of their employees, the employees would have considered this statement to be helpful.

Providing equipment that employees need to work from home

Another measure that was considered to be helpful by almost half of the respondents to the pandemic programming survey was paying for new equipment that employees needed to work from home. This is in line with the statement by Charalampous and Grant, that good office ergonomics are crucial for the health of employees working from home [28]. In the interviews, it was mentioned that development team members need a good home office to work from and that it was important too see that organisations were willing to support their employees.

This measure was considered to be a little more helpful by less experienced employees. Most likely because they are less likely to have a good office setup at home. Interviewees that already had equipment at home, mentioned that it was important that other employees were provided with the equipment they needed to perform their work.

For this measure, there was a miss match between the organisations that applied it and the employees that would have found it helpful. Less one third of respondents for whom their organisation bought equipment to work from home, considered this to be helpful. Of the respondents to whom this statement was not applicable more than half would have found it helpful to receive new equipment from their employer.

Encouraging staff to use this time for professional training

Almost half of the respondents to the Pandemic programming paper found it helpful when their organisation encouraged them to spend time on professional training. According to Ralph et al., many organisations applied this measure. 47% of respondents with less than two years of experiences considered this measure to be helpful, which is less than the general respondents. Reasons, mentioned in the interviews, for this measure not to be helpful is the fact that no relevant training was available or that respondents had no time to follow professional training.

When not applicable, more than half of the respondents would have considered this measure to be helpful, but less than one fourth of the respondents, to whom this measure was applicable found it helpful. This, again, shows a miss match between support that is offered by an employer and support that is required by an employee.

Measures which were least often considered to be helpful

The least helpful measures, according to the data analysis of the Pandemic Programming paper were Spending most of the day in an open call with the whole team, avoiding synchronous communication, continuing to have regular meetings, encouraging staff to touch base regularly with each other and having virtual social events.

All day open call

The fact that spending most of the day in an open call was not considered to be helpful was supported in the interviews. Interviewees indicated that this measure would not be helpful because it would cause too much distraction.

Avoiding synchronous communication

Avoiding synchronous communication was seen as unhelpful by most interviewees as well, because it would make communication even harder. Interviewees indicated that some communication had to be synchronous, but that other communication could just as easily take place via an asynchronous medium such as email. However, fully avoiding synchronous communication was a step to far.

Continuing to have regular meetings

Continuing to have regular meetings was seen as helpful by most interviewees. Literature on working from home also stretches the importance of communication. Miller et al. state that continuing to have regular meetings was helpful for software development teams who had to work from home during the pandemic and that these meetings enabled teams to be aware of each others progress and identify and address problems early on [75]. It is suspected that this measure was not considered to be helpful by the survey respondents because they considered this to be normal. The analysis also shows that more than half of the survey respondents, to whom this measure was not applicable, would have considered it to be helpful.

Encouraging staff to touch base regularly

Encouraging staff to touch base regularly with each other was only considered helpful by 4 out of 10 survey respondents. However, according to Agerfalk et al. [2], Armstrong and Cole [3] and Morison-Smith and Ruiz [76], encouraging cohesion and informal communication is considered to be very important when working from home. This is supported by the interview analysis, in which most interviewees were neutral or positive about encouraging staff to touch base regularly. The analysis shows that more than half of the survey respondents, to whom this measure was not applicable, would have found it helpful. This shows that many organisations in which the encouragement would be considered helpful, did not apply this measure.

virtual social events

Virtual social events were only considered to be helpful by 4 out of 10 survey respondents. However, 6 out of 10 respondents, whose organisations did not have virtual social events would have considered them to be helpful. This could indicate that these events were organised in the wrong organisations, or that the expectations of these events are too high for people who have not experienced them. Research on the subject of virtual social events by Miller et al. [75] and Olson and Olson [79] showed that organising non work related interaction between team members can improve the trust in a collaboration.

The interviewees that considered the virtual social events helpful stated that they worked against loneliness and that they helped to improve work mentality. Interviewees that indicated that these measures were unhelpful stated that they were a waste of time.

6.4.2 Managing the negative impacts of the pandemic

In this section, potential solutions to manage the negative impacts of the pandemic and be better prepared for the next pandemic, such as focusing on less experienced team members, protecting work-life balance, encouraging communication and interaction within teams, improving team coordination, improving team cohesion and enabling mutual support will be discussed.

Focusing on less experienced team members

The interview analysis shows that the negative effects of the pandemic, such as problems with concentration, a reduced quality of work, a reduced productivity and more time spent on not work related activities during working hours, are more likely to affect less experienced team members. This suggest that software development teams, in their efforts to mitigate the negative effects of working from home on their teams, should focus on the less experienced team members, because they are more likely to be negatively affected by working from home. Focusing on the support of inexperienced team members might help development team managers to be able to more effectively alleviate the impact of the next pandemic on their teams.

Protecting work-life balance

The interview analysis shows that work life boundaries can get blurred when working from home. This is supported by Kelliher et al., who state that employees, given more flexibility in their working arrangements, were willing to put more effort into their work [59] and Caligiuri et al., who found that the involuntary, shift to working from home had increased the risk for employees to experience work-life conflict [25].

According to Charalampous et al., the extra time spent on work as a result of agenda flexibility when working from home was limited for people with strict routines [28]. This suggests that encouraging team members to stick to a routine will limit the extent to which working from home causes problems with work-life balance. Employers could use this knowledge to prevent work-life conflict when the next pandemic occurs.

Encouraging communication and interaction within teams

The interview analysis shows that clarity and comprehensibility of sub tasks was negatively impacted by working from home, because it is harder to communicate digitally than it is to communicate face-to-face. According to Brentzen and Wong, coordination in a team depends on the interactions between team members [13] and according to Espinosa et al., coordination in digital teams is worse due to limited opportunities to interact [40].

Agerfalk et al. state that informal communication in teams enables trust and task awareness [2]. Morison-Smith and Ruiz, state that informal communication enables cohesion [76] and Armstrong and Cole found that informal communication can be used as a way to exchange feedback between team members [3]. This shows that software development teams should encourage formal and informal interaction and communication between team members in order to limit the negative effects of the pandemic on clarity and comprehensibility of sub tasks, trust, cohesion and feedback within teams.

Improving team coordination

It was described by Miller et al that developers, who are working from home are less aware of the work of others [75]. Fiore et al. found that distributed teams experience more problems with coordination [42] and Espinosa et al. found that the coordination of distributed development teams was problematic [40]. The interviews showed that this was mostly applicable to teams, which were experiencing problems with communication before working from home.

For teams, in which the work done on sub tasks was closely harmonized before working from home, the situation did not change during working from home. For most of the other teams, work on sub tasks became less closely harmonized during working from home. In the teams in which interviewees indicated that sub tasks were generally accepted by all team members before working from home, the acceptance of sub tasks remained similar when working from home. The interviewees from the teams in which the acceptance was lower before working from home reported a further deterioration during working from home. This shows that improving team coordination when teams are working at the office again would help teams to be better prepared for the next pandemic and limit the negative effects of working from home on coordination within teams.

Improving team cohesion

Overall, the interview analysis shows that team members found it less important to be part of the project team during working from home than they did before working from home. Working from home made it harder for them to stay in contact, which made them loose their connections and feelings that it was important to be part of the team. this is in line with Morrison-Smith and Ruiz who state that low trust between team members, caused by distance in remote teams, can cause team members to not feel like they are belonging to a team [76].

The interview analysis shows that teams that experienced high levels of cohesion before working from home experienced limited effects of working from home on their cohesion. Members of teams with less cohesion before working from home, in some instances, experienced that their feelings of belonging to the team and feelings of responsibility toward the team decreased.

Enabling mutual support

De Guinea et al. found that digital teams experience a lower frequency of communication and less knowledge sharing than co-located teams [33]. According to Faraj et al., mutual support can positively affect informal processes and knowledge sharing within teams [41]. The interview analysis showed that mutual support was more difficult during the pandemic, because less experienced team members experienced a higher barrier to ask for help and more experienced team members found it difficult to see who needed help. In order to mitigate the negative effect of the pandemic on mutual support and improve informal processes and knowledge sharing within teams, software development teams should ensure that the barrier, experienced by less experienced team members, to ask for help, is lowered. They should also make it easier for experienced team members to see who is in need of help. Teams could, for example organise support sessions or bring less experienced employees in to contact with more experienced employees that can help them.

7 Limitations

The limitations of this research have to be taken into account when interpreting the results and conclusions.

- Due to limited availability of potential interviewees, only 10 people were interviewed, so the interview results are hard to generalize or to perform a quantitative analysis. Therefore interview results were used to qualitatively analyze the experiences of software development team members, working from home during the Covid-19 pandemic.
- The research could be subject to self-report bias, because most of the research data is based on self-reported assessments of the effects of working from home in the pandemic on the respondents and their teams. This has been mitigated by asking neutrally worded questions, not asking leading questions and handling response data anonymously.
- The research could be subject to recall bias because both the survey respondents to the pandemic programming survey and the interviewees were asked about their experiences before- and during working from home. Regarding the period before working from home, this effect has been mitigated by limiting the scope to a short period of 3 months before working from home. Regarding the period during working from home, recall bias is not to be expected because survey respondents and interview respondents were asked about a situation which was still ongoing.
- The research could be subject to sampling bias. The survey respondents were from different countries. Because of that, their answers could be influenced by differences in social security structures, (organisational) cultures, employee-employer relations, the severity of the pandemic in their countries and the lengths and severity of Covid-19 measures. Regarding the pandemic programming data, Ralph et al. could not compare sample parameters to the full population because there are no parameters known for software development team members. However, when looking at the differences between the people who answered the open questions, who are expected to be more enthusiastic about the survey, and the people who did not answer the open questions, who are expected to be less enthusiastic, Ralph et al. did not find significant differences in the survey answers, used for this thesis [89]. This indicates that response bias was very limited. The interviewees were all working in the Netherlands so the interview results are only applicable to the Dutch situation. Therefore the results could have been different if members of software development teams, working in countries with, for example, different social security structures, different (organisational) cultures, different employee-employer relations, different severity of the pandemic in their countries and different lengths and severity of pandemic were interviewed. For the pre interview survey responses and the interviews, response bias can not be ruled out. Therefore, the interview data is used to research possible qualitative explanations of certain effects of working from home in the pandemic, which cannot be easily generalized.

8 Answering the sub-research questions

The sub-research questions about individual team members, teams, cross team collaboration and mitigating measures will be answered in this section.

8.1 SQ1: How did working from home during the pandemic impact individual software development team members?

The most notable effects of working from home during the lock downs on software development team members were related to scheduling flexibility, concentration, productivity and quality of work. Many development team members experienced an increased scheduling flexibility when working from home. This effect was strongest for team members with little experience in software development and working from home. Most team members appreciated the increased scheduling flexibility, because it enabled them to use their time more efficiently. However, for some, the increased scheduling flexibility disturbed the work-life balance. Less experienced team members experienced problems regarding concentration. Their more experienced co-workers found it easier to concentrate without the distractions of the office.

For some team members, the productivity decreased, often caused by communication related difficulties, for others the productivity increased, often as a result of increased focus. The performance of less experienced developers was more often negatively impacted by working from home than the performance of their more experienced co-workers. The effects of working from home on the quality of work were mostly positive for developers with higher levels of experience in software development and working from home and mostly negative for developers with lower levels of experience in software development and working from home.

8.2 SQ2: How did working from home during the lock downs impact software development teams?

The impact of working from home on development teams were researched in the fields of communication, cohesion, coordination, balance of team member contributions, mutual support and effort. Most development teams experienced a decrease in the frequency and quality of communication. The threshold for communication increased. The physical distance between team members resulted in less opportunities for direct- and informal communication, causing a decrease in the precision, timeliness and accuracy of information within the team. For teams with high levels of cohesion before working from home the effects of the pandemic on team cohesion were limited. For other teams, feelings of belonging- and responsibility toward the team decreased. It was harder for teams to digitally integrate new team members. In some teams, more conflicts arose due to external, pandemic related, factors and conflict resolution was harder, because it was harder to get together.

The negative effects of working from home on coordination, were most notable for teams that already experienced coordination related problems before the pandemic. Coordination problems were mostly caused by the limitations of digital communication. The balance of team member contributions was, over all, not heavily affected by working from home. The mutual support in software development teams was negatively affected by working from home. This was mostly caused by limitations in the speed- and quality of digital communication. The effect of working from home on mutual support was limited in teams with high levels of mutual support before the pandemic. In some teams, the feeling of being in the same boat, due to the pandemic, resulted in willingness to support each other. Work effort in development teams was negatively affected by working from home. This was caused by the fact that team members lost sight of the big picture of what they were working on, which negatively impacted their motivation, and the fact that the pandemic caused them to be occupied with other tasks, such as taking care of children who had to stay at home.

8.3 SQ3: How did working from home during the lock downs impact cross team collaboration, from the perspective of software development teams?

Employers organised digital social events as a means to maintain social cohesion within the organisation. Some team members did not see the added value of these events, but most of them considered these events to be helpful. Most team members, whose job required them to stay in contact with colleagues outside their own team, were able to maintain contact with other teams, using digital communication tools, such as email and video calls. For some teams, the amount of information that was shared with other teams decreased when they switched to working from home, but this was mostly caused by a lack of informal communication. In some organisations, teams were more willing to admit mistakes and share feedback because communication became more personal due to being in each others homes in video calls. In other organisations, the willingness to admit mistakes to other teams declined due to the fact that digital communication, such as email, makes it harder to be nuanced.

Shared mental models, that existed before working from home, remained mostly intact and enabled different teams to keep working together when working from home. Closed loop communication was not heavily impacted by working from home. Most development teams saw no effects regarding the extend to which they followed up on whether messages were received and the extend to which they acknowledged to others that they received messages. Despite the fact that the limitations of digital communication warrant extra verification a message is understood correctly, only a small part of development teams verified this more often when working from home.

8.4 SQ4: Which mitigating measures or preventive actions can be taken to alleviate the impact of the pandemic or help development teams to be better prepared for the next pandemic?

Teams in which cohesion and coordination were in order before the pandemic started, were less heavily impacted. Therefore, software development teams, experiencing problems with cohesion and coordination, should tackle their issues when everything gets back to normal in order to be better prepared for the next pandemic. Technical difficulties, when starting to work from home, were mentioned as a challenge. In order to ease this transition in the next pandemic, development teams should ensure that all employees have a sufficient work from home infrastructure and that enough technical support is available. Because working from home makes it more difficult to ask for help, and see who needs help, software development teams should set up a communication structure in which it is made easier for less experienced team members to ask their more experienced colleagues for help. The increased agenda flexibility can cause team members to experience blurred boundaries between their work- and private lives. Development teams can help team members to achieve a good work-life balance by encouraging them to adhere to a work routine. Communication issues, such as the lack of informal communication, cause many problems regarding team collaborations. Development teams should therefore actively promote informal interactions between team members.

Organisational support measures and the idea of being supported by an employer are considered to be helpful by many development team members. However, there is no silver bullet. Different team members are helped by different measures. Therefore development teams should actively ask their members which support measures would help them and try to cater to their individual needs.

9 Conclusion

The goal of this research was to understand the effects of working from home as a result of the Covid-19 pandemic on software development teams. This led to the main research question: **"How were software development teams affected by suddenly having to work from home as a result of the Covid-19 pandemic?"**. An inductive approach to theory was used, in which themes were identified and patterns were explained in order to generate new theory on the effects of working from home during the pandemic on software development teams. A mixed methods approach was applied in which the raw data set from a survey of 2,225 software developers, performed by Ralph et al. [89], was analyzed to get a quantitative insight into the effects of working from home due to the pandemic on individual software developers. In order to be able to qualitatively interpret the effects of having to work from home as a result of the Covid-19 pandemic on individual software developers, software development teams and cross team collaboration, 10 people, involved in software development teams in different roles and with different experience levels, were interviewed about their professional experiences during the pandemic. The findings from the survey data analysis and the interview analysis were discussed in the light of existing literature related to the effects of working from home on individuals, teams and cross team collaboration, leading to a set of conclusions that can be used to answer the research questions.

The study delivered the following 5 key findings:

1. The extent to which the focus and concentration of development team members was impacted by forced working from home is dependent on their level of experience with software development. This dependency was not previously mentioned in existing literature.
2. In contradiction to literature on working from home, both within and during the pandemic, the productivity of software development team members was, in general, negatively affected by forced working from home in the pandemic.
3. In line with existing literature on working from home, both within and during the pandemic, working from home during the pandemic posed communication challenges in software development teams, specifically regarding informal and spontaneous communication.
4. In line with existing literature on working from home, both within and during the pandemic, the negative impact of forced remote work on communication within development teams can only be partly mitigated by the use of digital communication tools.
5. In line with existing literature on working from home during the pandemic, both the actual support measures that organisations took and the feeling of being supported by an employer, were appreciated by development team members.

In summary, it can be concluded that the way of working in software development teams was heavily affected when teams were forced to work remote as a result of the Covid-19 pandemic, but that teams were able to cope with it relatively well. The impact on individual team members differed per individual and was dependent on their experience in software development and their experience with working from home. Collaboration, both within and between teams, was challenging due to various factors, communication being the most important of which. By analysing the effects of forced remote work on software development teams, this research provides practitioners with contextual knowledge and recommendations to be able to effectively manage the transition to working from home, when the next pandemic takes place.

10 Future research

This research has yielded an extensive set of qualitative explanations for the effects of working from home due to the pandemic. In future research, a quantitative survey on the qualitative explanations for these effects, with a large, representative sample, could provide insight into the frequency with which certain effects of working from home due to the pandemic can be explained by the causes, that were discussed in this thesis.

The interviewees in this research, were all working in the Netherlands. Executing this study in different countries with different social security structures, different (organisational) cultures, different employee-employer relations, different experiences regarding the severity of the pandemic and different lengths and severity of pandemic could provide insights in the differences and similarities in how the pandemic impacted software development teams in different parts of the world.

A longitudinal study, in which the effects of working from home on software development teams at the beginning of the Covid-19 pandemic are compared to the effects after development team members have had to work from home for a longer period of time, could provide insights into which effects can be attributed to a sudden shift in the way of working and which effects are caused by working from home for a longer period of time. Such a study will provide insights into which effects decrease over time, when development team members get used to working from home and which effects increase over time when the distance between team members has grown and the personal connections, from when teams were still working co-located, have watered down.

In the interviews with software development team members, interviewees were asked about their expectations for the period after the pandemic. Future research, executed after the pandemic, could provide insights into the effects that the pandemic had on the work life of software development team members, the acceptance of remote work and (digital) collaboration between- and within software development teams.

11 References

- [1] Pär J Ågerfalk, Kieran Conboy, and Michael D Myers. Information systems in the age of pandemics: Covid-19 and beyond, 2020.
- [2] Par J Agerfalk, Brian Fitzgerald, Helena Holmstrom Olsson, Brian Lings, Bjorn Lundell, and Eoin Ó Conchúir. A framework for considering opportunities and threats in distributed software development. 2005.
- [3] David J Armstrong and Paul Cole. Managing distances and differences in geographically distributed work groups. 1995.
- [4] Carol Atkinson and Laura Hall. Flexible working and happiness in the nhs. *Employee Relations*, 2011.
- [5] Diane Bandow. Time to create sound teamwork. *The Journal for quality and participation*, 24(2):41, 2001.
- [6] Sharmistha Banerjee. Designing a remote collaboration platform for working professionals that promotes social bonding. 2021.
- [7] Christopher M Barnes, John R Hollenbeck, David T Wagner, D Scott DeRue, Jennifer D Nahrgang, and Kelly M Schwind. Harmful help: The costs of backing-up behavior in teams. *Journal of Applied Psychology*, 93(3):529, 2008.
- [8] Michael Beckmann. Working-time autonomy as a management practice. *IZA World of Labor*, 2016.
- [9] France Belanger. Communication patterns in distributed work groups: A network analysis. *IEEE Transactions on Professional Communication*, 42(4):261–275, 1999.
- [10] France Bélanger and Christopher D Allport. Collaborative technologies in knowledge telework: an exploratory study. *Information Systems Journal*, 18(1):101–121, 2008.
- [11] France Bélanger, Rosann Webb Collins, and Paul H Cheney. Technology requirements and work group communication for telecommuters. *Information Systems Research*, 12(2):155–176, 2001.
- [12] Blaise J Bergiel, Erich B Bergiel, and Phillip W Balsmeier. Nature of virtual teams: a summary of their advantages and disadvantages. *Management research news*, 2008.
- [13] Marthe Berntzen and Sut I Wong. Autonomous but interdependent: The roles of initiated and received task interdependence in distributed team coordination. *International Journal of Electronic Commerce*, 25(1):7–28, 2021.
- [14] Gregory R Berry. Enhancing effectiveness on virtual teams: Understanding why traditional team skills are insufficient. *The Journal of Business Communication (1973)*, 48(2):186–206, 2011.
- [15] Kelly D Blake, Robert J Blendon, and Kasisomayajula Viswanath. Employment and compliance with pandemic influenza mitigation recommendations. *Emerging infectious diseases*, 16(2):212, 2010.

- [16] Jennifer L Blaskovich. Exploring the effect of distance: An experimental investigation of virtual collaboration, social loafing, and group decisions. *Journal of Information Systems*, 22(1):27–46, 2008.
- [17] Nicholas Bloom, James Liang, John Roberts, and Zhichun Jenny Ying. Does working from home work? evidence from a chinese experiment. *The Quarterly Journal of Economics*, 130(1):165–218, 2015.
- [18] Ettore Bolisani, Enrico Scarso, Christine Ipsen, Kathrin Kirchner, John Paulin Hansen, et al. Working from home during covid-19 pandemic: Lessons learned and issues. *Management & Marketing. Challenges for the Knowledge Society*, 15(1):458–476, 2020.
- [19] Erin Bradner and Gloria Mark. Why distance matters: effects on cooperation, persuasion and deception. In *Proceedings of the 2002 ACM conference on Computer supported cooperative work*, pages 226–235, 2002.
- [20] Virginia Braun and Victoria Clarke. Thematic analysis. 2012.
- [21] Christina Breuer, Joachim Hüffmeier, and Guido Hertel. Does trust matter more in virtual teams? a meta-analysis of trust and team effectiveness considering virtuality and documentation as moderators. *Journal of Applied Psychology*, 101(8):1151, 2016.
- [22] Helena Bulińska-Stangrecka and Anna Bagieńska. The role of employee relations in shaping job satisfaction as an element promoting positive mental health at work in the era of covid-19. *International Journal of Environmental Research and Public Health*, 18(4):1903, 2021.
- [23] Jenna Butler and Sonia Jaffe. Challenges and gratitude: A diary study of software engineers working from home during covid-19 pandemic. In *2021 IEEE/ACM 43rd International Conference on Software Engineering: Software Engineering in Practice (ICSE-SEIP)*, pages 362–363. IEEE, 2021.
- [24] John K Butler Jr. Trust expectations, information sharing, climate of trust, and negotiation effectiveness and efficiency. *Group & Organization Management*, 24(2):217–238, 1999.
- [25] Paula Caligiuri, Helen De Cieri, Dana Minbaeva, Alain Verbeke, and Angelika Zimmermann. International hrm insights for navigating the covid-19 pandemic: Implications for future research and practice, 2020.
- [26] Traci Carte and Laku Chidambaram. A capabilities-based theory of technology deployment in diverse teams: Leapfrogging the pitfalls of diversity and leveraging its potential with collaborative technology. *Journal of the Association for Information Systems*, 5(11):4, 2004.
- [27] Wayne F Cascio. Managing a virtual workplace. *Academy of Management Perspectives*, 14(3):81–90, 2000.
- [28] Maria Charalampous, CA Grant, and C Tramontano. The development of the e-work well-being scale and further validation of the e-work life scale. *Unpublished doctoral thesis, Coventry University*, 2020.

- [29] Nancy J Cooke, Jamie C Gorman, Jasmine L Duran, and Amanda R Taylor. Team cognition in experienced command-and-control teams. *Journal of Experimental Psychology: Applied*, 13(3):146, 2007.
- [30] Cecily D Cooper and Nancy B Kurland. Telecommuting, professional isolation, and employee development in public and private organizations. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*, 23(4):511–532, 2002.
- [31] Larry L Cummings and Philip Bromiley. The organizational trust inventory (oti). *Trust in organizations: Frontiers of theory and research*, 302(330):39–52, 1996.
- [32] Georgina Cundill, Blane Harvey, Mark Tebboth, Logan Cochrane, Bruce Currie-Alder, Katharine Vincent, Jon Lawn, Robert J Nicholls, Lucia Scodanibbio, Anjal Prakash, et al. Large-scale transdisciplinary collaboration for adaptation research: Challenges and insights. *Global Challenges*, 3(4):1700132, 2019.
- [33] Ana Ortiz De Guinea, Jane Webster, and D Sandy Staples. A meta-analysis of the consequences of virtualness on team functioning. *Information & management*, 49(6):301–308, 2012.
- [34] Bart A De Jong, Kurt T Dirks, and Nicole Gillespie. Trust and team performance: A meta-analysis of main effects, moderators, and covariates. *Journal of applied psychology*, 101(8):1134, 2016.
- [35] Alan R Dennis, Robert M Fuller, and Joseph S Valacich. Media, tasks, and communication processes: A theory of media synchronicity. *MIS quarterly*, pages 575–600, 2008.
- [36] Eduardo Witter dos Santos and Ingrid Nunes. Investigating the effectiveness of peer code review in distributed software development. In *Proceedings of the 31st Brazilian Symposium on Software Engineering*, pages 84–93, 2017.
- [37] Line Dubé and Daniel Robey. Surviving the paradoxes of virtual teamwork. *Information systems journal*, 19(1):3–30, 2009.
- [38] Amy C Edmondson, Roderick M Kramer, and Karen S Cook. Psychological safety, trust, and learning in organizations: A group-level lens. *Trust and distrust in organizations: Dilemmas and approaches*, 12:239–272, 2004.
- [39] Roar Espevik, Bjørn Helge Johnsen, and Jarle Eid. Communication and performance in co-located and distributed teams: an issue of shared mental models of team members? *Military Psychology*, 23(6):616–638, 2011.
- [40] Alberto Espinosa, Robert Kraut, Sandra Slaughter, Javier Lerch, James Herbsleb, and Audris Mockus. Shared mental models, familiarity, and coordination: A multi-method study of distributed software teams. *ICIS 2002 Proceedings*, page 39, 2002.
- [41] Samer Faraj and Lee Sproull. Coordinating expertise in software development teams. *Management science*, 46(12):1554–1568, 2000.

- [42] Stephen M Fiore, Eduardo Salas, Haydee M Cuevas, and Clint A Bowers. Distributed coordination space: toward a theory of distributed team process and performance. *Theoretical Issues in Ergonomics Science*, 4(3-4):340–364, 2003.
- [43] Marivic F Flores. Understanding the challenges of remote working and it's impact to workers. *International Journal of Business Marketing and Management (IJBMM)*, 4(11):40–44, 2019.
- [44] HR Gartner. survey reveals 88% of organizations have encouraged or required employees to work from home due to coronavirus, 2020.
- [45] Trisha Greenhalgh and Richard Peacock. Effectiveness and efficiency of search methods in systematic reviews of complex evidence: audit of primary sources. *Bmj*, 331(7524):1064–1065, 2005.
- [46] Elias Hadjielias, Olufunmilola Lola Dada, Allan Discua Cruz, Stavros Zekas, Michael Christofi, and Georgia Sakka. How do digital innovation teams function? understanding the team cognition-process nexus within the context of digital transformation. *Journal of Business Research*, 122:373–386, 2021.
- [47] Ryan Hamlin, Abhishek Shirali, Samir Singh, and Edward Woodcock. Virtually possible: Getting remote work right for g and a functions, May 2021.
- [48] James D. Herbsleb and Audris Mockus. An empirical study of speed and communication in globally distributed software development. *IEEE Transactions on software engineering*, 29(6):481–494, 2003.
- [49] Guido Hertel, Udo Konradt, and Borris Orlikowski. Managing distance by interdependence: Goal setting, task interdependence, and team-based rewards in virtual teams. *European Journal of work and organizational psychology*, 13(1):1–28, 2004.
- [50] Pamela J Hinds and Mark Mortensen. Understanding conflict in geographically distributed teams: The moderating effects of shared identity, shared context, and spontaneous communication. *Organization science*, 16(3):290–307, 2005.
- [51] Martin Hoegl and Hans Georg Gemuenden. Teamwork quality and the success of innovative projects: A theoretical concept and empirical evidence. *Organization science*, 12(4):435–449, 2001.
- [52] Martin Hoegl and Hans Georg Gemuenden. Teamwork quality and the success of innovative projects: A theoretical concept and empirical evidence. *Organization science*, 12(4):435–449, 2001.
- [53] Martin Hoegl, K Praveen Parboteeah, and Hans Georg Gemuenden. When teamwork really matters: task innovativeness as a moderator of the teamwork–performance relationship in software development projects. *Journal of Engineering and Technology Management*, 20(4):281–302, 2003.
- [54] Christine Ipsen, Kathrin Kirchner, and John P Hansen. International survey conducted the first months of the national lockdowns march-may, 2020. 2020.

- [55] Sirkka L Jarvenpaa and Dorothy E Leidner. Communication and trust in global virtual teams. *Organization science*, 10(6):791–815, 1999.
- [56] Philip Nicholas Johnson-Laird. *Mental models: Towards a cognitive science of language, inference, and consciousness*. Number 6. Harvard University Press, 1983.
- [57] Gareth R Jones and Jennifer M George. The experience and evolution of trust: Implications for cooperation and teamwork. *Academy of management review*, 23(3):531–546, 1998.
- [58] Judy Kay, Nicolas Maisonneuve, Kalina Yacef, and Peter Reimann. The big five and visualisations of team work activity. In *International Conference on Intelligent Tutoring Systems*, pages 197–206. Springer, 2006.
- [59] Clare Kelliher and Deirdre Anderson. Doing more with less? flexible working practices and the intensification of work. *Human relations*, 63(1):83–106, 2010.
- [60] Sara Kiesler and Jonathon N Cummings. What do we know about proximity and distance in work groups? a legacy of research. *Distributed work*, 1:57–80, 2002.
- [61] Amit Kramer and Karen Z Kramer. The potential impact of the covid-19 pandemic on occupational status, work from home, and occupational mobility, 2020.
- [62] Robert E Kraut, Susan R Fussell, Susan E Brennan, and Jane Siegel. Understanding effects of proximity on collaboration: Implications for technologies to support remote collaborative work. *Distributed work*, pages 137–162, 2002.
- [63] Parul Kumar, Neha Kumar, Priti Aggarwal, and Jasmine AL Yeap. Working in lockdown: the relationship between covid-19 induced work stressors, job performance, distress, and life satisfaction. *Current Psychology*, pages 1–16, 2021.
- [64] Yngve Lindsj rn, Dag IK Sjøberg, Torgeir Dings yr, Gunnar R Bergersen, and Tore Dyb . Teamwork quality and project success in software development: A survey of agile development teams. *Journal of Systems and Software*, 122:274–286, 2016.
- [65] Jessica Lipnack and Jeffrey Stamps. Reaching across space, time, and organizations with technology, 1997.
- [66] Glenn Littlepage, William Robison, and Kelly Reddington. Effects of task experience and group experience on group performance, member ability, and recognition of expertise. *Organizational behavior and human decision processes*, 69(2):133–147, 1997.
- [67] Suzan Lund, James Manyika, Anu Madgavkar, and Sven Smit. What’s next for remote work: An analysis of 2,000 tasks, 800 jobs, and nine countries.
- [68] Thomas W Malone and Kevin Crowston. The interdisciplinary study of coordination. *ACM Computing Surveys (CSUR)*, 26(1):87–119, 1994.
- [69] Shannon L Marlow, Christina N Lacerenza, and Eduardo Salas. Communication in virtual teams: A conceptual framework and research agenda. *Human Resource Management Review*, 27(4):575–589, 2017.

- [70] Anne P Massey, Mitzi M Montoya-Weiss, and Yu-Ting Hung. Because time matters: Temporal coordination in global virtual project teams. *Journal of management information systems*, 19(4):129–155, 2003.
- [71] John E Mathieu, Tonia S Heffner, Gerald F Goodwin, Eduardo Salas, and Janis A Cannon-Bowers. The influence of shared mental models on team process and performance. *Journal of applied psychology*, 85(2):273, 2000.
- [72] Roger C Mayer, James H Davis, and F David Schoorman. An integrative model of organizational trust. *Academy of management review*, 20(3):709–734, 1995.
- [73] Robert M McIntyre and Eduardo Salas. Measuring and managing for team performance: Emerging principles from complex environments. *Team effectiveness and decision making in organizations*, 16:9–45, 1995.
- [74] Addie Middleton, Kit N Simpson, Janet Prvu Bettger, and Mark G Bowden. Covid-19 pandemic and beyond: considerations and costs of telehealth exercise programs for older adults with functional impairments living at home—lessons learned from a pilot case study. *Physical therapy*, 100(8):1278–1288, 2020.
- [75] Courtney Miller, Paige Rodeghero, Margaret-Anne Storey, Denae Ford, and Thomas Zimmermann. “how was your weekend?” software development teams working from home during covid-19. In *2021 IEEE/ACM 43rd International Conference on Software Engineering (ICSE)*, pages 624–636. IEEE, 2021.
- [76] Sarah Morrison-Smith and Jaime Ruiz. Challenges and barriers in virtual teams: a literature review. *SN Applied Sciences*, 2:1–33, 2020.
- [77] Tuomas Niinimäki, Arttu Piri, and Casper Lassenius. Factors affecting audio and text-based communication media choice in global software development projects. In *2009 Fourth IEEE International Conference on Global Software Engineering*, pages 153–162. IEEE, 2009.
- [78] Judith S Olson and Gary M Olson. i2i trust in e-commerce. *Communications of the ACM*, 43(12):41–44, 2000.
- [79] Judith S Olson and Gary M Olson. Bridging distance: Empirical studies of distributed teams. In *Human-Computer Interaction and Management Information Systems: Applications. Advances in Management Information Systems*, pages 117–134. Routledge, 2014.
- [80] Tyler Pacheco, Simon Coulombe, Christine Khalil, Sophie Meunier, Marina Doucerain, Emilie Auger, and Emily Cox. Job security and the promotion of workers’ wellbeing in the midst of the covid-19 pandemic: A study with canadian workers one to two weeks after the initiation of social distancing measures. *International Journal of Wellbeing*, 10(3), 2020.
- [81] Vicente Peñarroja, Virginia Orengo, Ana Zornoza, and Ana Hernández. The effects of virtuality level on task-related collaborative behaviors: The mediating role of team trust. *Computers in Human Behavior*, 29(3):967–974, 2013.

- [82] Randall S Peterson and Kristin Jackson Behfar. The dynamic relationship between performance feedback, trust, and conflict in groups: A longitudinal study. *Organizational behavior and human decision processes*, 92(1-2):102–112, 2003.
- [83] Natalia Petrova. *Flexible working as an effective tool of organizational productivity increasing: perspectives of property and staff in Alcatel-Lucent Pte. Ltd.* 2011.
- [84] L Pierik. The effects of new ways of working: An empirical study of municipalities in the netherlands, looking at the relation between new ways of working and social cohesion, work life balance, and performance and the moderating role of leadership on these effects. Master's thesis, University of Twente, 2011.
- [85] Praveen Pinjani and Prashant Palvia. Trust and knowledge sharing in diverse global virtual teams. *Information & Management*, 50(4):144–153, 2013.
- [86] Christopher OLH Porter, John R Hollenbeck, Daniel R Ilgen, Aleksander PJ Ellis, Bradley J West, and Henry Moon. Backing up behaviors in teams: the role of personality and legitimacy of need. *Journal of applied psychology*, 88(3):391, 2003.
- [87] Dr KDV Prasad, Dr Mruthyanjaya Rao Mangipudi, Dr Rajesh Vaidya, and Budumuru Muralidhar. Organizational climate, opportunities, challenges and psychological well-being of the remote working employees during covid-19 pandemic: a general linear model approach with reference to information technology industry in hyderabad. *International Journal of Advanced Research in Engineering and Technology (IJARET)*, 11(4), 2020.
- [88] Sylwia Przytuła, Gabriela Strzelec, and Katarzyna Krysińska-Kościańska. Re-vision of future trends in human resource management (hrm) after covid-19. *Journal of Intercultural Management*, 12(4):70–90, 2020.
- [89] Paul Ralph, Sebastian Baltes, Gianisa Adisaputri, Richard Torkar, Vladimir Kovalenko, Marcos Kalinowski, Nicole Novielli, Shin Yoo, Xavier Devroey, Xin Tan, et al. Pandemic programming. *Empirical Software Engineering*, 25(6):4927–4961, 2020.
- [90] William B Rouse and Nancy M Morris. On looking into the black box: Prospects and limits in the search for mental models. *Psychological bulletin*, 100(3):349, 1986.
- [91] Monica DT Rysavy and Russell Michalak. Working from home: how we managed our team remotely with technology. *Journal of Library Administration*, 60(5):532–542, 2020.
- [92] Eduardo Salas, C Shawn Burke, and Janis A Cannon-Bowers. Teamwork: emerging principles. *International Journal of Management Reviews*, 2(4):339–356, 2000.
- [93] Eduardo Salas, Dana E Sims, and C Shawn Burke. Is there a “big five” in teamwork? *Small group research*, 36(5):555–599, 2005.
- [94] Mark Saunders, PHILIP Lewis, and ADRIAN Thornhill. Research methods. *Business Students 4th edition Pearson Education Limited, England*, 2007.
- [95] Dobrica Savić. Covid-19 and work from home: Digital transformation of the workforce. *Grey Journal (TGJ)*, 16(2):101–104, 2020.

- [96] S Seethalakshmi et al. Work from home at it companies—the new normal. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, 12(4):1285–1307, 2021.
- [97] Mark A Serva, Mark A Fuller, and Roger C Mayer. The reciprocal nature of trust: A longitudinal study of interacting teams. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*, 26(6):625–648, 2005.
- [98] Diane Strode. Applying adapted big five teamwork theory to agile software development. *arXiv preprint arXiv:1606.03549*, 2016.
- [99] Sarah Trainer, Agnieszka Miguel, Jean M Jacoby, and Jodi O'Brien. Exploring the gendered impacts of covid-19 on faculty. In *2021 CoNECD*, 2021.
- [100] Lena Waizenegger, Brad McKenna, Wenjie Cai, and Taino Bendz. An affordance perspective of team collaboration and enforced working from home during covid-19. *European Journal of Information Systems*, 29(4):429–442, 2020.
- [101] Patrick GT Walker, Charles Whittaker, Oliver J Watson, Marc Baguelin, Peter Winskill, Arran Hamlet, Bimandra A Djafaara, Zulma Cucunubá, Daniela Olivera Mesa, Will Green, et al. The impact of covid-19 and strategies for mitigation and suppression in low-and middle-income countries. *Science*, 369(6502):413–422, 2020.
- [102] Bin Wang, Yukun Liu, Jing Qian, and Sharon K Parker. Achieving effective remote working during the covid-19 pandemic: A work design perspective. *Applied psychology*, 70(1):16–59, 2021.
- [103] Sheila Simsarian Webber. Leadership and trust facilitating cross-functional team success. *Journal of management development*, 2002.

12 Appendix

12.1 Appendix 1: Pre-interview survey

We are conducting a study on how the COVID-19 pandemic has impacted the working situation, productivity, and teamwork quality of software practitioners and which measures organisations can take to minimize the negative effects of forced remote working. In order to help us interpret the quantitative data about these subjects, we are performing interviews. You have indicated that you are willing to participate in one of the interviews.

In order to effectively use the interview to go into depth on the most relevant issues, we want to ask you to fill in this survey. Your responses to this survey will, in combination with our quantitative research, help us to structure the interview and ask the right questions.

The survey will take up 10 minutes of your time.

1. Please enter your name. Your name will be used to use your survey responses in the interview. Your responses will be anonymized in the analysis so that nobody can track your responses to you.
2. Please choose the option that best describes you.
 - 2.1. Before the lockdown, I was working at the office. Now I am working from home.
 - 2.2. I've been working at the office, both before- and during the lockdown.
 - 2.3. I've been working at home, both before- and during the lockdown.
 - 2.4. Before the pandemic I was working remotely. Now I'm working at the office.
3. Below is a series of statements about how your organization might support you while you are working from home. For each item, first, if your company is doing it, please answer "Yes" in the first column; if not, Please answer 'No'. Please also select "Not relevant" if your organization doesn't have to reassure you of something because it is obvious. Second, in the second column, indicate how helpful you found or would have found this measure ('Very helpful', 'Unhelpful', 'Neutral', 'Helpful', 'Very helpful').
 - 3.1. I can (or could) take equipment (e.g. monitors) home from my workplace
 - 3.2. My organization will buy new equipment we need to work from home
 - 3.3. My organization will pay for software we need to work from home
 - 3.4. My organization will pay for some or all of my internet charges
 - 3.5. My organization has reassured me that I will keep my job
 - 3.6. My organization has reassured me that I will continue to be paid
 - 3.7. My organization has reassured me that I can take time off if I'm sick or need to care for dependents
 - 3.8. My organization has reassured me that they understand if my work performance suffers
 - 3.9. My team is continuing to have regular meetings (e.g. via video chat)

- 3.10. My team is avoiding synchronous communication (e.g. video chat)
 - 3.11. My organization is encouraging staff to touch base regularly with each other
 - 3.12. My team is having virtual social events (e.g. via video chat)
 - 3.13. For most of the day, I work with an open video or audio call to some or all of my team.
 - 3.14. My organization is sending food to staff working from home
 - 3.15. My organization is providing activities to occupy staff member's children
 - 3.16. My organization is providing at-home exercise programs
 - 3.17. My organization is encouraging staff to use this time for professional training
 - 3.18. My team has good work-from-home infrastructure (e.g. source control, VPN, remote desktop, file sharing)
 - 3.19. My team is peer reviewing commits, change requests or pull requests (peer code review)
 - 3.20. My organisation has implemented a meeting free day (e.g. meeting free Monday)
 - 3.21. My organisation imposed a mandatory pause between meetings (e.g. meetings end at the whole hour and start at ten past)
 - 3.22. My organisation asked me what problems i come across in this new situation and which solutions i deem necessary
 - 3.23. My manager checks in on my well being more frequently
4. In order to establish the impact of the pandemic on team work quality we want to ask you about the status of certain aspects of teamwork quality before working from home as a result of Covid-19 restrictions. For the following statements about communication, Firstly, please indicate on a 1-5 scale ('Strongly disagree', 'Disagree', 'Neutral', 'Agree', 'Strongly agree'), how much you agree with them regarding the situation in the 3 months before working from home Secondly, please indicate on a 1-5 scale ('Strongly disagree', 'Disagree', 'Neutral', 'Agree', 'Strongly agree'), how much you agree with them regarding the situation during working from home.
- 4.1. There was frequent communication within the team.
 - 4.2. The team members communicated often in spontaneous (TWQ) meetings, phone conversations, etc.
 - 4.3. The team members communicated mostly directly and personally with each other.
 - 4.4. There were mediators through whom much communication was conducted.
 - 4.5. Project-relevant information was shared openly by all team members.
 - 4.6. Important information was kept away from other team members in certain situations.
 - 4.7. In our team there were conflicts regarding the openness of the information flow.
 - 4.8. The team members were happy with the timeliness in which they received information from other team members.

- 4.9. The team members were happy with the precision of the information received from other team members.
- 4.10. The team members were happy with the usefulness of the information received from other team members.
5. In order to establish the impact of the pandemic on team work quality we want to ask you about the status of certain aspects of teamwork quality before working from home as a result of Covid-19 restrictions. For the following statements about cohesion, Firstly, please indicate on a 1-5 scale ('Strongly disagree', 'Disagree', 'Neutral', 'Agree', 'Strongly agree'), how much you agree with them regarding the situation in the 3 months before working from home Secondly, please indicate on a 1-5 scale ('Strongly disagree', 'Disagree', 'Neutral', 'Agree', 'Strongly agree'), how much you agree with them regarding the situation during working from home.
 - 5.1. It was important to the members of our team to be part of this project.
 - 5.2. The team did not see anything special in this project.
 - 5.3. The team members were strongly attached to this project.
 - 5.4. The project was important to our team. All members were fully integrated in our team.
 - 5.5. There were many personal conflicts in our team.
 - 5.6. There was personal attraction between the members of our team.
 - 5.7. Our team was sticking together.
 - 5.8. The members of our team felt proud to be part of the team.
 - 5.9. Every team member felt responsible for maintaining and protecting the team.
6. In order to establish the impact of the pandemic on team work quality we want to ask you about the status of certain aspects of teamwork quality before working from home as a result of Covid-19 restrictions. For the following statements about coordination, Firstly, please indicate on a 1-5 scale ('Strongly disagree', 'Disagree', 'Neutral', 'Agree', 'Strongly agree'), how much you agree with them regarding the situation in the 3 months before working from home Secondly, please indicate on a 1-5 scale ('Strongly disagree', 'Disagree', 'Neutral', 'Agree', 'Strongly agree'), how much you agree with them regarding the situation during working from home.
 - 6.1. The work done on sub tasks within the project was closely harmonized.
 - 6.2. There were clear and fully comprehended goals for sub tasks within our team.
 - 6.3. The goals for sub tasks were accepted by all team members.
 - 6.4. There were conflicting interests in our team regarding sub tasks/sub goals.
7. In order to establish the impact of the pandemic on team work quality we want to ask you about the status of certain aspects of teamwork quality before working from home as a result of Covid-19 restrictions. For the following statements about the balance of team member contributions, Firstly, please indicate on a 1-5 scale ('Strongly disagree', 'Disagree', 'Neutral', 'Agree', 'Strongly agree'), how much you agree with them regarding the situation in the 3 months before working from home Secondly, please indicate on

a 1-5 scale ('Strongly disagree', 'Disagree', 'Neutral', 'Agree', 'Strongly agree'), how much you agree with them regarding the situation during working from home.

- 7.1. The team recognized the specific potentials (strengths and weaknesses) of individual team members.
 - 7.2. The team members were contributing to the achievement of the team's goals in accordance with their specific potential.
 - 7.3. Imbalance of member contributions caused conflicts in our team.
8. In order to establish the impact of the pandemic on team work quality we want to ask you about the status of certain aspects of teamwork quality before working from home as a result of Covid-19 restrictions. For the following statements about mutual support, Firstly, please indicate on a 1-5 scale ('Strongly disagree', 'Disagree', 'Neutral', 'Agree', 'Strongly agree'), how much you agree with them regarding the situation in the 3 months before working from home Secondly, please indicate on a 1-5 scale ('Strongly disagree', 'Disagree', 'Neutral', 'Agree', 'Strongly agree'), how much you agree with them regarding the situation during working from home.
- 8.1. The team members helped and supported each other as best they could.
 - 8.2. If conflicts came up, they were easily and quickly resolved.
 - 8.3. Discussions and controversies were conducted constructively.
 - 8.4. Suggestions and contributions of team members were respected.
 - 8.5. Suggestions and contributions of team members were discussed and further developed.
 - 8.6. Our team was able to reach consensus regarding important issues.
9. In order to establish the impact of the pandemic on team work quality we want to ask you about the status of certain aspects of teamwork quality before working from home as a result of Covid-19 restrictions. For the following statements about effort, Firstly, please indicate on a 1-5 scale ('Strongly disagree', 'Disagree', 'Neutral', 'Agree', 'Strongly agree'), how much you agree with them regarding the situation in the 3 months before working from home Secondly, please indicate on a 1-5 scale ('Strongly disagree', 'Disagree', 'Neutral', 'Agree', 'Strongly agree'), how much you agree with them regarding the situation during working from home.
- 9.1. Every team member fully pushed the project.
 - 9.2. Every team member made the project their highest priority.
 - 9.3. Our team put much effort into the project.
 - 9.4. There were conflicts regarding the effort that team members put into the project.

We thank you for your time spent taking this survey. Your response has been recorded.

We are looking forward to the interview!

12.2 Appendix 2: Interview guide

First of all, thank you for participating in this interview. Before we start I want to tackle some issues with regard to confidentiality and set out the structure of this interview. Your answers will be used to provide a qualitative context for my research about Teamwork quality and corporate support measures during the Covid-19 pandemic. Your responses will be handled anonymously, so the answers you give cannot lead back to you. Of course, you only need to answer the questions that you want to answer. The interview will take approximately one hour and will consist out of questions about your personal situation, working from home during the lockdown, corporate support measures and team work quality during the lockdown and your views on your post-Covid work situation. Some questions will be related to the answers you gave in the pre-interview survey, other questions will be unrelated to that survey.

1. At this point, do you have any questions?
2. In order to correctly transcribe the interview, I would like to record your answers, is that okay?

I want to begin the interview with a set of questions about your personal situation in order to place your other answers in the correct context.

3. How was your personal situation affected by working from home?
4. What changed in your way of working?
5. What challenges did you perceive?
6. How did you solve these challenges?
7. What benefits did you encounter?
8. What was the effect of working remotely on your personal productivity?

In the pre-interview survey, you answered questions about a set of corporate support measures that may or may not have been taken in your own organisation. I want to ask you to elaborate on the things that stood out to me the most.

9. *For this question, the interviewee will be asked to elaborate on the corporate support measures for which they indicated, in the pre-interview survey, that they either found them 'very helpful' or 'very unhelpful'. The amount of questions posed in this part of the interview will differ from interviewee to interviewee, depending on how many measures were rated 'very helpful' or 'very unhelpful'. In some instances, the interviewee will also asked to elaborate on measures that were rated other than 'very helpful' or 'very unhelpful'. For example, when their answers were different than expected or when their answers seem to contradict something they said earlier in the interview.*

I would now like to focus on your personal experience with corporate support measures during the lockdown.

10. What kind of additional support, on top of the measures mentioned in the survey, did you receive from your organisation during the lockdown?

- 10.1. *Per measure, mentioned by the interviewee, the interviewee will be asked whether they considered it helpful.*
- 10.2. *Per measure, mentioned by the interviewee, the interviewee will be asked to explain why they considered it helpful or not helpful.*

11. Was there a specific kind of support that you were missing?

The lockdown could have had an effect on the way you work together within your team. I will now ask you some questions about teamwork during the lockdown.

12. How was your team affected by working from home?
13. What changed in your team's way of working?
14. What challenges did your team encounter?
15. How did your team solve these challenges?
16. What benefits did your team encounter?

In the survey you rated various aspects of teamwork quality for the period before- and the period during the lockdown. I want to ask you to elaborate on the things that stood out to me the most.

17. *For this question, the interviewee will be asked to elaborate on the statements for which their answer, in the pre interview survey, regarding the period they were working from home differed at least 3 points to their answer regarding the 3 months for the pandemic. The amount of questions posed in this part of the interview will differ from interviewee to interviewee, depending on how they responded in the pre interview survey. In some instances, the interviewee will also be asked to elaborate on statements for which they did not indicate a 'working from home effect' of at least three points. For example, when they do not indicate a working from home effect at, when their answers were different than expected or when their answers seem to contradict something they said earlier in the interview.*

Now we have spoken about the collaboration within your team, I want to talk about collaboration across teams in the context of the lockdown.

18. How did you maintain your social structure throughout the organisation outside your own team?
19. How did the lockdown impact cooperation across different teams?
20. How did you collaborate with other teams while working from home?
21. What measures did help or would have helped to improve cooperation between different teams?
22. How did you stay in contact with your colleagues outside of your own team?
23. How did working from home impact information sharing your team and other teams?

24. How did working from home impact the willingness to admit mistakes to- and accept feedback from other teams.
25. How did working from home impact the extend you were able to anticipate and predicting the needs of other teams and vice versa?
26. How did working from home impact your ability to identify changes in the teams, tasks, or team members and implicitly adjusting strategies accordingly?
27. How did working form home impact the extend to which you followed up to ensure that your messages were received by the other team?
28. How did working form home impact whether you acknowledged to the other team that their messages were received?
29. How did working form home impact the extend to which you clarified with the sender of the message that the message received is the same as the intended message?

I would also like to look forward to the period after the pandemic. In the survey, you have answered questions about working from home after the pandemic.

30. How many days will you continue to work from home?
31. How many would you like to have worked from home?
32. *In case of different answers to the previous questions, the interviewees will be asked how they feel about this discrepancy.*
33. What is your organization's strategy when it comes to working from home post-Covid?
34. Where do you foresee the largest impact in your organisation?
35. What did you learn from this pandemic personally? What are the take-aways?
36. What is going to change for you with regard to work?

This concludes my interview I want to thank you a lot for participating.

37. Do you have any final remarks?

Thank you for your time. I will keep you updated in the progress of my research and share a copy of my thesis once it is finished.

12.3 Appendix 3: Pandemic programming data analysis

The data set, which was analyzed for this research was provided by Ralph et al., the authors of a paper on the effects of working from home on software developers [89]. This data set was used to analyse the effects of working from home on individual development team members regarding their concentration, the time they spent not working when they were supposed to work, their performance and the quality of their work. The data set was also used to analyse a set of measures that organisations took in order to support their employees when working from home. Both the measures and the effects of working from home were analyzed in relation to the respondents' experience in software development, the respondents' experience with working from home and the size of the organisation where the respondents worked.

12.3.1 Demographics

Gender

1800 respondents were male, 394 respondents were female and 31 respondents reported 'other' or did not disclose their gender (See Table 16).

Country	Respondents	%
Male	1800	81%
Female	394	18%
Other/Not disclosed	31	1%

Table 16: Survey respondent genders

Age

The age of 13 respondents (1%) was below 20. 238 respondents(11%) answered that they were 20-24 years old. 610 respondents (27%) fall into the age group 25-29, 475 respondents (21%) fall into the age group 30-34, 419 respondents (19%) fall into the age group 35-39, 272 respondents (12%) fall into the age group 40-45, 95 respondents (4%) fall into the age group 45-49, 59 respondents (3%) fall into the age group 50-54, 28 respondents (1%) fall into the age group 55-59, 3 respondents (0%) fall into the age group 60-64, 3 respondents (0%) fall into the age group older than 65 and 10 respondents (0%) did not wish to disclose their age (see Table 17).

Age	Respondents	%
<20	13	1%
20-24	238	11%
25-29	610	27%
30-34	475	21%
35-39	419	19%
40-45	272	12%
45-49	95	4%
50-54	59	3%
55-59	28	1%
60-64	3	0%
>65	3	0%
Not disclosed	10	0%

Table 17: Survey respondent ages

Country

Most of the respondents come from Germany (23%), Russia (17%), Brazil (12%) and Italy (8%). Other countries from which respondents participated are United States (4%), Korea, South (4%), Belgium (3%), China (3%), Turkey (3%), India (2%), Japan (2%), Spain (2%), Iran (2%), Austria (1%), Canada (1%), United Kingdom (1%), Switzerland (1%), Saudi Arabia (1%), Australia (1%), Netherlands (1%) and France (1%). Belarus, Tunisia, Ireland, Israel, Ukraine, Sweden, New Zealand, Indonesia, Egypt, Algeria, Finland, United Arab Emirates, Poland, Romania, Thailand, Armenia, Libya, Oman, Morocco, Slovakia, Serbia and Montenegro, Latvia, Portugal, Slovenia, Denmark, Lebanon, Nepal, Norway, Mexico, Singapore, Luxembourg, Albania, Russia and Germany, Czech Republic, Cyprus, Ecuador and El Salvador all were responsible for < 1% of the responses. 19 respondents did not disclose their country (See Table 18).

Country	Respondents	%
Germany	505	23%
Russia	366	16%
Brazil	272	12%
Italy	173	8%
United States	99	4%
Korea, South	81	4%
Belgium	77	3%
China	76	3%
Turkey	66	3%
Other/Not disclosed	491	23%

Table 18: Survey respondent countries

Organisation size

12 (1%) respondents answered that their organisation had no employees. 98 (4%) respondents work for an organisation with 1-9 employees, 566 (25%) respondents indicated that they work for an organisation with 10-99 employees. 657 (30%) respondents work for an organisation with 100-999 employees, 540 (24%) respondents work for an organisation with 1.000-9.999 employees, 236 (11%) respondents work for an organisation with 10.000-99.999 employees and 116 (5%) respondents work for an organisation with over 100.000 employees (See Table 19).

Employees	Respondents	%
0	12	1%
1-9	98	4%
10-99	566	25%
100-999	657	30%
1.000-9.999	540	24%
10.000-99.999	236	11%
>10.000	116	5%

Table 19: Survey respondent organisation sizes

Years of experience in software development

The respondents are categorized, based on their experience in software development, 665 respondents (19%) indicated that they had less than 5 years of experience in software development, 591 respondents (17%) had 5-10 years experience in software development. 1094 respondents (31%) had 10-15 years experience in software development, 1090 respondents (31%) had over 15 years experience in software development and 41 respondents (1%) did not disclose their number of years of experience (See table 20).

Years of experience	Respondents	%
<5	665	19%
5-10	591	17%
10-15	1094	31%
>15	1090	31%
Not disclosed	41	1%

Table 20: Survey respondent experience in software development

Years of experience working from home

The survey respondents were asked to answer questions about their experience with working from home. 67 respondents (2%) indicated that they had no experience working from home, 1565 respondents (70%) indicated that they had 0-1 year of experience working from home, 373 respondents (17%) indicated that they had 1-5 years of experience working from home, 58 respondents (3%) indicated that they had 5-10 years of experience working from home, 68 respondents (3%) indicated that they had more than 10 years of experience working from home and 94 respondents (4%) did not disclose their experience with working from home (See table 21).

Years of experience	Respondents	%
0	67	3%
0-1	1565	70%
1-5	373	17%
5-10	58	3%
>10	68	3%
Not disclosed	94	4%

Table 21: Survey respondent experience working from home

12.3.2 Pandemic effects on individual software developers

Regarding the pandemic effects on individual software developers, the analysis focused on the amount of time spent on other things when respondents were supposed to be working, the effects of working from home on concentration, the effects of working from home on the self-perceived performance and the effects of working from home on the quality of delivered work. These themes were analysed individually and in relation to the respondents' years of experience in software development, the respondents' experience with working from home and size of the organisation where the respondents work (See Figure 3).

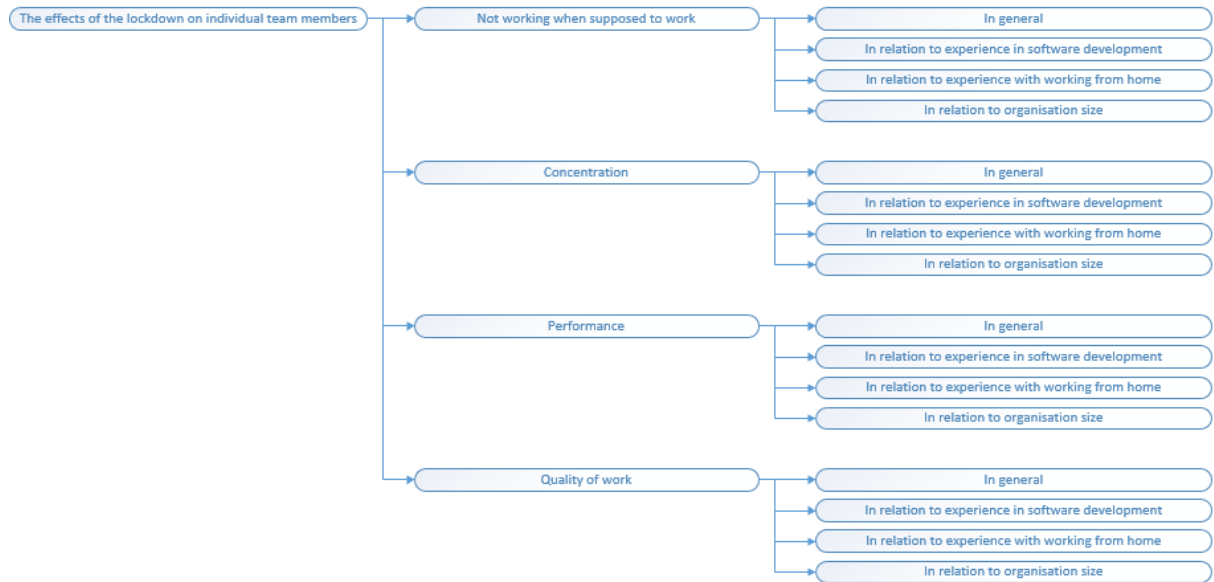


Figure 3: Themes focusing on pandemic effects on individual software developers

Time spent on not-work related activities during working hours

They survey respondents were asked how often they did not work at times when you were supposed to be working, in the 4 weeks before you began working from home and how often they did not work at times when you were supposed to be working since they began working from home. In this section their answers are analysed. The section covers an analysis of the general survey responses and analyses in which the frequency of Time spent on not-work related activities during working hours in relation to experience in software development, experience working from home and organisation size.

General survey responses

Out of 2225 respondents to the survey by Ralph et al., regarding the 4 weeks before working from home, 447 (20%) respondents indicated that they did not work at times when they were supposed to be working none of the time. 1039 (47%) answered that this happened a little of the time, 570 (26%) answered that this happened some of the time, 121 (5%) answered that this happened most of the time and 30 (1%) answered that this happened all of the time. 18 (1%) respondents did not answer this question. Regarding the period since they began working from home, 320 (14%) respondents indicated that they did not work at times when they were supposed to be working none of the time. 809 (36%) answered that this happened a little of the time, 784 (35%) answered that this happened some of the time, 246 (11%) answered that this happened most of the time and 31 (1%) answered that this happened all of the time. 35 (2%) respondents did not answer this question [89]. (See Table 22)

Not working when supposed to	None of the time	A little of the time	Some of the time	Most of the time	All of the time	No answer
Before working from home	447(20%)	1039(47%)	570(26%)	121(5%)	30(1%)	18(1%)
During working from home	320(14%)	809(36%)	784(35%)	246(11%)	31(1%)	35(2%)

Table 22: Time spent on not-work related activities during working hours

For 365 (16%) of the respondents to the survey by Ralph et al., the frequency with which they did not work at times when they were supposed to be working decreased after they began working from home. For 1030 (46%) respondents, the frequency remained equal and for 830 (37%) respondents the frequency increased [89]. (See Table 23)

Not working when supposed to	Respondents	%
Decrease	365	16%
Equal	1030	46%
Increase	830	37%

Table 23: Effect of working from home on Time spent on not-work related activities during working hours

Experience in software development

The effect of working from home on the frequency with which respondents to the survey by Ralph. et al. did not work at times when they were supposed to be working was analyzed in relation to the years of professional experience, working in software development. From the respondents with 0-5 years of experience, 105 (16%) reported that the frequency with which they did not work when they were supposed to be working had decreased, 288 (43%) reported that the frequency had remained equal and 272 (41%) reported that the frequency had increased. From the respondents with 5-10 years of experience, 93 (16%) reported that the frequency with which they did not work when they were supposed to be working had decreased, 265 (45%) reported that the frequency had remained equal and 233 (39%) reported that the frequency had increased. From the respondents with 10-15 years of experience, 79 (18%) reported that the frequency with which they did not work when they were supposed to be working had decreased, 198 (46%) reported that the frequency had remained equal and 152 (35%) reported that the frequency had increased. From the respondents with over 15 years of experience, 5 (12%) reported that the frequency with which they did not work when they were supposed to be working had decreased, 16 (39%) reported that the frequency had remained equal and 20 (49%) reported that the frequency had increased [89]. (See Table 24)

Years of experience in software development	0- 5	5-10	11-15	>15	Not disclosed
Decrease	105(16%)	93(16%)	79(18%)	83(17%)	5(12%)
Equal	288(43%)	265(45%)	198(46%)	263(53%)	16(39%)
Increase	272(41%)	233(39%)	152(35%)	153(31%)	20(49%)

Table 24: Time spent on not-work related activities during working hours in relation to experience in software development

Experience with working from home

The effect of working from home on the frequency with which respondents to the survey by Ralph. et al. did not work at times when they were supposed to be working was analyzed in relation to their experience with working from home. 11(16%) respondents, who had no experience with working from home, indicated that the frequency with which they did not work when they were supposed to be working had decreased, 37(55%) respondents with no experience indicated that the frequency had remained equal and 19(28%) responded that the frequency had increased. For the respondents with up to one year of experience working form home 244(16%) responded that the freq ency decreased, 19(46%) responded that the frequency had remained equal and 602(38%) responded that the frequency had increased. For the respondents with between one and five years of experience working form home 76(20%) responded that the freq ency decreased, 165(44%) responded that the frequency had remained equal and 132(35%) responded that the frequency had increased. For the respondents more than 5 years of experience working form home 26(21%) responded that the freq ency decreased, 67(53%) responded that the frequency had remained equal and 33(26%) responded that the frequency had increased. For the respondents that did not disclose their experience working form home 8(9%) responded that the freq ency decreased, 42(45%) responded that the frequency had remained equal and 44(47%) responded that the frequency had increased [89]. (See Table 25)

Years of experience working from home	no experience	up to one year	Between 1 and 5 years	more than 5 years	Not disclosed
Decrease	11(16%)	244(16%)	76(20%)	26(21%)	8(9%)
Equal	37(55%)	719(46%)	165(44%)	67(53%)	42(45%)
Increase	19(28%)	602(38%)	132(35%)	33(26%)	44(47%)

Table 25: Time spent on not-work related activities during working hours in relation to experience working from home

Organisation size

The effect of working from home on the frequency with which respondents to the survey by Ralph. et al. did not work at times when they were supposed to be working was analyzed in relation to the number of people in their organisation. 19 (19%) respondents, working for an organisation with 1-9 employees, indicated that the frequency with which they did not work when they were supposed to be working had decreased after they started working from home, 56 (47%) respondents working for such an organisation indicated that the frequency remained equal and 33 (34%) responded that the frequency had increased. Out of the respondents, working for an organisation with 10-99 employees, 92 (16%) respondents reported a decrease, 273 (48%) respondents reported that the frequency remained equal and 201(36%) reported an increase. Out of the respondents, working for an organisation with 100-999 employees, 110 (17%) respondents reported a decrease, 308 (47%) respondents reported that the frequency remained equal and 239(36%) reported an increase. Out of the respondents, working for an organisation with 1.000-9.999 employees, 88 (16%) respondents reported a decrease, 236 (44%) respondents reported that the frequency remained equal and 216(40%) reported an increase. Out of the respondents, working for an organisation with 10.000-99.000 employees, 33 (14%) respondents reported a decrease, 108 (46%) respondents reported that the frequency remained equal and 95(40%) reported an increase. Out of the respondents, working for an organisation with more than 100.000 employees, 10 (16%) respondents reported a decrease, 53 (46%) respondents reported that the frequency remained equal and 45 (39%) reported an increase. Out of the respondents, that did not disclose the number of employees, working for their organisation, 5 (42%) respondents reported a decrease, 6 (50%) respondents reported that the frequency remained equal and 1(8%) reported an increase [89]. (See Table 26)

Organisation size	1-9	10-99	100-999	1000-9999	10000-99999	>100000	Not disclosed
Decrease	19(19%)	92(16%)	110(17%)	88(16%)	33(14%)	18(16%)	5(42%)
Equal	46(47%)	273(48%)	308(47%)	236(44%)	108(46%)	53(46%)	6(50%)
Increase	33(34%)	201(36%)	239(36%)	216(40%)	95(40%)	45(39%)	1(8%)

Table 26: Time spent on not-work related activities during working hours in relation to organisation size

Concentration

They survey respondents were asked how often they did not concentrate enough on their work, in the 4 weeks before you began working from home and how often they did not concentrate enough on their work since they began working from home. In this section their answers are analysed. The section covers an analysis of the general survey responses and analyses in which the frequency of not concentrate enough on work in relation to experience in software development, experience working from home and organisation size.

General survey responses

Out of 2225 respondents to the survey by Ralph et al., regarding the 4 weeks before working from home, 418 (19%) respondents indicated that they did not concentrate enough on their work none of the time. 988 (44%) answered that this happened a little of the time, 621 (28%) answered that this happened some of the time, 145 (7%) answered that this happened most of the time and 34 (2%) answered that this happened all of the time. 19 (1%) respondents did not answer this question. Regarding the period since they began working from home, 402 (18%) respondents indicated that they did not concentrate enough on their work none of the time. 922 (41%) answered that this happened a little of the time, 580 (35%) answered that this happened some of the time, 239 (11%) answered that this happened most of the time and 47 (2%) answered that this happened all of the time. 35 (2%) respondents did not answer this question [89]. (See Table 27)

Not being able to concentrate	None of the time	A little of the time	Some of the time	Most of the time	All of the time	No answer
Before working from home	418(19%)	988(44%)	621(28%)	145(7%)	34(2%)	19(1%)
During working from home	402(18%)	922(41%)	580(26%)	239(11%)	47(2%)	35(2%)

Table 27: Not being able to concentrate

For 509 (23%) of the respondents to the survey by Ralph et al., the frequency with which they did not work at times when they were supposed to be working decreased after they began working from home. For 1100 (49%) respondents, the frequency remained equal and for 616 (28%) respondents the frequency increased [89]. (See Table 28)

Not being able to concentrate	Respondents	%
decrease	509	23%
equal	1100	49%
increase	616	28%

Table 28: Effect of working from home on not being able to concentrate

Experience in software development

The effect of working from home on the frequency with which respondents to the survey by Ralph. et al. did not concentrate enough was analyzed in relation to the years of professional experience, working in software development. From the respondents with 0-5 years of experience, 132 (20%) reported that the frequency with which they did not concentrate enough had decreased, 337 (51%) reported that the frequency had remained equal and 196 (29%) reported that the frequency had increased. From the respondents with 5-10 years of experience, 131 (22%) reported that the frequency with which they did not concentrate enough had decreased, 285 (48%) reported that the frequency had remained equal and 175 (30%) reported that the frequency had increased. From the respondents with 10-15 years of experience, 105 (24%) reported that the frequency with which they did not concentrate enough had decreased, 213 (50%) reported that the frequency had remained equal and 111 (26%) reported that the frequency had increased. From the respondents with over 15 years of experience, 136 (27%) reported that the frequency with which they did not concentrate enough had decreased, 243 (49%) reported that the frequency had remained equal and 120 (24%) reported that the frequency had increased [89]. (See Table 29)

Years of experience in software development	0- 5	5-10	11-15	>15	Not disclosed
decrease	132(20%)	131(22%)	105(24%)	136(27%)	5(12%)
equal	337(51%)	285(48%)	213(50%)	243(49%)	22(54%)
increase	196(29%)	175(30%)	111(26%)	120(24%)	14(34%)

Table 29: Not being able to concentrate in relation to experience in software development

Experience with working from home

The effect of working from home on the frequency with which respondents to the survey by Ralph. et al. did not concentrate enough was analyzed in relation to their experience with working from home. 16(24%) respondents, who had no experience with working from home, indicated that the frequency with which they did not concentrate enough had decreased, 40(60%) respondents with no experience indicated that the frequency had remained equal and 11(16%) responded that the frequency had increased. For the respondents with up to one year of experience working form home 355(23%) responded that the frequency decreased, 771(49%) responded that the frequency had remained equal and 439(28%) responded that the frequency had increased. For the respondents with between one and five years of experience working form home 94(25%) responded that the frequency decreased, 170(46%) responded that the frequency had remained equal and 109(29%) responded that the frequency had increased. For the respondents more than 5 years of experience working form home 29(23%) responded that the frequency decreased, 69(55%) responded that the frequency had remained equal and 28(22%) responded that the frequency had increased. For the respondents that did not disclose their experience working form home 15(16%) responded that the frequency decreased, 50(53%) responded that the frequency had remained equal and 29(31%) responded that the frequency had increased [89]. (See Table 30)

Years of experience working from home	no experience	up to one year	Between 1 and 5 years	more than 5 years	Not disclosed
decrease	16(24%)	355(23%)	94(25%)	29(23%)	15(16%)
equal	40(60%)	771(49%)	170(46%)	69(55%)	50(53%)
increase	11(16%)	439(28%)	109(29%)	28(22%)	29(31%)

Table 30: Not being able to concentrate in relation to experience working from home

Organisation size

The effect of working from home on the frequency with which respondents to the survey by Ralph. et al. did not concentrate enough was analyzed in relation to the number of people in their organisation. 26 (27%) respondents, working for an organisation with 1-9 employees, indicated that the frequency with which they did not concentrate enough had decreased after they started working from home, 38 (39%) respondents working for such an organisation indicated that the frequency remained equal and 34 (35%) responded that the frequency had increased. Out of the respondents, working for an organisation with 10-99 employees, 122 (22%) respondents reported a decrease, 298 (53%) respondents reported that the frequency remained equal and 146(26%) reported an increase. Out of the respondents, working for an organisation with 100-999 employees, 150 (23%) respondents reported a decrease, 336 (51%) respondents reported that the frequency remained equal and 171 (26%) reported an increase. Out of the respondents, working for an organisation with 1.000-9.999 employees, 129 (24%) respondents reported a decrease, 245 (45%) respondents reported that the frequency remained equal and 166 (31%) reported an increase. Out of the respondents, working for an organisation with 10.000-99.000 employees, 47 (20%) respondents reported a decrease, 121 (51%) respondents reported that the frequency remained equal and 68 (29%) reported an increase. Out of the respondents, working for an organisation with more than 100.000 employees, 30 (26%) respondents reported a decrease, 56 (48%) respondents reported that the frequency remained equal and 30 (26%) reported an increase. Out of the respondents, that did not disclose the number of employees, working for their organisation, 5 (42%) respondents reported a decrease, 6 (50%) respondents reported that the frequency remained equal and 1 (8%) reported an increase [89]. (See Table 31)

Organisation size	1-9	10-99	100-999	1000-9999	10000-99999	>100000	Not disclosed
decrease	26(27%)	122(22%)	150(23%)	129(24%)	47(20%)	30(26%)	5(42%)
equal	38(39%)	298(53%)	336(51%)	245(45%)	121(51%)	56(48%)	6(50%)
increase	34(35%)	146(26%)	171(26%)	166(31%)	68(29%)	30(26%)	1(8%)

Table 31: Not being able to concentrate in relation to organisation size

Quality of work

They survey respondents were asked how often the quality of their work was lower than it should have been, in the 4 weeks before you began working from home and how often the quality of their work was lower than it should have been since they began working from home. In this section their answers are analysed. The section covers an analysis of the general survey responses and analyses in which the frequency of not concentrate enough on work in relation to experience in software development, experience working from home and organisation size.

General survey responses

Out of 2225 respondents to the survey by Ralph et al., regarding the 4 weeks before working from home, 196 (9%) respondents indicated that the quality of their work was lower than it should have been none of the time. 1021 (46%) answered that this happened a little of the time, 739 (33%) answered that this happened some of the time, 214 (10%) answered that this happened most of the time and 37 (2%) answered that this happened all of the time. 18 (1%) respondents did not answer this question. Regarding the period since they began working from home, 252 (11%) respondents indicated that the quality of their work was lower than it should have been none of the time. 860 (39%) answered that this happened a little of the time, 717 (32%) answered that this happened some of the time, 316 (14%) answered that this happened most of the time and 44 (2%) answered that this happened all of the time. 36 (2%) respondents did not answer this question [89]. (See Table 32)

Lower quality of work	None of the time	A little of the time	Some of the time	Most of the time	All of the time	No answer
Before working from home	196(9%)	1021(46%)	739(33%)	214(10%)	37(2%)	18(1%)
During working from home	252(11%)	860(39%)	717(32%)	316(14%)	44(2%)	36(2%)

Table 32: Quality of work lower than it should be

For 578 (26%) of the respondents to the survey by Ralph et al., the frequency with which the quality of their work was lower than it should have been decreased after they began working from home. For 981 (44%) respondents, the frequency remained equal and for 666 (30%) respondents the frequency increased [89]. (See Table 33)

Quality of work lower than it should be	Respondents	%
Decrease	578	26%
Equal	981	44%
Increase	666	30%

Table 33: Effect of working from home on lower quality of work

Experience in software development

The effect of working from home on the frequency with which the quality of the work of the respondents to the survey by Ralph. et al. was lower than it should have been was analyzed in relation to the years of professional experience, working in software development. From the respondents with 0-5 years of experience, 161 (24%) reported that the frequency with which the quality of their work was lower than it should have been had decreased, 290 (44%) reported that the frequency had remained equal and 214 (32%) reported that the frequency had increased. From the respondents with 5-10 years of experience, 132 (22%) reported that the frequency with which the quality of their work was lower than it should have been had decreased, 259 (44%) reported that the frequency had remained equal and 200 (34%) reported that the frequency had increased. From the respondents with 10-15 years of experience, 134 (31%) reported that the frequency with which the quality of their work was lower than it should have been had decreased, 184 (43%) reported that the frequency had remained equal and 111 (26%) reported that the frequency had increased. From the respondents with over 15 years of experience, 143 (29%) reported that the frequency with which the quality of their work was lower than it should have been had decreased, 232 (46%) reported that the frequency had remained equal and 124 (25%) reported that the frequency had increased [89]. (See Table 34)

Years of experience in software development	0- 5	5-10	11-15	>15	Not disclosed
Decrease	161(24%)	132(22%)	134(31%)	143(29%)	8(20%)
Equal	290(44%)	259(44%)	184(43%)	232(46%)	16(39%)
Increase	214(32%)	200(34%)	111(26%)	124(25%)	17(41%)

Table 34: Lower quality of work in relation to experience in software development

Experience with working from home

The effect of working from home on the frequency with which the quality of the work of the respondents to the survey by Ralph. et al. was lower than it should have been was analyzed in relation to their experience with working from home. 6(24%) respondents, who had no experience with working from home, indicated that the frequency with which the quality of their work was lower than it should have been had decreased, 3(64%) respondents with no experience indicated that the frequency had remained equal and 8(12%) responded that the frequency had increased. For the respondents with up to one year of experience working form home 404(26%) responded that the frequency decreased, 680(43%) responded that the frequency had remained equal and 481(31%) responded that the frequency had increased. For the respondents with between one and five years of experience working form home 106(28%) responded that the frequency decreased, 157(42%) responded that the frequency had remained equal and 110(29%) responded that the frequency had increased. For the respondents more than 5 years of experience working form home 32(25%) responded that the frequency decreased, 62(49%) responded that the frequency had remained equal and 32(25%) responded that the frequency had increased. For the respondents that did not disclose their experience working form home 20(21%) responded that the frequency decreased, 39(41%) responded that the frequency had remained equal and 35(37%) responded that the frequency had increased [89]. (See Table 35)

Years of experience working from home	no experience	up to one year	Between 1 and 5 years	more than 5 years	Not disclosed
decrease	16(24%)	404(26%)	106(28%)	32(25%)	20(21%)
equal	43(64%)	680(43%)	157(42%)	62(49%)	39(41%)
increase	8(12%)	481(31%)	110(29%)	32(25%)	35(37%)

Table 35: Lower quality of work in relation to experience working from home

Organisation size

The effect of working from home on the frequency with which the quality of the work of the respondents to the survey by Ralph. et al. was lower than it should have been was analyzed in relation to the number of people in their organisation. 24(24%) respondents, working for an organisation with 1-9 employees, indicated that the frequency with which the quality of their work was lower than it should have been decreased after they started working from home, 42(43%) respondents working for such an organisation indicated that the frequency remained equal and 32(33%) responded that the frequency had increased. Out of the respondents, working for an organisation with 10-99 employees, 146(26%) respondents reported a decrease, 258(46%) respondents reported that the frequency remained equal and 162(29%) reported an increase. Out of the respondents, working for an organisation with 100-999 employees, 188(29%) respondents reported a decrease, 282(43%) respondents reported that the frequency remained equal and 187(28%) reported an increase. Out of the respondents, working for an organisation with 1.000-9.999 employees, 126(23%) respondents reported a decrease, 241(45%) respondents reported that the frequency remained equal and 173(32%) reported an increase. Out of the respondents, working for an organisation with 10.000-99.000 employees, 55(23%) respondents reported a decrease, 106(45%) respondents reported that the frequency remained equal and 75(32%) reported an increase. Out of the respondents, working for an organisation with more than 100.000 employees, 34(29%) respondents reported a decrease, 46(40%) respondents reported that the frequency remained equal and 36(31%) reported an increase. Out of the respondents, that did not disclose the number of employees, working for their organisation, 5 (42%) respondents reported a decrease, 6 (50%) respondents reported that the frequency remained equal and 1 (8%) reported an increase [89]. (See Table 36)

Organisation size	1-9	10-99	100-999	1000-9999	10000-99999	>100000	Not disclosed
decrease	24(24%)	146(26%)	188(29%)	126(23%)	55(23%)	34(29%)	5(42%)
equal	42(43%)	258(46%)	282(43%)	241(45%)	106(45%)	46(40%)	6(50%)
increase	32(33%)	162(29%)	187(28%)	173(32%)	75(32%)	36(31%)	1(8%)

Table 36: Lower quality of work in relation to organisation size

Performance

The survey respondents were asked how they would rate the usual performance of most workers in a similar job, how they would rate their usual job performance over the past year or two and how they would rate their overall job performance on the days they worked since they began working at home due to the COVID-19 pandemic. In this section their answers are analysed. The section covers an analysis of the general survey responses and analyses in which the frequency of not concentrate enough on work in relation to experience in software development, experience working from home and organisation size.

General survey responses

Out of 2225 respondents to the survey by Ralph et al., regarding the 2 years before working from home, 2(0%) respondents rated their own performance '1 out of 10', 2(0%) respondents rated their own performance '2 out of 10', 15(1%) respondents rated their own performance '3 out of 10', 21(1%) respondents rated their own performance '4 out of 10', 94(4%) respondents rated their own performance '5 out of 10', 175(8%) respondents rated their own performance '6 out of 10', 423(19%) respondents rated their own performance '7 out of 10', 818(37%) respondents rated their own performance '8 out of 10', 527(24%) respondents rated their own performance '9 out of 10', 126(6%) respondents rated their own performance '10 out of 10', 22(1%) respondents did not answer this question.

When asked about the usual performance of most workers in a similar job, 10(0%) respondents rated the usual performance of most workers in a similar job '1 out of 10', 27(1%) respondents rated the usual performance of most workers in a similar job '2 out of 10', 70(3%) respondents rated the usual performance of most workers in a similar job '3 out of 10', 138(6%) respondents rated the usual performance of most workers in a similar job '4 out of 10', 186(8%) respondents rated the usual performance of most workers in a similar job '5 out of 10', 304(14%) respondents rated the usual performance of most workers in a similar job '6 out of 10', 441(20%) respondents rated the usual performance of most workers in a similar job '7 out of 10', 525(24%) respondents rated the usual performance of most workers in a similar job '8 out of 10', 383(17%) respondents rated the usual performance of most workers in a similar job '9 out of 10', 120(5%) respondents rated the usual performance of most workers in a similar job '10 out of 10', 21(1%) respondents did not answer this question.

Regarding the performance on the days they worked since they began working at home due to the COVID-19 pandemic, 2(0%) respondents rated their own performance '1 out of 10', 2(0%) respondents rated their own performance '2 out of 10', 18(1%) respondents rated their own performance '3 out of 10', 51(2%) respondents rated their own performance '4 out of 10', 215(10%) respondents rated their own performance '5 out of 10', 362(16%) respondents rated their own performance '6 out of 10', 713(32%) respondents rated their own performance '7 out of 10', 621(28%) respondents rated their own performance '8 out of 10', 157(7%) respondents rated their own performance '9 out of 10', 51(2%) respondents rated their own performance '10 out of 10', 33(1%) respondents did not answer this question [89]. (See Table 37)

Rating	1	2	3	4	5	6	7	8	9	10	Not disclosed
Own performance over the past 2 years	2(0%)	2(0%)	15(1%)	21(1%)	94(4%)	175(8%)	423(19%)	818(37%)	527(24%)	126(6%)	22(1%)
Own performance during working from home	10(0%)	27(1%)	70(3%)	138(6%)	186(8%)	304(14%)	441(20%)	525(24%)	383(17%)	120(5%)	21(1%)
Usual performance of other workers	2(0%)	2(0%)	18(1%)	51(2%)	215(10%)	362(16%)	713(32%)	621(28%)	157(7%)	51(2%)	33(1%)

Table 37: Self perceived performance

For 1085 (49%) of the respondents to the survey by Ralph et al., the self reported performance decreased after they began working from home. For 706 (32%) respondents, the performance remained equal and for 434 (20%) respondents the performance increased [89]. (See Table 38

Self perceived performance	Respondents	%
decrease	1085	49%
equal	706	32%
increase	434	20%

Table 38: Effect of working from home on self perceived performance

Experience in software development

The effect of working from home on self perceived performance of the respondents to the survey by Ralph. et al. was analyzed in relation to the years of professional experience, working in software development. From the respondents with 0-5 years of experience, 346(52%) reported that their performance was lower when working from home, 185(28%) reported that their performance had remained equal and 134(20%) reported that their performance had increased. From the respondents with 5-10 years of experience, 303(51%) reported that their performance was lower when working from home, 176(30%) reported that their performance had remained equal and 112(19%) reported that their performance had increased. From the respondents with 10-15 years of experience, 193(45%) reported that their performance was lower when working from home, 152(35%) reported that their performance had remained equal and 84(20%) reported that their performance had increased. From the respondents with over 15 years of experience, 225(45%) reported that their performance was when working from home, 179(36%) reported that their performance had remained equal and 95(19%) reported that their performance had increased[89]. (See Table 34)

Years of experience in software development	0- 5	5-10	11-15	>15	Not disclosed
decrease	346(52%)	303(51%)	193(45%)	225(45%)	18(44%)
equal	185(28%)	176(30%)	152(35%)	179(36%)	14(34%)
increase	134(20%)	112(19%)	84(20%)	95(19%)	9(22%)

Table 39: Self perceived performance in relation to experience in software development

Experience with working from home

The effect of working from home on self perceived performance of the respondents to the survey by Ralph. et al. was analyzed in relation to the years of experience, working from home. From the respondents with no experience with working from home, 25(37%) reported that their performance was lower when working from home, 32(48%) reported that their performance had remained equal and 10(15%) reported that their performance had increased. From the respondents with up to one year of experience with working from home, 766(49%) reported that their performance was lower when working from home, 483(31%) reported that their performance had remained equal and 316(20%) reported that their performance had increased. From the respondents with between 1 and 5 years of experience with working from home,

186(50%) reported that their performance was lower when working from home, 117(31%) reported that their performance had remained equal and 70(19%) reported that their performance had increased. From the respondents with over 5 years of experience with working from home, 56(44%) reported that their performance was when working from home, 50(40%) reported that their performance had remained equal and 20(16%) reported that their performance had increased[89]. (See Table 40)

Years of experience working from home	no experience	up to one year	Between 1 and 5 years	more than 5 years	Not disclosed
decrease	25(37%)	766(49%)	186(50%)	56(44%)	52(55%)
equal	32(48%)	483(31%)	117(31%)	50(40%)	24(26%)
increase	10(15%)	316(20%)	70(19%)	20(16%)	18(19%)

Table 40: Self perceived performance in relation to experience working from home

Organisation size

The effect of working from home on self perceived performance of the respondents to the survey by Ralph. et al. was analyzed in relation to the years of experience, working from home. From the respondents, working for an organisation with 1-9 employees, 53(54%) reported that their performance was lower when working from home, 30(31%) reported that their performance had remained equal and 15(15%) reported that their performance had increased. From the respondents, working for an organisation with 10-99 employees, 265(47%) reported that their performance was lower when working from home, 183(32%) reported that their performance had remained equal and 118(21%) reported that their performance had increased. From the respondents, working for an organisation with 100-999 employees, 293(45%) reported that their performance was lower when working from home, 217(33%) reported that their performance had remained equal and 147(22%) reported that their performance had increased. From the respondents, working for an organisation with 1.000-9.999 employees, 297(55%) reported that their performance was lower when working from home, 77(33%) reported that their performance had remained equal and 91(17%) reported that their performance had increased. From the respondents, working for an organisation with 10.000-99.999 employees, 120(51%) reported that their performance was lower when working from home, 117(31%) reported that their performance had remained equal and 39(17%) reported that their performance had increased. From the respondents, working for an organisation with more than 100.000 employees, 55(47%) reported that their performance was when working from home, 40(34%) reported that their performance had remained equal and 21(18%) reported that their performance had increased[89]. (See Table 41)

Organisation size	1-9	10-99	100-999	1000-9999	10000-99999	>100000	Not disclosed
decrease	53(54%)	265(47%)	293(45%)	297(55%)	120(51%)	55(47%)	2(17%)
equal	30(31%)	183(32%)	217(33%)	152(28%)	77(33%)	40(34%)	7(58%)
increase	15(15%)	118(21%)	147(22%)	91(17%)	39(17%)	21(18%)	3(25%)

Table 41: Self perceived performance in relation to organisation size

12.3.3 Organisational support measures

They respondents to the survey by Ralph et al. were asked to indicate, for a set of statements about organisational support members that were taken by companies to support employees during the pandemic, to indicate whether the statement applied to them and whether they considered it helpful. The measures were categorized in to 7 main categories; 'Practical support', 'Reassurance, emotional support and health', 'Communication', 'Cohesion', 'Technical capabilities', 'policies' and 'Personal development'. In this section, the statements are analyses, based on their applicability and helpfulness in relation to the respondents' years of experience in software development, the respondents' experience with working from home and size of the organisation where the respondents work [89]. (See Figure 4)

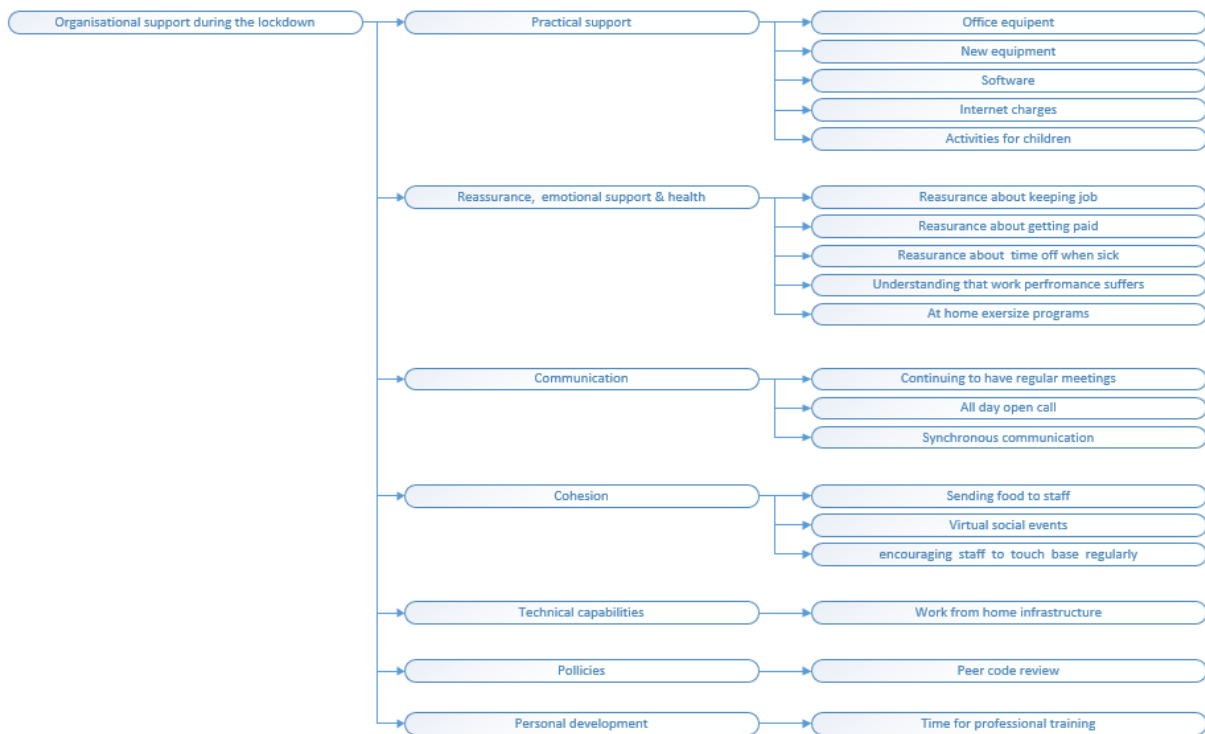


Figure 4: Themes focusing on organisational support

Practical support

The survey by Ralph et al. [89] includes 5 statements, which were categorized in the category 'practical support'. This category is divided into five themes: 'Office equipment', 'New equipment', 'Software', 'Internet charges' and 'Activities for children'.

Office equipment

The statement, "I can (or could) take equipment (e.g. monitors) home from my workplace" was applicable to 74% (1645) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 42)

Applicability	Respondents	%
Applicable	1645	74%
Not applicable	580	26%

Table 42: Applicability: "I can (or could) take equipment (e.g. monitors) home from my workplace"

According to the data set from the pandemic programming paper, by Ralph et al. , 36% (800) of all respondents, considered this measure to be helpful [89]. (See Table 43)

Helpfulness	Respondents	%
Helpful	800	36%
Not helpful	1425	64%

Table 43: Helpfulness: "I can (or could) take equipment (e.g. monitors) home from my workplace"

Out of the 1645 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 27% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 44)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	27%
Applicable	Not helpful	1197	73%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 44: Applicability and helpfulness: "I can (or could) take equipment (e.g. monitors) home from my workplace"

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 70% (594) of respondents with 0-5 years of experience, 77% (455) of respondents with 5-10 years of experience, 76%

(416) of respondents with 10-15 years of experience and 76% (378) of respondents with more than 15 years of experience [89]. (See Table 45)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	594(70%)	455(77%)	416(76%)	378(76%)
Not applicable	258(30%)	136(23%)	134(24%)	121(24%)

Table 45: Applicability and experience: "I can (or could) take equipment (e.g. monitors) home from my workplace"

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 40% (341) of respondents with 0-5 years of experience consider this measure to be helpful, so do 36% (215) of respondents with 5-10 years of experience, 33% (182) of respondents with 10-15 years of experience and 31% (153) of respondents with more than 15 years of experience [89]. (See Table 46)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	341(40%)	215(36%)	182(33%)	153(31%)
Not helpful	511(60%)	376(64%)	368(67%)	346(69%)

Table 46: Helpfulness and experience: "I can (or could) take equipment (e.g. monitors) home from my workplace"

Out of the 594 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 29% (173) considered this measure to be helpful. 65% (168) of the 258 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 455 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 30% (135) considered this measure to be helpful. 59% (80) of the 136 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 416 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 25% (103) considered this measure to be helpful. 59% (79) of the 134 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 378 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 23% (86) considered this measure to be helpful. 55% (67) of the 121 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 47)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	173(29%)	135(30%)	103(25%)	86(23%)
Applicable	Not helpful	421(71%)	320(70%)	313(75%)	292(77%)
Not applicable	Helpful	168(65%)	80(59%)	79(59%)	67(55%)
Not applicable	Not helpful	90(35%)	56(41%)	55(41%)	54(45%)

Table 47: Applicability , helpfulness and experience: "I can (or could) take equipment (e.g. monitors) home from my workplace"

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 61% (41) of respondents with no experience working from home, 74% (1202) of respondents with up to one year of experience working from home, 71% (487) of respondents with 1 to 5 years of experience working from home and 74% (144) of respondents with more than 5 years of experience working from home [89]. (See Table 48)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	41(61%)	1202(74%)	487(71%)	144(74%)
Not applicable	26(39%)	430(26%)	197(29%)	50(26%)

Table 48: Applicability and experience regarding working from home: "I can (or could) take equipment (e.g. monitors) home from my workplace"

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 31% (21) of respondents with no experience working from home, 37% () of respondents with up to one year of experience working from home, 35% (242) of respondents with 1 to 5 years of experience working from home and 30% (58) of respondents with more than 5 years of experience working from home [89]. (See Table 49)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	21(31%)	601(37%)	242(35%)	58(30%)
Not helpful	46(69%)	1031(63%)	442(65%)	136(70%)

Table 49: Helpfulness and experience regarding working from home: "I can (or could) take equipment (e.g. monitors) home from my workplace"

Out of the 41 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 17% (7) considered this measure to be helpful. 54% (14) of the 26 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 1202 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 28% (334) considered this measure to be helpful. 62% (267) of the 430 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 487 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 25% (124) considered this measure to be helpful. 60% (118) of the 197 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated

that they would have considered this measure to be helpful. Out of the 144 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 22% (32) considered this measure to be helpful. 52% (26) of the 50 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 50)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	7(17%)	334(28%)	124(25%)	32(22%)
Applicable	Not helpful	34(83%)	868(72%)	363(75%)	112(78%)
Not applicable	Helpful	14(54%)	267(62%)	118(60%)	26(52%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 50: Applicability, helpfulness and experience regarding working from home: "I can (or could) take equipment (e.g. monitors) home from my workplace"

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 63% (62) of respondents that work in an organisation with 1-9 employees, 75% (423) of respondents that work for an organisation with 10-99 employees, 72% (476) of respondents, working for an organisation with 100-999 employees, 75% (406) of respondents, working for an organisation with 1.000-9.999 employees and 78% (183) of respondents, working for an organisation with 10.000-99.999 employees and 76% (88) of respondents with more than 100,000 employees [89]. (See Table 51)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	62(63%)	423(75%)	476(72%)	406(75%)	183(78%)	88(76%)
Not applicable	36(37%)	143(25%)	181(28%)	134(25%)	53(22%)	28(24%)

Table 51: Applicability and organisation size: "I can (or could) take equipment (e.g. monitors) home from my workplace"

According to the data set from the survey by Ralph et al., 46% (45) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 35% (200) of respondents that work for an organisation with 10-99 employees, 35% (228) of respondents, working for an organisation with 100-999 employees, 37% (201) of respondents, working for an organisation with 1.000-9.999 employees, 33% (78) of respondents, working for an organisation with 10.000-99.999 employees and 39% (45) of respondents with more than 100,000 employees [89]. (See Table 52)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	45(46%)	200(35%)	228(35%)	201(37%)	78(33%)	45(39%)
Not helpful	53(54%)	366(65%)	429(65%)	339(63%)	158(67%)	71(61%)

Table 52: Helpfulness and organisation size: "I can (or could) take equipment (e.g. monitors) home from my workplace"

Out of the 62 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 32% (20) considered this measure to be helpful. 69% (25) of the 36 respondents, working in an organisation with 1-9 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 423 respondents, working in an organisation with 10-99 employees, that indicated that the statement was applicable to them, 28% (118) considered this measure to be helpful. 57% (82) of the 143 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 476 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 27% (127) considered this measure to be helpful. 56% (101) of the 181 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 406 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 27% (110) considered this measure to be helpful. 68% (91) of the 134 respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 183 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 25% (45) considered this measure to be helpful. 62% (33) of the 53 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 88 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 31% (27) considered this measure to be helpful. 64% (18) of the 28 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 53)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	20(32%)	118(28%)	127(27%)	110(27%)	45(25%)	27(31%)
Applicable	Not helpful	42(68%)	305(72%)	349(73%)	296(73%)	138(75%)	61(69%)
Not applicable	Helpful	25(69%)	82(57%)	101(56%)	91(68%)	33(62%)	18(64%)
Not applicable	Not helpful	11(31%)	61(43%)	80(44%)	43(32%)	20(38%)	10(36%)

Table 53: Applicability, helpfulness and organisation size: "I can (or could) take equipment (e.g. monitors) home from my workplace"

New equipment

The statement, "My organization will buy new equipment we need to work from home" was applicable to 62% (934) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 54)

Applicability	Respondents	%
Applicable	934	62%
Not applicable	580	38%

Table 54: Applicability: "My organization will buy new equipment we need to work from home"

According to the data set from the pandemic programming paper, by Ralph et al. , 53% (800) of all respondents, considered this measure to be helpful [89]. (See Table 55)

Helpfulness	Respondents	%
Helpful	800	53%
Not helpful	714	47%

Table 55: Helpfulness: "My organization will buy new equipment we need to work from home"

Out of the 934 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 48% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 56)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	48%
Applicable	Not helpful	486	52%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 56: Applicability and helpfulness: "My organization will buy new equipment we need to work from home"

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 29% (245) of respondents with 0-5 years of experience, 30% (177) of respondents with 5-10 years of experience, 32% (178) of respondents with 10-15 years of experience and 36% (182) of respondents with more than 15 years of experience [89]. (See Table 57)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	245(29%)	177(30%)	178(32%)	182(36%)
Not applicable	607(71%)	414(70%)	372(68%)	317(64%)

Table 57: Applicability and experience: "My organization will buy new equipment we need to work from home"

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 53% (450) of respondents with 0-5 years of experience consider this measure to be helpful, so do 52% (308) of respondents with 5-10 years of experience, 47% (259) of respondents with 10-15 years of experience and 44% (219) of respondents with more than 15 years of experience [89]. (See Table 58)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	450(53%)	308(52%)	259(47%)	219(44%)
Not helpful	402(47%)	283(48%)	291(53%)	280(56%)

Table 58: Helpfulness and experience: "My organization will buy new equipment we need to work from home"

Out of the 245 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 33% (82) considered this measure to be helpful. 61% (368) of the 607 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 177 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 35% (62) considered this measure to be helpful. 59% (246) of the 414 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 178 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 24% (43) considered this measure to be helpful. 58% (216) of the 372 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 182 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 25% (45) considered this measure to be helpful. 55% (174) of the 317 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 59)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	82(33%)	62(35%)	43(24%)	45(25%)
Applicable	Not helpful	163(67%)	115(65%)	135(76%)	137(75%)
Not applicable	Helpful	368(61%)	246(59%)	216(58%)	174(55%)
Not applicable	Not helpful	239(39%)	168(41%)	156(42%)	143(45%)

Table 59: Applicability, helpfulness and experience: "My organization will buy new equipment we need to work from home"

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 22% (15)

of respondents with no experience working from home, 29% (469) of respondents with up to one year of experience working from home, 33% (228) of respondents with 1 to 5 years of experience working from home and 37% (72) of respondents with more than 5 years of experience working from home [89]. (See Table 60)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	15(22%)	469(29%)	228(33%)	72(37%)
Not applicable	52(78%)	1163(71%)	456(67%)	122(63%)

Table 60: Applicability and experience regarding working from home: "My organization will buy new equipment we need to work from home"

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 46% (31) of respondents with no experience working from home, 50% () of respondents with up to one year of experience working from home, 51% (347) of respondents with 1 to 5 years of experience working from home and 44% (85) of respondents with more than 5 years of experience working from home [89]. (See Table 61)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	31(46%)	809(50%)	347(51%)	85(44%)
Not helpful	36(54%)	823(50%)	337(49%)	109(56%)

Table 61: Helpfulness and experience regarding working from home: "My organization will buy new equipment we need to work from home"

Out of the 15 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 13% (2) considered this measure to be helpful. 56% (29) of the 52 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 469 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 29% (137) considered this measure to be helpful. 58% (672) of the 1163 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 228 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 28% (63) considered this measure to be helpful. 62% (284) of the 456 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 72 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 25% (18) considered this measure to be helpful. 55% (67) of the 122 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 62)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	2(13%)	137(29%)	63(28%)	18(25%)
Applicable	Not helpful	13(87%)	332(71%)	165(72%)	54(75%)
Not applicable	Helpful	29(56%)	672(58%)	284(62%)	67(55%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 62: Applicability, helpfulness and experience regarding working from home: "My organization will buy new equipment we need to work from home"

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 31% (30) of respondents that work in an organisation with 1-9 employees, 30% (172) of respondents that work for an organisation with 10-99 employees, 29% (192) of respondents, working for an organisation with 100-999 employees, 36% (192) of respondents, working for an organisation with 1.000-9.999 employees and 24% (57) of respondents, working for an organisation with 10.000-99.999 employees and 37% (43) of respondents with more than 100,000 employees [89]. (See Table 63)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	30(31%)	172(30%)	192(29%)	192(36%)	57(24%)	43(37%)
Not applicable	68(69%)	394(70%)	465(71%)	348(64%)	179(76%)	73(63%)

Table 63: Applicability and organisation size: "My organization will buy new equipment we need to work from home"

According to the data set from the survey by Ralph et al., 49% (48) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 47% (268) of respondents that work for an organisation with 10-99 employees, 49% (325) of respondents, working for an organisation with 100-999 employees, 46% (249) of respondents, working for an organisation with 1.000-9.999 employees, 61% (144) of respondents, working for an organisation with 10.000-99.999 employees and 45% (52) of respondents with more than 100,000 employees [89]. (See Table 64)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	48(49%)	268(47%)	325(49%)	249(46%)	144(61%)	52(45%)
Not helpful	50(51%)	298(53%)	332(51%)	291(54%)	92(39%)	64(55%)

Table 64: Helpfulness and organisation size: "My organization will buy new equipment we need to work from home"

Out of the 30 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 27% (8) considered this measure to be helpful. 59% (40) of the 68 respondents, working in an organisation with 1-9 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 172 respondents, working in an organisation with 10-99

employees, that indicated that the statement was applicable to them, 31% (53) considered this measure to be helpful. 55% (215) of the 394 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 192 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 31% (59) considered this measure to be helpful. 57% (266) of the 465 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 192 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 26% (49) considered this measure to be helpful. 57% (200) of the 348 respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 57 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 33% (19) considered this measure to be helpful. 70% (125) of the 179 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 43 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 28% (12) considered this measure to be helpful. 55% (40) of the 73 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 65)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	8(27%)	53(31%)	59(31%)	49(26%)	19(33%)	12(28%)
Applicable	Not helpful	22(73%)	119(69%)	133(69%)	143(74%)	38(67%)	31(72%)
Not applicable	Helpful	40(59%)	215(55%)	266(57%)	200(57%)	125(70%)	40(55%)
Not applicable	Not helpful	28(41%)	179(45%)	199(43%)	148(43%)	54(30%)	33(45%)

Table 65: Applicability, helpfulness and organisation size: "My organization will buy new equipment we need to work from home"

Software

The statement,"My organization will pay for software we need to work from home" was applicable to 70% (1331) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 66)

Applicability	Respondents	%
Applicable	1331	70%
Not applicable	580	30%

Table 66: Applicability: "My organization will pay for software we need to work from home"

According to the data set from the pandemic programming paper, by Ralph et al. , 42% (800) of all respondents, considered this measure to be helpful [89]. (See Table 67)

Helpfulness	Respondents	%
Helpful	800	42%
Not helpful	1111	58%

Table 67: Helpfulness: "My organization will pay for software we need to work from home"

Out of the 1331 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 34% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 68)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	34%
Applicable	Not helpful	883	66%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 68: Applicability and helpfulness: "My organization will pay for software we need to work from home"

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 53% (450) of respondents with 0-5 years of experience, 53% (311) of respondents with 5-10 years of experience, 57% (316) of respondents with 10-15 years of experience and 56% (278) of respondents with more than 15 years of experience [89]. (See Table 69)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	450(53%)	311(53%)	316(57%)	278(56%)
Not applicable	402(47%)	280(47%)	234(43%)	221(44%)

Table 69: Applicability and experience: "My organization will pay for software we need to work from home"

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 39% (334) of respondents with 0-5 years of experience consider this measure to be helpful, so do 39% (232) of respondents with 5-10 years of experience, 36% (199) of respondents with 10-15 years of experience and 31% (155) of respondents with more than 15 years of experience [89]. (See Table 70)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	334(39%)	232(39%)	199(36%)	155(31%)
Not helpful	518(61%)	359(61%)	351(64%)	344(69%)

Table 70: Helpfulness and experience: "My organization will pay for software we need to work from home"

Out of the 450 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 30% (133) considered this measure to be helpful. 50% (201) of the 402 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 311 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 31% (96) considered this measure to be helpful. 49% (136) of the 280 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 316 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 25% (79) considered this measure to be helpful. 51% (120) of the 234 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 278 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 22% (60) considered this measure to be helpful. 43% (95) of the 221 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 71)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	133(30%)	96(31%)	79(25%)	60(22%)
Applicable	Not helpful	317(70%)	215(69%)	237(75%)	218(78%)
Not applicable	Helpful	201(50%)	136(49%)	120(51%)	95(43%)
Not applicable	Not helpful	201(50%)	144(51%)	114(49%)	126(57%)

Table 71: Applicability , helpfulness and experience: "My organization will pay for software we need to work from home"

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 40% (27) of respondents with no experience working from home, 54% (875) of respondents with up to one year of experience working from home, 57% (389) of respondents with 1 to 5 years of experience working from home and 57% (110) of respondents with more than 5 years of experience working from home [89]. (See Table 72)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	27(40%)	875(54%)	389(57%)	110(57%)
Not applicable	40(60%)	757(46%)	295(43%)	84(43%)

Table 72: Applicability and experience regarding working from home: "My organization will pay for software we need to work from home"

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 42% (28) of respondents with no experience working from home, 38% () of respondents with up to one year of experience working from home, 35% (239) of respondents with 1 to 5 years of experience working from home and 32% (63) of respondents with more than 5 years of experience working from home [89]. (See Table 73)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	28(42%)	615(38%)	239(35%)	63(32%)
Not helpful	39(58%)	1017(62%)	445(65%)	131(68%)

Table 73: Helpfulness and experience regarding working from home: "My organization will pay for software we need to work from home"

Out of the 27 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 15% (4) considered this measure to be helpful. 60% (24) of the 40 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 875 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 28% (249) considered this measure to be helpful. 48% (366) of the 757 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 389 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 24% (95) considered this measure to be helpful. 49% (144) of the 295 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 110 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 21% (23) considered this measure to be helpful. 48% (40) of the 84 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 74)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	4(15%)	249(28%)	95(24%)	23(21%)
Applicable	Not helpful	23(85%)	626(72%)	294(76%)	87(79%)
Not applicable	Helpful	24(60%)	366(48%)	144(49%)	40(48%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 74: Applicability, helpfulness and experience regarding working from home: "My organization will pay for software we need to work from home"

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 49% (48) of respondents that work in an organisation with 1-9 employees, 50% (284) of respondents that work for an organisation with 10-99 employees, 52% (342) of respondents, working for an organisation with 100-999 employees, 58% (311) of respondents, working for an organisation with 1.000-9.999 employees and 62% (146) of respondents, working for an organisation with 10.000-99.999 employees and 69% (80) of respondents with more than 100,000 employees [89]. (See Table 75)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	48(49%)	284(50%)	342(52%)	311(58%)	146(62%)	80(69%)
Not applicable	50(51%)	282(50%)	315(48%)	229(42%)	90(38%)	36(31%)

Table 75: Applicability and organisation size: "My organization will pay for software we need to work from home"

According to the data set from the survey by Ralph et al., 47% (46) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 38% (216) of respondents that work for an organisation with 10-99 employees, 35% (228) of respondents, working for an organisation with 100-999 employees, 37% (198) of respondents, working for an organisation with 1.000-9.999 employees, 36% (86) of respondents, working for an organisation with 10.000-99.999 employees and 36% (42) of respondents with more than 100,000 employees [89]. (See Table 76)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	46(47%)	216(38%)	228(35%)	198(37%)	86(36%)	42(36%)
Not helpful	52(53%)	350(62%)	429(65%)	342(63%)	150(64%)	74(64%)

Table 76: Helpfulness and organisation size: "My organization will pay for software we need to work from home"

Out of the 48 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 29% (14) considered this measure to be helpful. 64% (32) of the 50 respondents, working in an organisation with 1-9 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 284 respondents, working in an organisation with 10-99 employees, that indicated that the statement was applicable to them, 25% (70) considered this measure to be helpful. 52% (146) of the 282 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 342 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 27% (91) considered this measure to be helpful. 43% (137) of the 315 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 311 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 30% (93) considered this measure to be helpful. 46% (105) of the 229 respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 146 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 27% (39) considered this measure to be helpful. 52% (47) of the 90 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 80 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 31% (25) considered

this measure to be helpful. 47% (17) of the 36 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 77)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	14(29%)	70(25%)	91(27%)	93(30%)	39(27%)	25(31%)
Applicable	Not helpful	34(71%)	214(75%)	251(73%)	218(70%)	107(73%)	55(69%)
Not applicable	Helpful	32(64%)	146(52%)	137(43%)	105(46%)	47(52%)	17(47%)
Not applicable	Not helpful	18(36%)	136(48%)	178(57%)	124(54%)	43(48%)	19(53%)

Table 77: Applicability, helpfulness and organisation size: "My organization will pay for software we need to work from home"

Internet charges

The statement, "My organization will pay for some or all of my internet charges" was applicable to 51% (611) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 78)

Applicability	Respondents	%
Applicable	611	51%
Not applicable	580	49%

Table 78: Applicability: "My organization will pay for some or all of my internet charges"

According to the data set form the pandemic programming paper, by Ralph et al. , 67% (800) of all respondents, considered this measure to be helpful [89]. (See Table 79)

Helpfulness	Respondents	%
Helpful	800	67%
Not helpful	391	33%

Table 79: Helpfulness: "My organization will pay for some or all of my internet charges"

Out of the 611 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 73% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 80)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	73%
Applicable	Not helpful	163	27%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 80: Applicability and helpfulness: "My organization will pay for some or all of my internet charges"

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 9% (74) of respondents with 0-5 years of experience, 10% (58) of respondents with 5-10 years of experience, 10% (57) of respondents with 10-15 years of experience and 12% (59) of respondents with more than 15 years of experience [89]. (See Table 81)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	74(9%)	58(10%)	57(10%)	59(12%)
Not applicable	778(91%)	533(90%)	493(90%)	440(88%)

Table 81: Applicability and experience: "My organization will pay for some or all of my internet charges"

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 54% (464) of respondents with 0-5 years of experience consider this measure to be helpful, so do 51% (301) of respondents with 5-10 years of experience, 53% (289) of respondents with 10-15 years of experience and 48% (240) of respondents with more than 15 years of experience [89]. (See Table 82)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	464(54%)	301(51%)	289(53%)	240(48%)
Not helpful	388(46%)	290(49%)	261(47%)	259(52%)

Table 82: Helpfulness and experience: "My organization will pay for some or all of my internet charges"

Out of the 74 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 20% (15) considered this measure to be helpful. 58% (449) of the 778 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 58 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 33% (19) considered this measure to be helpful. 53% (282) of the 533 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 57 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 26% (15) considered this measure to be helpful. 56% (274) of the 493 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 59 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 17% (10) considered this measure to be helpful. 52% (230) of the 440 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 83)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	15(20%)	19(33%)	15(26%)	10(17%)
Applicable	Not helpful	59(80%)	39(67%)	42(74%)	49(83%)
Not applicable	Helpful	449(58%)	282(53%)	274(56%)	230(52%)
Not applicable	Not helpful	329(42%)	251(47%)	219(44%)	210(48%)

Table 83: Applicability , helpfulness and experience: "My organization will pay for some or all of my internet charges"

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 16% (11) of respondents with no experience working from home, 9% (149) of respondents with up to one year of experience working from home, 11% (75) of respondents with 1 to 5 years of experience working from home and 12% (23) of respondents with more than 5 years of experience working from home [89]. (See Table 84)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	11(16%)	149(9%)	75(11%)	23(12%)
Not applicable	56(84%)	1483(91%)	609(89%)	171(88%)

Table 84: Applicability and experience regarding working from home: "My organization will pay for some or all of my internet charges"

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 54% (36) of respondents with no experience working from home, 53% () of respondents with up to one year of experience working from home, 55% (378) of respondents with 1 to 5 years of experience working from home and 45% (87) of respondents with more than 5 years of experience working from home [89]. (See Table 85)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	36(54%)	858(53%)	378(55%)	87(45%)
Not helpful	31(46%)	774(47%)	306(45%)	107(55%)

Table 85: Helpfulness and experience regarding working from home: "My organization will pay for some or all of my internet charges"

Out of the 11 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 27% (3) considered this measure to be helpful. 59% (33) of the 56 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 149 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 30% (44) considered this measure to be helpful. 55% (814) of the 1483 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 75 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 24% (18) considered this measure to be helpful. 59% (360) of the 609 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated

that they would have considered this measure to be helpful. Out of the 23 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 9% (2) considered this measure to be helpful. 50% (85) of the 171 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 86)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	3(27%)	44(30%)	18(24%)	2(9%)
Applicable	Not helpful	8(73%)	105(70%)	57(76%)	21(91%)
Not applicable	Helpful	33(59%)	814(55%)	360(59%)	85(50%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 86: Applicability, helpfulness and experience regarding working from home: "My organization will pay for some or all of my internet charges"

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 7% (7) of respondents that work in an organisation with 1-9 employees, 9% (50) of respondents that work for an organisation with 10-99 employees, 7% (44) of respondents, working for an organisation with 100-999 employees, 11% (59) of respondents, working for an organisation with 1.000-9.999 employees and 11% (25) of respondents, working for an organisation with 10.000-99.999 employees and 27% (31) of respondents with more than 100,000 employees [89]. (See Table 87)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	7(7%)	50(9%)	44(7%)	59(11%)	25(11%)	31(27%)
Not applicable	91(93%)	516(91%)	613(93%)	481(89%)	211(89%)	85(73%)

Table 87: Applicability and organisation size: "My organization will pay for some or all of my internet charges"

According to the data set from the survey by Ralph et al., 63% (62) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 50% (281) of respondents that work for an organisation with 10-99 employees, 53% (346) of respondents, working for an organisation with 100-999 employees, 52% (279) of respondents, working for an organisation with 1.000-9.999 employees, 55% (129) of respondents, working for an organisation with 10.000-99.999 employees and 46% (53) of respondents with more than 100,000 employees [89]. (See Table 88)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	62(63%)	281(50%)	346(53%)	279(52%)	129(55%)	53(46%)
Not helpful	36(37%)	285(50%)	311(47%)	261(48%)	107(45%)	63(54%)

Table 88: Helpfulness and organisation size: "My organization will pay for some or all of my internet charges"

Out of the 7 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 0% (0) considered this measure to be helpful. 68% (62) of the 91 respondents, working in an organisation with 1-9 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 50 respondents, working in an organisation with 10-99 employees, that indicated that the statement was applicable to them, 20% (10) considered this measure to be helpful. 53% (271) of the 516 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 44 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 30% (13) considered this measure to be helpful. 54% (333) of the 613 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 59 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 27% (16) considered this measure to be helpful. 55% (263) of the 481 respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 25 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 24% (6) considered this measure to be helpful. 58% (123) of the 211 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 31 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 32% (10) considered this measure to be helpful. 51% (43) of the 85 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 89)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	0(0%)	10(20%)	13(30%)	16(27%)	6(24%)	10(32%)
Applicable	Not helpful	7(100%)	40(80%)	31(70%)	43(73%)	19(76%)	21(68%)
Not applicable	Helpful	62(68%)	271(53%)	333(54%)	263(55%)	123(58%)	43(51%)
Not applicable	Not helpful	29(32%)	245(47%)	280(46%)	218(45%)	88(42%)	42(49%)

Table 89: Applicability, helpfulness and organisation size: "My organization will pay for some or all of my internet charges"

Activities for children

The statement, "My organization is providing activities to occupy staff member's children" was applicable to 50% (578) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 90)

Applicability	Respondents	%
Applicable	578	50%
Not applicable	580	50%

Table 90: Applicability: "My organization is providing activities to occupy staff member's children"

According to the data set from the pandemic programming paper, by Ralph et al. , 69% (800) of all respondents, considered this measure to be helpful [89]. (See Table 91)

Helpfulness	Respondents	%
Helpful	800	69%
Not helpful	358	31%

Table 91: Helpfulness: "My organization is providing activities to occupy staff member's children"

Out of the 578 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 78% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 92)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	78%
Applicable	Not helpful	130	22%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 92: Applicability and helpfulness: "My organization is providing activities to occupy staff member's children"

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 7% (60) of respondents with 0-5 years of experience, 8% (48) of respondents with 5-10 years of experience, 6% (35) of respondents with 10-15 years of experience and 7% (34) of respondents with more than 15 years of experience [89]. (See Table 93)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	60(7%)	48(8%)	35(6%)	34(7%)
Not applicable	792(93%)	543(92%)	515(94%)	465(93%)

Table 93: Applicability and experience: "My organization is providing activities to occupy staff member's children"

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 47% (402) of respondents with 0-5 years of experience consider this measure to be helpful, so do 46% (271) of respondents with 5-10 years of experience, 51% (283) of respondents with 10-15 years of experience and 44% (219) of respondents with more than 15 years of experience [89]. (See Table 94)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	402(47%)	271(46%)	283(51%)	219(44%)
Not helpful	450(53%)	320(54%)	267(49%)	280(56%)

Table 94: Helpfulness and experience: "My organization is providing activities to occupy staff member's children"

Out of the 60 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 20% (12) considered this measure to be helpful. 49% (390) of the 792 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 48 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 23% (11) considered this measure to be helpful. 48% (260) of the 543 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 35 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 20% (7) considered this measure to be helpful. 54% (276) of the 515 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 34 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 9% (3) considered this measure to be helpful. 46% (216) of the 465 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 95)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	12(20%)	11(23%)	7(20%)	3(9%)
Applicable	Not helpful	48(80%)	37(77%)	28(80%)	31(91%)
Not applicable	Helpful	390(49%)	260(48%)	276(54%)	216(46%)
Not applicable	Not helpful	402(51%)	283(52%)	239(46%)	249(54%)

Table 95: Applicability , helpfulness and experience: "My organization is providing activities to occupy staff member's children"

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 10% (7) of

respondents with no experience working from home, 7% (113) of respondents with up to one year of experience working from home, 10% (65) of respondents with 1 to 5 years of experience working from home and 6% (12) of respondents with more than 5 years of experience working from home [89]. (See Table 96)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	7(10%)	113(7%)	65(10%)	12(6%)
Not applicable	60(90%)	1519(93%)	619(90%)	182(94%)

Table 96: Applicability and experience regarding working from home: "My organization is providing activities to occupy staff member's children"

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 58% (39) of respondents with no experience working from home, 46% () of respondents with up to one year of experience working from home, 50% (339) of respondents with 1 to 5 years of experience working from home and 44% (85) of respondents with more than 5 years of experience working from home [89]. (See Table 97)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	39(58%)	758(46%)	339(50%)	85(44%)
Not helpful	28(42%)	874(54%)	345(50%)	109(56%)

Table 97: Helpfulness and experience regarding working from home: "My organization is providing activities to occupy staff member's children"

Out of the 7 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 14% (1) considered this measure to be helpful. 63% (38) of the 60 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 113 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 19% (22) considered this measure to be helpful. 48% (736) of the 1519 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 65 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 15% (10) considered this measure to be helpful. 53% (329) of the 619 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 12 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 0% (0) considered this measure to be helpful. 47% (85) of the 182 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 98)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	1(14%)	22(19%)	10(15%)	0(0%)
Applicable	Not helpful	6(86%)	91(81%)	55(85%)	12(100%)
Not applicable	Helpful	38(63%)	736(48%)	329(53%)	85(47%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 98: Applicability, helpfulness and experience regarding working from home: "My organization is providing activities to occupy staff member's children"

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 7% (7) of respondents that work in an organisation with 1-9 employees, 4% (23) of respondents that work for an organisation with 10-99 employees, 7% (44) of respondents, working for an organisation with 100-999 employees, 10% (52) of respondents, working for an organisation with 1.000-9.999 employees and 7% (17) of respondents, working for an organisation with 10.000-99.999 employees and 13% (15) of respondents with more than 100,000 employees [89]. (See Table 99)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	7(7%)	23(4%)	44(7%)	52(10%)	17(7%)	15(13%)
Not applicable	91(93%)	543(96%)	613(93%)	488(90%)	219(93%)	101(87%)

Table 99: Applicability and organisation size: "My organization is providing activities to occupy staff member's children"

According to the data set from the survey by Ralph et al., 48% (47) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 42% (240) of respondents that work for an organisation with 10-99 employees, 46% (302) of respondents, working for an organisation with 100-999 employees, 48% (257) of respondents, working for an organisation with 1.000-9.999 employees, 51% (120) of respondents, working for an organisation with 10.000-99.999 employees and 52% (60) of respondents with more than 100,000 employees [89]. (See Table 100)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	47(48%)	240(42%)	302(46%)	257(48%)	120(51%)	60(52%)
Not helpful	51(52%)	326(58%)	355(54%)	283(52%)	116(49%)	56(48%)

Table 100: Helpfulness and organisation size: "My organization is providing activities to occupy staff member's children"

Out of the 7 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 0% (0) considered this measure to be helpful. 52% (47) of the 91 respondents, working in an organisation with 1-9 employees, to whom the statement did not apply, indicated that they would have considered

this measure to be helpful. Out of the 23 respondents, working in an organisation with 10-99 employees, that indicated that the statement was applicable to them, 13% (3) considered this measure to be helpful. 44% (237) of the 543 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 44 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 20% (9) considered this measure to be helpful. 48% (293) of the 613 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 52 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 23% (12) considered this measure to be helpful. 50% (245) of the 488 respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 17 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 12% (2) considered this measure to be helpful. 54% (118) of the 219 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 15 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 27% (4) considered this measure to be helpful. 55% (56) of the 101 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 101)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	0(0%)	3(13%)	9(20%)	12(23%)	2(12%)	4(27%)
Applicable	Not helpful	7(100%)	20(87%)	35(80%)	40(77%)	15(88%)	11(73%)
Not applicable	Helpful	47(52%)	237(44%)	293(48%)	245(50%)	118(54%)	56(55%)
Not applicable	Not helpful	44(48%)	306(56%)	320(52%)	243(50%)	101(46%)	45(45%)

Table 101: Applicability, helpfulness and organisation size: "My organization is providing activities to occupy staff member's children"

Reassurance, emotional support and health

The survey by Ralph et al. [89] includes 5 statements, which we categorized in the category 'Reassurance, emotional support and health'. This category is divided into five themes : 'Reassurance about keeping job', 'Reassurance about getting paid', 'Reassurance about time off when sick', 'Understanding that work performance suffers' and 'At home exercise programs'.

Reassurance about keeping job

The statement,"My organization has reassured me that I will keep my job" was applicable to 72% (1475) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 102)

Applicability	Respondents	%
Applicable	1475	72%
Not applicable	580	28%

Table 102: Applicability: "My organization has reassured me that I will keep my job"

According to the data set form the pandemic programming paper, by Ralph et al. , 39% (800) of all respondents, considered this measure to be helpful [89]. (See Table 103)

Helpfulness	Respondents	%
Helpful	800	39%
Not helpful	1255	61%

Table 103: Helpfulness: "My organization has reassured me that I will keep my job"

Out of the 1475 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 30% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 104)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	30%
Applicable	Not helpful	1027	70%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 104: Applicability and helpfulness: "My organization has reassured me that I will keep my job"

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 62% (526) of respondents with 0-5 years of experience, 63% (374) of respondents with 5-10 years of experience, 63% (347) of respondents with 10-15 years of experience and 63% (315) of respondents with more than 15 years of experience [89]. (See Table 105)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	526(62%)	374(63%)	347(63%)	315(63%)
Not applicable	326(38%)	217(37%)	203(37%)	184(37%)

Table 105: Applicability and experience: "My organization has reassured me that I will keep my job"

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 44% (372) of respondents with 0-5 years of experience consider this measure to be helpful, so do 41% (243) of respondents with 5-10 years of experience, 38% (209) of respondents with 10-15 years of experience and 33% (165) of respondents with more then 15 years of experience [89]. (See Table 106)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	372(44%)	243(41%)	209(38%)	165(33%)
Not helpful	480(56%)	348(59%)	341(62%)	334(67%)

Table 106: Helpfulness and experience: "My organization has reassured me that I will keep my job"

Out of the 526 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 29% (154) considered this measure to be helpful. 67% (218) of the 326 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 374 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 29% (108) considered this measure to be helpful. 62% (135) of the 217 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 347 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 22% (78) considered this measure to be helpful. 65% (131) of the 203 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 315 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 18% (58) considered this measure to be helpful. 58% (107) of the 184 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 107)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	154(29%)	108(29%)	78(22%)	58(18%)
Applicable	Not helpful	372(71%)	266(71%)	269(78%)	257(82%)
Not applicable	Helpful	218(67%)	135(62%)	131(65%)	107(58%)
Not applicable	Not helpful	108(33%)	82(38%)	72(35%)	77(42%)

Table 107: Applicability , helpfulness and experience: "My organization has reassured me that I will keep my job"

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 60% (40) of respondents with no experience working from home, 62% (1018) of respondents with up to one year of experience working from home, 66% (450) of respondents with 1 to 5 years of experience working from home and 63% (122) of respondents with more than 5 years of experience working from home [89]. (See Table 108)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	40(60%)	1018(62%)	450(66%)	122(63%)
Not applicable	27(40%)	614(38%)	234(34%)	72(37%)

Table 108: Applicability and experience regarding working from home: "My organization has reassured me that I will keep my job"

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 34% (23) of respondents with no experience working from home, 41% (667) of respondents with up to one year of experience working from home, 37% (253) of respondents with 1 to 5 years of experience working from home and 37% (72) of respondents with more than 5 years of experience working from home [89]. (See Table 109)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	23(34%)	667(41%)	253(37%)	72(37%)
Not helpful	44(66%)	965(59%)	431(63%)	122(63%)

Table 109: Helpfulness and experience regarding working from home: "My organization has reassured me that I will keep my job"

Out of the 40 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 13% (5) considered this measure to be helpful. 67% (18) of the 27 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 1018 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 27% (273) considered this measure to be helpful. 64% (394) of the 614 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 450 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 25% (111) considered this measure to be helpful. 61% (142) of the 234 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 122 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 21% (26) considered this measure to be helpful. 64% (46) of the 72 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 110)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	5(13%)	273(27%)	111(25%)	26(21%)
Applicable	Not helpful	35(88%)	745(73%)	339(75%)	96(79%)
Not applicable	Helpful	18(67%)	394(64%)	142(61%)	46(64%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 110: Applicability, helpfulness and experience regarding working from home: "My organization has reassured me that I will keep my job"

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 61% (60) of respondents that work in an organisation with 1-9 employees, 62% (352) of respondents that work for an organisation with 10-99 employees, 61% (402) of respondents, working for an organisation with 100-999 employees, 66% (359) of respondents, working for an organisation with 1.000-9.999 employees and 59% (139) of respondents, working for an organisation with 10.000-99.999 employees and 61% (71) of respondents with more than 100,000 employees [89]. (See Table 111)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	60(61%)	352(62%)	402(61%)	359(66%)	139(59%)	71(61%)
Not applicable	38(39%)	214(38%)	255(39%)	181(34%)	97(41%)	45(39%)

Table 111: Applicability and organisation size: "My organization has reassured me that I will keep my job"

According to the data set from the survey by Ralph et al., 43% (42) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 41% (232) of respondents that work for an organisation with 10-99 employees, 38% (251) of respondents, working for an organisation with 100-999 employees, 40% (217) of respondents, working for an organisation with 1.000-9.999 employees, 43% (101) of respondents, working for an organisation with 10.000-99.999 employees and 40% (46) of respondents with more than 100,000 employees [89]. (See Table 112)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	42(43%)	232(41%)	251(38%)	217(40%)	101(43%)	46(40%)
Not helpful	56(57%)	334(59%)	406(62%)	323(60%)	135(57%)	70(60%)

Table 112: Helpfulness and organisation size: "My organization has reassured me that I will keep my job"

Out of the 60 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 30% (18) considered this measure to be helpful. 63% (24) of the 38 respondents, working in an organisation with 1-9 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 352 respondents, working in an organisation with 10-99 employees, that indicated that the statement was applicable to them, 27% (94) considered this measure to be helpful. 64% (138) of the 214 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 402 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 24% (96) considered this measure to be helpful. 61% (155) of the 255 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 359 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 27% (98) considered this measure to be helpful. 66% (119) of the 181 respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 139 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 27% (38) considered this measure to be helpful. 65% (63) of the 97 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 71 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 24% (17) considered

this measure to be helpful. 64% (29) of the 45 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 113)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	18(30%)	94(27%)	96(24%)	98(27%)	38(27%)	17(24%)
Applicable	Not helpful	42(70%)	258(73%)	306(76%)	261(73%)	101(73%)	54(76%)
Not applicable	Helpful	24(63%)	138(64%)	155(61%)	119(66%)	63(65%)	29(64%)
Not applicable	Not helpful	14(37%)	76(36%)	100(39%)	62(34%)	34(35%)	16(36%)

Table 113: Applicability, helpfulness and organisation size: "My organization has reassured me that I will keep my job"

Reassurance about getting paid

The statement, "My organization has reassured me that I will continue to be paid" was applicable to 74% (1677) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 114)

Applicability	Respondents	%
Applicable	1677	74%
Not applicable	580	26%

Table 114: Applicability: "My organization has reassured me that I will continue to be paid"

According to the data set form the pandemic programming paper, by Ralph et al. , 35% (800) of all respondents, considered this measure to be helpful [89]. (See Table 115)

Helpfulness	Respondents	%
Helpful	800	35%
Not helpful	1457	65%

Table 115: Helpfulness: "My organization has reassured me that I will continue to be paid"

Out of the 1677 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 27% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 116)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	27%
Applicable	Not helpful	1229	73%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 116: Applicability and helpfulness: "My organization has reassured me that I will continue to be paid"

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 76% (649) of respondents with 0-5 years of experience, 74% (437) of respondents with 5-10 years of experience, 74% (406) of respondents with 10-15 years of experience and 77% (382) of respondents with more than 15 years of experience [89]. (See Table 117)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	649(76%)	437(74%)	406(74%)	382(77%)
Not applicable	203(24%)	154(26%)	144(26%)	117(23%)

Table 117: Applicability and experience: "My organization has reassured me that I will continue to be paid"

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 37% (312) of respondents with 0-5 years of experience consider this measure to be helpful, so do 34% (203) of respondents with 5-10 years of experience, 35% (190) of respondents with 10-15 years of experience and 28% (142) of respondents with more than 15 years of experience [89]. (See Table 118)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	312(37%)	203(34%)	190(35%)	142(28%)
Not helpful	540(63%)	388(66%)	360(65%)	357(72%)

Table 118: Helpfulness and experience: "My organization has reassured me that I will continue to be paid"

Out of the 649 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 29% (185) considered this measure to be helpful. 63% (127) of the 203 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 437 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 28% (124) considered this measure to be helpful. 51% (79) of the 154 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 406 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 25% (102) considered this measure to be helpful. 61% (88) of the 144 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 382 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 20% (76) considered this measure to be helpful. 56% (66) of the 117 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 119)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	185(29%)	124(28%)	102(25%)	76(20%)
Applicable	Not helpful	464(71%)	313(72%)	304(75%)	306(80%)
Not applicable	Helpful	127(63%)	79(51%)	88(61%)	66(56%)
Not applicable	Not helpful	76(37%)	75(49%)	56(39%)	51(44%)

Table 119: Applicability , helpfulness and experience: "My organization has reassured me that I will continue to be paid"

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 70% (47) of respondents with no experience working from home, 75% (1230) of respondents with up to one year of experience working from home, 74% (505) of respondents with 1 to 5 years of experience working from home and 72% (140) of respondents with more than 5 years of experience working from home [89]. (See Table 120)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	47(70%)	1230(75%)	505(74%)	140(72%)
Not applicable	20(30%)	402(25%)	179(26%)	54(28%)

Table 120: Applicability and experience regarding working from home: "My organization has reassured me that I will continue to be paid"

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 28% (19) of respondents with no experience working from home, 35% () of respondents with up to one year of experience working from home, 34% (233) of respondents with 1 to 5 years of experience working from home and 34% (65) of respondents with more than 5 years of experience working from home [89]. (See Table 121)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	19(28%)	578(35%)	233(34%)	65(34%)
Not helpful	48(72%)	1054(65%)	451(66%)	129(66%)

Table 121: Helpfulness and experience regarding working from home: "My organization has reassured me that I will continue to be paid"

Out of the 47 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 15% (7) considered this measure to be helpful. 60% (12) of the 20 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 1230 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 27% (335) considered this measure to be helpful. 60% (243) of the 402 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 505 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 24% (123) considered this measure to be helpful. 61% (110) of the 179 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated

that they would have considered this measure to be helpful. Out of the 140 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 23% (32) considered this measure to be helpful. 61% (33) of the 54 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 122)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	7(15%)	335(27%)	123(24%)	32(23%)
Applicable	Not helpful	40(85%)	895(73%)	382(76%)	108(77%)
Not applicable	Helpful	12(60%)	243(60%)	110(61%)	33(61%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 122: Applicability, helpfulness and experience regarding working from home: "My organization has reassured me that I will continue to be paid"

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 54% (53) of respondents that work in an organisation with 1-9 employees, 73% (414) of respondents that work for an organisation with 10-99 employees, 76% (500) of respondents, working for an organisation with 100-999 employees, 79% (425) of respondents, working for an organisation with 1.000-9.999 employees and 79% (186) of respondents, working for an organisation with 10.000-99.999 employees and 74% (86) of respondents with more than 100,000 employees [89]. (See Table 123)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	53(54%)	414(73%)	500(76%)	425(79%)	186(79%)	86(74%)
Not applicable	45(46%)	152(27%)	157(24%)	115(21%)	50(21%)	30(26%)

Table 123: Applicability and organisation size: "My organization has reassured me that I will continue to be paid"

According to the data set from the survey by Ralph et al., 51% (50) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 35% (197) of respondents that work for an organisation with 10-99 employees, 32% (207) of respondents, working for an organisation with 100-999 employees, 36% (194) of respondents, working for an organisation with 1.000-9.999 employees, 33% (79) of respondents, working for an organisation with 10.000-99.999 employees and 36% (42) of respondents with more than 100,000 employees [89]. (See Table 124)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	50(51%)	197(35%)	207(32%)	194(36%)	79(33%)	42(36%)
Not helpful	48(49%)	369(65%)	450(68%)	346(64%)	157(67%)	74(64%)

Table 124: Helpfulness and organisation size: "My organization has reassured me that I will continue to be paid"

Out of the 53 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 34% (18) considered this measure to be helpful. 71% (32) of the 45 respondents, working in an organisation with 1-9 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 414 respondents, working in an organisation with 10-99 employees, that indicated that the statement was applicable to them, 25% (102) considered this measure to be helpful. 63% (95) of the 152 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 500 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 26% (129) considered this measure to be helpful. 50% (78) of the 157 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 425 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 29% (122) considered this measure to be helpful. 63% (72) of the 115 respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 186 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 26% (49) considered this measure to be helpful. 60% (30) of the 50 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 86 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 26% (22) considered this measure to be helpful. 67% (20) of the 30 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 125)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	18(34%)	102(25%)	129(26%)	122(29%)	49(26%)	22(26%)
Applicable	Not helpful	35(66%)	312(75%)	371(74%)	303(71%)	137(74%)	64(74%)
Not applicable	Helpful	32(71%)	95(63%)	78(50%)	72(63%)	30(60%)	20(67%)
Not applicable	Not helpful	13(29%)	57(38%)	79(50%)	43(37%)	20(40%)	10(33%)

Table 125: Applicability, helpfulness and organisation size: "My organization has reassured me that I will continue to be paid"

Reassurance about time off when sick

The statement, "My organization has reassured me that I can take time off if I'm sick or need to care for dependents" was applicable to 72% (1519) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 126)

Applicability	Respondents	%
Applicable	1519	72%
Not applicable	580	28%

Table 126: Applicability: "My organization has reassured me that I can take time off if I'm sick or need to care for dependents"

According to the data set from the pandemic programming paper, by Ralph et al. , 38% (800) of all respondents, considered this measure to be helpful [89]. (See Table 127)

Helpfulness	Respondents	%
Helpful	800	38%
Not helpful	1299	62%

Table 127: Helpfulness: "My organization has reassured me that I can take time off if I'm sick or need to care for dependents"

Out of the 1519 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 29% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 128)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	29%
Applicable	Not helpful	1071	71%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 128: Applicability and helpfulness: "My organization has reassured me that I can take time off if I'm sick or need to care for dependents"

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 64% (544) of respondents with 0-5 years of experience, 66% (392) of respondents with 5-10 years of experience, 67% (366) of respondents with 10-15 years of experience and 67% (333) of respondents with more than 15 years of experience [89]. (See Table 129)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	544(64%)	392(66%)	366(67%)	333(67%)
Not applicable	308(36%)	199(34%)	184(33%)	166(33%)

Table 129: Applicability and experience: "My organization has reassured me that I can take time off if I'm sick or need to care for dependents"

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 43% (363) of respondents with 0-5 years of experience consider this measure to be helpful, so do 44% (260) of respondents with 5-10 years of experience, 38% (211) of respondents with 10-15 years of experience and 33% (166) of respondents with more than 15 years of experience [89]. (See Table 130)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	363(43%)	260(44%)	211(38%)	166(33%)
Not helpful	489(57%)	331(56%)	339(62%)	333(67%)

Table 130: Helpfulness and experience: "My organization has reassured me that I can take time off if I'm sick or need to care for dependents"

Out of the 544 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 29% (158) considered this measure to be helpful. 67% (205) of the 308 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 392 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 31% (122) considered this measure to be helpful. 69% (138) of the 199 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 366 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 23% (85) considered this measure to be helpful. 68% (126) of the 184 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 333 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 22% (73) considered this measure to be helpful. 56% (93) of the 166 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 131)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	158(29%)	122(31%)	85(23%)	73(22%)
Applicable	Not helpful	386(71%)	270(69%)	281(77%)	260(78%)
Not applicable	Helpful	205(67%)	138(69%)	126(68%)	93(56%)
Not applicable	Not helpful	103(33%)	61(31%)	58(32%)	73(44%)

Table 131: Applicability , helpfulness and experience: "My organization has reassured me that I can take time off if I'm sick or need to care for dependents"

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 60% (40)

of respondents with no experience working from home, 65% (1063) of respondents with up to one year of experience working from home, 68% (468) of respondents with 1 to 5 years of experience working from home and 68% (131) of respondents with more than 5 years of experience working from home [89]. (See Table 132)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	40(60%)	1063(65%)	468(68%)	131(68%)
Not applicable	27(40%)	569(35%)	216(32%)	63(32%)

Table 132: Applicability and experience regarding working from home: "My organization has reassured me that I can take time off if I'm sick or need to care for dependents"

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 40% (27) of respondents with no experience working from home, 41% () of respondents with up to one year of experience working from home, 37% (255) of respondents with 1 to 5 years of experience working from home and 36% (69) of respondents with more than 5 years of experience working from home [89]. (See Table 133)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	27(40%)	673(41%)	255(37%)	69(36%)
Not helpful	40(60%)	959(59%)	429(63%)	125(64%)

Table 133: Helpfulness and experience regarding working from home: "My organization has reassured me that I can take time off if I'm sick or need to care for dependents"

Out of the 40 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 20% (8) considered this measure to be helpful. 70% (19) of the 27 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 1063 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 28% (293) considered this measure to be helpful. 67% (380) of the 569 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 468 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 24% (113) considered this measure to be helpful. 66% (142) of the 216 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 131 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 24% (31) considered this measure to be helpful. 60% (38) of the 63 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 134)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	8(20%)	293(28%)	113(24%)	31(24%)
Applicable	Not helpful	32(80%)	770(72%)	355(76%)	100(76%)
Not applicable	Helpful	19(70%)	380(67%)	142(66%)	38(60%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 134: Applicability, helpfulness and experience regarding working from home: "My organization has reassured me that I can take time off if I'm sick or need to care for dependents"

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 51% (50) of respondents that work in an organisation with 1-9 employees, 58% (329) of respondents that work for an organisation with 10-99 employees, 67% (437) of respondents, working for an organisation with 100-999 employees, 71% (382) of respondents, working for an organisation with 1.000-9.999 employees and 71% (168) of respondents, working for an organisation with 10.000-99.999 employees and 73% (85) of respondents with more than 100,000 employees [89]. (See Table 135)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	50(51%)	329(58%)	437(67%)	382(71%)	168(71%)	85(73%)
Not applicable	48(49%)	237(42%)	220(33%)	158(29%)	68(29%)	31(27%)

Table 135: Applicability and organisation size: "My organization has reassured me that I can take time off if I'm sick or need to care for dependents"

According to the data set from the survey by Ralph et al., 49% (48) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 42% (240) of respondents that work for an organisation with 10-99 employees, 39% (254) of respondents, working for an organisation with 100-999 employees, 38% (207) of respondents, working for an organisation with 1.000-9.999 employees, 39% (92) of respondents, working for an organisation with 10.000-99.999 employees and 41% (47) of respondents with more than 100,000 employees [89]. (See Table 136)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	48(49%)	240(42%)	254(39%)	207(38%)	92(39%)	47(41%)
Not helpful	50(51%)	326(58%)	403(61%)	333(62%)	144(61%)	69(59%)

Table 136: Helpfulness and organisation size: "My organization has reassured me that I can take time off if I'm sick or need to care for dependents"

Out of the 50 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 30% (15) considered this measure to be helpful. 69% (33) of the 48 respondents, working in an organisation with 1-9

employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 329 respondents, working in an organisation with 10-99 employees, that indicated that the statement was applicable to them, 25% (82) considered this measure to be helpful. 67% (158) of the 237 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 437 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 26% (113) considered this measure to be helpful. 64% (141) of the 220 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 382 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 27% (104) considered this measure to be helpful. 65% (103) of the 158 respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 168 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 28% (47) considered this measure to be helpful. 66% (45) of the 68 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 85 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 28% (24) considered this measure to be helpful. 74% (23) of the 31 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 137)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	15(30%)	82(25%)	113(26%)	104(27%)	47(28%)	24(28%)
Applicable	Not helpful	35(70%)	247(75%)	324(74%)	278(73%)	121(72%)	61(72%)
Not applicable	Helpful	33(69%)	158(67%)	141(64%)	103(65%)	45(66%)	23(74%)
Not applicable	Not helpful	15(31%)	79(33%)	79(36%)	55(35%)	23(34%)	8(26%)

Table 137: Applicability, helpfulness and organisation size: "My organization has reassured me that I can take time off if I'm sick or need to care for dependents"

Understanding that work performance suffers

The statement, "My organization has reassured me that they understand if my work performance suffers" was applicable to 66% (1109) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 138)

Applicability	Respondents	%
Applicable	1109	66%
Not applicable	580	34%

Table 138: Applicability: "My organization has reassured me that they understand if my work performance suffers"

According to the data set form the pandemic programming paper, by Ralph et al. , 47% (800) of all respondents, considered this measure to be helpful [89]. (See Table 139)

Helpfulness	Respondents	%
Helpful	800	47%
Not helpful	889	53%

Table 139: Helpfulness: "My organization has reassured me that they understand if my work performance suffers"

Out of the 1109 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 40% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 140)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	40%
Applicable	Not helpful	661	60%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 140: Applicability and helpfulness: "My organization has reassured me that they understand if my work performance suffers"

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 39% (334) of respondents with 0-5 years of experience, 45% (264) of respondents with 5-10 years of experience, 41% (224) of respondents with 10-15 years of experience and 41% (203) of respondents with more than 15 years of experience [89]. (See Table 141)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	334(39%)	264(45%)	224(41%)	203(41%)
Not applicable	518(61%)	327(55%)	326(59%)	296(59%)

Table 141: Applicability and experience: "My organization has reassured me that they understand if my work performance suffers"

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 52% (442) of respondents with 0-5 years of experience consider this measure to be helpful, so do 47% (278) of respondents with 5-10 years of experience, 47% (256) of respondents with 10-15 years of experience and 41% (206) of respondents with more then 15 years of experience [89]. (See Table 142)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	442(52%)	278(47%)	256(47%)	206(41%)
Not helpful	410(48%)	313(53%)	294(53%)	293(59%)

Table 142: Helpfulness and experience: "My organization has reassured me that they understand if my work performance suffers"

Out of the 334 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 30% (101) considered this measure to be helpful. 66% (341) of the 518 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 264 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 27% (70) considered this measure to be helpful. 64% (208) of the 327 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 224 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 25% (57) considered this measure to be helpful. 61% (199) of the 326 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 203 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 20% (41) considered this measure to be helpful. 56% (165) of the 296 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 143)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	101(30%)	70(27%)	57(25%)	41(20%)
Applicable	Not helpful	233(70%)	194(73%)	167(75%)	162(80%)
Not applicable	Helpful	341(66%)	208(64%)	199(61%)	165(56%)
Not applicable	Not helpful	177(34%)	119(36%)	127(39%)	131(44%)

Table 143: Applicability , helpfulness and experience: "My organization has reassured me that they understand if my work performance suffers"

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 40% (27) of respondents with no experience working from home, 41% (667) of respondents with up to one year of experience working from home, 41% (282) of respondents with 1 to 5 years of experience working from home and 44% (85) of respondents with more than 5 years of experience working from home [89]. (See Table 144)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	27(40%)	667(41%)	282(41%)	85(44%)
Not applicable	40(60%)	965(59%)	402(59%)	109(56%)

Table 144: Applicability and experience regarding working from home: "My organization has reassured me that they understand if my work performance suffers"

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 46% (31) of respondents with no experience working from home, 49% () of respondents with up to one year of experience working from home, 48% (327) of respondents with 1 to 5 years of experience working from home and 40% (78) of respondents with more than 5 years of experience working from home [89]. (See Table 145)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	31(46%)	793(49%)	327(48%)	78(40%)
Not helpful	36(54%)	839(51%)	357(52%)	116(60%)

Table 145: Helpfulness and experience regarding working from home: "My organization has reassured me that they understand if my work performance suffers"

Out of the 27 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 19% (5) considered this measure to be helpful. 65% (26) of the 40 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 667 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 28% (188) considered this measure to be helpful. 63% (605) of the 965 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 282 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 25% (70) considered this measure to be helpful. 64% (257) of the 402 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 85 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 22% (19) considered this measure to be helpful. 54% (59) of the 109 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 146)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	5(19%)	188(28%)	70(25%)	19(22%)
Applicable	Not helpful	22(81%)	479(72%)	212(75%)	66(78%)
Not applicable	Helpful	26(65%)	605(63%)	257(64%)	59(54%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 146: Applicability, helpfulness and experience regarding working from home: "My organization has reassured me that they understand if my work performance suffers"

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 39% (38) of respondents that work in an organisation with 1-9 employees, 36% (203) of respondents that work for an organisation with 10-99 employees, 37% (241) of respondents, working for an organisation with 100-999 employees, 49% (267) of respondents, working for an organisation with 1.000-9.999 employees and 41% (96) of respondents, working for an organisation with 10.000-99.999 employees and 44% (51) of respondents with more than 100,000 employees [89]. (See Table 147)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	38(39%)	203(36%)	241(37%)	267(49%)	96(41%)	51(44%)
Not applicable	60(61%)	363(64%)	416(63%)	273(51%)	140(59%)	65(56%)

Table 147: Applicability and organisation size: "My organization has reassured me that they understand if my work performance suffers"

According to the data set from the survey by Ralph et al., 50% (49) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 49% (278) of respondents that work for an organisation with 10-99 employees, 48% (313) of respondents, working for an organisation with 100-999 employees, 47% (254) of respondents, working for an organisation with 1.000-9.999 employees, 44% (104) of respondents, working for an organisation with 10.000-99.999 employees and 44% (51) of respondents with more than 100,000 employees [89]. (See Table 148)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	49(50%)	278(49%)	313(48%)	254(47%)	104(44%)	51(44%)
Not helpful	49(50%)	288(51%)	344(52%)	286(53%)	132(56%)	65(56%)

Table 148: Helpfulness and organisation size: "My organization has reassured me that they understand if my work performance suffers"

Out of the 38 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 29% (11) considered this measure to be helpful. 63% (38) of the 60 respondents, working in an organisation with 1-9 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 203 respondents, working in an organisation with 10-99 employees, that indicated that the statement was applicable to them, 23% (47) considered this measure to be helpful. 64% (231) of the 363 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 241 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 29% (69) considered this measure to be helpful. 59% (244) of the 416 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 267 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 27% (73) considered this measure to be helpful. 66% (181) of the 273 respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 96 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 26% (25) considered this measure to be helpful. 56% (79) of the 140 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 51 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 25% (13) considered

this measure to be helpful. 58% (38) of the 65 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 149)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	11(29%)	47(23%)	69(29%)	73(27%)	25(26%)	13(25%)
Applicable	Not helpful	27(71%)	156(77%)	172(71%)	194(73%)	71(74%)	38(75%)
Not applicable	Helpful	38(63%)	231(64%)	244(59%)	181(66%)	79(56%)	38(58%)
Not applicable	Not helpful	22(37%)	132(36%)	172(41%)	92(34%)	61(44%)	27(42%)

Table 149: Applicability, helpfulness and organisation size: "My organization has reassured me that they understand if my work performance suffers"

At home exercise programs

The statement, "My organization is providing at-home exercise programs" was applicable to 56% (731) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 150)

Applicability	Respondents	%
Applicable	731	56%
Not applicable	580	44%

Table 150: Applicability: "My organization is providing at-home exercise programs"

According to the data set from the pandemic programming paper, by Ralph et al. , 61% (800) of all respondents, considered this measure to be helpful [89]. (See Table 151)

Helpfulness	Respondents	%
Helpful	800	61%
Not helpful	511	39%

Table 151: Helpfulness: "My organization is providing at-home exercise programs"

Out of the 731 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 61% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 152)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	61%
Applicable	Not helpful	283	39%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 152: Applicability and helpfulness: "My organization is providing at-home exercise programs"

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 16% (137) of respondents with 0-5 years of experience, 16% (97) of respondents with 5-10 years of experience, 15% (85) of respondents with 10-15 years of experience and 13% (67) of respondents with more than 15 years of experience [89]. (See Table 153)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	137(16%)	97(16%)	85(15%)	67(13%)
Not applicable	715(84%)	494(84%)	465(85%)	432(87%)

Table 153: Applicability and experience: "My organization is providing at-home exercise programs"

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 45% (380) of respondents with 0-5 years of experience consider this measure to be helpful, so do 42% (247) of respondents with 5-10 years of experience, 40% (221) of respondents with 10-15 years of experience and 38% (192) of respondents with more than 15 years of experience [89]. (See Table 154)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	380(45%)	247(42%)	221(40%)	192(38%)
Not helpful	472(55%)	344(58%)	329(60%)	307(62%)

Table 154: Helpfulness and experience: "My organization is providing at-home exercise programs"

Out of the 137 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 22% (30) considered this measure to be helpful. 49% (350) of the 715 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 97 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 26% (25) considered this measure to be helpful. 45% (222) of the 494 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 85 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 14% (12) considered this measure to be helpful. 45% (209) of the 465 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 67 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 18% (12) considered this measure to be helpful. 42% (180) of the 432 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 155)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	30(22%)	25(26%)	12(14%)	12(18%)
Applicable	Not helpful	107(78%)	72(74%)	73(86%)	55(82%)
Not applicable	Helpful	350(49%)	222(45%)	209(45%)	180(42%)
Not applicable	Not helpful	365(51%)	272(55%)	256(55%)	252(58%)

Table 155: Applicability , helpfulness and experience: "My organization is providing at-home exercise programs"

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 18% (12) of respondents with no experience working from home, 16% (261) of respondents with up to one year of experience working from home, 18% (123) of respondents with 1 to 5 years of experience working from home and 13% (26) of respondents with more than 5 years of experience working from home [89]. (See Table 156)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	12(18%)	261(16%)	123(18%)	26(13%)
Not applicable	55(82%)	1371(84%)	561(82%)	168(87%)

Table 156: Applicability and experience regarding working from home: "My organization is providing at-home exercise programs"

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 51% (34) of respondents with no experience working from home, 42% () of respondents with up to one year of experience working from home, 42% (286) of respondents with 1 to 5 years of experience working from home and 37% (72) of respondents with more than 5 years of experience working from home [89]. (See Table 157)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	34(51%)	683(42%)	286(42%)	72(37%)
Not helpful	33(49%)	949(58%)	398(58%)	122(63%)

Table 157: Helpfulness and experience regarding working from home: "My organization is providing at-home exercise programs"

Out of the 12 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 25% (3) considered this measure to be helpful. 56% (31) of the 55 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 261 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 20% (51) considered this measure to be helpful. 46% (632) of the 1371 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 123 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 18% (22) considered this measure to be helpful. 47% (264) of the 561 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated

that they would have considered this measure to be helpful. Out of the 26 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 8% (2) considered this measure to be helpful. 42% (70) of the 168 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 158)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	3(25%)	51(20%)	22(18%)	2(8%)
Applicable	Not helpful	9(75%)	210(80%)	101(82%)	24(92%)
Not applicable	Helpful	31(56%)	632(46%)	264(47%)	70(42%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 158: Applicability, helpfulness and experience regarding working from home: "My organization is providing at-home exercise programs"

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 4% (4) of respondents that work in an organisation with 1-9 employees, 7% (42) of respondents that work for an organisation with 10-99 employees, 16% (105) of respondents, working for an organisation with 100-999 employees, 22% (117) of respondents, working for an organisation with 1.000-9.999 employees and 24% (56) of respondents, working for an organisation with 10.000-99.999 employees and 22% (25) of respondents with more than 100,000 employees [89]. (See Table 159)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	4(4%)	42(7%)	105(16%)	117(22%)	56(24%)	25(22%)
Not applicable	94(96%)	524(93%)	552(84%)	423(78%)	180(76%)	91(78%)

Table 159: Applicability and organisation size: "My organization is providing at-home exercise programs"

According to the data set from the survey by Ralph et al., 52% (51) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 41% (231) of respondents that work for an organisation with 10-99 employees, 42% (276) of respondents, working for an organisation with 100-999 employees, 41% (223) of respondents, working for an organisation with 1.000-9.999 employees, 38% (89) of respondents, working for an organisation with 10.000-99.999 employees and 38% (44) of respondents with more than 100,000 employees [89]. (See Table 160)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	51(52%)	231(41%)	276(42%)	223(41%)	89(38%)	44(38%)
Not helpful	47(48%)	335(59%)	381(58%)	317(59%)	147(62%)	72(62%)

Table 160: Helpfulness and organisation size: "My organization is providing at-home exercise programs"

Out of the 4 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 25% (1) considered this measure to be helpful. 53% (50) of the 94 respondents, working in an organisation with 1-9 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 42 respondents, working in an organisation with 10-99 employees, that indicated that the statement was applicable to them, 17% (7) considered this measure to be helpful. 43% (224) of the 524 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 105 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 17% (18) considered this measure to be helpful. 47% (258) of the 552 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 117 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 25% (29) considered this measure to be helpful. 46% (194) of the 423 respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 56 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 13% (7) considered this measure to be helpful. 46% (82) of the 180 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 25 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 24% (6) considered this measure to be helpful. 42% (38) of the 91 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 161)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	1(25%)	7(17%)	18(17%)	29(25%)	7(13%)	6(24%)
Applicable	Not helpful	3(75%)	35(83%)	87(83%)	88(75%)	49(88%)	19(76%)
Not applicable	Helpful	50(53%)	224(43%)	258(47%)	194(46%)	82(46%)	38(42%)
Not applicable	Not helpful	44(47%)	300(57%)	294(53%)	229(54%)	98(54%)	53(58%)

Table 161: Applicability, helpfulness and organisation size: "My organization is providing at-home exercise programs"

Communication

The survey by Ralph et al. [89] includes three statements, which we categorized in the category 'Communication'. This category is divided into three themes : 'Continuing to have regular meetings', 'All day open call' and 'Synchronous communication'.

Continuing to have regular meetings

The statement,"My team is continuing to have regular meetings (e.g. via video chat)" was applicable to 77% (1933) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 162)

Applicability	Respondents	%
Applicable	1933	77%
Not applicable	580	23%

Table 162: Applicability: "My team is continuing to have regular meetings (e.g. via video chat)"

According to the data set form the pandemic programming paper, by Ralph et al. , 32% (800) of all respondents, considered this measure to be helpful [89]. (See Table 163)

Helpfulness	Respondents	%
Helpful	800	32%
Not helpful	1713	68%

Table 163: Helpfulness: "My team is continuing to have regular meetings (e.g. via video chat)"

Out of the 1933 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 23% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 164)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	23%
Applicable	Not helpful	1485	77%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 164: Applicability and helpfulness: "My team is continuing to have regular meetings (e.g. via video chat)"

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 89% (762) of respondents with 0-5 years of experience, 90% (530) of respondents with 5-10 years of experience, 90%

(495) of respondents with 10-15 years of experience and 88% (439) of respondents with more than 15 years of experience [89]. (See Table 165)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	762(89%)	530(90%)	495(90%)	439(88%)
Not applicable	90(11%)	61(10%)	55(10%)	60(12%)

Table 165: Applicability and experience: "My team is continuing to have regular meetings (e.g. via video chat)"

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 31% (265) of respondents with 0-5 years of experience consider this measure to be helpful, so do 30% (176) of respondents with 5-10 years of experience, 27% (150) of respondents with 10-15 years of experience and 24% (121) of respondents with more then 15 years of experience [89]. (See Table 166)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	265(31%)	176(30%)	150(27%)	121(24%)
Not helpful	587(69%)	415(70%)	400(73%)	378(76%)

Table 166: Helpfulness and experience: "My team is continuing to have regular meetings (e.g. via video chat)"

Out of the 762 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 27% (208) considered this measure to be helpful. 63% (57) of the 90 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 530 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 27% (145) considered this measure to be helpful. 51% (31) of the 61 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 495 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 23% (116) considered this measure to be helpful. 62% (34) of the 55 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 439 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 20% (87) considered this measure to be helpful. 57% (34) of the 60 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 167)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	208(27%)	145(27%)	116(23%)	87(20%)
Applicable	Not helpful	554(73%)	385(73%)	379(77%)	352(80%)
Not applicable	Helpful	57(63%)	31(51%)	34(62%)	34(57%)
Not applicable	Not helpful	33(37%)	30(49%)	21(38%)	26(43%)

Table 167: Applicability , helpfulness and experience: "My team is continuing to have regular meetings (e.g. via video chat)"

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 82% (55) of respondents with no experience working from home, 89% (1455) of respondents with up to one year of experience working from home, 90% (613) of respondents with 1 to 5 years of experience working from home and 87% (169) of respondents with more than 5 years of experience working from home [89]. (See Table 168)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	55(82%)	1455(89%)	613(90%)	169(87%)
Not applicable	12(18%)	177(11%)	71(10%)	25(13%)

Table 168: Applicability and experience regarding working from home: "My team is continuing to have regular meetings (e.g. via video chat)"

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 25% (17) of respondents with no experience working from home, 29% () of respondents with up to one year of experience working from home, 26% (180) of respondents with 1 to 5 years of experience working from home and 25% (48) of respondents with more than 5 years of experience working from home [89]. (See Table 169)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	17(25%)	475(29%)	180(26%)	48(25%)
Not helpful	50(75%)	1157(71%)	504(74%)	146(75%)

Table 169: Helpfulness and experience regarding working from home: "My team is continuing to have regular meetings (e.g. via video chat)"

Out of the 55 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 18% (10) considered this measure to be helpful. 58% (7) of the 12 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 1455 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 26% (377) considered this measure to be helpful. 55% (98) of the 177 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 613 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 22% (137) considered this measure to be helpful. 61% (43) of the 71 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated

that they would have considered this measure to be helpful. Out of the 169 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 20% (33) considered this measure to be helpful. 60% (15) of the 25 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 170)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	10(18%)	377(26%)	137(22%)	33(20%)
Applicable	Not helpful	45(82%)	1078(74%)	476(78%)	136(80%)
Not applicable	Helpful	7(58%)	98(55%)	43(61%)	15(60%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 170: Applicability, helpfulness and experience regarding working from home: "My team is continuing to have regular meetings (e.g. via video chat)"

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 76% (74) of respondents that work in an organisation with 1-9 employees, 85% (482) of respondents that work for an organisation with 10-99 employees, 90% (593) of respondents, working for an organisation with 100-999 employees, 92% (495) of respondents, working for an organisation with 1.000-9.999 employees and 92% (217) of respondents, working for an organisation with 10.000-99.999 employees and 93% (108) of respondents with more than 100,000 employees [89]. (See Table 171)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	74(76%)	482(85%)	593(90%)	495(92%)	217(92%)	108(93%)
Not applicable	24(24%)	84(15%)	64(10%)	45(8%)	19(8%)	8(7%)

Table 171: Applicability and organisation size: "My team is continuing to have regular meetings (e.g. via video chat)"

According to the data set from the survey by Ralph et al., 33% (32) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 30% (168) of respondents that work for an organisation with 10-99 employees, 26% (171) of respondents, working for an organisation with 100-999 employees, 30% (160) of respondents, working for an organisation with 1.000-9.999 employees, 28% (67) of respondents, working for an organisation with 10.000-99.999 employees and 28% (33) of respondents with more than 100,000 employees [89]. (See Table 172)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	32(33%)	168(30%)	171(26%)	160(30%)	67(28%)	33(28%)
Not helpful	66(67%)	398(70%)	486(74%)	380(70%)	169(72%)	83(72%)

Table 172: Helpfulness and organisation size: "My team is continuing to have regular meetings (e.g. via video chat)"

Out of the 74 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 27% (20) considered this measure to be helpful. 50% (12) of the 24 respondents, working in an organisation with 1-9 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 482 respondents, working in an organisation with 10-99 employees, that indicated that the statement was applicable to them, 24% (117) considered this measure to be helpful. 61% (51) of the 84 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 593 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 24% (144) considered this measure to be helpful. 42% (27) of the 64 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 495 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 26% (129) considered this measure to be helpful. 69% (31) of the 45 respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 217 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 25% (54) considered this measure to be helpful. 68% (13) of the 19 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 108 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 25% (27) considered this measure to be helpful. 75% (6) of the 8 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 173)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	20(27%)	117(24%)	144(24%)	129(26%)	54(25%)	27(25%)
Applicable	Not helpful	54(73%)	365(76%)	449(76%)	366(74%)	163(75%)	81(75%)
Not applicable	Helpful	12(50%)	51(61%)	27(42%)	31(69%)	13(68%)	6(75%)
Not applicable	Not helpful	12(50%)	33(39%)	37(58%)	14(31%)	6(32%)	2(25%)

Table 173: Applicability, helpfulness and organisation size: "My team is continuing to have regular meetings (e.g. via video chat)"

All day open call

The statement, "For most of the day, I work with an open video or audio call to some or all of my team." was applicable to 62% (963) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 174)

Applicability	Respondents	%
Applicable	963	62%
Not applicable	580	38%

Table 174: Applicability: "For most of the day, I work with an open video or audio call to some or all of my team."

According to the data set from the pandemic programming paper, by Ralph et al. , 52% (800) of all respondents, considered this measure to be helpful [89]. (See Table 175)

Helpfulness	Respondents	%
Helpful	800	52%
Not helpful	743	48%

Table 175: Helpfulness: "For most of the day, I work with an open video or audio call to some or all of my team."

Out of the 963 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 47% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 176)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	47%
Applicable	Not helpful	515	53%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 176: Applicability and helpfulness: "For most of the day, I work with an open video or audio call to some or all of my team."

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 26% (225) of respondents with 0-5 years of experience, 27% (159) of respondents with 5-10 years of experience, 27% (146) of respondents with 10-15 years of experience and 25% (127) of respondents with more than 15 years of experience [89]. (See Table 177)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	225(26%)	159(27%)	146(27%)	127(25%)
Not applicable	627(74%)	432(73%)	404(73%)	372(75%)

Table 177: Applicability and experience: "For most of the day, I work with an open video or audio call to some or all of my team."

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 25% (213) of respondents with 0-5 years of

experience consider this measure to be helpful, so do 22% (130) of respondents with 5-10 years of experience, 26% (144) of respondents with 10-15 years of experience and 19% (97) of respondents with more than 15 years of experience [89]. (See Table 178)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	213(25%)	130(22%)	144(26%)	97(19%)
Not helpful	639(75%)	461(78%)	406(74%)	402(81%)

Table 178: Helpfulness and experience: "For most of the day, I work with an open video or audio call to some or all of my team."

Out of the 225 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 14% (32) considered this measure to be helpful. 29% (181) of the 627 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 159 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 18% (28) considered this measure to be helpful. 24% (102) of the 432 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 146 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 11% (16) considered this measure to be helpful. 32% (128) of the 404 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 127 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 10% (13) considered this measure to be helpful. 23% (84) of the 372 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 179)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	32(14%)	28(18%)	16(11%)	13(10%)
Applicable	Not helpful	193(86%)	131(82%)	130(89%)	114(90%)
Not applicable	Helpful	181(29%)	102(24%)	128(32%)	84(23%)
Not applicable	Not helpful	446(71%)	330(76%)	276(68%)	288(77%)

Table 179: Applicability , helpfulness and experience: "For most of the day, I work with an open video or audio call to some or all of my team."

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 48% (32) of respondents with no experience working from home, 27% (434) of respondents with up to one year of experience working from home, 30% (202) of respondents with 1 to 5 years of experience working from home and 26% (50) of respondents with more than 5 years of experience working from home [89]. (See Table 180)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	32(48%)	434(27%)	202(30%)	50(26%)
Not applicable	35(52%)	1198(73%)	482(70%)	144(74%)

Table 180: Applicability and experience regarding working from home: "For most of the day, I work with an open video or audio call to some or all of my team."

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 34% (23) of respondents with no experience working from home, 23% () of respondents with up to one year of experience working from home, 24% (166) of respondents with 1 to 5 years of experience working from home and 20% (39) of respondents with more than 5 years of experience working from home [89]. (See Table 181)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	23(34%)	380(23%)	166(24%)	39(20%)
Not helpful	44(66%)	1252(77%)	518(76%)	155(80%)

Table 181: Helpfulness and experience regarding working from home: "For most of the day, I work with an open video or audio call to some or all of my team."

Out of the 32 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 19% (6) considered this measure to be helpful. 49% (17) of the 35 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 434 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 14% (61) considered this measure to be helpful. 27% (319) of the 1198 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 202 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 10% (20) considered this measure to be helpful. 30% (146) of the 482 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 50 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 10% (5) considered this measure to be helpful. 24% (34) of the 144 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 182)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	6(19%)	61(14%)	20(10%)	5(10%)
Applicable	Not helpful	26(81%)	373(86%)	182(90%)	45(90%)
Not applicable	Helpful	17(49%)	319(27%)	146(30%)	34(24%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 182: Applicability, helpfulness and experience regarding working from home: "For most of the day, I work with an open video or audio call to some or all of my team."

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 28% (27)

of respondents that work in an organisation with 1-9 employees, 27% (154) of respondents that work for an organisation with 10-99 employees, 25% (166) of respondents, working for an organisation with 100-999 employees, 27% (144) of respondents, working for an organisation with 1.000-9.999 employees and 30% (70) of respondents, working for an organisation with 10.000-99.999 employees and 23% (27) of respondents with more than 100,000 employees [89]. (See Table 183)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	27(28%)	154(27%)	166(25%)	144(27%)	70(30%)	27(23%)
Not applicable	71(72%)	412(73%)	491(75%)	396(73%)	166(70%)	89(77%)

Table 183: Applicability and organisation size: "For most of the day, I work with an open video or audio call to some or all of my team."

According to the data set from the survey by Ralph et al., 40% (39) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 23% (128) of respondents that work for an organisation with 10-99 employees, 23% (149) of respondents, working for an organisation with 100-999 employees, 22% (121) of respondents, working for an organisation with 1.000-9.999 employees, 24% (57) of respondents, working for an organisation with 10.000-99.999 employees and 20% (23) of respondents with more than 100,000 employees [89]. (See Table 184)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	39(40%)	128(23%)	149(23%)	121(22%)	57(24%)	23(20%)
Not helpful	59(60%)	438(77%)	508(77%)	419(78%)	179(76%)	93(80%)

Table 184: Helpfulness and organisation size: "For most of the day, I work with an open video or audio call to some or all of my team."

Out of the 27 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 15% (4) considered this measure to be helpful. 49% (35) of the 71 respondents, working in an organisation with 1-9 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 154 respondents, working in an organisation with 10-99 employees, that indicated that the statement was applicable to them, 13% (20) considered this measure to be helpful. 26% (108) of the 412 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 166 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 14% (24) considered this measure to be helpful. 25% (125) of the 491 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 144 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 14% (20) considered this measure to be helpful. 26% (101) of the 396

respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 70 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 13% (9) considered this measure to be helpful. 29% (48) of the 166 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful . Out of the 27 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 4% (1) considered this measure to be helpful. 25% (22) of the 89 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 185)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	4(15%)	20(13%)	24(14%)	20(14%)	9(13%)	1(4%)
Applicable	Not helpful	23(85%)	134(87%)	142(86%)	124(86%)	61(87%)	26(96%)
Not applicable	Helpful	35(49%)	108(26%)	125(25%)	101(26%)	48(29%)	22(25%)
Not applicable	Not helpful	36(51%)	304(74%)	366(75%)	295(74%)	118(71%)	67(75%)

Table 185: Applicability, helpfulness and organisation size: "For most of the day, I work with an open video or audio call to some or all of my team."

Synchronous communication

The statement," My team is avoiding synchronous communication (e.g. video chat)" was applicable to 55% (716) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 186)

Applicability	Respondents	%
Applicable	716	55%
Not applicable	580	45%

Table 186: Applicability: "My team is avoiding synchronous communication (e.g. video chat)"

According to the data set form the pandemic programming paper, by Ralph et al. , 62% (800) of all respondents, considered this measure to be helpful [89]. (See Table 187)

Helpfulness	Respondents	%
Helpful	800	62%
Not helpful	496	38%

Table 187: Helpfulness: "My team is avoiding synchronous communication (e.g. video chat)"

Out of the 716 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 63% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 188)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	63%
Applicable	Not helpful	268	37%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 188: Applicability and helpfulness: "My team is avoiding synchronous communication (e.g. video chat)"

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 14% (117) of respondents with 0-5 years of experience, 14% (81) of respondents with 5-10 years of experience, 16% (90) of respondents with 10-15 years of experience and 14% (70) of respondents with more than 15 years of experience [89]. (See Table 189)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	117(14%)	81(14%)	90(16%)	70(14%)
Not applicable	735(86%)	510(86%)	460(84%)	429(86%)

Table 189: Applicability and experience: "My team is avoiding synchronous communication (e.g. video chat)"

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 25% (212) of respondents with 0-5 years of experience consider this measure to be helpful, so do 26% (155) of respondents with 5-10 years of experience, 27% (150) of respondents with 10-15 years of experience and 24% (120) of respondents with more than 15 years of experience [89]. (See Table 190)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	212(25%)	155(26%)	150(27%)	120(24%)
Not helpful	640(75%)	436(74%)	400(73%)	379(76%)

Table 190: Helpfulness and experience: "My team is avoiding synchronous communication (e.g. video chat)"

Out of the 117 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 15% (17) considered this measure to be helpful. 27% (195) of the 735 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 81 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 25% (20) considered this measure to be helpful. 26% (135) of the 510 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 90 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 11% (10) considered this measure to be helpful. 30% (140) of the 460 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered

this measure to be helpful. Out of the 70 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 13% (9) considered this measure to be helpful. 26% (111) of the 429 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 191)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	17(15%)	20(25%)	10(11%)	9(13%)
Applicable	Not helpful	100(85%)	61(75%)	80(89%)	61(87%)
Not applicable	Helpful	195(27%)	135(26%)	140(30%)	111(26%)
Not applicable	Not helpful	540(73%)	375(74%)	320(70%)	318(74%)

Table 191: Applicability , helpfulness and experience: "My team is avoiding synchronous communication (e.g. video chat)"

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 19% (13) of respondents with no experience working from home, 14% (228) of respondents with up to one year of experience working from home, 18% (120) of respondents with 1 to 5 years of experience working from home and 15% (30) of respondents with more than 5 years of experience working from home [89]. (See Table 192)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	13(19%)	228(14%)	120(18%)	30(15%)
Not applicable	54(81%)	1404(86%)	564(82%)	164(85%)

Table 192: Applicability and experience regarding working from home: "My team is avoiding synchronous communication (e.g. video chat)"

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 37% (25) of respondents with no experience working from home, 25% () of respondents with up to one year of experience working from home, 27% (183) of respondents with 1 to 5 years of experience working from home and 25% (48) of respondents with more than 5 years of experience working from home [89]. (See Table 193)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	25(37%)	411(25%)	183(27%)	48(25%)
Not helpful	42(63%)	1221(75%)	501(73%)	146(75%)

Table 193: Helpfulness and experience regarding working from home: "My team is avoiding synchronous communication (e.g. video chat)"

Out of the 13 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 8% (1) considered this measure to be helpful. 44% (24) of the 54 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful.

Out of the 228 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 14% (32) considered this measure to be helpful. 27% (379) of the 1404 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 120 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 16% (19) considered this measure to be helpful. 29% (164) of the 564 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 30 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 13% (4) considered this measure to be helpful. 27% (44) of the 164 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 194)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	1(8%)	32(14%)	19(16%)	4(13%)
Applicable	Not helpful	12(92%)	196(86%)	101(84%)	26(87%)
Not applicable	Helpful	24(44%)	379(27%)	164(29%)	44(27%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 194: Applicability, helpfulness and experience regarding working from home: "My team is avoiding synchronous communication (e.g. video chat)"

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 18% (18) of respondents that work in an organisation with 1-9 employees, 17% (95) of respondents that work for an organisation with 10-99 employees, 13% (85) of respondents, working for an organisation with 100-999 employees, 12% (66) of respondents, working for an organisation with 1.000-9.999 employees and 14% (34) of respondents, working for an organisation with 10.000-99.999 employees and 16% (18) of respondents with more than 100,000 employees [89]. (See Table 195)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	18(18%)	95(17%)	85(13%)	66(12%)	34(14%)	18(16%)
Not applicable	80(82%)	471(83%)	572(87%)	474(88%)	202(86%)	98(84%)

Table 195: Applicability and organisation size: "My team is avoiding synchronous communication (e.g. video chat)"

According to the data set from the survey by Ralph et al., 30% (29) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 25% (144) of respondents that work for an organisation with 10-99 employees, 25% (162) of respondents, working for an organisation with 100-999 employees, 26% (142) of respondents, working for an organisation with 1.000-9.999 employees, 27% (63) of respondents, working for an organisation with 10.000-99.999 employees and 22% (26) of respondents with more than 100,000 employees [89]. (See Table 196)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	29(30%)	144(25%)	162(25%)	142(26%)	63(27%)	26(22%)
Not helpful	69(70%)	422(75%)	495(75%)	398(74%)	173(73%)	90(78%)

Table 196: Helpfulness and organisation size: "My team is avoiding synchronous communication (e.g. video chat)"

Out of the 18 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 6% (1) considered this measure to be helpful. 35% (28) of the 80 respondents, working in an organisation with 1-9 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 95 respondents, working in an organisation with 10-99 employees, that indicated that the statement was applicable to them, 23% (22) considered this measure to be helpful. 26% (122) of the 471 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 85 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 12% (10) considered this measure to be helpful. 27% (152) of the 572 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 66 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 23% (15) considered this measure to be helpful. 27% (127) of the 474 respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 34 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 3% (1) considered this measure to be helpful. 31% (62) of the 202 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 18 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 6% (1) considered this measure to be helpful. 26% (25) of the 98 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 197)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	1(6%)	22(23%)	10(12%)	15(23%)	1(3%)	1(6%)
Applicable	Not helpful	17(94%)	73(77%)	75(88%)	51(77%)	33(97%)	17(94%)
Not applicable	Helpful	28(35%)	122(26%)	152(27%)	127(27%)	62(31%)	25(26%)
Not applicable	Not helpful	52(65%)	349(74%)	420(73%)	347(73%)	140(69%)	73(74%)

Table 197: Applicability, helpfulness and organisation size: "My team is avoiding synchronous communication (e.g. video chat)"

Cohesion

The survey by Ralph et al. [89] includes three statements, which we categorized in the category 'Cohesion'. This category is divided into three themes : 'Sending food to staff', 'Virtual social events' and 'Encouraging staff to touch base regularly'.

Sending food to staff

The statement," My organization is sending food to staff working from home" was applicable to 47% (518) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 198)

Applicability	Respondents	%
Applicable	518	47%
Not applicable	580	53%

Table 198: Applicability: "My organization is sending food to staff working from home"

According to the data set form the pandemic programming paper, by Ralph et al. , 73% (800) of all respondents, considered this measure to be helpful [89]. (See Table 199)

Helpfulness	Respondents	%
Helpful	800	73%
Not helpful	298	27%

Table 199: Helpfulness: "My organization is sending food to staff working from home"

Out of the 518 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 86% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 200)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	86%
Applicable	Not helpful	70	14%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 200: Applicability and helpfulness: "My organization is sending food to staff working from home"

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 5% (45) of respondents with 0-5 years of experience, 6% (33) of respondents with 5-10 years of experience, 2% (13) of respondents with 10-15 years of experience and 2% (10) of respondents with more than 15 years of experience [89]. (See Table 201)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	45(5%)	33(6%)	13(2%)	10(2%)
Not applicable	807(95%)	558(94%)	537(98%)	489(98%)

Table 201: Applicability and experience: "My organization is sending food to staff working from home"

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 49% (418) of respondents with 0-5 years of experience consider this measure to be helpful, so do 44% (261) of respondents with 5-10 years of experience, 46% (251) of respondents with 10-15 years of experience and 38% (190) of respondents with more than 15 years of experience [89]. (See Table 202)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	418(49%)	261(44%)	251(46%)	190(38%)
Not helpful	434(51%)	330(56%)	299(54%)	309(62%)

Table 202: Helpfulness and experience: "My organization is sending food to staff working from home"

Out of the 45 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 31% (14) considered this measure to be helpful. 50% (404) of the 807 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 33 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 24% (8) considered this measure to be helpful. 45% (253) of the 558 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 13 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 8% (1) considered this measure to be helpful. 47% (250) of the 537 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 10 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 0% (0) considered this measure to be helpful. 39% (190) of the 489 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 203)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	14(31%)	8(24%)	1(8%)	0(0%)
Applicable	Not helpful	31(69%)	25(76%)	12(92%)	10(100%)
Not applicable	Helpful	404(50%)	253(45%)	250(47%)	190(39%)
Not applicable	Not helpful	403(50%)	305(55%)	287(53%)	299(61%)

Table 203: Applicability , helpfulness and experience: "My organization is sending food to staff working from home"

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 4% (3) of respondents with no experience working from home, 4% (65) of respondents with up to one year of experience working from home, 5% (33) of respondents with 1 to 5 years of experience working from home and 3% (5) of respondents with more than 5 years of experience working from home [89]. (See Table 204)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	3(4%)	65(4%)	33(5%)	5(3%)
Not applicable	64(96%)	1567(96%)	651(95%)	189(97%)

Table 204: Applicability and experience regarding working from home: "My organization is sending food to staff working from home"

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 55% (37) of respondents with no experience working from home, 45% () of respondents with up to one year of experience working from home, 46% (315) of respondents with 1 to 5 years of experience working from home and 41% (80) of respondents with more than 5 years of experience working from home [89]. (See Table 205)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	37(55%)	733(45%)	315(46%)	80(41%)
Not helpful	30(45%)	899(55%)	369(54%)	114(59%)

Table 205: Helpfulness and experience regarding working from home: "My organization is sending food to staff working from home"

Out of the 3 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 0% (0) considered this measure to be helpful. 58% (37) of the 64 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 65 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 22% (14) considered this measure to be helpful. 46% (719) of the 1567 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 33 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 24% (8) considered this measure to be helpful. 47% (307) of the 651 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 5 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 0% (0) considered this measure to be helpful. 42% (80) of the 189 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 206)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	0(0%)	14(22%)	8(24%)	0(0%)
Applicable	Not helpful	3(100%)	51(78%)	25(76%)	5(100%)
Not applicable	Helpful	37(58%)	719(46%)	307(47%)	80(42%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 206: Applicability, helpfulness and experience regarding working from home: "My organization is sending food to staff working from home"

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 4% (4) of respondents that work in an organisation with 1-9 employees, 2% (11) of respondents that work for an organisation with 10-99 employees, 2% (16) of respondents, working for an organisation with 100-999 employees, 4% (24) of respondents, working for an organisation with 1.000-9.999 employees and 12% (28) of respondents, working for an organisation with 10.000-99.999 employees and 3% (4) of respondents with more than 100,000 employees [89]. (See Table 207)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	4(4%)	11(2%)	16(2%)	24(4%)	28(12%)	4(3%)
Not applicable	94(96%)	555(98%)	641(98%)	516(96%)	208(88%)	112(97%)

Table 207: Applicability and organisation size: "My organization is sending food to staff working from home"

According to the data set from the survey by Ralph et al., 52% (51) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 42% (236) of respondents that work for an organisation with 10-99 employees, 44% (291) of respondents, working for an organisation with 100-999 employees, 46% (247) of respondents, working for an organisation with 1.000-9.999 employees, 46% (109) of respondents, working for an organisation with 10.000-99.999 employees and 45% (52) of respondents with more than 100,000 employees [89]. (See Table 208)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	51(52%)	236(42%)	291(44%)	247(46%)	109(46%)	52(45%)
Not helpful	47(48%)	330(58%)	366(56%)	293(54%)	127(54%)	64(55%)

Table 208: Helpfulness and organisation size: "My organization is sending food to staff working from home"

Out of the 4 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 0% (0) considered this measure to be helpful. 54% (51) of the 94 respondents, working in an organisation with 1-9 employees, to whom the statement did not apply, indicated that they would have considered

this measure to be helpful. Out of the 11 respondents, working in an organisation with 10-99 employees, that indicated that the statement was applicable to them, 27% (3) considered this measure to be helpful. 42% (233) of the 555 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 16 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 13% (2) considered this measure to be helpful. 45% (289) of the 641 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 24 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 8% (2) considered this measure to be helpful. 47% (245) of the 516 respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 28 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 39% (11) considered this measure to be helpful. 47% (98) of the 208 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 4 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 0% (0) considered this measure to be helpful. 46% (52) of the 112 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 209)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	0(0%)	3(27%)	2(13%)	2(8%)	11(39%)	0(0%)
Applicable	Not helpful	4(100%)	8(73%)	14(88%)	22(92%)	17(61%)	4(100%)
Not applicable	Helpful	51(54%)	233(42%)	289(45%)	245(47%)	98(47%)	52(46%)
Not applicable	Not helpful	43(46%)	322(58%)	352(55%)	271(53%)	110(53%)	60(54%)

Table 209: Applicability, helpfulness and organisation size: "My organization is sending food to staff working from home"

Virtual social events

The statement, "My team is having virtual social events (e.g. via video chat)" was applicable to 71% (1415) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 210)

Applicability	Respondents	%
Applicable	1415	71%
Not applicable	580	29%

Table 210: Applicability: "My team is having virtual social events (e.g. via video chat)"

According to the data set from the pandemic programming paper, by Ralph et al. , 40% (800) of all respondents, considered this measure to be helpful [89]. (See Table 211)

Helpfulness	Respondents	%
Helpful	800	40%
Not helpful	1195	60%

Table 211: Helpfulness: "My team is having virtual social events (e.g. via video chat)"

Out of the 1415 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 32% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 212)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	32%
Applicable	Not helpful	967	68%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 212: Applicability and helpfulness: "My team is having virtual social events (e.g. via video chat)"

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 55% (471) of respondents with 0-5 years of experience, 54% (322) of respondents with 5-10 years of experience, 60% (331) of respondents with 10-15 years of experience and 57% (286) of respondents with more than 15 years of experience [89]. (See Table 213)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	471(55%)	322(54%)	331(60%)	286(57%)
Not applicable	381(45%)	269(46%)	219(40%)	213(43%)

Table 213: Applicability and experience: "My team is having virtual social events (e.g. via video chat)"

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 35% (295) of respondents with 0-5 years of experience consider this measure to be helpful, so do 32% (189) of respondents with 5-10 years of experience, 32% (176) of respondents with 10-15 years of experience and 27% (134) of respondents with more than 15 years of experience [89]. (See Table 214)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	295(35%)	189(32%)	176(32%)	134(27%)
Not helpful	557(65%)	402(68%)	374(68%)	365(73%)

Table 214: Helpfulness and experience: "My team is having virtual social events (e.g. via video chat)"

Out of the 471 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 25% (118) considered this measure to be helpful. 46% (177) of the 381 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 322 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 26% (85) considered this measure to be helpful. 39% (104) of the 269 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 331 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 21% (70) considered this measure to be helpful. 48% (106) of the 219 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 286 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 16% (46) considered this measure to be helpful. 41% (88) of the 213 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 215)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	118(25%)	85(26%)	70(21%)	46(16%)
Applicable	Not helpful	353(75%)	237(74%)	261(79%)	240(84%)
Not applicable	Helpful	177(46%)	104(39%)	106(48%)	88(41%)
Not applicable	Not helpful	204(54%)	165(61%)	113(52%)	125(59%)

Table 215: Applicability , helpfulness and experience: "My team is having virtual social events (e.g. via video chat)"

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 51% (34) of respondents with no experience working from home, 54% (888) of respondents with up to one year of experience working from home, 60% (407) of respondents with 1 to 5 years of experience working from home and 61% (119) of respondents with more than 5 years of experience working from home [89]. (See Table 216)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	34(51%)	888(54%)	407(60%)	119(61%)
Not applicable	33(49%)	744(46%)	277(40%)	75(39%)

Table 216: Applicability and experience regarding working from home: "My team is having virtual social events (e.g. via video chat)"

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 34% (23) of respondents with no experience working from home, 33% () of respondents with up to one year of experience working from home, 30% (204) of respondents with 1 to 5 years of experience working from home and 25% (49) of respondents with more than 5 years of experience working from home [89]. (See Table 217)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	23(34%)	537(33%)	204(30%)	49(25%)
Not helpful	44(66%)	1095(67%)	480(70%)	145(75%)

Table 217: Helpfulness and experience regarding working from home: "My team is having virtual social events (e.g. via video chat)"

Out of the 34 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 15% (5) considered this measure to be helpful. 55% (18) of the 33 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 888 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 24% (209) considered this measure to be helpful. 44% (328) of the 744 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 407 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 21% (84) considered this measure to be helpful. 43% (120) of the 277 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 119 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 13% (15) considered this measure to be helpful. 45% (34) of the 75 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 218)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	5(15%)	209(24%)	84(21%)	15(13%)
Applicable	Not helpful	29(85%)	679(76%)	323(79%)	104(87%)
Not applicable	Helpful	18(55%)	328(44%)	120(43%)	34(45%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 218: Applicability, helpfulness and experience regarding working from home: "My team is having virtual social events (e.g. via video chat)"

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 42% (41) of respondents that work in an organisation with 1-9 employees, 51% (286) of respondents that work for an organisation with 10-99 employees, 57% (377) of respondents, working for an organisation with 100-999 employees, 62% (337) of respondents, working for an organisation with 1.000-9.999 employees and 54% (128) of respondents, working for an organisation with 10.000-99.999 employees and 62% (72) of respondents with more than 100,000 employees [89]. (See Table 219)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	41(42%)	286(51%)	377(57%)	337(62%)	128(54%)	72(62%)
Not applicable	57(58%)	280(49%)	280(43%)	203(38%)	108(46%)	44(38%)

Table 219: Applicability and organisation size: "My team is having virtual social events (e.g. via video chat)"

According to the data set from the survey by Ralph et al., 42% (41) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 33% (184) of respondents that work for an organisation with 10-99 employees, 29% (192) of respondents, working for an organisation with 100-999 employees, 34% (181) of respondents, working for an organisation with 1.000-9.999 employees, 34% (81) of respondents, working for an organisation with 10.000-99.999 employees and 28% (33) of respondents with more than 100,000 employees [89]. (See Table 220)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	41(42%)	184(33%)	192(29%)	181(34%)	81(34%)	33(28%)
Not helpful	57(58%)	382(67%)	465(71%)	359(66%)	155(66%)	83(72%)

Table 220: Helpfulness and organisation size: "My team is having virtual social events (e.g. via video chat)"

Out of the 41 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 29% (12) considered this measure to be helpful. 51% (29) of the 57 respondents, working in an organisation with 1-9 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 286 respondents, working in an organisation with 10-99 employees, that indicated that the statement was applicable to them, 21% (61) considered this measure to be helpful. 44% (123) of the 280 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 377 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 21% (81) considered this measure to be helpful. 40% (111) of the 280 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 337 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 25% (84) considered this measure to be helpful. 48% (97) of the 203 respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 128 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 23% (30) considered this measure to be helpful. 47% (51) of the 108 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 72 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 18% (13) considered

this measure to be helpful. 45% (20) of the 44 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 221)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	12(29%)	61(21%)	81(21%)	84(25%)	30(23%)	13(18%)
Applicable	Not helpful	29(71%)	225(79%)	296(79%)	253(75%)	98(77%)	59(82%)
Not applicable	Helpful	29(51%)	123(44%)	111(40%)	97(48%)	51(47%)	20(45%)
Not applicable	Not helpful	28(49%)	157(56%)	169(60%)	106(52%)	57(53%)	24(55%)

Table 221: Applicability, helpfulness and organisation size: "My team is having virtual social events (e.g. via video chat)"

Encouraging staff to touch base regularly

The statement, "My organization is encouraging staff to touch base regularly with each other" was applicable to 72% (1520) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 222)

Applicability	Respondents	%
Applicable	1520	72%
Not applicable	580	28%

Table 222: Applicability: "My organization is encouraging staff to touch base regularly with each other"

According to the data set from the pandemic programming paper, by Ralph et al. , 38% (800) of all respondents, considered this measure to be helpful [89]. (See Table 223)

Helpfulness	Respondents	%
Helpful	800	38%
Not helpful	1300	62%

Table 223: Helpfulness: "My organization is encouraging staff to touch base regularly with each other"

Out of the 1520 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 29% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 224)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	29%
Applicable	Not helpful	1072	71%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 224: Applicability and helpfulness: "My organization is encouraging staff to touch base regularly with each other"

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 65% (553) of respondents with 0-5 years of experience, 61% (363) of respondents with 5-10 years of experience, 61% (336) of respondents with 10-15 years of experience and 61% (305) of respondents with more than 15 years of experience [89]. (See Table 225)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	553(65%)	363(61%)	336(61%)	305(61%)
Not applicable	299(35%)	228(39%)	214(39%)	194(39%)

Table 225: Applicability and experience: "My organization is encouraging staff to touch base regularly with each other"

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 31% (262) of respondents with 0-5 years of experience consider this measure to be helpful, so do 31% (185) of respondents with 5-10 years of experience, 34% (187) of respondents with 10-15 years of experience and 27% (137) of respondents with more than 15 years of experience [89]. (See Table 226)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	262(31%)	185(31%)	187(34%)	137(27%)
Not helpful	590(69%)	406(69%)	363(66%)	362(73%)

Table 226: Helpfulness and experience: "My organization is encouraging staff to touch base regularly with each other"

Out of the 553 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 23% (128) considered this measure to be helpful. 45% (134) of the 299 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 363 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 26% (95) considered this measure to be helpful. 39% (90) of the 228 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 336 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 24% (81) considered this measure to be helpful. 50% (106) of the 214 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 305 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 17% (52) considered this measure to be helpful. 44% (85) of the 194 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 227)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	128(23%)	95(26%)	81(24%)	52(17%)
Applicable	Not helpful	425(77%)	268(74%)	255(76%)	253(83%)
Not applicable	Helpful	134(45%)	90(39%)	106(50%)	85(44%)
Not applicable	Not helpful	165(55%)	138(61%)	108(50%)	109(56%)

Table 227: Applicability , helpfulness and experience: "My organization is encouraging staff to touch base regularly with each other"

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 67% (45) of respondents with no experience working from home, 63% (1031) of respondents with up to one year of experience working from home, 62% (425) of respondents with 1 to 5 years of experience working from home and 58% (112) of respondents with more than 5 years of experience working from home [89]. (See Table 228)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	45(67%)	1031(63%)	425(62%)	112(58%)
Not applicable	22(33%)	601(37%)	259(38%)	82(42%)

Table 228: Applicability and experience regarding working from home: "My organization is encouraging staff to touch base regularly with each other"

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 28% (19) of respondents with no experience working from home, 31% () of respondents with up to one year of experience working from home, 29% (198) of respondents with 1 to 5 years of experience working from home and 28% (54) of respondents with more than 5 years of experience working from home [89]. (See Table 229)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	19(28%)	511(31%)	198(29%)	54(28%)
Not helpful	48(72%)	1121(69%)	486(71%)	140(72%)

Table 229: Helpfulness and experience regarding working from home: "My organization is encouraging staff to touch base regularly with each other"

Out of the 45 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 16% (7) considered this measure to be helpful. 55% (12) of the 22 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 1031 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 24% (245) considered this measure to be helpful. 44% (266) of the 601 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 425 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 20% (84) considered this measure to be helpful. 44% (114) of the 259 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated

that they would have considered this measure to be helpful. Out of the 112 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 17% (19) considered this measure to be helpful. 43% (35) of the 82 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 230)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	7(16%)	245(24%)	84(20%)	19(17%)
Applicable	Not helpful	38(84%)	786(76%)	341(80%)	93(83%)
Not applicable	Helpful	12(55%)	266(44%)	114(44%)	35(43%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 230: Applicability, helpfulness and experience regarding working from home: "My organization is encouraging staff to touch base regularly with each other"

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 52% (51) of respondents that work in an organisation with 1-9 employees, 58% (329) of respondents that work for an organisation with 10-99 employees, 64% (419) of respondents, working for an organisation with 100-999 employees, 66% (354) of respondents, working for an organisation with 1.000-9.999 employees and 61% (143) of respondents, working for an organisation with 10.000-99.999 employees and 72% (84) of respondents with more than 100,000 employees [89]. (See Table 231)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	51(52%)	329(58%)	419(64%)	354(66%)	143(61%)	84(72%)
Not applicable	47(48%)	237(42%)	238(36%)	186(34%)	93(39%)	32(28%)

Table 231: Applicability and organisation size: "My organization is encouraging staff to touch base regularly with each other"

According to the data set from the survey by Ralph et al., 34% (33) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 31% (173) of respondents that work for an organisation with 10-99 employees, 29% (193) of respondents, working for an organisation with 100-999 employees, 30% (162) of respondents, working for an organisation with 1.000-9.999 employees, 36% (86) of respondents, working for an organisation with 10.000-99.999 employees and 30% (35) of respondents with more than 100,000 employees [89]. (See Table 232)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	33(34%)	173(31%)	193(29%)	162(30%)	86(36%)	35(30%)
Not helpful	65(66%)	393(69%)	464(71%)	378(70%)	150(64%)	81(70%)

Table 232: Helpfulness and organisation size: "My organization is encouraging staff to touch base regularly with each other"

Out of the 51 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 24% (12) considered this measure to be helpful. 45% (21) of the 47 respondents, working in an organisation with 1-9 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 329 respondents, working in an organisation with 10-99 employees, that indicated that the statement was applicable to them, 23% (75) considered this measure to be helpful. 41% (98) of the 237 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 419 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 22% (91) considered this measure to be helpful. 43% (102) of the 238 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 354 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 23% (83) considered this measure to be helpful. 42% (79) of the 186 respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 143 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 22% (31) considered this measure to be helpful. 59% (55) of the 93 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 84 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 27% (23) considered this measure to be helpful. 38% (12) of the 32 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 233)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	12(24%)	75(23%)	91(22%)	83(23%)	31(22%)	23(27%)
Applicable	Not helpful	39(76%)	254(77%)	328(78%)	271(77%)	112(78%)	61(73%)
Not applicable	Helpful	21(45%)	98(41%)	102(43%)	79(42%)	55(59%)	12(38%)
Not applicable	Not helpful	26(55%)	139(59%)	136(57%)	107(58%)	38(41%)	20(63%)

Table 233: Applicability, helpfulness and organisation size: "My organization is encouraging staff to touch base regularly with each other"

Technical capabilities

The survey by Ralph et al. [89] includes 1 statement, which we categorized in the category 'Technical capabilities'. This category consists of only one theme : 'Work at home infrastructure'.

Work at home infrastructure

The statement, "My team has good work-from-home infrastructure (e.g. source control, VPN, remote desktop, file sharing)" was applicable to 76% (1844) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 234)

Applicability	Respondents	%
Applicable	1844	76%
Not applicable	580	24%

Table 234: Applicability: "My team has good work-from-home infrastructure (e.g. source control, VPN, remote desktop, file sharing)"

According to the data set form the pandemic programming paper, by Ralph et al. , 33% (800) of all respondents, considered this measure to be helpful [89]. (See Table 235)

Helpfulness	Respondents	%
Helpful	800	33%
Not helpful	1624	67%

Table 235: Helpfulness: "My team has good work-from-home infrastructure (e.g. source control, VPN, remote desktop, file sharing)"

Out of the 1844 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 24% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 236)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	24%
Applicable	Not helpful	1396	76%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 236: Applicability and helpfulness: "My team has good work-from-home infrastructure (e.g. source control, VPN, remote desktop, file sharing)"

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 83% (711) of respondents with 0-5 years of experience, 86% (507) of respondents with 5-10 years of experience, 91%

(503) of respondents with 10-15 years of experience and 87% (432) of respondents with more than 15 years of experience [89]. (See Table 237)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	711(83%)	507(86%)	503(91%)	432(87%)
Not applicable	141(17%)	84(14%)	47(9%)	67(13%)

Table 237: Applicability and experience: "My team has good work-from-home infrastructure (e.g. source control, VPN, remote desktop, file sharing)"

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 35% (298) of respondents with 0-5 years of experience consider this measure to be helpful, so do 34% (201) of respondents with 5-10 years of experience, 31% (168) of respondents with 10-15 years of experience and 28% (138) of respondents with more than 15 years of experience [89]. (See Table 238)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	298(35%)	201(34%)	168(31%)	138(28%)
Not helpful	554(65%)	390(66%)	382(69%)	361(72%)

Table 238: Helpfulness and experience: "My team has good work-from-home infrastructure (e.g. source control, VPN, remote desktop, file sharing)"

Out of the 711 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 30% (210) considered this measure to be helpful. 62% (88) of the 141 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 507 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 29% (146) considered this measure to be helpful. 65% (55) of the 84 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 503 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 27% (135) considered this measure to be helpful. 70% (33) of the 47 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 432 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 21% (92) considered this measure to be helpful. 69% (46) of the 67 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 239)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	210(30%)	146(29%)	135(27%)	92(21%)
Applicable	Not helpful	501(70%)	361(71%)	368(73%)	340(79%)
Not applicable	Helpful	88(62%)	55(65%)	33(70%)	46(69%)
Not applicable	Not helpful	53(38%)	29(35%)	14(30%)	21(31%)

Table 239: Applicability , helpfulness and experience: "My team has good work-from-home infrastructure (e.g. source control, VPN, remote desktop, file sharing)"

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 73% (49) of respondents with no experience working from home, 86% (1401) of respondents with up to one year of experience working from home, 87% (593) of respondents with 1 to 5 years of experience working from home and 86% (167) of respondents with more than 5 years of experience working from home [89]. (See Table 240)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	49(73%)	1401(86%)	593(87%)	167(86%)
Not applicable	18(27%)	231(14%)	91(13%)	27(14%)

Table 240: Applicability and experience regarding working from home: "My team has good work-from-home infrastructure (e.g. source control, VPN, remote desktop, file sharing)"

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 42% (28) of respondents with no experience working from home, 34% () of respondents with up to one year of experience working from home, 30% (203) of respondents with 1 to 5 years of experience working from home and 27% (53) of respondents with more than 5 years of experience working from home [89]. (See Table 241)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	28(42%)	550(34%)	203(30%)	53(27%)
Not helpful	39(58%)	1082(66%)	481(70%)	141(73%)

Table 241: Helpfulness and experience regarding working from home: "My team has good work-from-home infrastructure (e.g. source control, VPN, remote desktop, file sharing)"

Out of the 49 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 29% (14) considered this measure to be helpful. 78% (14) of the 18 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 1401 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 28% (393) considered this measure to be helpful. 68% (157) of the 231 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 593 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 25% (147) considered this measure to be helpful. 62% (56) of the 91 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated

that they would have considered this measure to be helpful. Out of the 167 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 21% (35) considered this measure to be helpful. 67% (18) of the 27 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 242)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	14(29%)	393(28%)	147(25%)	35(21%)
Applicable	Not helpful	35(71%)	1008(72%)	446(75%)	132(79%)
Not applicable	Helpful	14(78%)	157(68%)	56(62%)	18(67%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 242: Applicability, helpfulness and experience regarding working from home: "My team has good work-from-home infrastructure (e.g. source control, VPN, remote desktop, file sharing)"

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 68% (67) of respondents that work in an organisation with 1-9 employees, 83% (470) of respondents that work for an organisation with 10-99 employees, 88% (575) of respondents, working for an organisation with 100-999 employees, 91% (489) of respondents, working for an organisation with 1.000-9.999 employees and 87% (206) of respondents, working for an organisation with 10.000-99.999 employees and 91% (105) of respondents with more than 100,000 employees [89]. (See Table 243)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	67(68%)	470(83%)	575(88%)	489(91%)	206(87%)	105(91%)
Not applicable	31(32%)	96(17%)	82(12%)	51(9%)	30(13%)	11(9%)

Table 243: Applicability and organisation size: "My team has good work-from-home infrastructure (e.g. source control, VPN, remote desktop, file sharing)"

According to the data set from the survey by Ralph et al., 36% (35) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 36% (201) of respondents that work for an organisation with 10-99 employees, 31% (202) of respondents, working for an organisation with 100-999 employees, 32% (174) of respondents, working for an organisation with 1.000-9.999 employees, 32% (75) of respondents, working for an organisation with 10.000-99.999 employees and 31% (36) of respondents with more than 100,000 employees [89]. (See Table 244)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	35(36%)	201(36%)	202(31%)	174(32%)	75(32%)	36(31%)
Not helpful	63(64%)	365(64%)	455(69%)	366(68%)	161(68%)	80(69%)

Table 244: Helpfulness and organisation size: "My team has good work-from-home infrastructure (e.g. source control, VPN, remote desktop, file sharing)"

Out of the 67 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 22% (15) considered this measure to be helpful. 65% (20) of the 31 respondents, working in an organisation with 1-9 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 470 respondents, working in an organisation with 10-99 employees, that indicated that the statement was applicable to them, 29% (134) considered this measure to be helpful. 70% (67) of the 96 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 575 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 26% (152) considered this measure to be helpful. 61% (50) of the 82 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 489 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 28% (137) considered this measure to be helpful. 73% (37) of the 51 respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 206 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 27% (56) considered this measure to be helpful. 63% (19) of the 30 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 105 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 29% (30) considered this measure to be helpful. 55% (6) of the 11 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 245)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	15(22%)	134(29%)	152(26%)	137(28%)	56(27%)	30(29%)
Applicable	Not helpful	52(78%)	336(71%)	423(74%)	352(72%)	150(73%)	75(71%)
Not applicable	Helpful	20(65%)	67(70%)	50(61%)	37(73%)	19(63%)	6(55%)
Not applicable	Not helpful	11(35%)	29(30%)	32(39%)	14(27%)	11(37%)	5(45%)

Table 245: Applicability, helpfulness and organisation size: "My team has good work-from-home infrastructure (e.g. source control, VPN, remote desktop, file sharing)"

Policies

The survey by Ralph et al. [89] includes 1 statement, which we categorized in the category 'Policies'. This category consists of one theme : 'Peer code review'.

Peer code review

The statement, "My team is peer reviewing commits, change requests or pull requests (peer code review)" was applicable to 72% (1482) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 246)

Applicability	Respondents	%
Applicable	1482	72%
Not applicable	580	28%

Table 246: Applicability: "My team is peer reviewing commits, change requests or pull requests (peer code review)"

According to the data set from the pandemic programming paper, by Ralph et al. , 39% (800) of all respondents, considered this measure to be helpful [89]. (See Table 247)

Helpfulness	Respondents	%
Helpful	800	39%
Not helpful	1262	61%

Table 247: Helpfulness: "My team is peer reviewing commits, change requests or pull requests (peer code review)"

Out of the 1482 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 30% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 248)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	30%
Applicable	Not helpful	1034	70%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 248: Applicability and helpfulness: "My team is peer reviewing commits, change requests or pull requests (peer code review)"

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 64% (542) of respondents with 0-5 years of experience, 65% (384) of respondents with 5-10 years of experience, 64% (354) of respondents with 10-15 years of experience and 60% (298) of respondents with more than 15 years of experience [89]. (See Table 249)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	542(64%)	384(65%)	354(64%)	298(60%)
Not applicable	310(36%)	207(35%)	196(36%)	201(40%)

Table 249: Applicability and experience: "My team is peer reviewing commits, change requests or pull requests (peer code review)"

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 37% (315) of respondents with 0-5 years of experience consider this measure to be helpful, so do 39% (230) of respondents with 5-10 years of experience, 34% (189) of respondents with 10-15 years of experience and 34% (169) of respondents with more than 15 years of experience [89]. (See Table 250)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	315(37%)	230(39%)	189(34%)	169(34%)
Not helpful	537(63%)	361(61%)	361(66%)	330(66%)

Table 250: Helpfulness and experience: "My team is peer reviewing commits, change requests or pull requests (peer code review)"

Out of the 542 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 27% (146) considered this measure to be helpful. 55% (169) of the 310 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 384 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 30% (114) considered this measure to be helpful. 56% (116) of the 207 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 354 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 23% (83) considered this measure to be helpful. 54% (106) of the 196 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 298 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 22% (66) considered this measure to be helpful. 51% (103) of the 201 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 251)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	146(27%)	114(30%)	83(23%)	66(22%)
Applicable	Not helpful	396(73%)	270(70%)	271(77%)	232(78%)
Not applicable	Helpful	169(55%)	116(56%)	106(54%)	103(51%)
Not applicable	Not helpful	141(45%)	91(44%)	90(46%)	98(49%)

Table 251: Applicability , helpfulness and experience: "My team is peer reviewing commits, change requests or pull requests (peer code review)"

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 61% (41)

of respondents with no experience working from home, 63% (1024) of respondents with up to one year of experience working from home, 63% (428) of respondents with 1 to 5 years of experience working from home and 60% (116) of respondents with more than 5 years of experience working from home [89]. (See Table 252)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	41(61%)	1024(63%)	428(63%)	116(60%)
Not applicable	26(39%)	608(37%)	256(37%)	78(40%)

Table 252: Applicability and experience regarding working from home: "My team is peer reviewing commits, change requests or pull requests (peer code review)"

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 37% (25) of respondents with no experience working from home, 38% () of respondents with up to one year of experience working from home, 34% (233) of respondents with 1 to 5 years of experience working from home and 30% (59) of respondents with more than 5 years of experience working from home [89]. (See Table 253)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	25(37%)	615(38%)	233(34%)	59(30%)
Not helpful	42(63%)	1017(62%)	451(66%)	135(70%)

Table 253: Helpfulness and experience regarding working from home: "My team is peer reviewing commits, change requests or pull requests (peer code review)"

Out of the 41 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 20% (8) considered this measure to be helpful. 65% (17) of the 26 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 1024 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 28% (283) considered this measure to be helpful. 55% (332) of the 608 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 428 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 23% (97) considered this measure to be helpful. 53% (136) of the 256 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 116 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 16% (18) considered this measure to be helpful. 53% (41) of the 78 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 254)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	8(20%)	283(28%)	97(23%)	18(16%)
Applicable	Not helpful	33(80%)	741(72%)	331(77%)	98(84%)
Not applicable	Helpful	17(65%)	332(55%)	136(53%)	41(53%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 254: Applicability, helpfulness and experience regarding working from home: "My team is peer reviewing commits, change requests or pull requests (peer code review)"

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 42% (41) of respondents that work in an organisation with 1-9 employees, 55% (314) of respondents that work for an organisation with 10-99 employees, 65% (426) of respondents, working for an organisation with 100-999 employees, 68% (366) of respondents, working for an organisation with 1.000-9.999 employees and 69% (164) of respondents, working for an organisation with 10.000-99.999 employees and 74% (86) of respondents with more than 100,000 employees [89]. (See Table 255)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	41(42%)	314(55%)	426(65%)	366(68%)	164(69%)	86(74%)
Not applicable	57(58%)	252(45%)	231(35%)	174(32%)	72(31%)	30(26%)

Table 255: Applicability and organisation size: "My team is peer reviewing commits, change requests or pull requests (peer code review)"

According to the data set from the survey by Ralph et al., 48% (47) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 39% (221) of respondents that work for an organisation with 10-99 employees, 35% (227) of respondents, working for an organisation with 100-999 employees, 37% (201) of respondents, working for an organisation with 1.000-9.999 employees, 33% (77) of respondents, working for an organisation with 10.000-99.999 employees and 32% (37) of respondents with more than 100,000 employees [89]. (See Table 256)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	47(48%)	221(39%)	227(35%)	201(37%)	77(33%)	37(32%)
Not helpful	51(52%)	345(61%)	430(65%)	339(63%)	159(67%)	79(68%)

Table 256: Helpfulness and organisation size: "My team is peer reviewing commits, change requests or pull requests (peer code review)"

Out of the 41 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 22% (9) considered this measure to be helpful. 67% (38) of the 57 respondents, working in an organisation with 1-9 employees, to whom the statement did not apply, indicated that they would have considered

this measure to be helpful. Out of the 314 respondents, working in an organisation with 10-99 employees, that indicated that the statement was applicable to them, 26% (82) considered this measure to be helpful. 55% (139) of the 252 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 426 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 25% (108) considered this measure to be helpful. 52% (119) of the 231 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 366 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 30% (108) considered this measure to be helpful. 53% (93) of the 174 respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 164 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 23% (38) considered this measure to be helpful. 54% (39) of the 72 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 86 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 27% (23) considered this measure to be helpful. 47% (14) of the 30 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 257)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	9(22%)	82(26%)	108(25%)	108(30%)	38(23%)	23(27%)
Applicable	Not helpful	32(78%)	232(74%)	318(75%)	258(70%)	126(77%)	63(73%)
Not applicable	Helpful	38(67%)	139(55%)	119(52%)	93(53%)	39(54%)	14(47%)
Not applicable	Not helpful	19(33%)	113(45%)	112(48%)	81(47%)	33(46%)	16(53%)

Table 257: Applicability, helpfulness and organisation size: "My team is peer reviewing commits, change requests or pull requests (peer code review)"

Personal development

The survey by Ralph et al. [89] includes 1 statement, which we categorized in the category 'Personal development'. This category consists of one theme: 'Time for professional training'.

Time for professional training

The statement, "My organization is encouraging staff to use this time for professional training" was applicable to 60% (862) of the survey respondents to the pandemic programming survey, executed by Ralph et al. [89]. (See Table 258)

Applicability	Respondents	%
Applicable	862	60%
Not applicable	580	40%

Table 258: Applicability: "My organization is encouraging staff to use this time for professional training"

According to the data set from the pandemic programming paper, by Ralph et al. , 55% (800) of all respondents, considered this measure to be helpful [89]. (See Table 259)

Helpfulness	Respondents	%
Helpful	800	55%
Not helpful	642	45%

Table 259: Helpfulness: "My organization is encouraging staff to use this time for professional training"

Out of the 862 respondents to the survey, by Ralph et al. , that indicated that the statement was applicable to them, 52% (448) considered this measure to be helpful. 61% (352) of the 580 respondents to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 260)

Applicability	Helpfulness	Respondents	%
Applicable	Helpful	448	52%
Applicable	Not helpful	414	48%
Not applicable	Helpful	352	61%
Not applicable	Not helpful	228	39%

Table 260: Applicability and helpfulness: "My organization is encouraging staff to use this time for professional training"

Experience in software development

When the experience of the respondents in software development is considered, the survey data from Ralph et al., shows that this statement is applicable to 25% (210) of respondents with 0-5 years of experience, 26% (156) of respondents with 5-10 years of experience, 24% (134) of respondents with 10-15 years of experience and 22% (111) of respondents with more than 15 years of experience [89]. (See Table 261)

Applicability	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	210(25%)	156(26%)	134(24%)	111(22%)
Not applicable	642(75%)	435(74%)	416(76%)	388(78%)

Table 261: Applicability and experience: "My organization is encouraging staff to use this time for professional training"

Regarding the helpfulness of this measure in relation to the experience of the respondents, the survey data from Ralph et al., shows that 48% (408) of respondents with 0-5 years of experience consider this measure to be helpful, so do 50% (296) of respondents with 5-10 years of experience, 47% (259) of respondents with 10-15 years of experience and 43% (215) of respondents with more than 15 years of experience [89]. (See Table 262)

Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Helpful	408(48%)	296(50%)	259(47%)	215(43%)
Not helpful	444(52%)	295(50%)	291(53%)	284(57%)

Table 262: Helpfulness and experience: "My organization is encouraging staff to use this time for professional training"

Out of the 210 respondents to the survey by Ralph et al. with 0-5 years of experience, that indicated that the statement was applicable to them, 23% (49) considered this measure to be helpful. 56% (359) of the 642 respondents, with less than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 156 respondents with 5-10 years of experience, that indicated that the statement was applicable to them, 28% (43) considered this measure to be helpful. 58% (253) of the 435 respondents, with 5-10 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 134 respondents with 10-15 years of experience, that indicated that the statement was applicable to them, 20% (27) considered this measure to be helpful. 56% (232) of the 416 respondents, with 10-15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 111 respondents with more than 15 years of experience, that indicated that the statement was applicable to them, 18% (20) considered this measure to be helpful. 50% (195) of the 388 respondents, with more than 15 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 263)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	49(23%)	43(28%)	27(20%)	20(18%)
Applicable	Not helpful	161(77%)	113(72%)	107(80%)	91(82%)
Not applicable	Helpful	359(56%)	253(58%)	232(56%)	195(50%)
Not applicable	Not helpful	283(44%)	182(42%)	184(44%)	193(50%)

Table 263: Applicability , helpfulness and experience: "My organization is encouraging staff to use this time for professional training"

Experience in working from home

The survey data from Ralph et al. shows that that this statement is applicable to 36% (24) of respondents with no experience working from home, 24% (384) of respondents with up to one year of experience working from home, 26% (180) of respondents with 1 to 5 years of experience working from home and 25% (49) of respondents with more than 5 years of experience working from home [89]. (See Table 264)

Applicability	No experience	>= 1 year	1-5 years	> 5 years
Applicable	24(36%)	384(24%)	180(26%)	49(25%)
Not applicable	43(64%)	1248(76%)	504(74%)	145(75%)

Table 264: Applicability and experience regarding working from home: "My organization is encouraging staff to use this time for professional training"

According to the survey data, which was provided by Ralph et al., this statement is considered helpful by 46% (31) of respondents with no experience working from home, 49% () of respondents with up to one year of experience working from home, 48% (330) of respondents with 1 to 5 years of experience working from home and 43% (84) of respondents with more than 5 years of experience working from home [89]. (See Table 265)

Helpfulness	No experience	>= 1 year	1-5 years	> 5 years
Helpful	31(46%)	796(49%)	330(48%)	84(43%)
Not helpful	36(54%)	836(51%)	354(52%)	110(57%)

Table 265: Helpfulness and experience regarding working from home: "My organization is encouraging staff to use this time for professional training"

Out of the 24 respondents to the survey by Ralph et al., with no experience regarding working from home, that indicated that the statement was applicable to them, 29% (7) considered this measure to be helpful. 56% (24) of the 43 respondents, with no experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 384 respondents with up to one year of experience with working from home, that indicated that the statement was applicable to them, 25% (95) considered this measure to be helpful. 56% (701) of the 1248 respondents, with up to one year of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 180 respondents with 1-5 years of experience, that indicated that the statement was applicable to them, 22% (40) considered this measure to be helpful. 58% (290) of the 504 respondents, with 1-5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 49 respondents with more than 5 years of experience, that indicated that the statement was applicable to them, 12% (6) considered this measure to be helpful. 54% (78) of the 145 respondents, with more than 5 years of experience, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 266)

Applicability	Helpfulness	< 5 years	5-10 years	10-15 years	> 15 years
Applicable	Helpful	7(29%)	95(25%)	40(22%)	6(12%)
Applicable	Not helpful	17(71%)	289(75%)	140(78%)	43(88%)
Not applicable	Helpful	24(56%)	701(56%)	290(58%)	78(54%)
Not applicable	Not helpful	(0%)	(0%)	(0%)	(0%)

Table 266: Applicability, helpfulness and experience regarding working from home: "My organization is encouraging staff to use this time for professional training"

Organisation size

The survey data from Ralph et al. shows that that this statement is applicable to 24% (24) of respondents that work in an organisation with 1-9 employees, 20% (114) of respondents that work for an organisation with 10-99 employees, 19% (127) of respondents, working for an organisation with 100-999 employees, 32% (175) of respondents, working for an organisation with 1.000-9.999 employees and 25% (60) of respondents, working for an organisation with 10.000-99.999 employees and 31% (36) of respondents with more than 100,000 employees [89]. (See Table 267)

Applicability	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Applicable	24(24%)	114(20%)	127(19%)	175(32%)	60(25%)	36(31%)
Not applicable	74(76%)	452(80%)	530(81%)	365(68%)	176(75%)	80(69%)

Table 267: Applicability and organisation size: "My organization is encouraging staff to use this time for professional training"

According to the data set from the survey by Ralph et al., 53% (52) of respondents, that work in an organisation with 1-9 employees, consider this measure to be helpful, so do 49% (276) of respondents that work for an organisation with 10-99 employees, 48% (315) of respondents, working for an organisation with 100-999 employees, 44% (238) of respondents, working for an organisation with 1.000-9.999 employees, 52% (123) of respondents, working for an organisation with 10.000-99.999 employees and 46% (53) of respondents with more than 100,000 employees [89]. (See Table 268)

Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	> 100.000 FTE
Helpful	52(53%)	276(49%)	315(48%)	238(44%)	123(52%)	53(46%)
Not helpful	46(47%)	290(51%)	342(52%)	302(56%)	113(48%)	63(54%)

Table 268: Helpfulness and organisation size: "My organization is encouraging staff to use this time for professional training"

Out of the 24 respondents to the survey by Ralph et al., working in an organisation with 1-9 employees, that indicated that the statement was applicable to them, 33% (8) considered this measure to be helpful. 59% (44) of the 74 respondents, working in an organisation with 1-9 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 114 respondents, working in an organisation with 10-99 employees, that indicated that the statement was applicable to them, 27% (31) considered this measure to be helpful. 54% (245) of the 452 respondents, working in an organisation with 10-99 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 127 respondents, working in an organisation with 100-999 employees, that indicated that the statement was applicable to them, 22% (28) considered this measure to be helpful. 54% (287) of the 530 respondents, working in an organisation with 100-999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 175 respondents, working in an organisation with 1.000-9.999 employees, that indicated that the statement was applicable to them, 21% (37) considered this measure to be helpful. 55% (201) of the 365 respondents, working in an organisation with 1.000-9.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 60 respondents, working in an organisation with 10.000-99.999 employees, that indicated that the statement was applicable to them, 25% (15) considered this measure to be helpful. 61% (108) of the 176 respondents, working in an organisation with 10.000-99.999 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful. Out of the 36 respondents, working in an organisation with more than 100.000 employees, that indicated that the statement was applicable to them, 19% (7) considered this

measure to be helpful. 58% (46) of the 80 respondents, working in an organisation with more than 100.000 employees, to whom the statement did not apply, indicated that they would have considered this measure to be helpful [89]. (See Table 269)

Applicability	Helpfulness	1-9 FTE	10-99 FTE	100-999 FTE	1.000-9.999 FTE	10.000-99.999 FTE	>100.000 FTE
Applicable	Helpful	8(33%)	31(27%)	28(22%)	37(21%)	15(25%)	7(19%)
Applicable	Not helpful	16(67%)	83(73%)	99(78%)	138(79%)	45(75%)	29(81%)
Not applicable	Helpful	44(59%)	245(54%)	287(54%)	201(55%)	108(61%)	46(58%)
Not applicable	Not helpful	30(41%)	207(46%)	243(46%)	164(45%)	68(39%)	34(43%)

Table 269: Applicability, helpfulness and organisation size: "My organization is encouraging staff to use this time for professional training"

12.4 Appendix 4: Interview analysis

We interviewed 10 people involved with software development in order to understand the impact of the Covid-19 pandemic, on them, their teams and collaboration with different teams.

12.4.1 Qualitative analysis method

This qualitative data was analysed, using a thematic analysis. Braun et al. described 6 phases of thematic analysis. In the first phase, the researcher familiarizes himself with the data. [20]. In this research, this phase involved listening to the video recordings of the interviews and reading interview transcripts. In the second phase, according to Braun et al. the researcher generates initial codes [20]. Due to the set up of the interviews, in which the questions were aimed at very specific aspects of the experiences of the interviewees, the initial codifications were relatively straightforward. The interviews were asked about the same aspects of a common experience which lead to comparable answers, which enabled a structured coding of their answers. The third phase, described by Braun et al., is searching for themes [20]. This was also, to some extent, made easier by the theme based structure of the interviews. When reviewing the themes, which is the fourth phase according to Braun et al. [20], we determined whether the themes were actually themes or just codes, we weighed whether the themes were providing us with information that was actually helpful in answering the research questions and we defined the scope and boundaries of the themes. We also evaluated whether we had enough data to support the themes and whether the data about certain themes was coherent. After the themes were reviewed, we proceeded to the fifth stage, described by Braun et al. In this stage we had to define and name the themes [20]. We aimed to define themes with a singular focus, which were related to each other, which had as little overlap as possible and which addressed the research question. The sixth and final phase, according to Braun et al., aims at producing a report of the analysis. In order to provide a comprehensive overview of the analysis of the interview findings, the findings were grouped per sub research question and per (sub)theme.

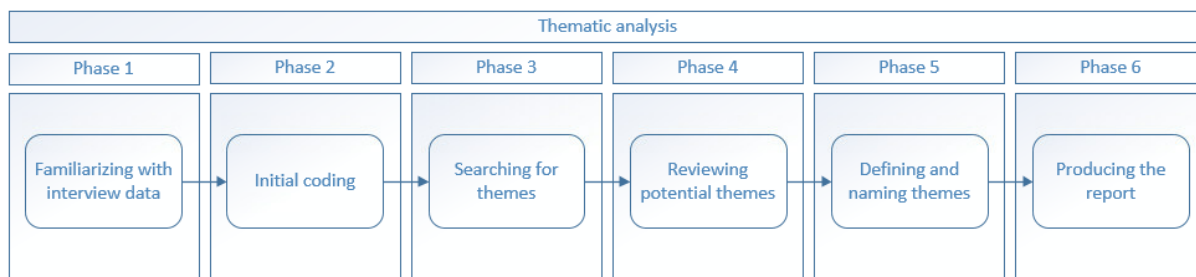


Figure 5: Thematic analysis [20]

12.4.2 Themes and structure

The responses are grouped per sub research question in three categories. The information that was used to answer the first sub research question, "How did working from home during the pandemic impact individual software development team members?" was grouped under the category 'individual team members'. This category covers themes related to personal experience of the interviewees during the pandemic, including the impact on their personal lives, professional lives and productivity. The information which was used to answer the second sub-research question "How did working from home during the lock downs impact software development teams?" was grouped in the category 'teamwork'. This category covers themes related to the effects of the pandemic on themes and the various aspects of team work quality. The information that was used to answer the third sub-research question, "How did working from home during the lock downs impact cross team collaboration, from the perspective of software development teams?", was grouped in the 'cross team collaboration' category. In this category, themes related to the effects of the pandemic on cross team collaboration and the enabling factors for cross team collaboration, are covered.

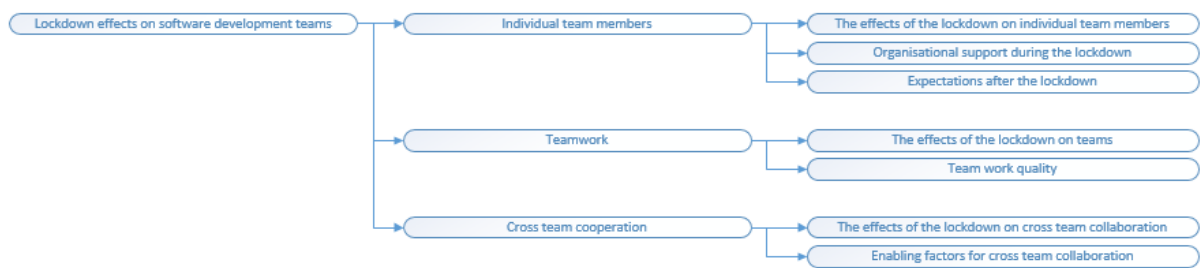


Figure 6: interview themes

12.4.3 Participants

We interviewed 10 people, involved in software development. The interviewees have different positions, experience levels (from 2 years to 23 years), pre-covid work situations (in-office, hybrid and remote) and they work for different organisation types with different organisations sizes (From 20 FTE to >500.000 FTE). See Table 270.

Code	Position	Experience*	Pre-Covid work situation**	Organisation type	Organisation size
P1	Business analyst	11 years	Hybrid	IT services and consulting	>1.000 FTE
P2	Integration architect	23 years	In-office	IT services and consulting	>1.000 FTE
P3	Junior software developer	2 years	In-office	IT services	500-1000 FTE
P4	Software developer	7 years	In-office	Web shop	0-25 FTE
P5	Developer	2 years	Hybrid	IT services	0-25 FTE
P6	Developer advocate	6 years	Remote	Technology	>1.000 FTE
P7	software developer	2 years	In-office	Post service	>1.000 FTE
P8	Software architect	7 years	In-office	IT start-up	0-25 FTE
P9	Director expert services	2 years	In-office	Application development	>1000 FTE
P10	Manager data and AI	10 years	In-office	IT services and consulting	>1000 FTE

Table 270: Interview participants

* 'Experience' refers to the years of experience of an interviewee in a job related to software development.

** the 'Pre-Covid work situation' is considered 'in-office' when interviewees work remote for less then 25 % of the time, 'hybrid' for interviewees that work from home 25-75 % of the time and 'remote' for interviewees that work from home more then 75% of the time.

12.4.4 How did working from home during the pandemic impact individual software development team members?

In order to answer this sub research question, we asked the interviewees questions about the effects of the pandemic on individual team members, the organisational support, they received during the pandemic and their expectations for after the pandemic (see Figure 7).

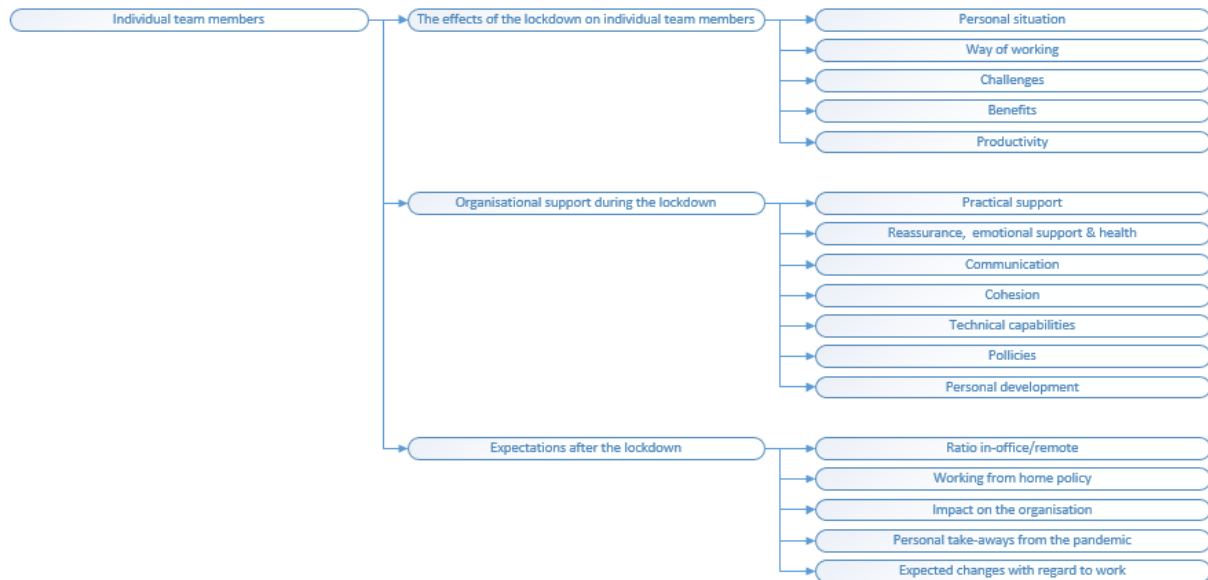


Figure 7: Themes focusing on the individual team member

The effects of the pandemic on individual team members

We asked the interviewees about their personal situation during the pandemic in order to get an idea about the impact of the pandemic on individual development team members. The interviewees also talked about the changes in their way of working, the challenges they encountered when working form home, the benefits they experiences when working from home and the impact of suddenly having to work from home on their personal productivity.

Personal situation

The effects of the pandemic on the personal situation of the interviewees were diverse, but also showed commonalities. Over all, the interviewees reported that the impact of working from home on their personal situations was not that big but some interviewees mentioned that they missed the social contact with their colleagues. The loss of social contact with colleagues affected some more than others. Some interviewees mentioned that they could make more use of their day due to flexible work times and some mentioned that the boundaries between work and live were blurred. One interviewee mentioned that it was difficult to work from home, when his children were at home as well and two interviewees motioned that they liked the fact that they could spend more time with their pets (see Table 271).

Impact on personal situation	Interviewees
Limited impact	P1, P2, P5, P8, P9
Missing social contact	P1, P10
Flexible work times	P1, P2, P5
Blurred Work-life boundaries	P1, P3, P10
More time spent with pets	P3, P7
Loss of job satisfaction	P3
Difficulty with children at home	P10

Table 271: The effects of working from home on the personal situation

Limited Impact

Most of the interviewees stated that having to work from home as a result of Covid-19 measures only had a limited impact on their personal lives. Despite the many things that changed, the impact of having to work from home was manageable for most interviewees.

P1: "A lot changed, but because I already had worked form home, I had a well equipped home office with a good office chair and screen. I went from working from home 1-2 days to working form home 5 days. Not seeing your co-workers is difficult, but I already worked in international teams, so telecommuting wasn't a big shock for me. I mostly missed the social contact and the drinks after work."

P4: "Other aspects of the pandemic had a way larger impact on my personal live than having to work from home.."

Missing social contact

Two interviewees mentioned that they were personally struggling with the fact that they lost personal social contact with their colleagues. Other interviewees mentioned the loss of social contact as well, but not in relation to their personal lives.

P3: "At home, I'm alone the whole time and I miss social contact with coworkers. I like working at the office more, even though the actual work is the same. My job satisfaction has become less by working from home. "

Flexible work times

Some interviewees also found that they had more flexibility to do household tasks, like doing groceries or emptying the washing machine, when they were working from home. Multiple employees mentioned that the flexibility of their new working situation and the time they saved by not having to commute made it easier for them to exercise.

P1: "I had the flexibility to take an hour in the afternoon to go get groceries or to the gym"

Blurred work life boundaries

An interviewee stated that she found it difficult to keep a clear border between work and her personal life and another interviewee mentioned that the newly gained flexibility in work times had a negative effect on work-life balance. A third interviewee also stated that it is easier to work late when working from home, because you do not have to commute back from the office.

P3: "I stopped eating at my dinner table because that was my working spot and I found it difficult to let go of work after I was done. You cannot leave it at the office."

P1: "The flexible working times had a negative effect on work life balance... .. when someone gets a work related message on half past 8 in the evening, he is just as far from his work spot as on 9 in the morning."

More time spent with pets

Two interviewees mentioned that they liked the fact that they were able to spend more time with their pets during working from home.

P3: "...another advantage is that I am able to spend more time at home with my dog."

P7: "Working from home is nicer for my cat."

Loss of job satisfaction

One interviewee mentioned that she lost her job satisfaction, because of working from home. She stated that she liked working at the office more than working from home, even though the actual work was the same.

P3: "My job satisfaction has decreased. There were days on which I thought about throwing the towel into the ring and quitting"

Difficulty with children at home

One interviewee mentioned that he experienced difficulties working from home, when his children had to stay home as well.

P10: "When you have to work from home, due to a pandemic and the children are at home as well, it becomes a difficult story... ..The children do not like to be at home and are forced to do their school work at home. They become grumpy, which impacts the atmosphere at home."

Way of working

We spoke to the interviewees about the impact of the pandemic on their way of working. The transition to digital communication, a more flexible interpretation of work times and the fact that it became impossible to hold physical events were mentioned as changes in the way of working of the interviewees (see Table 272).

change in way of working	Interviewees
Flexible work times	P1, P2, P5, P7
Digital communication	P1, P2, P4, P5, P8, P9, P10
Digital events	P6

Table 272: The changes in the way of working

Flexible work times

One interviewee mentioned that he started later because he used to commute before morning traffic. Multiple interviewees were more flexible regarding their working hours. They broke their workday in half in order to do chores or go to the gym. Some interviewees saw these breaks form work as beneficial to their concentration. An interviewee stated that a short pause to drink a cup of coffee or go for a walk, helped to regain focus. However, some interviewees stated that they found out that the break was not working well when they were writing code, because it took them out of focus.

P1: "My workday is more scattered. At the office, the culture requires you to make many ours. When working from home, I focus more on my actual production than on the amount of hours I work... ...I do not take these breaks when I am writing code, because that would take me out of my concentration.

P4: "sometimes I broke my workday in 2 parts. I noticed that this was not conducive to the quality of my work, because you are 'out of it' for a period of time. "

Digital communication

Some interviewees stated that working from home changed a lot regarding communication. An interviewee stated that he felt more responsibility for his own goals and deliverables because it was harder for him to communicate with this team.

P4: "I'm am more aware of my personal responsibilities... ...Communication is difficult, so you are even more responsible for your own deliverables and goals."

P9: "In my current job, mu whole day is full of meetings. Digital meetings are, in a different way, demanding than face to face meetings. "

Digital events

Events or presentations that would normally take place at the office, now had to be done virtual. One interviewee, whose job, for a large part, consists of giving presentations and training, stated that this changed a lot in his way of working. He tackled this by splitting the training and events that would normally take one or more days into multiple smaller sessions that were easier to process digitally.

P6: "Normally, I give in person training to customers, partners and the community. Now, this has to be done digitally. This changed a lot in my way of working."

Challenges

We asked the interviewees about the challenges, they individually encountered as a result of having to work from home. The interviewees mentioned various challenges such as giving digital feedback, getting to know new coworkers, communicating with colleagues, keeping focus, getting the right office equipment and bad internet connection. These challenges have been listed in *table 273*.

Challenge	Interviewees
Giving feedback	P1, P5, P8
Getting to know new coworkers	P2, P3
Communicating with colleagues	P2, P3 P4, P5, P8, P9, P10
Keeping focus	P3, P5, P7
Getting the right office equipment	P1
Bad internet connection	P5
Office dynamic and culture	P9

Table 273: The challenges of working from home

Giving Feedback

An interviewee mentioned that he found it harder to have difficult conversations, that would normally have taken place in person via video chat. Other interviewees also stated that, when communicating digitally, it is harder to convey and notice non verbal clues when giving feedback. One interviewee stated that they had to get used to this and that people eventually started to take stuff less bluntly.

P1: "It was difficult to point out people's mistakes. Normally, a lot of communication is non-verbal and that is a lot harder via a video call... ..there is no real solution for this except getting used to it. People start to take the method of communication into account and take stuff less bluntly then it came across on the screen."

Getting to know new co-workers

Two interviewees that started working with new team members during the pandemic, mentioned that it was more difficult for them to get to know their new team members. One of them solved this by planning many structural meeting with the colleagues he worked with most.

P1: "It was difficult to get to know new colleagues, to make connections... ..I planned as much structural meetings as possible, with the people I would normally meet at the coffee machine."

Communication with colleagues

Most interviewees mentioned that they found it harder to communicate with co-workers while working from home. Most of them reported that this became better once, everyone got used to the pandemic. However, one respondent explicitly mentioned that the communication quality did not reach the level from before working from home.

P4: "Communication was the biggest challenge. It harder to plan meetings, you have to call for everything, people aren't always available and when people are at home, working on code, they are more focused than at the office, which makes it harder to reach them... ..In the beginning we communication was very much affected by working form home. Eventually it went well again."

P7: "At the office, people come to your desk to ask questions and you walk others when you have questions for them. When you are using Slack, the treshold to contact colleagues is higher. When we got more used to working form home, the communication improved, but not to the level from when we were still working at the office. "

Keeping focus

Some interviewees mentioned that they had problems with keeping focus. One employee had more focus in the beginning, but started to have trouble focusing when she had been working at home for a while. Other interviewees reported a decrease in concentration, directly from the start of having to work from home.

P7: "Sometimes it was difficult for me to concentrate. This was dependent on the situation. My problems with communication did not improve or worsen when I had gotten more used to working from home."

Getting the right office equipment

One interviewee stated that she found it very difficult to find the right office chair, which lead to back pain.

P7: "I way less than 50 KG and, that makes it difficult to find the right chair. I spent over a year to find an office chair, only to find out in two weeks that it did not work."

Bad internet connection

One interviewee struggled with a bad internet connection that caused his VPN to function sub optimal and found that it was way more difficult to cooperate with colleagues, while working from home. He decided to go back to working partly at his office after 3 weeks working from home.

P3: "Our VPN doesn't not always work well, which causes some things to take longer than they should."

Office dynamic and culture

One interviewee mentioned that the restrictions on meeting in person had an impact on the office dynamic and company culture of his organisation.

P9: "Our organisation sells community knowledge. It is important for the community to be together, exchange knowledge and be able to walk to each others desks when needed. This was not possible when working from home. The great danger is that our dynamic and culture break down."

Benefits

We asked the interviewees about the benefits, they individually encountered as a result of having to work from home. Interviewees mentioned that they liked the fact that, because of working from home, they had no commute, they had more flexibility in their work day, they were able to focus more on their jobs, they learned to communicate more effectively, they lost calling anxiety and were more locationally independent. These benefits have been listed in *table 275*.

Benefit	Interviewees
No commute	P1, P2, P3, P7, P9, P10
Flexibility	P1, P5, P7, P9
Better focus	P1, P3, P4, P8, P9, P10
Disappeared calling threshold	P4
Location independence	P7, P9
Less micro managing	P9

Table 274: The benefits of working from home

No commute

Interviewees stated the fact that they did not have to commute when working from home as an advantage. On top of the obvious time savings. One interviewee started his workday at a later time, because he did not have to commute to work before traffic. Interviewees also saw the financial benefit in receiving travel a travel allowance, without having to spend it.

P9: "Not having to commute was an enormous advantage."

P2: "A benefit was the fact that I did not have to spend time on my commute anymore. On top of that, my lease contract ended. I was able to change that into a travel budget, which I did not have to use for travel, because of working from home."

Flexibility

The flexibility to work out and do chores during office hours was seen as a benefit of working from home by some of the interviewees. However, some interviewees also saw disadvantages. One interviewee said that taking long breaks made him lose focus and another interviewee stated that it was hard to reach colleagues because of their flexible work schedules.

P1: "A benefit, was that I was able to do more things during office hours. I was able to do groceries or go to the gym in the afternoon."

Better focus

Most interviewees found that they were able to concentrate better because they were disturbed less often than when they were working from home. However, one interviewee stated that she was able to concentrate better in the beginning, but that, after a while, her concentration at the office was better than at home. One interview stated that it was dependent on the day, whether she was able to concentrate well or not. Her concentration was not better or worse at home than it was at the office. Another interviewee stated that he was able to work concentrated at home when he had a lot to do, but that he was more distracted when he was less busy.

P7: "Whether I am able to concentrate, depends on the moment. You can get distracted working at home, but at the office you can also be distracted by your colleagues."

P2: "When I'm busy, I can work well at home. When I'm less busy, I get distracted more easily."

Reduced calling anxiety

Another interviewee stated that the increased need for phone calls, which were needed to be able to communicate with colleagues when working from home, helped reduce his barriers to call people by phone.

P4: "The the threshold to call someone has disappeared."

Location independence

One interviewee saw the fact that she could interact with people, independently of their location, as a benefit of working from home. Another interviewee stated that he might not have kept working in his current job, if it would not have been possible to work from home.

P9: "I do not think, I would have kept working here, if I had to go to the office every day. Before Covid, it would have not been possible to work from home in my function, because of the long commute to my office. "

Productivity

The interviewees responded differently regarding effects of working from home on their self perceived productivity. Two interviewees indicated no changes in their productivity as a result of working from home. The interviews stated that their productivity had increased. For one interviewee, the productivity increased at the beginning of the pandemic, but after a while her productivity at home was lower than her productivity at the office. Another interviewee reported that his productivity was higher in the beginning of the pandemic, but eventually equal to the period before the pandemic and two interviewees stated that the pandemic had decreased their productivity.

Productivity	Interviewees
Equal to before working from home	P7, P8, P9
Higher than before working from home	P1, P4, P6, P10
Lower than before working from home	P2, P3, P5

Table 275: Self perceived productivity during working from home

Equal to before working from home

Three interviewees reported a that their self perceived productivity had remained equal during working from home. One reported that her productivity changed from day to day, but that that was not related to whether she was working from home. Another interviewee reported that he was disturbed less at home, but that he did not see any changes in his productivity. A third interviewee thought, at first, that his productivity would be higher because he was not disturbed, but saw later that negative effect of the working form home on communication within the team leveled out his productivity to equal to before the pandemic.

P9: "I do not really see a difference. At the office, you are disturbed more often and at home you can just keep working, but in general my productivity has remained stable, both at home and at the office. "

P8: "In the beginning I thought that my productivity would increase a lot because I was not disturbed. Eventually I started missing the communication with the team. It is less easy to ask them stuff. Under the line, I expect that my productivity has remained equal"

Higher than before working form home

The interviewees reported a higher productivity while working from home. three interviewees stated that the were more productive because they were disturbed less often. not disturbed. For another interviewee, his production increased because he had more time for work when he could not leave his house due to the pandemic.

P1: "While working from home, I am more productive per worked hour. My productivity, while coding, is higher at home because there is less distraction and because i can use my own equipment. At the office I cannot use my loud mechanical keyboard."

Lower than before working form home

Three interviewees reported that their productivity was lower then before working from home. For one of them, the productivity increased initially, but declined after working from home for a while. For one, the effect was limited to a shorter span of attention when work was less busy and one reported a strong decrease in productivity and also mentioned that some of his colleagues were about half as productive as before working form home.

P3: "When I started working from home, I had more focus, because I was disturbed less often, but eventually the four walls around you become to much. Now, we are allowed to work at the office more often and my focus is better of the office than at home."

P5: "My productivity became significantly worse. I have colleagues that worked at about 50% of their normal productivity. Eventually we had to take that into account in our planning."

Organisational support during the pandemic

The interviewees were asked to answer a set of questions about the organisational support measures that were taken in order to support employees when working from home and limit the negative effects of the pandemic. In the interview preparation survey, all interviewees ranked the perceived helpfulness of 23 statements about organisational support during the pandemic on a 5 point Likert scale ranging from 'very unhelpful' to 'very helpful'. Because the limited duration of the interview did not allow to discuss all 23 statements in dept, interviewees were only asked to elaborate about the statements that were rated 'very unhelpful' and 'very helpful' by the interviewee. On top of that, in some interviews, other statements because the views of the interviewee were directly conflicting with the survey data or otherwise interesting. Therefore, some of the statements were not discussed during the interview and some of the statements were discussed only with a subset of the interviewees. The responses of the interviewees are grouped per theme in the categories 'Practical support', 'Reassurance, emotional support & health', 'Communication', 'Cohesion', 'Technical capabilities', 'Policies' and 'Personal development' (See Figure 8).

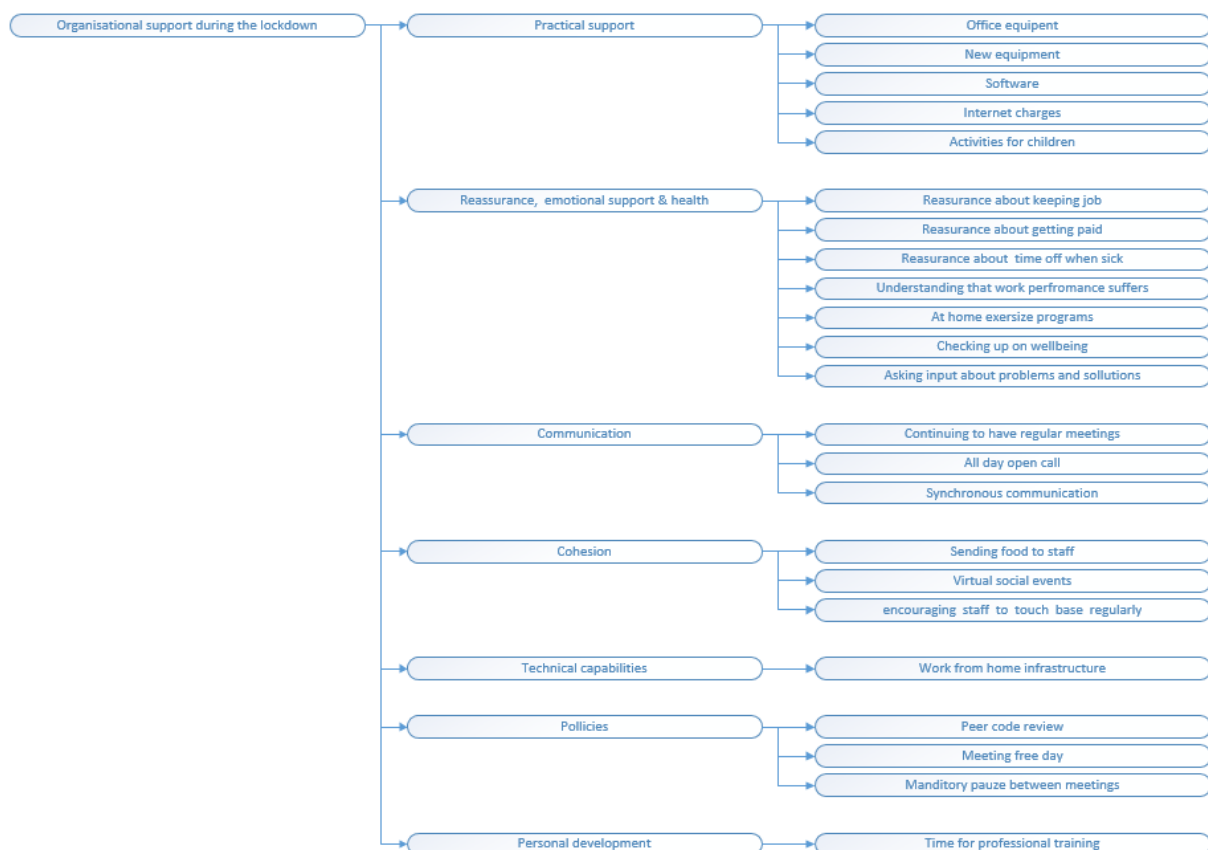


Figure 8: Themes focusing on organisational support

Practical support

Five themes were grouped in the category 'Practical support. The themes 'Office equipment', 'New equipment', 'Software', 'Internet charges' and 'Activities for children'.

Office equipment

In the pre-interview survey, 6 interviewees (60%) stated that the statement "I can (or could) take equipment (e.g. monitors) home from my workplace" applied to them, 3 interviewees (30%) responded that the statement did not apply to them and 1 interviewee (10%) responded that the statement was not applicable in their situation (see Table 276).

Applicability	Yes	No	Not relevant
Frequency	6	3	1
Interviewees	P1 P2 P4 P6 P9 P10	P3 P5 P7	P8
Percentage	60%	30%	10%

Table 276: Applicability: I can (or could) take equipment (e.g. monitors) home from my workplace

When asked about the helpfulness of the support measure, 4 interviewees (40%) stated that they considered the measure to be very helpful, 4 interviewees (40%) stated that they considered the measure to be helpful, 2 interviewees (20%) stated that they were neutral about the measure, 0 interviewees (0%) stated that they considered the measure to be unhelpful and 0 interviewees (0%) stated that they found the measure very unhelpful (see Table 277).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	4	4	2	0	0
Interviewees	P2 P3 P4 P6	P1 P5 P7 P10	P8 P9		
Percentage	40%	40%	20%	0%	0%

Table 277: Helpfulness: I can (or could) take equipment (e.g. monitors) home from my workplace

All of the fthe interviewees that considered the fact that they could bring home office equipment to be very helpful, indicated that the statement was applicable to them. According to an interviewee, one needs a good work spot in order to be function. Some of them already had a well-equipped home office, but mentioned that it was important that the organisation showed that they were willing to support their employees when necessary.

P4: "You need a good work spot in order to be able to function."

P6: "I find it very important that a company facilitates everything, which is needed to help employees to perform at their best... ..this has a supporting effect and that is important to me. The feeling that you are supported by your employer, even when you are not at the office, is just as important as the practical benefit of the equipment that is provided."

New equipment

In the pre-interview survey, 6 interviewees (60%) stated that the statement "My organization will buy new equipment we need to work from home" applied to them, 4 interviewees (40%) responded that the statement did not apply to them and 0 interviewees (0%) responded that the statement was not applicable in their situation (see Table 278).

Applicability	Yes	No	Not relevant
Frequency	6	4	0
Interviewees	P1 P2 P4 P6 P7 P9	P3 P5 P8 P10	
Percentage	60%	40%	0%

Table 278: Applicability: My organization will buy new equipment we need to work from home

When asked about the helpfulness of the support measure, 7 interviewees (70%) stated that they considered the measure to be very helpful, 3 interviewees (30%) stated that they considered the measure to be helpful, 0 interviewees (0%) stated that they were neutral about the measure, 0 interviewees (0%) stated that they considered the measure to be unhelpful and 0 interviewees (0%) stated that they found the measure very unhelpful (see Table 279).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	7	3	0	0	0
Interviewees	P2 P3 P4 P6 P7 P9 P10	P1 P5 P8			
Percentage	70%	30%	0%	0%	0%

Table 279: Helpfulness: My organization will buy new equipment we need to work from home

The interviewees found it helpful or very helpful that their organisation paid for new equipment they needed to work from home. An interviewee stated that buying the right equipment helped him to be productive and another interviewee, who already had anything he needed at home, stated that it was very helpful for his colleagues that were in need of new office equipment. Interviewees also mentioned that they were happy about the flexibility of their organisations regarding the kind of equipment that they could buy.

P7: "We had a budget, which we could use to buy a noise-canceling headphone and a screen. I did that and that helped me to stay productive."

P9: "I already had that stuff, but for the people who didn't, this was very helpful"

Software

In the pre-interview survey, 5 interviewees (50%) stated that the statement "My organization will pay for software we need to work from home" applied to them, 0 interviewees (0%) responded that the statement did not apply to them and 5 interviewees (50%) responded that the statement was not applicable in their situation (see Table 280).

Applicability	Yes	No	Not relevant
Frequency	5	0	5
Interviewees	P1 P4 P5 P6 P9		P2 P3 P7 P8 P10
Percentage	50%	0%	50%

Table 280: Applicability: My organization will pay for software we need to work from home

When asked about the helpfulness of the support measure, 4 interviewees (40%) stated that they considered the measure to be very helpful, 1 interviewee (10%) stated that they considered the measure to be helpful, 5 interviewees (50%) stated that they were neutral about the measure, 0 interviewees (0%) stated that they considered the measure to be unhelpful and 0 interviewees (0%) stated that they found the measure very unhelpful (see Table 281).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	4	1	5	0	0
Interviewees	P2 P4 P6 P9	P1	P3 P5 P7 P8 P10		
Percentage	40%	10%	50%	0%	0%

Table 281: Helpfulness: My organization will pay for software we need to work from home

One of the interviewees, who stated that the measure was very helpful, did not need software himself, but saw the helpfulness for people that did need them. Another interviewee stated that he the feeling that he was supported by his employer even though he was not at the office just as important that he got the software he needed.

P2: "I did not need any software, but I see how this can be helpful for the people that do need it."

P6: "I find it very important that a company facilitates every thing that is needed to help employees perform their best work, both at the office and at home... ..I got video editing software because, as a result of the pandemic, I had to record a lot of presentations that I would have normally given live. The feeling of being supported by your employer, despite not being physically present, is just as important as the actual stuff you receive. "

Internet charges

In the pre-interview survey, 3 interviewees (30%) stated that the statement "My organization will pay for some or all of my internet charges" applied to them, 5 interviewees (50%) responded that the statement did not apply to them and 2 interviewees (20%) responded that the statement was not applicable in their situation (see Table 282).

Applicability	Yes	No	Not relevant
Frequency	3	5	2
Interviewees	P5 P6 P9	P1 P2 P3 P7 P8	P4 P10
Percentage	30%	50%	20%

Table 282: Applicability: My organization will pay for some or all of my internet charges

When asked about the helpfulness of the support measure, 1 interviewee (10%) stated that they considered the measure to be very helpful, 1 interviewee (10%) stated that they considered the measure to be helpful, 6 interviewees (60%) stated that they were neutral about the measure, 2 interviewees (20%) stated that they considered the measure to be unhelpful and 0 interviewees (0%) stated that they found the measure very unhelpful (see Table 283).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	1	1	6	2	0
Interviewees	P9	P6	P3 P4 P5 P7 P8 P10	P1 P2	
Percentage	10%	10%	60%	20%	0%

Table 283: Helpfulness: My organization will pay for some or all of my internet charges

The opinions of the interviewees regarding their organisation paying for their internet cost are generally neutral. One interviewee, that considered this measure to be very helpful, argued that employers should pay for internet cost when they expect their employees to be available all the time. He acknowledges that everyone has internet, whether the employer is paying for it or not, but that internet is mostly used for work related purposes. Because of that, it is only fair that the employer pay for the cost. Another interviewee considers this measure unhelpful. He believes that people should not complain, especially when you take into account the great advantages of working from home, like not having to commute anymore.

P9: "We live in a fast world and are expected to be available outside office hours. Everyone has internet at home, whether your boss pays for it or not, but I know that my employees appreciate it when the company contributes. Also because internet is mostly used for work related purposes, especially during working from home. Then, it is only fair that the employer contributes."

P2: "People already have an internet connection.... ...I think its nonsense, that people are complaining about having to pay for their own thee bags. If you look at the advantages, like the reduced time spend commuting, you cannot complain. Only when an employer demands a high connection speed or a more stable connection, the employer should pay for it."

Activities for children

In the pre-interview survey, 2 interviewees (20%) stated that the statement "My organization is providing activities to occupy staff member's children" applied to them, 4 interviewees (40%) responded that the statement did not apply to them and 4 interviewees (40%) responded that the statement was not applicable in their situation (see Table 284).

Applicability	Yes	No	Not relevant
Frequency	2	4	4
Interviewees	P1 P6	P3 P5 P9 P10	P2 P4 P7 P8
Percentage	20%	40%	40%

Table 284: Applicability: My organization is providing activities to occupy staff member's children

When asked about the helpfulness of the support measure, 0 interviewees (0%) stated that they considered the measure to be very helpful, 3 interviewees (30%) stated that they considered the measure to be helpful, 7 interviewees (70%) stated that they were neutral about the measure, 0 interviewees (0%) stated that they considered the measure to be unhelpful and 0 interviewees (0%) stated that they found the measure very unhelpful (see Table 285).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	0	3	7	0	0
Interviewees		P1 P2 P6	P3 P4 P5 P7 P8 P9 P10		
Percentage	0%	30%	70%	0%	0%

Table 285: Helpfulness: My organization is providing activities to occupy staff member's children

None of the interviewees considered this measure to be very helpful or very unhelpful, and for that reason it was not discussed in dept in the interviews.

Reassurance, emotional support and health

8 themes were grouped in the category 'Reassurance, emotional support and health'. 'Reassurance about keeping job', 'Reassurance about getting paid', 'Reassurance about time off when sick', 'Understanding that work performance suffers', 'At home exercise programs', 'Checking up on well being' and 'Asking input about problems and solutions'.

Reassurance about keeping job

In the pre-interview survey, 7 interviewees (70%) stated that the statement "My organization has reassured me that I will keep my job" applied to them, 0 interviewees (0%) responded that the statement did not apply to them and 3 interviewees (30%) responded that the statement was not applicable in their situation (see Table 286).

Applicability	Yes	No	Not relevant
Frequency	7	0	3
Interviewees	P1 P2 P4 P5 P6 P7 P8		P3 P9 P10
Percentage	70%	0%	30%

Table 286: Applicability: My organization has reassured me that I will keep my job

When asked about the helpfulness of the support measure, 5 interviewees (50%) stated that they considered the measure to be very helpful, 0 interviewees (0%) stated that they considered the measure to be helpful, 5 interviewees (50%) stated that they were neutral about the measure, 0 interviewees (0%) stated that they considered the measure to be unhelpful and 0 interviewees (0%) stated that they found the measure very unhelpful (see Table 287).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	5	0	5	0	0
Interviewees	P1 P2 P4 P6 P7		P3 P5 P8 P9 P10		
Percentage	50%	0%	50%	0%	0%

Table 287: Helpfulness: My organization has reassured me that I will keep my job

Half of the interviewees believed it to be very helpful, that their organisation reassured them that they would keep their job. The other interviewees were neutral about this measure. One interviewee mentioned that he found that it was the right approach in a situation for which no-one is to blame. Another interviewee stated that it was more about the feeling that the organisation is there for you, than about the actual reassurance and one interviewee said that he and his team members believed that the reassurance that there would not be any lay-offs due to Covid was important for the mentality in the organisation.

P1: "It's just part of a situation in which no-one is to blame. You should reassure your employees that everything is going to be alright."

P4: "It is more about the feeling that the organisation is there for you than about the reassurance itself."

P6: "I think, this is important for the mentality in the organisation. Both me and my teammates experienced it that way."

Reassurance about getting paid

In the pre-interview survey, 7 interviewees (70%) stated that the statement "My organization has reassured me that I will continue to be paid" applied to them, 0 interviewees (0%) responded that the statement did not apply to them and 3 interviewees (30%) responded that the statement was not applicable in their situation (see Table 288).

Applicability	Yes	No	Not relevant
Frequency	7	0	3
Interviewees	P1 P2 P4 P5 P6 P7 P8		P3 P9 P10
Percentage	70%	0%	30%

Table 288: Applicability: My organization has reassured me that I will continue to be paid

When asked about the helpfulness of the support measure, 5 interviewees (50%) stated that they considered the measure to be very helpful, 0 interviewees (0%) stated that they considered the measure to be helpful, 5 interviewees (50%) stated that they were neutral about the measure, 0 interviewees (0%) stated that they considered the measure to be unhelpful and 0 interviewees (0%) stated that they found the measure very unhelpful (see Table 289).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	5	0	5	0	0
Interviewees	P1 P2 P4 P6 P7		P3 P5 P8 P9 P10		
Percentage	50%	0%	50%	0%	0%

Table 289: Helpfulness: My organization has reassured me that I will continue to be paid

The responses regarding assurance about continuing to get paid were divided. 5/10 interviewees found it very helpful, 5/10 were neutral about it. The interviewees that found the measure to be very helpful mentioned that they found it only logical in a situation for which no-one was to blame. One interviewee was seconded and got paid even though her assignment was canceled.

P7: "In my current function I work seconded. One month during the pandemic, I was paid even though my assignment was canceled."

Reassurance about time off when sick

In the pre-interview survey, 9 interviewees (90%) stated that the statement "My organization has reassured me that I can take time off if I'm sick or need to care for dependents" applied to them, 1 interviewee (10%) responded that the statement did not apply to them and 0 interviewees (0%) responded that the statement was not applicable in their situation (see Table 290).

Applicability	Yes	No	Not relevant
Frequency	9	1	0
Interviewees	P1 P3 P4 P5 P6 P7 P8 P9 P10	P2	
Percentage	90%	10%	0%

Table 290: Applicability: My organization has reassured me that I can take time off if I'm sick or need to care for dependents

When asked about the helpfulness of the support measure, 6 interviewees (60%) stated that they considered the measure to be very helpful, 2 interviewees (20%) stated that they considered the measure to be helpful, 2 interviewees (20%) stated that they were neutral about the measure, 0 interviewees (0%) stated that they considered the measure to be unhelpful and 0 interviewees (0%) stated that they found the measure very unhelpful (see Table 291).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	6	2	2	0	0
Interviewees	P1 P2 P4 P7 P9 P10	P3 P6	P5 P8		
Percentage	60%	20%	20%	0%	0%

Table 291: Helpfulness: My organization has reassured me that I can take time off if I'm sick or need to care for dependents

Most interviewees found it helpful or even very helpful that their organisation had reassured them that they could take time off if they were sick or needed to care for dependents. One interviewee mentioned that he found it very important that his organisation cared for the well being of the employees. Multiple interviewee, who found this measure very helpful, experienced this first hand, and found that their employers were very flexible about this.

P4: "I find it very important that an organisation cares for the well being of its employees."

P10: "When something unexpected happened, It was no problem to be absent for two or three hours or even for a whole week. That was very helpful."

Understanding that work performance suffers

In the pre-interview survey, 6 interviewees (60%) stated that the statement "My organization has reassured me that they understand if my work performance suffers" applied to them, 4 interviewees (40%) responded that the statement did not apply to them and 0 interviewees (0%) responded that the statement was not applicable in their situation (see Table 292).

Applicability	Yes	No	Not relevant
Frequency	6	4	0
Interviewees	P1 P2 P4 P6 P7 P10	P3 P5 P8 P9	
Percentage	60%	40%	0%

Table 292: Applicability: My organization has reassured me that they understand if my work performance suffers

When asked about the helpfulness of the support measure, 4 interviewees (44,4%) stated that they considered the measure to be very helpful, 2 interviewees (22,2%) stated that they considered the measure to be helpful, 3 interviewees (33,3%) stated that they were neutral about the measure, 0 interviewees (0%) stated that they considered the measure to be unhelpful and 0 interviewees (0%) stated that they found the measure very unhelpful (see Table 293).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	4	2	3	0	0
Interviewees	P1 P2 P4 P6	P3 P7	P5 P8 P9		
Percentage	44,4%	22,2%	33,3%	0%	0%

Table 293: Helpfulness: My organization has reassured me that they understand if my work performance suffers

The assurance that the organisation understood that work performance could suffer as a result of Covid was seen as helpful or very helpful by most interviewees. One interviewee stated that his organisation understood that people got crazy from all the digital meetings even though it did not apply to him, because he was already used to them.

P6: "It was a good thing that they told us that they understood that we might become crazy from all of the back-to-back digital meetings even though it was not applicable to me, because I was already used to them."

At home exercise programs

In the pre-interview survey, 4 interviewees (40%) stated that the statement "My organization is providing at-home exercise programs" applied to them, 3 interviewees (30%) responded that the statement did not apply to them and 3 interviewees (30%) responded that the statement was not applicable in their situation (see Table 294).

Applicability	Yes	No	Not relevant
Frequency	4	3	3
Interviewees	P1 P6 P9 P10	P3 P5 P8	P2 P4 P7
Percentage	40%	30%	30%

Table 294: Applicability: My organization is providing at-home exercise programs

When asked about the helpfulness of the support measure, 1 interviewee (10%) stated that they considered the measure to be very helpful, 4 interviewees (40%) stated that they considered the measure to be helpful, 3 interviewees (30%) stated that they were neutral about the measure, 2 interviewees (20%) stated that they considered the measure to be unhelpful and 0 interviewees (0%) stated that they found the measure very unhelpful (see Table 295).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	1	4	3	2	0
Interviewees	P3	P1 P2 P6 P10	P4 P7 P9	P5 P8	
Percentage	10%	40%	30%	20%	0%

Table 295: Helpfulness: My organization is providing at-home exercise programs

Only one of the respondents found this measure very helpful, even though he did not need it himself.

P2: "At home exercise programs were not needed for me, but i do see that they can be helpful for people for whom they are relevant."

Checking up on well being

In the pre-interview survey, 6 interviewees (60%) stated that the statement "My manager checks in on my wellbeing more frequently" applied to them, 3 interviewees (30%) responded that the statement did not apply to them and 1 interviewee (10%) responded that the statement was not applicable in their situation (see Table 296).

Applicability	Yes	No	Not relevant
Frequency	6	3	1
Interviewees	P1 P3 P4 P6 P7 P10	P2 P5 P9	P8
Percentage	60%	30%	10%

Table 296: Applicability: My manager checks in on my wellbeing more frequently

When asked about the helpfulness of the support measure, 4 interviewees (40%) stated that they considered the measure to be very helpful, 4 interviewees (40%) stated that they considered the measure to be helpful, 2 interviewees (20%) stated that they were neutral about the measure, 0 interviewees (0%) stated that they considered the measure to be unhelpful and 0 interviewees (0%) stated that they found the measure very unhelpful (see Table 297).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	4	4	2	0	0
Interviewees	P3 P4 P6 P7	P2 P8 P9 P10	P1 P5		
Percentage	40%	40%	20%	0%	0%

Table 297: Helpfulness: My manager checks in on my wellbeing more frequently

80% of the interviewees found this measure at least helpful and 40% found it very helpful. Out of those 4 interviewees, one already had daily checkups with his manager before the pandemic and one interviewee stated that the frequency of these checkups had increased from once per two weeks before the pandemic to once per week during the pandemic. Another interviewee had a checkup every two weeks. All of the interviewees that found this measure very helpful, were pleased with the way it was organised at their organisation.

P1: "There were informal checkups every two weeks about how I was feeling. I liked that a lot."

P6: "The frequency of this checkups has doubled to once per week. Every week, I have a 15-30 minute 1 to 1 with my manager. I like that these meetings are more frequent and shorter than before. These meetings start with how I am feeling and continue about blockades in my project and how my manager can assist in those. "

P7: "Sometimes it is difficult to focus on how you are doing when you are constantly working. These meetings ensure that you think about how you are feeling from time to time."

Asking input about problems and solutions

In the pre-interview survey, 5 interviewees (50%) stated that the statement "My organisation asked me what problems i come across in this new situation and which solutions i deem necessary" applied to them, 5 interviewees (50%) responded that the statement did not apply to them and 0 interviewees (0%) responded that the statement was not applicable in their situation (see Table 298).

Applicability	Yes	No	Not relevant
Frequency	5	5	0
Interviewees	P1 P2 P4 P6 P10	P3 P5 P7 P8 P9	
Percentage	50%	50%	0%

Table 298: Applicability: My organisation asked me what problems i come across in this new situation and which solutions i deem necessary

When asked about the helpfulness of the support measure, 4 interviewees (40%) stated that they considered the measure to be very helpful, 5 interviewees (50%) stated that they considered the measure to be helpful, 1 interviewee (10%) stated that they were neutral about the measure, 0 interviewees (0%) stated that they considered the measure to be unhelpful and 0 interviewees (0%) stated that they found the measure very unhelpful (see Table 299).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	4	5	1	0	0
Interviewees	P1 P3 P4 P8	P2 P6 P7 P9 P10	P5		
Percentage	40%	50%	10%	0%	0%

Table 299: Helpfulness: My organisation asked me what problems i come across in this new situation and which solutions i deem necessary

Most interviewees found, or would have found, it helpful or very helpful when if their organisation asked them about the problems they came across and the solutions they deemed necessary. One interviewee explained that his organisation used a check-in tool to send out a weekly survey in which employees could indicate how they were feeling. Interviewees also indicated that their employers really tried to solve the issues of their employees. One interviewee stated that he spoke less about problems and solutions with his employer during the pandemic and that he would have wanted to do this more often.

P6: "We have a Check-in tool. That is a weekly survey with an open field in which employees can indicate how they are doing. The outcome of these surveys is used by the organisation. They track how people are doing and in virtual events they sometimes refer to the outcomes of the survey."

P8: "Before Covid, My employer and I had these kind of conversations more often. The became less frequent during the pandemic. That could have been better."

Communication

3 themes were grouped in the category 'Continuing to have regular meetings', 'All day open call' and 'Synchronous communication'

Continuing to have regular meetings

In the pre-interview survey, 10 interviewees (100%) stated that the statement "My team is continuing to have regular meetings (e.g. via video chat)" applied to them, 0 interviewees (0%) responded that the statement did not apply to them and 0 interviewees (0%) responded that the statement was not applicable in their situation (see Table 300).

Applicability	Yes	No	Not relevant
Frequency	10	0	0
Interviewees	P1 P2 P3 P4 P5 P6 P7 P8 P9 P10		
Percentage	100%	0%	0%

Table 300: Applicability: My team is continuing to have regular meetings (e.g. via video chat)

When asked about the helpfulness of the support measure, 5 interviewees (56%) stated that they considered the measure to be very helpful, 2 interviewees (22%) stated that they considered the measure to be helpful, 2 interviewees (22%) stated that they were neutral about the measure, 0 interviewees (0%) stated that they considered the measure to be unhelpful and 0 interviewees (0%) stated that they found the measure very unhelpful (see Table 301).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	5	2	2	0	0
Interviewees	P1 P4 P5 P6 P9	P2 P8	P3 P7		
Percentage	56%	22%	22%	0%	0%

Table 301: Helpfulness: My team is continuing to have regular meetings (e.g. via video chat)

All interviewees indicated that their team continued to have regular meetings. Five interviewees indicated that they found this to be very helpful. One of them said that regular meetings had become very important because of the loss of unplanned informal meetings and another interviewee mentioned that his team started with daily stand ups and that that helped to keep everything together. An interviewee, who also found continuing to have regular meetings very important, mentioned the disadvantage that all of the scheduled digital meetings caused his agenda to fill up very quickly.

P1: "Continuing to have regular meetings is one of the most important things. When you are not physically together at the office, you quickly loose sight of each other. Problems can occur about stuff that you would otherwise have heard of. You need to approach people in a more structured way, because you cannot see when someone is busy. It is important to plan moments to talks about projects or personal affairs. "

P5: "We started with daily stand-ups. That held everything together. Otherwise you have no idea what your colleagues are up to or whether they are even working... In the beginning of the lockdown, we did not have these stand-ups and that was chaotic. After we started the stand-ups that improved immediately. "

P9: "Because you needed to plan a Zoom call for everything, the agenda's filled up quickly, but due to the continuation of regular meetings, working from home did not impact my information stream. "

All day open call

In the pre-interview survey, 1 interviewee (10%) stated that the statement "For most of the day, I work with an open video or audio call to some or all of my team." applied to them, 9 interviewees (90%) responded that the statement did not apply to them and 0 interviewees (0%) responded that the statement was not applicable in their situation (see Table 302).

Applicability	Yes	No	Not relevant
Frequency	1	9	0
Interviewees	P8	P1 P2 P3 P4 P5 P6 P7 P9 P10	
Percentage	10%	90%	0%

Table 302: Applicability: For most of the day, I work with an open video or audio call to some or all of my team.

When asked about the helpfulness of the support measure, 1 interviewee (10%) stated that they considered the measure to be very helpful, 0 interviewees (0%) stated that they considered the measure to be helpful, 3 interviewees (30%) stated that they were neutral about the measure, 4 interviewees (40%) stated that they considered the measure to be unhelpful and 2 interviewees (20%) stated that they found the measure very unhelpful (see Table 303).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	1	0	3	4	2
Interviewees	P3		P6 P7 P10	P2 P5 P8 P9	P1 P4
Percentage	10%	0%	30%	40%	20%

Table 303: Helpfulness: For most of the day, I work with an open video or audio call to some or all of my team.

Interviewees are divided about the helpfulness of being in an open call all day. Most interviewees were neutral about this or considered it to be unhelpful. The one interviewee that would have considered this to be helpful, stated that she was able to focus more when she was not working alone. she would have liked to be in contact with colleagues during the day and finds it annoying that she, sometimes, has to wait more then an hour to get a reaction to a question. The interviewees that consider this measure to be very unhelpful, name the constant distraction and the feeling of being constantly monitored as the main disadvantages.

P3: "When I look at something, together with someone else, I work better. I am more focused, when I am not alone... ...I like being in contact with people. I heard about people being in an audio call all day. You can mute that call, when you want to, but it p=makes it easier to quickly discuss stuff. When I ask questions now, I sometimes have to wait one and a half hour to get a response. that is super annoying."

P2: "In an audio call, you will constantly have noise around you. When people need me, then can ping me via Teams. An open call would be to distracting. We all work relatively autonomous. When you need something from someone, you can ping or call them."

P4: "Calls are helpful, but all-day calls are not. You get some kind of 'Big Brother' effect. You are constantly monitored which gives and unpleasant feeling. "

Synchronous communication

In the pre-interview survey, 0 interviewees (0%) stated that the statement "My team is avoiding synchronous communication (e.g. video chat)" applied to them, 9 interviewees (90%) responded that the statement did not apply to them and 1 interviewee (10%) responded that the statement was not applicable in their situation (see Table 304).

Applicability	Yes	No	Not relevant
Frequency	0	9	1
Interviewees		P2 P3 P4 P5 P6 P7 P8 P9 P10	P1
Percentage	0%	90%	10%

Table 304: Applicability: My team is avoiding synchronous communication (e.g. video chat)

When asked about the helpfulness of the support measure, 0 interviewees (0%) stated that they considered the measure to be very helpful, 2 interviewees (22%) stated that they considered the measure to be helpful, 3 interviewees (33%) stated that they were neutral about the measure, 1 interviewee (11%) stated that they considered the measure to be unhelpful and 3 interviewees (33,%) stated that they found the measure very unhelpful (see Table 305).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	0	2	3	1	3
Interviewees		P2 P6	P1 P3 P7	P8	P4 P5 P9
Percentage	0%	22%	33%	11%	33%

Table 305: Helpfulness: My team is avoiding synchronous communication (e.g. video chat)

One interviewee, who found this measure to be very unhelpful, stated that communication was difficult enough and that it would not be helpful to add any more restrictions. This is in line with the opinions of the other interviewees that consider this measure very unhelpful. Another interviewee also explained that synchronous communication is faster and that asynchronous communication leaves room for misinterpretation. A third interviewee that also found this measure very unhelpful, did admit that synchronous communication can keep someone else from their work, but found that synchronous communication was needed sometimes. An interviewee, who considered this measure to be helpful, stated that he was a fan of asynchronous communication, because synchronous communication implies that you have to think about to say on the spot. He also said that synchronous communication takes up more time.

P4: "Communication was difficult enough, you should not restrict that any further by avoiding synchronous communication. "

P9: "Verbal communication works faster than long emails. That is the danger when you work remotely. In my experience, emails are never the most effective way of communication. Thing can be misinterpreted and you get long email threads. In my eyes that is not very effective. Sometimes emails are necessary, when you want to address multiple people, but you are often faster with a personal conversation. "

P5: "Avoiding communication is never practical... ...synchronous communication is can be very effective at times, but it also keeps people from their work. When you ask something asynchronously, people can take it up at a time that suits them better. "

P6: I am a big fan of asynchronous communication, but I know that other people think differently about it. I do not think that it is always practical to communicate synchronously, because you have to think about what you say on the spot. For some people, that does not work well. They prefer to think about things in their own time... ...A call costs you 30 to 60 minutes of your day. "

Cohesion

3 themes were grouped in the category 'Sending food to staff', 'Virtual social events' and 'Encouraging staff to touch base regularly'.

Sending food to staff

In the pre-interview survey, 3 interviewees (30%) stated that the statement "My organization is sending food to staff working from home" applied to them, 6 interviewees (60%) responded that the statement did not apply to them and 1 interviewee (10%) responded that the statement was not applicable in their situation (see Table 306).

Applicability	Yes	No	Not relevant
Frequency	3	6	1
Interviewees	P3 P6 P7	P1 P2 P5 P8 P9 P10	P4
Percentage	30%	60%	10%

Table 306: Applicability: My organization is sending food to staff working from home

When asked about the helpfulness of the support measure, 0 interviewees (0%) stated that they considered the measure to be very helpful, 3 interviewees (30%) stated that they considered the measure to be helpful, 5 interviewees (50%) stated that they were neutral about the measure, 1 interviewee (10%) stated that they considered the measure to be unhelpful and 1 interviewee (10%) stated that they found the measure very unhelpful (see Table 307).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	0	3	5	1	1
Interviewees		P5 P6 P8	P3 P4 P7 P9 P10	P1	P2
Percentage	0%	30%	50%	10%	10%

Table 307: Helpfulness: My organization is sending food to staff working from home

Most interviewees were neutral about this measure. One interviewee, that was neutral about the helpfulness of the measure, did mention that she got a lot of food sent to her home and that she liked that a lot.

P3: I got loads of fruit boxes, nuts and 'Friday afternoon drinks'-packages. That was super nice! "

Virtual social events

In the pre-interview survey, 7 interviewees (70%) stated that the statement "My team is having virtual social events (e.g. via video chat)" applied to them, 2 interviewees (20%) responded that the statement did not apply to them and 1 interviewee (10%) responded that the statement was not applicable in their situation (see Table 308).

Applicability	Yes	No	Not relevant
Frequency	7	2	1
Interviewees	P1 P2 P6 P7 P8 P9 P10	P3 P5	P4
Percentage	70%	20%	10%

Table 308: Applicability: My team is having virtual social events (e.g. via video chat)

When asked about the helpfulness of the support measure, 2 interviewees (20%) stated that they considered the measure to be very helpful, 5 interviewees (50%) stated that they considered the measure to be helpful, 1 interviewee (10%) stated that they were neutral about the measure, 2 interviewees (20%) stated that they considered the measure to be unhelpful and 0 interviewees (0%) stated that they found the measure very unhelpful (see Table 309).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	2	5	1	2	0
Interviewees	P9 P10	P2 P3 P6 P7 P8	P4	P1 P5	
Percentage	20%	50%	10%	20%	0%

Table 309: Helpfulness: My team is having virtual social events (e.g. via video chat)

The interviewees were divided about virtual social events. Some found them helpful, or even very helpful, others found them unhelpful. The interviewees that considered the virtual social events helpful stated that they worked against loneliness and that they helped to improve work mentality. One interviewee, who found the events very helpful, mentioned that, after a while, the enthusiasm for these events went down for some people, but that others kept participating. Another interviewee, who did not find the virtual social events helpful, considered them to be a waste of time. He likes physical social work events, but believes that it does not work well online.

P6: These events work to improve the work mentality and to prevent loneliness. Event when I did not attend the event, I saw that people in the group chat was positive about it, which made me feel positive as well. "

P10: I liked that the organisation encouraged organising virtual social events. However, they were only attended by a small group. After a while, you saw that a large group of people did loose interest and stopped participating. For about 25% of people the events stayed very helpful."

P5: Virtual social events are a waste of time... ...Virtual social events just dont work. Social events from work are nice, but online they really don't work. I've had these online events with friends in my private life. That did not even work."

Encouraging staff to touch base regularly

In the pre-interview survey, 9 interviewees (90%) stated that the statement "My organization is encouraging staff to touch base regularly with each other" applied to them, 1 interviewee (10%) responded that the statement did not apply to them and 0 interviewees (0%) responded that the statement was not applicable in their situation (see Table 310).

Applicability	Yes	No	Not relevant
Frequency	9	1	0
Interviewees	P1 P2 P4 P5 P6 P7 P8 P9 P10	P3	
Percentage	90%	10%	0%

Table 310: Applicability: My organization is encouraging staff to touch base regularly with each other

When asked about the helpfulness of the support measure, 3 interviewees (30%) stated that they considered the measure to be very helpful, 7 interviewees (70%) stated that they considered the measure to be helpful, 0 interviewees (0%) stated that they were neutral about the measure, 0 interviewees (0%) stated that they considered the measure to be unhelpful and 0 interviewees (0%) stated that they found the measure very unhelpful (see Table 311).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	3	7	0	0	0
Interviewees	P4 P9 P10	P1 P2 P3 P5 P6 P7 P8			
Percentage	30%	70%	0%	0%	0%

Table 311: Helpfulness: My organization is encouraging staff to touch base regularly with each other

The interviewees found it helpful or even very helpful that the organisation encourages staff to touch base regularly. one interviewee, who found the measure very helpful, stated that the people most likely would have touched base anyway. Another interviewee stated that it comes across better when it comes from the organisation than when it comes from colleagues.

P9: Probably, people would have done this anyway. We are not a team of individuals, we are a community."

P4: It is good that this comes from the organisation. That the organisation shows that it is good to touch base. This comes across better to people than when it comes from their colleagues. ."

Technical capabilities

The 'Work from home infrastructure' theme was the only team that fit the 'Technical capabilities' category.

Work from home infrastructure

In the pre-interview survey, 8 interviewees (80%) stated that the statement "My team has good work-from-home infrastructure (e.g. source control, VPN, remote desktop, file sharing)" applied to them, 2 interviewees (20%) responded that the statement did not apply to them and 0 interviewees (0%) responded that the statement was not applicable in their situation (see Table 312).

Applicability	Yes	No	Not relevant
Frequency	8	2	0
Interviewees	P1 P2 P4 P6 P7 P8 P9 P10	P3 P5	
Percentage	80%	20%	0%

Table 312: Applicability: My team has good work-from-home infrastructure (e.g. source control, VPN, remote desktop, file sharing)

When asked about the helpfulness of the support measure, 7 interviewees (70%) stated that they considered the measure to be very helpful, 3 interviewees (30%) stated that they considered the measure to be helpful, 0 interviewees (0%) stated that they were neutral about the measure, 0 interviewees (0%) stated that they considered the measure to be unhelpful and 0 interviewees (0%) stated that they found the measure very unhelpful (see Table 313).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	7	3	0	0	0
Interviewees	P1 P2 P3 P4 P6 P8 P9	P5 P7 P10			
Percentage	70%	30%	0%	0%	0%

Table 313: Helpfulness: My team has good work-from-home infrastructure (e.g. source control, VPN, remote desktop, file sharing)

For most interviewees the work at home infrastructure was good. Some interviewees had difficulties when they started working from home, but eventually everything was fine. One interviewee responded that problems arose when they switched to a different IT system during working from home. Even though, she understood that the transition could not be delayed until after the pandemic, switching during the pandemic brought practical problems regarding support.

P1: In the beginning it was difficult. I had a good setup at home, but some colleagues did not."

P3: Our VPN works fine, but during the lockdown we transitioned to another system. This happened without explanation and support... ...I did not find it practical to plan the transition in this period."

Policies

Peer code review

In the pre-interview survey, 9 interviewees (90%) stated that the statement "My team is peer reviewing commits, change requests or pull requests (peer code review)" applied to them, 1 interviewee (10%) responded that the statement did not apply to them and 0 interviewees (0%) responded that the statement was not applicable in their situation (see Table 314).

Applicability	Yes	No	Not relevant
Frequency	9	1	0
Interviewees	P1 P2 P3 P4 P5 P6 P7 P8 P10	P9	
Percentage	90%	10%	0%

Table 314: Applicability: My team is peer reviewing commits, change requests or pull requests (peer code review)

When asked about the helpfulness of the support measure, 5 interviewees (50%) stated that they considered the measure to be very helpful, 4 interviewees (40%) stated that they considered the measure to be helpful, 1 interviewee (10%) stated that they were neutral about the measure, 0 interviewees (0%) stated that they considered the measure to be unhelpful and 0 interviewees (0%) stated that they found the measure very unhelpful (see Table 315).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	5	4	1	0	0
Interviewees	P1 P4 P6 P7 P8	P2 P5 P9 P10	P3		
Percentage	50%	40%	10%	0%	0%

Table 315: Helpfulness: My team is peer reviewing commits, change requests or pull requests (peer code review)

Various interviewees indicate that peer reviewing commits, change requests or pull requests was already important before Covid. Peer code review, according to one of the interviewees, is very helpful because it helps to find stuff that you have missed and because everyone has complementary knowledge. Another interviewee stated that peer code review had become more important when working from home because there was less room to discuss things with each other. According to this interviewee, peer code review happened more as a result of working from home and this increase remained after going back to the office. One interview mentioned that peer code review also enables employees to learn from each other and that it results in better code. Another one found peer code review the most important thing in software development.

P1: This was already important before the lockdown so we already did that. You always want someone to look at your code, because you will miss stuff, when you are proud of what you have built. Everyone has complementary knowledge. This did not become more important during the lockdown, because it was already very high on the list."

P4: This has become more important during working from home, because there is less room to discuss things with each other.... ..this happened more when working from home and that remained when we went back to the office.."

P7: It allows people to learn from each other. People work in different ways. It can make code a little help, faster or safer. It is a form of knowledge sharing. "

P8: This is the most important part of software development."

Meeting free day

In the pre-interview survey, 2 interviewees (20%) stated that the statement "My organisation has implemented a meeting free day (e.g. meeting free Monday)" applied to them, 7 interviewees (70%) responded that the statement did not apply to them and 1 interviewee (10%) responded that the statement was not applicable in their situation (see Table 316).

Applicability	Yes	No	Not relevant
Frequency	2	7	1
Interviewees	P6 P10	P2 P3 P4 P5 P7 P8 P9	P1
Percentage	20%	70%	10%

Table 316: Applicability: My organisation has implemented a meeting free day (e.g. meeting free Monday)

When asked about the helpfulness of the support measure, 3 interviewees (30%) stated that they considered the measure to be very helpful, 0 interviewees (0%) stated that they considered the measure to be helpful, 4 interviewees (40%) stated that they were neutral about the measure, 1 interviewee (10%) stated that they considered the measure to be unhelpful and 2 interviewees (20%) stated that they found the measure very unhelpful (see Table 317).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	3	0	4	1	2
Interviewees	P6 P8 P10		P1 P3 P4 P7	P9	P2 P5
Percentage	30%	0%	40%	10%	20%

Table 317: Helpfulness: My organisation has implemented a meeting free day (e.g. meeting free Monday)

Interviewees are divided about having a meeting free day. One interviewee, who had a working free day and found it very helpful, was positive about the measure because he believes that meetings are often not necessary. Having a meeting free day, or week, allowed people to work on projects that would otherwise not have been done. Another advantage is, according to an interviewee that would have found a meeting free day very helpful, is not being disturbed. Another interviewee that found meeting free days very helpful, indicated that meeting free days worked well in the beginning, but that, after a while, people started planning meetings in those days. An interviewee, who was neutral about meeting free days, said that people have to be able to contact each other, even on meeting free days.

An interviewee that would have found meeting free meetings very unhelpful, explained that meeting free days weren't possible in his job. Coordination is an important part of his day and even when you plan a meeting free day, the amount of meetings that are needed does not decrease. That results in more meetings on other days. The interviewee found a morning without meetings much more convenient than a whole day because he isn't able to concentrate on his development work for 8 hours in a row, because that would be to demanding.

P6: For our department, we had a weekly meeting free day and we have even had meeting free weeks. The meeting free day was fully free of meetings and in the meeting free week, all standard reoccurring meetings were canceled. During that week, the plan was to do an extra sprint and to work on projects that would otherwise not have been done. The meetings that were important for these projects continues, but all other meetings were canceled... .. I find it a good thing, to think twice about wether a meeting is needed and I believe that meetings are often not necessary. "

P8: "An advantage of meeting free days is not being disturbed. When we started working from home, we did not disturb each other. When we had gotten used to it, we started disturbing each other more often and more meetings came back. I would like to have a meeting free day and not be disturbed. Weekly would be a good frequency to start with. "

P10: One day in the week, we have a meeting limited day. In the beginning that worked fine but now, you see that this day is used to plan meetings when other days don not work. There is not much meeting free day left. People see it as an opportunity to plan meetings because people, in principle, have no other meetings planned on that day."

P5: "The nature of my job does not allow a day without meetings. Coordination is a large part of my day. Planning a meeting free day does not reduce the amount of needed meetings. As a result of that you are just going to have even more meetings on other days. Personally, i prefer to start early, which allows me to have a meeting free morning. That is more convenient than a meeting free day, because I do not have the concentration span to maintain the intensity of my other work for 8 hours straight. "

Mandatory pause between meetings

In the pre-interview survey, 3 interviewees (30%) stated that the statement "My organisation imposed a mandatory pause between meetings (e.g. meetings end at the whole hour en start at ten past)" applied to them, 7 interviewees (70%) responded that the statement did not apply to them and 0 interviewees (0%) responded that the statement was not applicable in their situation (see Table 318).

Applicability	Yes	No	Not relevant
Frequency	3	7	0
Interviewees	P4 P6 P10	P1 P2 P3 P5 P7 P8 P9	
Percentage	30%	70%	0%

Table 318: Applicability: My organisation imposed a mandatory pause between meetings (e.g. meetings end at the whole hour en start at ten past)

When asked about the helpfulness of the support measure, 3 interviewees (30%) stated that they considered the measure to be very helpful, 3 interviewees (30%) stated that they considered the measure to be helpful, 1 interviewee (10%) stated that they were neutral about the measure, 0 interviewees (0%) stated that they considered the measure to be unhelpful and 3 interviewees (30%) stated that they found the measure very unhelpful (see Table 319).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	3	3	1	0	3
Interviewees	P3 P4 P8	P6 P9 P10	P7		P1 P2 P5
Percentage	30%	30%	10%	0%	30%

Table 319: Helpfulness: My organisation imposed a mandatory pause between meetings (e.g. meetings end at the whole hour and start at ten past)

The opinions of the interviewees about a mandatory pause between meetings cover both ends of the spectrum. An interviewee that would consider this mandatory pause to be very helpful, names having time to prepare meetings, to go to the toilet or to shortly stand up between meetings as advantages. She also would like to have time to blow off steam after an unpleasant meeting and to be able to shift to the next meeting. Another interviewee that finds this very helpful explained that a pause gives you the time to think about something else and shift your focus to your next meeting. Another interviewee states that being in meetings from the start of your day until after lunch does not help productivity and concentration.

P3: "I would like a pause between meetings, because I like time to prepare. I like time to go to the toilet, I like time to stand up between meetings... ...It is also nice to be able to blow off steam between meetings and to have time to switch."

P4: "A pause between meetings helps to think about something else and shift focus to the next meeting... ... It is also nice have time to get some air or go to the toilet."

P8: "Some days, you go from meeting to meeting. One day per week, we have a lot of scrum events. Sometimes, these meetings keep us busy until after lunch. that is not good for productivity and concentration. "

The interviewees that consider a meeting free day to be very unhelpful say that it would be difficult because everyone has a different schedule, that they do not want their company to impose this, that it would be very difficult to plan meetings, and that, sometimes, you just have too much meeting to schedule a pause.

P1: "For me, this would be very unhelpful, because everyone has a different schedule. You can take time for a pause when you need to. A mandatory time between meetings makes planning more difficult. 15 minutes pause after every meeting would not be workable for us."

P2: "I do not want my company to impose this or install this automatically. If they would advise it, that would be fine. If meetings start a little later or end a little earlier, that's fine, but people should be able to decide on that themselves. Personally, i don't shorten my meetings, but I do try not to plan them back to back. "

Personal development

The 'Time for professional training' theme was the only team that fit the 'Personal development' category.

Time for professional training

In the pre-interview survey, 4 interviewees (40%) stated that the statement "My organization is encouraging staff to use this time for professional training" applied to them, 4 interviewees (40%) responded that the statement did not apply to them and 2 interviewees (20%) responded that the statement was not applicable in their situation (see Table 320).

Applicability	Yes	No	Not relevant
Frequency	4	4	2
Interviewees	P1 P6 P7 P10	P3 P5 P8 P9	P2 P4
Percentage	40%	40%	20%

Table 320: Applicability: My organization is encouraging staff to use this time for professional training

When asked about the helpfulness of the support measure, 2 interviewees (20%) stated that they considered the measure to be very helpful, 5 interviewees (50%) stated that they considered the measure to be helpful, 3 interviewees (30%) stated that they were neutral about the measure, 0 interviewees (0%) stated that they considered the measure to be unhelpful and 0 interviewees (0%) stated that they found the measure very unhelpful (see Table 321).

Helpfulness	Very helpful	Helpful	Neutral	Unhelpful	Very unhelpful
Frequency	2	5	3	0	0
Interviewees	P1 P3	P2 P6 P7 P8 P10	P4 P5 P9		
Percentage	20%	50%	30%	0%	0%

Table 321: Helpfulness: My organization is encouraging staff to use this time for professional training

None of the interviewees found this measure to be unhelpful. An interviewee who found it very helpful did not make use of this himself but did approve that this was encouraged for those for which it was relevant.

P1: "I did not make a lot of use of this myself because I did not have any down time and no new training's were developed and I had already finished all of the training that was relevant for me. I do applaud that this was encouraged by my organisation. "

Other measures

After the questions about the statements related to the corporate support measures in the survey, we asked the the interviewees about additional support measures that were not in the survey. We asked them about the additional support measures that their organisation took, on top of the measures mentioned in the survey, whether they considered these measures helpful and why they considered the measures helpful or not helpful. The interviewees named a allowance for working at home, adjustments in their mobility plan, meeting etiquette, office availability during the pandemic and following government policy.

Working at home allowance

Various interviewees mention a 'working at home' allowance. The ones who got this allowance were positive about it and some interviewees who did received this allowance were disappointed about that. One interviewee stated that he did not find it necessary and found that people were complaining to much.

P1: "When it became clear that this situation was going to take longer, budget was freed up, among other things, for a 'working at home' allowance. I used it to buy a docking station for my Mac Book."

P7: "Some companies gave their employees a 'working from home' bonus. The company were I am seconded does this, but my own company does not. That is disappointing."

P2: "I find it nonsense that people are complaining about having to pay for their own teabags. If you look at what you are getting back, in the form of for example a reduced commute, you cannot complain."

Adjustments in mobility plan

Two interviewees were happy with the flexibility of their employer regarding their mobility plan. Because they still got a compensation for travel expenses, even though they were working at home, they got extra money"

P1: "I Liked the fact that there was a lot of flexibility in my mobility budget. When you did not need your lease care you could hand it in and get a cash allowance instead. The worked the same with a public transportation suscription."

Office availability

Some interviewees were very happy with the fact that their company allowed them to go back to the office when that became possible again.

P1: "As soon as working from home became less mandatory, we had a schedule for people to work at the office. With that we were able to restart working at the office. It was nice for me that that was possible again. Some people, who had grown attached to working from home were less happy that they had to go to the office again."

Following government Covid policy

Two interviewees motioned that they were pleased that their organisation followed government policies regarding Covid-19 when the offices opened up again. This reduced the risk of a whole

department having to go into quarantine and showed that the organisation cared about the health of their employees. The interviewees did mention that the policies were, sometimes stricter than some people would have wanted and that it proved difficult to adhere to the 1.5 meters distance.

P4: "It was made clear that people with symptoms had to stay at home and get tested. When someone sick had come to the office, it could have resulted in the whole department having to go into quarantine, staying at home when having symptoms reduced that risk. The 1.5 meters distance was not kept everywhere, especially with work that required colleagues to be close to each other like caring stuff. "

P10: "My organisation values the health of their employees. The local rules were followed. Sometimes a little more strictly than you would have wished, but always with the goal of protecting the health of employees. I am very please with how my organisation has acted regarding rules and policies considering Covid."

Missing measures

As a last question, regarding corporate support, we asked interviewees whether there were any measures that their organisation should have taken, but did not take. The respondents did not name any concrete measures besides not getting a 'work at home allowance', that they were missing. However, one respondent mentioned that she believed that here organisation could have handled it better, but that she did not knew how.

After the pandemic

The interviewees were asked about various aspects of their work lives after the pandemic. They answered questions about their preferred amount of days working at the office, their organisation's policies regarding working from home, the impact of the pandemic on their organisation and their way of working and their personal take-aways from the pandemic.

Preferred amount of office days

The interviewees were asked how many days they wanted to remain working at home after Covid and what their company policy, regarding working at home, would be after the pandemic. Companies policies were mostly in line with interviewee preferences (see Table 322).

One interviewee, who had been working in a remote role before Covid, wanted to remain working remote and only visit the office a few days per month. One interviewee wanted to work 1 to 2 days at the office. One interviewee wanted to work 2 days at the office. 2 interviewees wanted to work 2 or 3 days at the office. Two interviewees wanted to work 3 days at the office and one interviewee wanted to work at the office on the days he worked whole days and at home when he worked half days. When working full time, he wanted to work 5 days at the office. One interviewee did not want to work at home for a set number of days but only when he had to do work that required a lot of concentration. Another interviewee indicated that he did not really care whether he worked at home or at the office.

P1: "I would like to work 2 days at the office and three days at home, but if I would do more consulting and less developing, I would prefer it the other way around."

P5: "When working 8 hours in a day, I prefer to work at the office. Only when I work half days I prefer to work at home."

Interviewee	Company policy	Preferred office days
P1	Free choice limited by needs from projects and colleagues	2
P2	Follow the policy of the company where you are seconded	1-2
P3	At least 2 days at the office	3
P4	At least 3 days at the office	No preference
P5	In office first, remote only in agreement with colleagues	5
P6	Fully remote	0
P7	At least 2-3 days at the office	2 to 3
P8	3 days at the office	3
P9	Remote first	2-3
P10	Not yet known	No preference

Table 322: Preferred amount of office days

Company policy regarding working from home

Table 322 shows the preferred amount of office days of the interviewees in relation to the policies of their organisations. The company policies differ from interviewee to interviewee, One interviewee expects that the policy will remain 100% remote and for another one the policy will be 'remote first' , which implies that employees only come to the office when it is needed. Two interviewees will get to decide how many days they remain working at the office themselves, but will have to consult with their colleagues. One interviewee will have to go to the office at least 2 days per week, one has to go to the office 2 to 3 days per week and 2 have to spend 3 days per week at the office. One interviewee will have to follow the policy of the company where they are seconded and one interviewee does not yet know what the policy will be.

P9: "The policy will be 'remote first' that entails that you are not expected at the office. . . . I have 12 desks to divide over 50 people, but when more people come to the office, that is fine as well. I cannot demand that people come to the office but I have asked everyone to work at the office on 2 set days per week."

P5: "In general you work at the office, If you want to work remote, you can arrange that in agreement with your colleagues."

Impact of Covid on the organisation

When asked about the greatest expected lasting impact of Covid on their organisation, 6 interviewees name the normalisation of remote- hybrid working (see table 323).

Interviewee	Largest impact of Covid on the organisation
P1	Working at home will become more normalized; It has become more common to do non-work related activities during office hours, which results in a better work-life balance
P2	No lasting Impact
P3	Meetings with customers will be conducted online more often
P4	Working at home will remain
P5	Working at home will be more accepted.
P6	Many meetings will remain digital
P7	Companies will work hybrid
P8	Internal communication has become more complete and more clear
P9	"Working at home will be more accepted. It will be difficult to keep the social dynamic and culture within the organisation. The social aspect and the energy at the office will decrease."
P10	Companies will look at the potential savings as a result of working from home and facilitate this in order to become more efficient

Table 323: Largest impact of Covid on the organisation

Two interviewees expect that a significant part of meetings will remain digital. One interviewee states that it has become more common to do non work related activities during office hours resulting in a better work life balance. One interviewee explained that Covid had forced his organisation to communicate in a more structured manner. One interviewee is afraid that working from home will hurt the company culture and office dynamic and one interviewee expects that Covid will have no long term impact on his organisation.

P1: "Working from home will be normalized even more. What's really new is that it has become common to do non-work related activities during office hours resulting in a better work life balance"

P6: "Many meetings will remain permanently digital. However, I think that conferences, training and hackatons will become physical again."

P8: "Communication is structured better now. Tickets have a complete context and everything has been equipped for remote working. "

P9: "Working at home will be enabled. That was unmentionable before Covid. People are used to video calls and stuff like that. That is the biggest lasting impact. The biggest challenge is to keep the office dynamic and corporate culture from before the pandemic. "

Changes regarding work life

Most interviewees reported little to no expected changes regarding their work-life (see Table 324).

Change regarding work life	Interviewee(s)
There will be no changes regarding my work life	P4 P5 P6 P7 P10
Working at home will be accepted more easily	P2 P8 P9
I have become more outspoken and communicate more directly	P3
There will be more flexibility to do other things during work	P1

Table 324: Change regarding work life

One interviewee mentioned that he expected to have a more flexible work day. Three interviewees expected that it would become easier for them to work from home. One interviewee expects that video calls will be used more often and one interviewee has become more outspoken en expects that she will communicate more directly after the pandemic.

P1: "I will have more flexibility to do other things during work."

P8: "I think that video calls and working form home will become more common. "

P3: "I have become more outspoken in meetings and more direct in my communication."

Personal take-aways from the pandemic

The interviewees mentioned various personal takeaways from the pandemic (see table 325). The interviewees mentioned that learned about themselves and their organisations.

Interviewee	Personal take-aways from the pandemic
P1	Some people are weird
P2	We can easily work with less travel time, but 100% remote is not ideal.
P3	I'm extrovert instead of introvert and I am more down to earth than others. I've become better at letting things go
P4	I know more about my company and how i can work from home
P5	not really
P6	I've learned to work better remote and 100% remote and I've learned to deal with the personal schedule of other people
P7	I have learned how you can have a digital job interview
P8	The importance of communication
P9	No
P10	I have learned to be more patient and I've learned a lot about interpersonal communication

Table 325: Personal take-aways from the pandemic

One interviewee stated that he found out that 'some people are weird'. Various interviewees learned how they could work from home better and what the advantages of working from home are. One interview also learned that working 100% remote is not ideal. An interviewee mentioned that she found out that she was more extra vert than she thought to be. She also learned to let go of things more easily. Two interviewees said that they learned about communication and its importance and one of them also learned to be more patient. Other take ways that were mentioned were learning how to cope with the personal schedules of others and learning how to do a digital job interview.

P3: "I have learned a lot about myself. I have learn that I am more extra-vert than i thought. I have learned that I should not be in my home 24/7... ...I have become better at letting go of things"

P6: "I have learned hoe to work remote and 100% remote better and I've learned how to deal with the personal schedules of others."

P10: "I have learned to be more patient. I have learned a lot in the field of interpersonal communication."

12.4.5 How did working from home during the pandemic impact software development teams?

In order to answer this sub research question, we asked the interviewees questions about the effects of the pandemic on their teams and the various aspects of teamwork quality (see Figure 11)

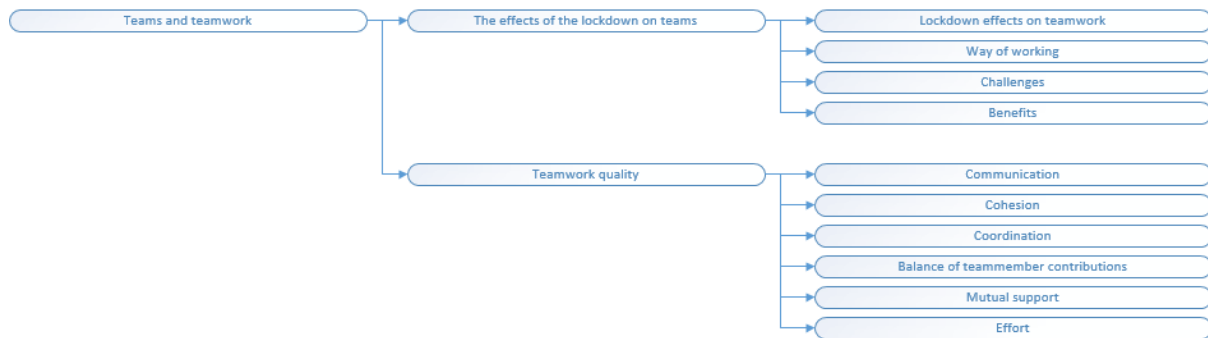


Figure 9: Subjects focusing on development teams

The effects of the pandemic on teams and teamwork

the interviewees were asked about the effects of the pandemic on their teams. The questions covered the broad effects of the pandemic on teams, the effects on the way the team worked, the challenges the team encountered and the benefits of the pandemic regarding teams and teamwork.

Pandemic effects on teamwork

Interviewees mention various effects of the pandemic on their teams and teamwork. Three interviewees mention that there is a higher threshold for communication. Two interviewees stated that communication became more difficult all meetings needed to be planned and that there was a higher threshold for people to ask for support. Two interviewees explicitly mentioned that there was less communication in their teams. one interviewee found that the communication became more negative. One interviewee also mentioned that communication became more long winded and another interviewee stated that all in-person events were canceled. Two interviewees mentioned that the effects of the pandemic on their teams and teamwork were limited. One interviewee stated that communication, in some way, became easier and another interviewee stated that he finally saw added value in the daily stand ups of his team. There was also an interviewee that said the pandemic caused people to be more dependent on each other and that people saw that they needed each other. Table 326 shows the effects of working from home on teams and teamwork and the interviewees that mentioned them.

Effect on teamwork	Interviewees
Higher threshold for communication	P1 P5 P8 P9
Less communication	P3 P8
Lower communication quality	P3 P10
In person events were canceled	P6
Effects are limited	P1 P6
Cooperation became easier	P7
Daily startup became more relevant	P2
More interdependence	P4

Table 326: The effects of working from home on teams and teamwork

Higher threshold for communication

Interviewees mentioned that there was a higher threshold to communicate with each other. One interviewee mentioned that the juniors in his team had a lower productivity because they found it too difficult to call colleagues when they needed help. This resulted in them using a half day to try to figure out a solution for something that could have been explained to them in 10 minutes. Another boundary to communicate was, according to two of the interviewees, that they had to plan and schedule a meeting every time where they would normally just walk to someone's desk to ask something.

P5: "Having to plan every small meeting caused a high threshold to communicate. In my team we have many juniors that sometimes have technical questions regarding coding. You saw that their productivity decreased because they found the threshold too high to call a colleague when they were stuck on something. This caused them to spend half a day on searching for a solution for a problem that could have been solved in ten minutes by asking a colleague for help."

P9: "At the office, when you are sitting next to each other, it is very easy to socialize or ask for support. This became more difficult because of working from home. You need to schedule a meeting every time you need to discuss something and that worked a lot more difficult."

Less communication

Two interviewees explicitly mentioned that there was less communication during working from home. Both indicate that this problem was largest in the beginning of the pandemic and that it became better over time.

P3: "In the beginning people communicated less with each other. Now, we have agreed to update each other more often, but in the beginning you heard nothing for days in a row."

P8: "In the beginning the threshold for communication was very high. That resulted in a decrease in communication which was bad for cooperation. Later, when we were used to the new situation, communication improved."

Lower communication quality

Two interviewees reported a decrease in quality of the communication in their teams. one interviewee reported that the tone of meetings had become more negative and another interviewee said that discussion, and communication as a whole, become more long-winded.

P3: "The tone of meetings has become more negative."

P9: "There is a lot of discussion via email and calls have become more long-winded. This could be caused by the fact that people don't feel well, but you really see that communication is more long-winded."

In person events were canceled

One interviewee mentioned that the only thing that changed for him was the fact that in person events were canceled.

P9: "The only thing that changed was that our quarterly in person events were canceled."

Effects are limited

Two interviewees responded that the effects of the pandemic on their teams were limited. One stated that he was working on a project for which most of the team was scattered over different countries. Because of that, they were already working online so not much changed for them.

P1: "For a large project, I was working on, a large part of the team was not stationed in the Netherlands. Everything was already digital so not much has changed."

Communication became easier

One interviewee mentioned that using digital tools for communication brought some advantages regarding cooperation.

P7: "When you are at home, it is easy to share your screen and mark stuff via Slack. Maybe that went easier than at the office. Physically it is difficult to look at a screen with three people. Cooperation was comparable and maybe even easier when working from home."

Daily startup became more relevant

One interviewee mentioned that the daily startup of his team, which he had found redundant before the pandemic, was pleasant when everyone was working from home.

P2: "We have a daily startup every morning. Before the lockdown, I thought it was nonsense, but when everyone was working from home, it was pleasant."

More interdependence

One interviewee mentioned that, when working from home, his team members became more aware of the fact that they needed each other and that they had to work together.

P4: "You realize that you need each other in such a period."

Way of working

In the interviews, the interviewees mentioned various effects of the lock downs on their way of working. The effects were both positive and negative (see Table 327)

Effect on way of working	Interviewees
Checking in on each other more often	P1
Informal feedback had to be planned	P1
No hybrid meetings	P2
More calling	P4
Better documentation	P4
Giving difficult tasks to senior developers	P5
More one-on-one communication	P9
flexible work times	P10

Table 327: The effects of working from home on the way of working

Checking in on each other more often

One interviewee stated that his team members were checking up on each other more often during the pandemic.

P1: "People were more aware about checking in with each other and asking how they were doing than normal. That was really nice. "

Informal feedback had to be planned

An interviewee mentioned that informal feedback, that would normally have taken place during Friday afternoon drinks had to be planned.

P1: "Informal feedback now had to be planned. Before working from home, this happened during the Friday afternoon drinks but that is not possible anymore."

No hybrid meetings

One interviewee stated that there were no hybrid meetings anymore during the pandemic, because everyone had to participate digitally.

P2: "A general advantage of working from home is that we did not have hybrid meetings anymore. I have experienced meetings in which a part of the group was on the table and a part was calling in... ... the microphone is never close to the person that is speaking, you do not hear what other people are saying and they do not hear you. There are always people that write stuff on a whiteboard, which is invisible for people who are calling in. An advantage of remote working is that everyone has the same limitations. This works nicely because everyone can participate to the same extend."

More calling

One interviewee stated that his team communicated better and called each other more often than before working from home.

P4: "We called each other more often. We communicate better and know what we can expect from each other and how we can support each other."

Better documentation

an interviewee mentioned that documentation improved and more work instructions were written.

P4: "Documentation is better and we have more work instructions... .. This started during working from home, because the need for documentation became higher, but it remained after we were allowed to go back to the office."

Giving difficult tasks to senior developers

One interviewee mentioned that difficult tasks were given to more senior employees because junior employees did not ask for help and therefore failed to tackle issues in time.

P5: "We decided to give more difficult tasks to senior employees instead of to the juniors, expecting that the seniors could help them. Because the juniors did not ask for help, it took them too much time."

P9: "At the office, when you are sitting next to each other, it is easier to socialize or ask for support. This became more difficult when working from home. "

More one-on-one communication

According to one interviewee, communication became more one-on-one during working from home because people planned individual meeting with each other and everyone kept talking to the same set of people.

P9: "Often, individual one-on-one meetings were scheduled. Because of this, the same people kept talking to each other instead of to other people in the team. "

Flexible work times

One interviewee stated that people used the flexibility in work times to do personal activities during office hours, which made them harder to reach.

P10: "The availability of people was problematic sometimes, After a while people stated to work during different hours. This can be very annoying... ..Some people are not available after 15:00 because of personal issues. We try to be understanding about everyone's personal situation, but it would be nice if people would take calls and be available when they are supposed to be at work."

Challenges for teams

The interviewees mentioned various challenges, regarding teamwork, that they encountered during working from home. Challenges that were mentioned were difficulties with digitally on-boarding new people, a bad atmosphere in the team, bad communication, technical issues with video-calls and limited availability of people (see Table 328).

Challenge	Interviewees
On-boarding new people	P1 P2
Technical issues when video calling	P4
Bad atmosphere	P3
Bad communication	P3 P5 P9 P10
Limited availability of people	P2 P10

Table 328: Challenges regarding teamwork

On-boarding new people

2 interviewees mentioned that they had experienced difficulties in digitally on-boarding new team members. One of them stated that it was more time consuming to digitally on-board new people and that, even then, the actual integration would not reach the same level as when it would have been possible to do a physical on-boarding. The other interviewee mentioned that the new team member, who had joined the team during working from home, was not well integrated in the team and did not fully commit.

P1: "The project was growing so we had to on-board new people. This is a lot more difficult when you are working digitally. Meeting physically and working online after that, works way better than integrating someone online. Digital costs more time and effort and you might never reach the same level of integration as when you would have had a physical on-boarding."

P2: "We had a Team member that joined the team during the lockdown. After a while we kind of lost him. Because of personal distractions, like laying a new floor at his home, this person was not attending meetings that he should attend. We got more and more last minute cancellations... ...Eventually, the situation was discussed with this person. I do not know the outcome of that conversation. "

One interviewee, whose whole team started during the pandemic, did not experience these issues. He mentioned that it went surprisingly well.

P7: "It went surprisingly well even though the team started during the lockdown."

Technical issues when video calling

One interviewee mentioned that, he encountered technical problems with video calls in the beginning of the pandemic. This was solved by the organisation by providing technical support and supplying the required equipment to employees.

P4: "Video calls did not go well in the beginning, people had bad webcams and bad internet connection... ...The company solved these issues with IT support and supplying the equipment that people needed."

Bad atmosphere

One interviewee stated that the atmosphere in the team was bad during working from home. After they raised this issue, the team tried to solve this by using a coach, focus sing on agile scrum coaching, team leader coaching and feedback workshops. They also applied the Lencioni pyramid to their team cooperation. They feedback training did not help much, but by introducing the Lencioni pyramid, the situation eventually improved.

P3: "The mutual atmosphere was bad... ...We started with the Pyramid of Lencioni and we introduced a coach for agile scrum coaching, team leader coaching and feedback workshops... ...We started working well with Lencioni, but the feedback training did not really help. We do see progress now. "

Bad communication

Fthe interviewees state that their team encountered problems regrading communication when working form home. They mentioned that communication became more difficult and that it happened less. The boundary to speak to each other became higher and communication became more long winded. These issues were solved by continuing to plan meetings, dividing work in a way that reduced the need for communication and increasing the amount of one on one phone calls, when meetings got stuck and email treads became to long.

P5: "Communication was difficult and happened way less... ...Eventually we divided the work in a way that people were able to do the work that they got without the need for help from colleagues."

P9: "The boundary to speak to each other is higher... ...We tried to solve this by continuing to plan meetings."

P10: "We saw that the communication became long-winded, this slowly developed over the first 2-3 months of the lockdown... ...In order to solve this, we decided to call each other to solve this. When long email threads occurred and when meetings got stuck, we planned one on one meeting or asked people to work out concrete proposals that could be discussed in the next meeting."

Limited availability of people

2 interviewees mentioned that there were difficulties regarding the availability of people because of flexible work times and people that did too much personal activities during office hours. Eventually the one-on-one meetings with these people were planned to explain what was expected of them when working form home.

P10: "The availability of people was problematic. After a while, people started working different hours. That can sometimes be very annoying... ...I am not going to deny that I sometimes do my grocery shopping during office hours, but some people are not available after 15:00... ...We spoke to these people individually and, showing understanding for their home situation, explained to them that we expected them to pick up their phones and be available when they were supposed to be available. "

Benefits

The interviewees mentioned 3 benefits of working from home in relation to teamwork. For the team of one of the interviewees, the pandemic improved the way they communicated to each other. One interviewee said that the flexible work times ensured that people were more easy to reach after office hours and an interviewee was pleased that his team stopped having hybrid meetings because everyone had to call in from home (see Table 329).

Benefit	Interviewees
Improved digital communication	P4
Flexible working times	P1
Loss of hybrid meetings	P2 P3

Table 329: Benefits regarding teamwork

Better communication

One interviewee stated that working form home taught him and his team how to communicate better.

P4: "We have learned to communicate better."

Flexible working times

According to one of the interviewees, the flexible work times resulted in the fact that colleagues were more easily available after office hours.

P1: "There was more flexibility in working hours. This has disadvantages for work life balance, but it is very handy when you have to deliver a project. when you send a message to a team member at 20:30, he is just as far from his work spot as at 9:00... ...With stress and deadlines, it is pleasant to be able to work together outside office hours."

No hybrid meetings

Two interviewee mentioned that they were glad that their team did not do any hybrid meetings during working form home because everyone had to call in. According to these interviewee, hybrid meetings do not work because microphones cannot pick up the voices of everyone in the room and people draw stuff on whiteboards that not everyone can see. Fully digital meetings work better because everyone participates with the same limitations.

P2: "A general advantage of working from home is that we did not have hybrid meetings anymore. I have experienced meetings in which a part of the group was on the table and a part was calling in... ... the microphone is never close to the person that is speaking, you do not hear what other people are saying and they don not hear you. There are always people that write stuff on a whiteboard, which is invisible for people who are calling in. An advantage of remote working is that everyone has the same limitations. This works nicely because everyone can participate to the same extend."

P3: "We do not have hybrid meetings anymore because everyone is in the call separately. Hybrid meeings dont work because microphones cannot register the voices of various speaking people well."

Teamwork quality

In the interviews, Teamwork quality was discussed on the basis of 34 aspects being part of 6 facets of teamwork quality proposed by Hoegl and Gemeunde [51] (see Figure 10).

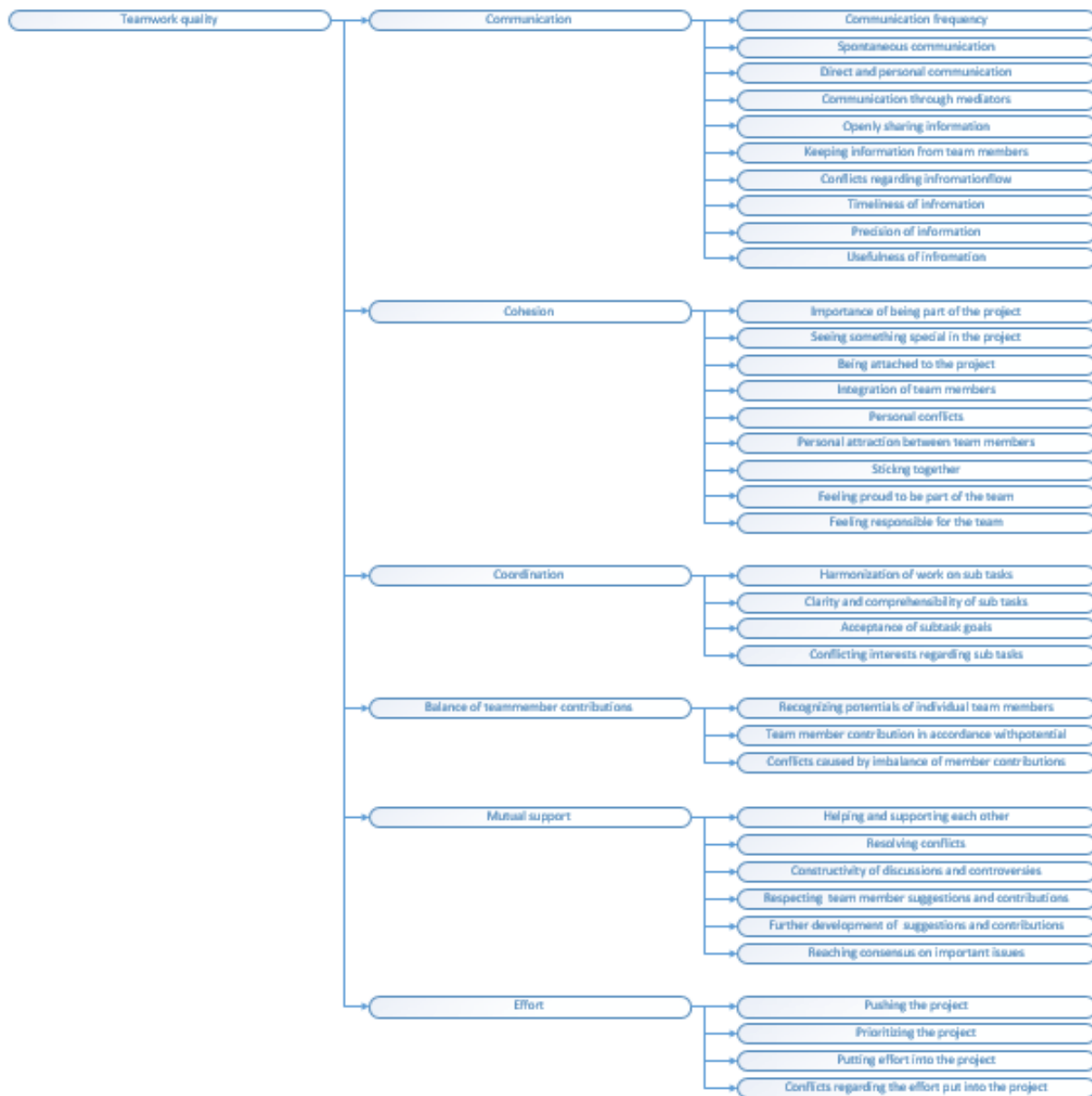


Figure 10: Team work quality

In the interview preparation survey, the interviewees rated 34 statements that can be used to measure the 6 facets of Team Work Quality [51]. For each statement, the interviewee rated the extent to which they agreed with it on a 5 point likert scale ranging from 'strongly disagree' to 'strongly agree'. They did this regarding the period before working from home and the period during working from home. Because the limited duration of the interview did not allow us to discuss all 34 statements in depth, we asked the interviewees to elaborate all statements for which they had indicated a strong difference (≥ 2 points) between the period before- and the period during working from home. The responses of the interviewees are grouped per aspect and the aspects are grouped per facet.

Communication

The interviewees were asked to indicate to what extent they agreed with a set of statements in the category 'Communication' in relation to their experiences during the pandemic. The 10 aspects of Team Work Quality that fall into the 'Communication' category are, according to Hoegl and Gemeunde, 'Communication frequency', 'Spontaneous communication', 'Direct and personal communication', 'Communication through mediators', 'Openly sharing information', 'Keeping information from team members', 'Conflicts regarding information flow', 'Timeliness of information', 'Precision of information' and 'Usefulness of information'[51] (see Figure 10).

Communication frequency

When answering the pre-interview survey questions, regarding the 3 months before working from home, 5 interviewees (56%) indicated that they strongly agreed with the statement "There was frequent communication within the team.", 4 interviewees (44%) responded that they agreed with the statement, 0 interviewees (0%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 330).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	5	4	0	0	0
Interviewees	P3 P4 P7 P8 P9	P1 P2 P5 P10			
Percentage	56%	44%	0%	0%	0%

Table 330: Before working from home: There was frequent communication within the team.

When asked about their experiences during working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement, 3 interviewees (33%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 2 interviewees (22%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 331). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P3 strongly agreed with the statement. During working from home, he disagreed with the statement. Before working from home, P5 agreed with the statement. During working from home, he was neutral about the statement. Before working from home, P8 strongly agreed with the statement. During working from home, he agreed with the statement. Before working from home, P9 strongly agreed with the statement. During working from home, he was neutral about the statement. Before working from home, P10 agreed with the statement. During working from home, he disagreed with the statement. The other interviewees reported no changes as a result of working from home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	3	2	2	0
Interviewees	P4 P7	P1 P2 P8	P5 P9	P3 P10	
Percentage	22%	33%	22%	22%	0%

Table 331: During working from home: There was frequent communication within the team.

One interviewee explained that it is more difficult to communicate frequently when you are not together at the office.

P1: "You loose sight of each other when you are not together at the office, Problems can occur that you would have been aware off when you were at the office."

Spontaneous communication

When answering the pre-interview survey questions, regarding the 3 months before working from home, 4 interviewees (44%) indicated that they strongly agreed with the statement "The team members communicated often in spontaneous (TWQ) meetings, phone conversations, etc.", 5 interviewees (56%) responded that they agreed with the statement, 0 interviewees (0%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 332).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	4	5	0	0	0
Interviewees	P3 P4 P5 P9	P1 P2 P7 P8 P10			
Percentage	44%	56%	0%	0%	0%

Table 332: Before working from home: The team members communicated often in spontaneous (TWQ) meetings, phone conversations, etc.

When asked about their experiences during working from home, 1 interviewee (11%) indicated that they strongly agreed with the statement, 2 interviewees (22%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 3 interviewees (33%) responded that they disagreed with the the statement and 1 interviewee (11%) responded that they strongly disagreed with the the statement (see Table 333). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P2 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P3 strongly agreed with the statement. During working form home, he the statement. Before working from home, P5 strongly agreed with the statement. During working form home, he disagreed with the statement. Before working from home, P7 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P8 agreed with the statement. During working form home, he disagreed with the statement. Before working from home, P9 strongly agreed with the statement. During working form home, he agreed with the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	1	2	2	3	1
Interviewees	P4	P1 P9	P2 P7	P5 P8 P10	P3
Percentage	11%	22%	22%	33%	11%

Table 333: During working from home: The team members communicated often in spontaneous meetings, phone conversations, etc.

Interviewees mentioned that communication had to be more structured. All meetings need to be planned and that is more difficult than just walking to someone's office. When working from home, you can't just walk up to someone and ask a question.

P1: "You have to approach people in a more structured manner, for example, in order to see whether someone is busy."

P9: "When you are not sitting next to each other, it is harder to quickly communicate with each other. You have to plan that, which is not always possible. Most people in my team are on projects, when they are busy with that, and you do not physically see them, you can't quickly grab someone's sleeve."

Direct and personal communication

When answering the pre-interview survey questions, regarding the 3 months before working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement "The team members communicated mostly directly and personally with each other.", 7 interviewees (78%) responded that they agreed with the statement, 0 interviewees (0%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the statement and 0 interviewees (0%) responded that they strongly disagreed with the statement (see Table 334).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	7	0	0	0
Interviewees	P3 P4	P1 P2 P5 P7 P8 P9 P10			
Percentage	22%	78%	0%	0%	0%

Table 334: Before working from home: The team members communicated mostly directly and personally with each other.

When asked about their experiences during working from home, 1 interviewee (11%) indicated that they strongly agreed with the statement, 2 interviewees (22%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 4 interviewees (44%) responded that they disagreed with the statement and 0 interviewees (0%) responded that they strongly disagreed with the statement (see Table 335). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P2 agreed with the statement. During working from home, he was neutral about the statement. Before working from home, P3 strongly agreed with the statement. During working from home, he disagreed with the statement. Before working from home, P5 agreed with the statement. During working from home, he disagreed with the statement. Before working from home, P8 agreed with the statement. During working

form home, he disagreed with the statement. Before working from home, P9 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	1	2	2	4	0
Interviewees	P4	P1 P7	P2 P9	P3 P5 P8 P10	
Percentage	11%	22%	22%	44%	0%

Table 335: During working from home: The team members communicated mostly directly and personally with each other.

Interviewees mention that there is less direct, personal communication when working form home. You can't meet people at the coffee machine and you don't plan digital meetings to have the short personal talks that you would have there. One interviewee also mentioned that people kept meeting the same people inside their own bubble and another interviewee did mention that it was important to keep talking about personal affairs.

P8: "It's in the little things like talking about the weekend at the coffee machine. You miss that completely when working from home because you don't plan that kind of conversations."

P9: "At the office, it is very easy to socialize or ask support, that is more difficult when working from home. You have to plan meetings to talk about stuff and that went a lot less smoothly. A lot of individual meetings were planned, because of this, people kept talking to each other instead of with other people in the team. People keep going to the same colleagues"

P1: "It is important to plan moments to talk about projects and personal affairs."

Communication through mediators

When answering the pre-interview survey questions, regarding the 3 months before working from home, 1 interviewee (11%) indicated that they strongly agreed with the statement "There were mediators through whom much communication was conducted.", 1 interviewee (11%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 2 interviewees (22%) responded that they disagreed with the the statement and 3 interviewees (33%) responded that they strongly disagreed with the the statement (see Table 336).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	1	1	2	2	3
Interviewees	P1	P2	P7 P8	P3 P10	P4 P5 P9
Percentage	11%	11%	22%	22%	33%

Table 336: Before working from home: There were mediators through whom much communication was conducted.

When asked about their experiences during working from home, 1 interviewee (11%) indicated that they strongly agreed with the statement, 1 interviewee (11%) responded that they agreed with the statement, 3 interviewees (33%) responded that they were neutral about the statement. 1 interviewee (11%) responded that they disagreed with the the statement and 3 interviewees (33%) responded that they strongly disagreed with the the statement (see Table 337). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P2 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P7 was neutral about the statement. During working form home, he agreed with the statement. Before working from home, P10 disagreed with the statement. During working form home, he was neutral about the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	1	1	3	1	3
Interviewees	P1	P7	P2 P8 P10	P3	P4 P5 P9
Percentage	11%	11%	33%	11%	33%

Table 337: During working from home: There were mediators through whom much communication was conducted.

One interviewee explained that he made more use of mediators when working form home because it was more difficult to digitally get trough to some people. He used people with good relations with these people as mediator to get trough to them. This cost him a lot of energy, but it served its purpose.

P1: "There is a type of people with whom you can communicate perfectly fine in a physical setting, but with whom it is way more difficult to communicate digitally. I a physical setting, you can convince these people because you have a personal conversation on the work floor. When you want to get to some kind of solution in the digital sphere, it is more difficult to get something done. Then, I went looking for a third person with whom this person had a good personal relationship and explained to them that I could not get across the message one-on-one. that third person functioned as a mediator to realize something I could not realize myself. This cost me a lot of extra energy but it did work.

Openly sharing information

When answering the pre-interview survey questions, regarding the 3 months before working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement "Project-relevant information was shared openly by all team members.", 5 interviewees (56%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 1 interviewee (11%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 338).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	5	1	1	0
Interviewees	P4 P9	P1 P3 P5 P7 P10	P8	P2	
Percentage	22%	56%	11%	11%	0%

Table 338: Before working from home: Project-relevant information was shared openly by all team members.

When asked about their experiences during working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement, 4 interviewees (44%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 1 interviewee (11%) responded that they disagreed with the the statement and 1 interviewee (11%) responded that they strongly disagreed with the the statement (see Table 339). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P2 disagreed with the statement. During working form home, he was neutral about the statement. Before working from home, P8 was neutral about the statement. During working form home, he the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	4	1	1	1
Interviewees	P4 P9	P1 P3 P5 P7	P2	P10	P8
Percentage	22%	44%	11%	11%	11%

Table 339: During working from home: Project-relevant information was shared openly by all team members.

One interviewee, who found that project relevant information was shared less openly during working from home, stated that this had everything to do with the fact that you hear a lot of information when you work in the same physical space. Digital communication is aimed at a specific subject and you do not hear what people normally talk about in the corridors. Because of that you get some project relevant information to late or not at all.

P10: "This had everything to do with the information you get when you are physically in the same place. Both formal and informal communication. Now, you just sit behind your PC and the digital communication is aimed at specific subjects. You don't hear he things that you would normally hear in the corridors. Because of this, some information reaches you to late, or not at all."

Keeping important information from team members

When answering the pre-interview survey questions, regarding the 3 months before working from home, 1 interviewee (11%) indicated that they strongly agreed with the statement "Important information was kept away from other team members in certain situations.", 1 interviewee (11%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 3 interviewees (33%) responded that they disagreed with the the statement and 3 interviewees (33%) responded that they strongly disagreed with the the statement (see Table 340).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	1	1	1	3	3
Interviewees	P1	P8	P5	P2 P3 P10	P4 P7 P9
Percentage	11%	11%	11%	33%	33%

Table 340: Before working from home: Important information was kept away from other team members in certain situations.

When asked about their experiences during working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement, 1 interviewee (11%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 2 interviewees (22%) responded that they disagreed with the the statement and 3 interviewees (33%) responded that they strongly disagreed with the the statement (see Table 341). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P8 agreed with the statement. During working form home, he strongly agreed with the statement. Before working from home, P10 disagreed with the statement. During working form home, he agreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	1	1	2	3
Interviewees	P1 P8	P10	P5	P2 P3	P4 P7 P9
Percentage	22%	11%	11%	22%	33%

Table 341: During working from home: Important information was kept away from other team members in certain situations.

The interviewees did not feel that important information was kept from them a lot more than before the pandemic. One interviewee agreed with the statement before working from home and strongly agreed with the statement during working from home. He indicated that information was already kept away from certain team members before the pandemic and that it worsened when they started working from home. Project kickoffs were canceled and deadlines and other information were only known by the project leader.

P8: "This was already bad in our organisation and it only became worse during working from home. Project kick-offs were canceled and information was only known by the project leader. This caused us to have less information. I don't know the reason why they shard less information."

Conflicts regarding information flow

When answering the pre-interview survey questions, regarding the 3 months before working from home, 0 interviewees (0%) indicated that they strongly agreed with the statement "In our team there were conflicts regarding the openness of the information flow.(R)", 0 interviewees (0%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 3 interviewees (33%) responded that they disagreed with the the statement and 4 interviewees (44%) responded that they strongly disagreed with the the statement (see Table 342).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	0	0	2	3	4
Interviewees			P5 P8	P1 P7 P10	P2 P3 P4 P9
Percentage	0%	0%	22%	33%	44%

Table 342: Before working from home: In our team there were conflicts regarding the openness of the information flow.(R)

When asked about their experiences during working from home, 0 interviewees (0%) indicated that they strongly agreed with the statement, 2 interviewees (22%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 2 interviewees (22%) responded that they disagreed with the the statement and 4 interviewees (44%) responded that they strongly disagreed with the the statement (see Table 343). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P8 was neutral about the statement. During working form home, he agreed with the statement. Before working from home, P10 disagreed with the statement. During working form home, he agreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	0	2	1	2	4
Interviewees		P8 P10	P5	P1 P7	P2 P3 P4 P9
Percentage	0%	22%	11%	22%	44%

Table 343: During working from home: In our team there were conflicts regarding the openness of the information flow.(R)

One interviewee stated that because people get incomplete information or hear information to late, people sometimes have conflicting information. This is annoying. People sometimes share information that later turns out to be incomplete or incorrect, this causes frustration.

P10: "You sometimes have conflicting information. This is annoying. You get a situation in which people do not have all the information they are supposed to have... ..When people later find out that information is incorrect or only half correct, this causes frustration."

Timeliness of information

When answering the pre-interview survey questions, regarding the 3 months before working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement "The team members were happy with the timeliness in which they received information from other team members.", 3 interviewees (33%) responded that they agreed with the statement, 4 interviewees (44%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 344).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	3	4	0	0
Interviewees	P4 P9	P1 P5 P10	P2 P3 P7 P8		
Percentage	22%	33%	44%	0%	0%

Table 344: Before working from home: The team members were happy with the timeliness in which they received information from other team members.

When asked about their experiences during working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement, 2 interviewees (22%) responded that they agreed with the statement, 3 interviewees (33%) responded that they were neutral about the statement. 2 interviewees (22%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 345). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P3 was neutral about the statement. During working form home, he disagreed with the statement. Before working from home, P5 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P7 was neutral about the statement. During working form home, he agreed with the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	2	3	2	0
Interviewees	P4 P9	P1 P7	P2 P5 P8	P3 P10	
Percentage	22%	22%	33%	22%	0%

Table 345: During working from home: The team members were happy with the timeliness in which they received information from other team members.

Interviewees mentioned that the timeliness of the received information was problematic. Informal face-to-face communication is faster than digital communication. When working at the office, questions are generally answered right away, Not getting that answer quickly enough when working form home can cause people to interpret things wrongly and make unnecessary mistakes.

P5: "In our organisation a lot of information is shared at the coffee machine. This does not happen when working form home. Formally sharing information takes longer than informal face-to-face communication. It causes trouble when people hear things to late, or not at all."

P8: "When a user story is not clear, you can normally ask for an explanation and get a quick answer. When you don't get that answer quickly enough when working from home, you have to make your own assumptions. When yo interpret things incorrectly this causes unnecessary mistakes that have to be corrected later."

Precision of information

When answering the pre-interview survey questions, regarding the 3 months before working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement "The team members were happy with the precision of the information received from other team members.", 4 interviewees (44%) responded that they agreed with the statement, 3 interviewees (33%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 346).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	4	3	0	0
Interviewees	P1 P4	P5 P8 P9 P10	P2 P3 P7		
Percentage	22%	44%	33%	0%	0%

Table 346: Before working from home: The team members were happy with the precision of the information received from other team members.

When asked about their experiences during working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement, 3 interviewees (33%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 2 interviewees (22%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 347). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P3 was neutral about the statement. During working form home, he disagreed with the statement. Before working from home, P7 was neutral about the statement. During working form home, he agreed with the statement. Before working from home, P8 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	3	2	2	0
Interviewees	P1 P4	P5 P7 P9	P2 P8	P3 P10	
Percentage	22%	33%	22%	22%	0%

Table 347: During working from home: The team members were happy with the precision of the information received from other team members.

Interviewees have different experiences regarding the precision of the information they received during working from home. One interviewee stated that communication had become more precise because everything was digital. Another interviewee indicated that he often had an incomplete picture because he did not get all the information he normally heard at the office.

P7: "Communication is more precise because everything is communicated digitally. When you get information face-to-face you quickly forget parts."

Usefulness of information

When answering the pre-interview survey questions, regarding the 3 months before working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement "The team members were happy with the usefulness of the information received from other team members.", 4 interviewees (44%) responded that they agreed with the statement, 3 interviewees (33%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 348).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	4	3	0	0
Interviewees	P1 P4	P5 P8 P9 P10	P2 P3 P7		
Percentage	22%	44%	33%	0%	0%

Table 348: Before working from home: The team members were happy with the usefulness of the information received from other team members.

When asked about their experiences during working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement, 3 interviewees (33%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 3 interviewees (33%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 349). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P3 was neutral about the statement. During working form home, he disagreed with the statement. Before working from home, P7 was neutral about the statement. During working form home, he agreed with the statement. Before working from home, P8 agreed with the statement. During working form home, he disagreed with the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	3	1	3	0
Interviewees	P1 P4	P5 P7 P9	P2	P3 P8 P10	
Percentage	22%	33%	11%	33%	0%

Table 349: During working from home: The team members were happy with the usefulness of the information received from other team members.

One interviewee, indicated that team members were less happy with the usefulness of the received information, because information was often incomplete and therefore less useful.

P7: "You don't get all the information you need. Because of that, people are sharing half information. That information is less useful and later, people find out that the information is incorrect or only half correct."

Cohesion

The interviewees were asked to indicate to what extent they agreed with a set of statements in the category 'Cohesion' in relation to their experiences during the pandemic. The 9 aspects of Team Work Quality that fall into the 'cohesion' category are, according to Hoegl and Gemeunde, 'Importance of being part of the project', 'Seeing something special in the project', 'Being attached to the project', 'Integration of team members', 'Personal conflicts', 'Personal attraction between team members', 'Sticking together', 'Feeling proud to be part of the team' and 'Feeling responsible for the team' [51] (see Figure 10).

Importance of being part of the project

When answering the pre-interview survey questions, regarding the 3 months before working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement "It was important to the members of our team to be part of this project.", 5 interviewees (56%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 350).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	5	1	0	0
Interviewees	P4 P8 P9	P1 P2 P3 P7 P10	P5		
Percentage	33%	56%	11%	0%	0%

Table 350: Before working from home: It was important to the members of our team to be part of this project.

When asked about their experiences during working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement, 3 interviewees (33%) responded that they agreed with the statement, 3 interviewees (33%) responded that they were neutral about the statement. 1 interviewee (11%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 351). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P3 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P8 strongly agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	3	3	1	0
Interviewees	P4 P9	P1 P2 P7	P3 P5 P8	P10	
Percentage	22%	33%	33%	11%	0%

Table 351: During working from home: It was important to the members of our team to be part of this project.

For the teams of some interviewees, having to work from home resulted in team members finding it less important to be part of the project. One interviewee explained that the loss of contact resulted in a disinterest. People are not comfortable in their own skin, don't feel like they are part of the team and lose the relation with their colleagues. This recovered when they were allowed to go to the office again.

P10: "Because people lose contact, they lose the connection they had. This results in disinterest. People don't feel comfortable in their own skin. At a certain point, you lose them and they lose interest. They don't feel attached to a certain project or team anymore. This recovered when we were able to go to the office again. You saw the relations recover."

Seeing something special in the project

When answering the pre-interview survey questions, regarding the 3 months before working from home, 0 interviewees (0%) indicated that they strongly agreed with the statement "The team did not see anything special in this project. (R)", 1 interviewee (11%) responded that they agreed with the statement, 3 interviewees (33%) responded that they were neutral about the statement. 4 interviewees (44%) responded that they disagreed with the statement and 1 interviewee (11%) responded that they strongly disagreed with the statement (see Table 352).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	0	1	3	4	1
Interviewees		P7	P3 P8 P9	P1 P2 P5 P10	P4
Percentage	0%	11%	33%	44%	11%

Table 352: Before working from home: The team did not see anything special in this project. (R)

When asked about their experiences during working from home, 0 interviewees (0%) indicated that they strongly agreed with the statement, 1 interviewee (11%) responded that they agreed with the statement, 4 interviewees (44%) responded that they were neutral about the statement. 3 interviewees (33%) responded that they disagreed with the statement and 1 interviewee (11%) responded that they strongly disagreed with the statement (see Table 353). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P10 disagreed with the statement. During working from home, he was neutral about the statement. The other interviewees reported no changes as a result of working from home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	0	1	4	3	1
Interviewees		P7	P3 P8 P9 P10	P1 P2 P5	P4
Percentage	0%	11%	44%	33%	11%

Table 353: During working from home: The team did not see anything special in this project.

One interviewee mentioned that his team was very enthusiastic about the project, because the project was super interesting.

P1: "The project was really cool. That gave us a lot of energy."

Being attached to the project

When answering the pre-interview survey questions, regarding the 3 months before working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement "The team members were strongly attached to this project.", 4 interviewees (44%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 354).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	4	2	0	0
Interviewees	P1 P4 P9	P2 P7 P8 P10	P3 P5		
Percentage	33%	44%	22%	0%	0%

Table 354: Before working from home: The team members were strongly attached to this project.

When asked about their experiences during working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement, 1 interviewee (11%) responded that they agreed with the statement, 3 interviewees (33%) responded that they were neutral about the statement. 2 interviewees (22%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 355). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P2 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P3 was neutral about the statement. During working form home, he disagreed with the statement. Before working from home, P8 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	1	3	2	0
Interviewees	P1 P4 P9	P7	P2 P5 P8	P3 P10	
Percentage	33%	11%	33%	22%	0%

Table 355: During working from home: The team members were strongly attached to this project.

One interviewee mentioned that he was feeling less involved with the project after he had to work from home for a while.

P3: "Working at home has lasted very long now, I notice that I start feeling less attachment to the project."

Integration of team members

When answering the pre-interview survey questions, regarding the 3 months before working from home, 1 interviewee (11%) indicated that they strongly agreed with the statement "The project was important to our team. All members were fully integrated in our team.", 6 interviewees (67%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 356).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	1	6	2	0	0
Interviewees	P4	P1 P2 P7 P8 P9 P10	P3 P5		
Percentage	11%	67%	22%	0%	0%

Table 356: Before working from home: The project was important to our team. All members were fully integrated in our team.

When asked about their experiences during working from home, 1 interviewee (13%) indicated that they strongly agreed with the statement, 3 interviewees (38%) responded that they agreed with the statement, 2 interviewees (25%) responded that they were neutral about the statement. 2 interviewees (25%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 357). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P1 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P3 was neutral about the statement. During working form home, he the statement. Before working from home, P5 was neutral about the statement. During working form home, he disagreed with the statement. Before working from home, P8 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	1	3	2	2	0
Interviewees	P4	P2 P7 P9	P1 P8	P5 P10	
Percentage	13%	38%	25%	25%	0%

Table 357: During working from home: The project was important to our team. All members were fully integrated in our team.

An interviewee mentioned that the team found it difficult to digitally on-board new people to the project. He mentioned that it was way harder than doing it physically or hybrid.

P1: "The project grew, so we had to on-board new people. This is a lot more difficult when you have to do it remote. It is easier to introduce someone in a physical setting than doing it online. Digital on-boarding required way more time and effort and in the end you might not even reach the same level of integration."

Personal conflicts

When answering the pre-interview survey questions, regarding the 3 months before working from home, 0 interviewees (0%) indicated that they strongly agreed with the statement "There were many personal conflicts in our team. (R)", 0 interviewees (0%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 4 interviewees (44%) responded that they disagreed with the the statement and 4 interviewees (44%) responded that they strongly disagreed with the the statement (see Table 358).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	0	0	1	4	4
Interviewees			P8	P1 P3 P7 P10	P2 P4 P5 P9
Percentage	0%	0%	11%	44%	44%

Table 358: Before working from home: There were many personal conflicts in our team. (R)

When asked about their experiences during working from home, 0 interviewees (0%) indicated that they strongly agreed with the statement, 3 interviewees (33%) responded that they agreed with the statement, 0 interviewees (0%) responded that they were neutral about the statement. 2 interviewees (22%) responded that they disagreed with the the statement and 4 interviewees (44%) responded that they strongly disagreed with the the statement (see Table 359). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P3 disagreed with the statement. During working form home, he agreed with the statement. Before working from home, P8 was neutral about the statement. During working form home, he agreed with the statement. Before working from home, P10 disagreed with the statement. During working form home, he agreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	0	3	0	2	4
Interviewees		P3 P8 P10		P1 P7	P2 P4 P5 P9
Percentage	0%	33%	0%	22%	44%

Table 359: During working from home: There were many personal conflicts in our team. (R)

Interviewees mentioned that non-work related tensions, as a result of the pandemic, caused problems in the work setting.

P3: "There were more unresolved issues. The Covid situation was unhelpful and issues were not talked out at the coffee machine."

P10: "The Covid situation at home created an atmosphere that caused people to not feel good in their own skin. This caused personal conflicts on the work floor."

Personal attraction between team members

When answering the pre-interview survey questions, regarding the 3 months before working from home, 0 interviewees (0%) indicated that they strongly agreed with the statement "There was personal attraction between the members of our team.", 3 interviewees (33%) responded that they agreed with the statement, 5 interviewees (56%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 1 interviewee (11%) responded that they strongly disagreed with the the statement (see Table 360).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	0	3	5	0	1
Interviewees		P1 P3 P8	P2 P5 P7 P9 P10		P4
Percentage	0%	33%	56%	0%	11%

Table 360: Before working from home: There was personal attraction between the members of our team.

When asked about their experiences during working from home, 0 interviewees (0%) indicated that they strongly agreed with the statement, 1 interviewee (11%) responded that they agreed with the statement, 6 interviewees (67%) responded that they were neutral about the statement. 1 interviewee (11%) responded that they disagreed with the the statement and 1 interviewee (11%) responded that they strongly disagreed with the the statement (see Table 361). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P1 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P3 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	0	1	6	1	1
Interviewees		P8	P1 P2 P5 P7 P9 P10	P3	P4
Percentage	0%	11%	67%	11%	11%

Table 361: During working from home: There was personal attraction between the members of our team.

Personal attraction between team members was not discussed in the interviews.

Sticking together

When answering the pre-interview survey questions, regarding the 3 months before working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement "Our team was sticking together.", 5 interviewees (56%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 362).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	5	1	0	0
Interviewees	P1 P4 P9	P2 P3 P7 P8 P10	P5		
Percentage	33%	56%	11%	0%	0%

Table 362: Before working from home: Our team was sticking together.

When asked about their experiences during working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement, 3 interviewees (33%) responded that they agreed with the statement, 0 interviewees (0%) responded that they were neutral about the statement. 3 interviewees (33%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 363). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P3 agreed with the statement. During working form home, he disagreed with the statement. Before working from home, P5 was neutral about the statement. During working form home, he disagreed with the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	3	0	3	0
Interviewees	P1 P4 P9	P2 P7 P8		P3 P5 P10	
Percentage	33%	33%	0%	33%	0%

Table 363: During working from home: Our team was sticking together.

One interviewee mentioned that the team was less less close because team members were not able to, for example, have a coffee together anymore. An interview, working in an international team, thought that the cohesion in the team was positively affected by the fact that all team members were confronted with the pandemic.

P5: "You don't drink a cup of coffee together and you don't really see each other. That results in a team that is less close."

P6: "I am in a team with people from all over the world. Because of the pandemic, everyone was in the same boat. In my opinion, this is very unique and I believe that it positively affected cohesion."

Feeling proud to be part of the team

When answering the pre-interview survey questions, regarding the 3 months before working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement "The members of our team felt proud to be part of the team.", 6 interviewees (67%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 364).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	6	1	0	0
Interviewees	P1 P4	P2 P3 P5 P7 P9 P10	P8		
Percentage	22%	67%	11%	0%	0%

Table 364: Before working from home: The members of our team felt proud to be part of the team.

When asked about their experiences during working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement, 3 interviewees (33%) responded that they agreed with the statement, 0 interviewees (0%) responded that they were neutral about the statement. 3 interviewees (33%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 365). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P3 agreed with the statement. During working form home, he disagreed with the statement. Before working from home, P7 agreed with the statement. During working form home, he strongly agreed with the statement. Before working from home, P8 was neutral about the statement. During working form home, he disagreed with the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	3	0	3	0
Interviewees	P1 P4 P7	P2 P5 P9		P3 P8 P10	
Percentage	33%	33%	0%	33%	0%

Table 365: During working from home: The members of our team felt proud to be part of the team.

Feeling proud to be part of the team was not discussed in the interviews.

Feeling responsible for the team

When answering the pre-interview survey questions, regarding the 3 months before working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement "Every team member felt responsible for maintaining and protecting the team.", 4 interviewees (44%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 1 interviewee (11%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 366).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	4	1	1	0
Interviewees	P1 P4 P8	P2 P7 P9 P10	P3	P5	
Percentage	33%	44%	11%	11%	0%

Table 366: Before working from home: Every team member felt responsible for maintaining and protecting the team.

When asked about their experiences during working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement, 4 interviewees (44%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 2 interviewees (22%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 367). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P8 strongly agreed with the statement. During working form home, he agreed with the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	4	1	2	0
Interviewees	P1 P4	P2 P7 P8 P9	P3	P5 P10	
Percentage	22%	44%	11%	22%	0%

Table 367: During working from home: Every team member felt responsible for maintaining and protecting the team.

Another interviewee explained that project kickoffs were canceled during the pandemic and that, because of that, people did not have a clear view of what they were doing. this resulted in less enthusiasm about the project and feeling less responsible for the deliverables.

P8: "Normally projects started with a kick of in which team members got a lot of information about the project and the end product that had to be delivered. This motivated people. Because these kickoffs were canceled during the lockdown, team members did not really know what they were working on and they felt less responsible."

Coordination

The interviewees were asked to indicate to what extent they agreed with a set of statements in the category 'Coordination' in relation to their experiences during the pandemic. The 4 aspects of Team Work Quality that fall into the 'coordination' category are, according to Hoegl and Gemeunde, 'Harmonization of work on sub tasks', 'Clarity and comprehensibility of sub tasks', 'Acceptance of sub tasks goals' and 'Conflicting interests regarding sub tasks' [51] (see Figure 10).

Harmonization of work on sub tasks

When answering the pre-interview survey questions, regarding the 3 months before working from home, 4 interviewees (44%) indicated that they strongly agreed with the statement "The work done on sub tasks within the project was closely harmonized.", 4 interviewees (44%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 368).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	4	4	1	0	0
Interviewees	P1 P3 P4 P9	P2 P7 P8 P10	P5		
Percentage	44%	44%	11%	0%	0%

Table 368: Before working from home: The work done on sub tasks within the project was closely harmonized.

When asked about their experiences during working from home, 4 interviewees (44%) indicated that they strongly agreed with the statement, 1 interviewee (11%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 2 interviewees (22%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 369). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P2 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P3 strongly agreed with the statement. During working form home, he agreed with the statement. Before working from home, P7 agreed with the statement. During working form home, he strongly agreed with the statement. Before working from home, P8 agreed with the statement. During working form home, he disagreed with the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	4	1	2	2	0
Interviewees	P1 P4 P7 P9	P3	P2 P5	P8 P10	
Percentage	44%	11%	22%	22%	0%

Table 369: During working from home: The work done on sub tasks within the project was closely harmonized.

Interviewees indicate that it is harder to coordinate and to see who is available. It is harder to reach people and harder to see how busy people are and therefore it is harder to decide who has to do certain tasks.

P2: "Coordination is more difficult. Working times are more flexible and because of that people aren't always available."

P8: "It is more difficult to keep track of who is doing what. You could not see who was busy and who had a lot of time, so it was harder to divide tasks accordingly."

Clarity and comprehensibility of sub tasks

When answering the pre-interview survey questions, regarding the 3 months before working from home, 4 interviewees (44%) indicated that they strongly agreed with the statement "There were clear and fully comprehended goals for sub tasks within our team.", 3 interviewees (33%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 370).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	4	3	2	0	0
Interviewees	P1 P3 P4 P9	P7 P8 P10	P2 P5		
Percentage	44%	33%	22%	0%	0%

Table 370: Before working from home: There were clear and fully comprehended goals for sub tasks within our team.

When asked about their experiences during working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement, 3 interviewees (33%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 1 interviewee (11%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 371). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P3 strongly agreed with the statement. During working form home, he agreed with the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	3	2	1	0
Interviewees	P1 P4 P9	P3 P7 P8	P2 P5	P10	
Percentage	33%	33%	22%	11%	0%

Table 371: During working from home: There were clear and fully comprehended goals for sub tasks within our team.

One interviewee indicated that it was more difficult to get across what had to be done. According to this interviewee, it was easier to convey a clear message, when physically in the same room.

P10: "It was very difficult to get stuff done and to convey what was expected of people. Normally you sit together and explain, that is harder in a digital setting."

Acceptance of sub task goals

When answering the pre-interview survey questions, regarding the 3 months before working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement "The goals for sub tasks were accepted by all team members.", 4 interviewees (44%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 372).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	4	2	0	0
Interviewees	P3 P4 P9	P1 P5 P7 P10	P2 P8		
Percentage	33%	44%	22%	0%	0%

Table 372: Before working from home: The goals for sub tasks were accepted by all team members.

When asked about their experiences during working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement, 3 interviewees (33%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 2 interviewees (22%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 373). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P8 was neutral about the statement. During working form home, he disagreed with the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	3	1	2	0
Interviewees	P3 P4 P9	P1 P5 P7	P2	P8 P10	
Percentage	33%	33%	11%	22%	0%

Table 373: During working from home: The goals for sub tasks were accepted by all team members.

One interviewee indicated that the acceptance of sub tasks was lower during working from home because it is easier for people to hide. He also stated that people were less proactive compared to when they were at the office.

P10: "Normally, you just ask someone, sitting across from you, to do something. That is more easily accepted than when you just throw it over the wall. In a digital work space people can hide more easily when they do not want a certain task by, for example, not taking your phone calls. I noticed that people hid a lot behind 'communication and interaction'. They were also less productive than when they were at the office."

Conflicting interests regarding sub tasks

When answering the pre-interview survey questions, regarding the 3 months before working from home, 0 interviewees (0%) indicated that they strongly agreed with the statement "There were conflicting interests in our team regarding sub tasks/sub goals.", 2 interviewees (22%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 4 interviewees (44%) responded that they disagreed with the the statement and 2 interviewees (22%) responded that they strongly disagreed with the the statement (see Table 374).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	0	2	1	4	2
Interviewees		P5 P10	P8	P1 P2 P3 P7	P4 P9
Percentage	0%	22%	11%	44%	22%

Table 374: Before working from home: There were conflicting interests in our team regarding sub tasks/sub goals.

When asked about their experiences during working from home, 0 interviewees (0%) indicated that they strongly agreed with the statement, 2 interviewees (22%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 4 interviewees (44%) responded that they disagreed with the the statement and 2 interviewees (22%) responded that they strongly disagreed with the the statement (see Table 375). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P7 disagreed with the statement. During working form home, he was neutral about the statement. Before working from home, P8 was neutral about the statement. During working form home, he agreed with the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	0	2	1	4	2
Interviewees		P5 P8	P7	P1 P2 P3 P10	P4 P9
Percentage	0%	22%	11%	44%	22%

Table 375: During working from home: There were conflicting interests in our team regarding sub tasks/sub goals.

Because the interviewees did not indicate an effect of working from home on conflicts regarding sub tasks, this subject was not discussed in the interviews.

Balance of team member contributions

The interviewees were asked to indicate to what extent they agreed with a set of statements in the category 'Balance of team member contributions' in relation to their experiences during the pandemic. The 3 aspects of Team Work Quality that fall into the 'Balance of team member contributions' category are, according to Hoegl and Gemeunde, 'Recognizing the potentials of individual team members', 'Team member contribution in accordance with potential' and 'Conflicts caused by imbalance of team member contributions' [51] (see Figure 10).

Recognizing potentials of individual team members

When answering the pre-interview survey questions, regarding the 3 months before working from home, 1 interviewee (11%) indicated that they strongly agreed with the statement "The team recognized the specific potentials (strengths and weaknesses) of individual team members.", 6 interviewees (67%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 1 interviewee (11%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 376).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	1	6	1	1	0
Interviewees	P4	P1 P2 P7 P8 P9 P10	P5	P3	
Percentage	11%	67%	11%	11%	0%

Table 376: Before working from home: The team recognized the specific potentials (strengths and weaknesses) of individual team members.

When asked about their experiences during working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement, 3 interviewees (33%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 1 interviewee (11%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 377). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P1 agreed with the statement. During working form home, he strongly agreed with the statement. Before working from home, P7 agreed with the statement. During working form home, he strongly agreed with the statement. Before working from home, P10 agreed with the statement. During working form home, he was neutral about the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	3	2	1	0
Interviewees	P1 P4 P7	P2 P8 P9	P5 P10	P3	
Percentage	33%	33%	22%	11%	0%

Table 377: During working from home: The team recognized the specific potentials (strengths and weaknesses) of individual team members.

Interviewees indicated that specific strengths and weaknesses of individual team members were an important factor in the division of tasks. Because everyone was working more independent and it was more difficult to ask for help, important difficult tasks were assigned to more senior and experienced team members in order to ensure that they would be delivered on time.

P1: "You need to trust that people will deliver the work that is assigned to them, because you cant walk by to check on them. Important and complex tasks were assigned to senior team members. That way, you can be certain that it will be alright. Some people find it difficult to ask for help. Because of that, there is a significant risk that they ring the bell too late. "

Team member contribution in accordance with potential

When answering the pre-interview survey questions, regarding the 3 months before working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement "The team members were contributing to the achievement of the team's goals in accordance with their specific potential.", 7 interviewees (78%) responded that they agreed with the statement, 0 interviewees (0%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 378).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	7	0	0	0
Interviewees	P4 P9	P1 P2 P3 P5 P7 P8 P10			
Percentage	22%	78%	0%	0%	0%

Table 378: Before working from home: The team members were contributing to the achievement of the team's goals in accordance with their specific potential.

When asked about their experiences during working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement, 5 interviewees (56%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 379). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P7 agreed with the statement. During working form home, he strongly agreed with the statement. Before working from home, P8 agreed with the statement. During working form home, he was neutral about the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	5	1	0	0
Interviewees	P4 P7 P9	P1 P2 P3 P5 P10	P8		
Percentage	33%	56%	11%	0%	0%

Table 379: During working from home: The team members were contributing to the achievement of the team's goals in accordance with their specific potential.

According to the interviewees, most team members did what they could. However, one interviewee stated that some team members were more hindered by the pandemic than others. This impacted their productivity, but that was compensated by extra effort from their colleagues. people were understanding, so this did not cause any problems.

P4: "Actually, most team members were equally affected by the lockdown. Because of that, team member contributions stayed equal. "

P1: "There was a difference in production between team members. Some people, for example the people with children at home, were affected more heavily by the pandemic. I did not see that as problematic. Other team members were willing to work harder to help colleagues with problems. People were willing to help each other in a natural way."

Conflicts caused by imbalance of member contributions

When answering the pre-interview survey questions, regarding the 3 months before working from home, 0 interviewees (0%) indicated that they strongly agreed with the statement "Imbalance of member contributions caused conflicts in our team.", 3 interviewees (33%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 3 interviewees (33%) responded that they disagreed with the the statement and 2 interviewees (22%) responded that they strongly disagreed with the the statement (see Table 380).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	0	3	1	3	2
Interviewees		P5 P8 P10	P2	P1 P7 P9	P3 P4
Percentage	0%	33%	11%	33%	22%

Table 380: Before working from home: Imbalance of member contributions caused conflicts in our team.

When asked about their experiences during working from home, 1 interviewee (11%) indicated that they strongly agreed with the statement, 3 interviewees (33%) responded that they agreed with the statement, 0 interviewees (0%) responded that they were neutral about the statement. 3 interviewees (33%) responded that they disagreed with the the statement and 2 interviewees (22%) responded that they strongly disagreed with the the statement (see Table 381). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P2 was neutral about the statement. During working form home, he agreed with the statement. Before working from home, P8 agreed with the statement. During working form home, he strongly agreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	1	3	0	3	2
Interviewees	P8	P2 P5 P10		P1 P7 P9	P3 P4
Percentage	11%	33%	0%	33%	22%

Table 381: During working from home: Imbalance of member contributions caused conflicts in our team.

One interviewee mentioned that some tensions arose because of a new team member that did not perform as he should.

P2: "A team member that joined the team later did not perform as he should have. After a while he started to detach from het team. That can be caused by the fact that you are more easily distracted at home. The organisation was flexible regarding working times because they saw that the situation was difficult enough. Not everyone handles that in the same way."

Mutual support

The interviewees were asked to indicate to what extent they agreed with a set of statements in the category 'Mutual support' in relation to their experiences during the pandemic. The 6 aspects of Team Work Quality that fall into the 'Mutual support' category are, according to Hoegl and Gemeunde, 'Helping and supporting each other', 'Resolving conflicts', 'Constructivity of discussions and controversies', 'Respecting team member suggestions and contributions', 'Further development of suggestions and contributions' and 'Reaching consensus on important issues' [51] (see Figure 10).

Helping and supporting each other

When answering the pre-interview survey questions, regarding the 3 months before working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement "The team members helped and supported each other as best they could.", 5 interviewees (56%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 382).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	5	1	0	0
Interviewees	P3 P4 P9	P1 P2 P7 P8 P10	P5		
Percentage	33%	56%	11%	0%	0%

Table 382: Before working from home: The team members helped and supported each other as best they could.

When asked about their experiences during working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement, 1 interviewee (11%) responded that they agreed with the statement, 5 interviewees (56%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table

383). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P1 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P3 strongly agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P7 agreed with the statement. During working form home, he strongly agreed with the statement. Before working from home, P8 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P10 agreed with the statement. During working form home, he was neutral about the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	1	5	0	0
Interviewees	P4 P7 P9	P2	P1 P3 P5 P8 P10		
Percentage	33%	11%	56%	0%	0%

Table 383: During working from home: The team members helped and supported each other as best they could.

Interviewees have different experiences regarding the mutual support in their teams during working from home. One interviewee stated that people supported each other less during the pandemic, because they weren't able to see who needed the support. The willingness to support was as high as normal, but people did not see where the support was needed. Another interviewee did not notice changes regarding mutual support. In his team, there has always been a lot of support and that did not change during the lock downs.

P1: "People helped and supported each other less because they could not see who needed support. They were just as willing to help others as before working from home but did not see where help was needed.."

P1: "The amount of mutual support has not changed a lot. Mutual support has always been good in our team."

Resolving conflicts

When answering the pre-interview survey questions, regarding the 3 months before working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement "If conflicts came up, they were easily and quickly resolved.", 4 interviewees (44%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 384).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	4	2	0	0
Interviewees	P4 P8 P9	P1 P5 P7 P10	P2 P3		
Percentage	33%	44%	22%	0%	0%

Table 384: Before working from home: If conflicts came up, they were easily and quickly resolved.

When asked about their experiences during working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement, 1 interviewee (11%) responded that they agreed with the statement, 3 interviewees (33%) responded that they were neutral about the statement. 3 interviewees (33%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 385). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P1 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P3 was neutral about the statement. During working form home, he disagreed with the statement. Before working from home, P5 agreed with the statement. During working form home, he disagreed with the statement. Before working from home, P7 agreed with the statement. During working form home, he strongly agreed with the statement. Before working from home, P8 strongly agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P9 strongly agreed with the statement. During working form home, he agreed with the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	1	3	3	0
Interviewees	P4 P7	P9	P1 P2 P8	P3 P5 P10	
Percentage	22%	11%	33%	33%	0%

Table 385: During working from home: If conflicts came up, they were easily and quickly resolved.

Interviewees indicate that conflicts were more difficult to resolve because op the limitations regarding communication when working from home. The absence of a manager, who could function as a mediator when conflicts occur at the office, was also named as a factor the made resolving conflicts more difficult.

P5: "Email communication is not always clear, so meetings need to be planned. This causes it to take longer to talk to each other when you have a conflict. You can't just walk to someones desk to talk stuff out."

P8: "Conflicts were resolved less quickly because, at the office, managers can function as a mediator and solve issues on the day they occur. When working from home, conflicts keep simmering on."

Constructivity of discussions and controversies

When answering the pre-interview survey questions, regarding the 3 months before working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement "Discussions and controversies were conducted constructively.", 4 interviewees (44%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 1 interviewee (11%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 386).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	4	1	1	0
Interviewees	P4 P8 P9	P1 P2 P7 P10	P5	P3	
Percentage	33%	44%	11%	11%	0%

Table 386: Before working from home: Discussions and controversies were conducted constructively.

When asked about their experiences during working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement, 2 interviewees (22%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 2 interviewees (22%) responded that they disagreed with the the statement and 1 interviewee (11%) responded that they strongly disagreed with the the statement (see Table 387). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P1 agreed with the statement. During working form home, he strongly agreed with the statement. Before working from home, P3 disagreed with the statement. During working form home, he the statement. Before working from home, P8 strongly agreed with the statement. During working form home, he disagreed with the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	2	1	2	1
Interviewees	P1 P4 P9	P2 P7	P5	P8 P10	P3
Percentage	33%	22%	11%	22%	11%

Table 387: During working from home: Discussions and controversies were conducted constructively.

Interviewees state that discussions and controversies were conducted less constructively during working from home. This was caused by the limitations of digital communication tools. Teams did take this into account and tried to adjust their messages accordingly.

P8: "Digital reactions in Slack or in tickets are less nuanced than when you give them to someone face to face. That makes the discussion less constructive."

P1: "When you have to point out someones mistakes during working from home, these talks are difficult. Normally, you converse a lot of information non-verbally, that is a lot more difficult in a video call. Because we ware aware of this, we tried to keep this in mind and aim for a constructive tone."

Respecting team member suggestions and contributions

When answering the pre-interview survey questions, regarding the 3 months before working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement "Suggestions and contributions of team members were respected.", 4 interviewees (44%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the

the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 388).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	4	2	0	0
Interviewees	P4 P8 P9	P1 P2 P7 P10	P3 P5		
Percentage	33%	44%	22%	0%	0%

Table 388: Before working from home: Suggestions and contributions of team members were respected.

When asked about their experiences during working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement, 4 interviewees (44%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 1 interviewee (11%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 389). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P3 was neutral about the statement. During working form home, he disagreed with the statement. Before working from home, P8 strongly agreed with the statement. During working form home, he agreed with the statement. Before working from home, P10 agreed with the statement. During working form home, he was neutral about the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	4	2	1	0
Interviewees	P4 P9	P1 P2 P7 P8	P5 P10	P3	
Percentage	22%	44%	22%	11%	0%

Table 389: During working from home: Suggestions and contributions of team members were respected.

Respecting the suggestions and contributions of team members was not discussed in dept in the interviews

Further development of suggestions and contributions

When answering the pre-interview survey questions, regarding the 3 months before working from home, 3 interviewees (38%) indicated that they strongly agreed with the statement "Suggestions and contributions of team members were discussed and further developed.", 5 interviewees (63%) responded that they agreed with the statement, 0 interviewees (0%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 390).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	5	0	0	0
Interviewees	P4 P8 P9	P2 P3 P5 P7 P10			
Percentage	38%	63%	0%	0%	0%

Table 390: Before working from home: Suggestions and contributions of team members were discussed and further developed.

When asked about their experiences during working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement, 3 interviewees (33%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 2 interviewees (22%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 391). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P1 the statement. During working form home, he agreed with the statement. Before working from home, P3 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P7 agreed with the statement. During working form home, he strongly agreed with the statement. Before working from home, P8 strongly agreed with the statement. During working form home, he disagreed with the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	3	1	2	0
Interviewees	P4 P7 P9	P1 P2 P5	P3	P8 P10	
Percentage	33%	33%	11%	22%	0%

Table 391: During working from home: Suggestions and contributions of team members were discussed and further developed.

For the teams of the interviewees that strongly agreed with this statement before the pandemic, nothing changed during the pandemic regarding discussing and developing the ideas and suggestions of team members. An interviewee, who agreed with the statement before working from home and disagreed during working from home, said that they gave presentations of improvement proposals when working at the office and that they stopped doing this when they had to work from home. He also stated that they were more focused on daily tasks during the pandemic and had less time to develop new ideas. Another interviewee, who also indicated that his opinion about this statement switched from 'agree' to 'disagree', explained that the digital meetings of his team were time-boxed which left less room to talk about the input of team members.

P8: "At the office, we often gave presentations about improvement proposals that could be developed. When we started working remote, we could have used video calls for this, but we did not do that. During the lockdown we were more focused on our daily activities and we did not have time to develop these kinds of ideas."

P10: "In my experience, digital meetings are time-boxed. When a discussion arises, time slips away. Sometimes, people had good ideas that were not discussed because the meeting time had passed. We did less with their input that I would have wanted. Before everything became digital, in face to face meetings, this went more constructively and much better."

Reaching consensus on important issues

When answering the pre-interview survey questions, regarding the 3 months before working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement "Our team was able to reach consensus regarding important issues.", 7 interviewees (78%) responded that they agreed with the statement, 0 interviewees (0%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 392).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	7	0	0	0
Interviewees	P4 P9	P1 P2 P3 P5 P7 P8 P10			
Percentage	22%	78%	0%	0%	0%

Table 392: Before working from home: Our team was able to reach consensus regarding important issues.

When asked about their experiences during working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement, 4 interviewees (44%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 2 interviewees (22%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 393). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P3 agreed with the statement. During working form home, he disagreed with the statement. Before working from home, P8 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	4	1	2	0
Interviewees	P4 P9	P1 P2 P5 P7	P8	P3 P10	
Percentage	22%	44%	11%	22%	0%

Table 393: During working from home: Our team was able to reach consensus regarding important issues.

One interviewee stated that it was harder to reach consensus because it was harder to communicate when working from home.

P10: "During the pandemic, in which people are already in a different state of mind, it was harder to reach consensus because communication was more difficult."

Effort

The interviewees were asked to indicate to what extent they agreed with a set of statements in the category 'Effort' in relation to their experiences during the pandemic. The 4 aspects of Team Work Quality that fall into the 'Effort' category are, according to Hoegl and Gemeunde, 'Pushing the project', 'Prioritizing the project', 'Putting effort into the project' and 'Conflicts regarding the effort put into the project' [51] (see Figure 10).

Pushing the project

When answering the pre-interview survey questions, regarding the 3 months before working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement "Every team member fully pushed the project.", 5 interviewees (56%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 394).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	5	1	0	0
Interviewees	P1 P4 P9	P2 P3 P7 P8 P10	P5		
Percentage	33%	56%	11%	0%	0%

Table 394: Before working from home: Every team member fully pushed the project.

When asked about their experiences during working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement, 2 interviewees (22%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 2 interviewees (22%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 395). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P3 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P8 agreed with the statement. During working form home, he disagreed with the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	2	2	2	0
Interviewees	P1 P4 P9	P2 P7	P3 P5	P8 P10	
Percentage	33%	22%	22%	22%	0%

Table 395: During working from home: Every team member fully pushed the project.

According to one of the interviewees, people felt less attached ot the project because they did not have the full picture. That caused them to push the project less than they did before working from home.

P8: "People felt less involved with the project. because of the lack of kick of meetings, team members knew less about the deadlines and other promises to customers. Because of that, they did not feel responsible and did not push to get things done."

Prioritizing the project

When answering the pre-interview survey questions, regarding the 3 months before working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement "Every team member made the project their highest priority.", 3 interviewees (33%) responded that they agreed with the statement, 4 interviewees (44%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 396).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	3	4	0	0
Interviewees	P4 P9	P3 P7 P10	P1 P2 P5 P8		
Percentage	22%	33%	44%	0%	0%

Table 396: Before working from home: Every team member made the project their highest priority.

When asked about their experiences during working from home, 2 interviewees (22%) indicated that they strongly agreed with the statement, 2 interviewees (22%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 3 interviewees (33%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 397). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P1 was neutral about the statement. During working form home, he agreed with the statement. Before working from home, P3 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P5 was neutral about the statement. During working form home, he disagreed with the statement. Before working from home, P8 was neutral about the statement. During working form home, he disagreed with the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	2	2	2	3	0
Interviewees	P4 P9	P1 P7	P2 P3	P5 P8 P10	
Percentage	22%	22%	22%	33%	0%

Table 397: During working from home: Every team member made the project their highest priority.

Prioritizing the project was not discussed in the interviews.

Putting effort into the project

When answering the pre-interview survey questions, regarding the 3 months before working from home, 4 interviewees (44%) indicated that they strongly agreed with the statement "Our team put much effort into the project.", 4 interviewees (44%) responded that they agreed with the statement, 1 interviewee (11%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 398).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	4	4	1	0	0
Interviewees	P1 P4 P8 P9	P2 P3 P7 P10	P5		
Percentage	44%	44%	11%	0%	0%

Table 398: Before working from home: Our team put much effort into the project.

When asked about their experiences during working from home, 3 interviewees (33%) indicated that they strongly agreed with the statement, 2 interviewees (22%) responded that they agreed with the statement, 4 interviewees (44%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 0 interviewees (0%) responded that they strongly disagreed with the the statement (see Table 399). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P3 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P8 strongly agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P10 agreed with the statement. During working form home, he was neutral about the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	3	2	4	0	0
Interviewees	P1 P4 P9	P2 P7	P3 P5 P8 P10		
Percentage	33%	22%	44%	0%	0%

Table 399: During working from home: Our team put much effort into the project.

One interviewee stated that people put less effort into the project because they could not see the full picture of what they were working on. Another interviewee explained that there were situations in which it was difficult for people to do their work as good as before working from home, but that everyone tried to do the best they could.

P8: "People felt less connected to the project, because they did not have the full picture, that negatively impacted the effort they put into the project."

P9: "There were situations in which people with young children at home had some difficulties, but everyone tried to do their work as good as possible."

Conflicts regarding the effort put into the project

When answering the pre-interview survey questions, regarding the 3 months before working from home, 0 interviewees (0%) indicated that they strongly agreed with the statement "There were conflicts regarding the effort that team members put into the project.", 2 interviewees (22%) responded that they agreed with the statement, 3 interviewees (33%) responded that they were neutral about the statement. 0 interviewees (0%) responded that they disagreed with the the statement and 4 interviewees (44%) responded that they strongly disagreed with the the statement (see Table 400).

Before	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	0	2	3	0	4
Interviewees		P3 P10	P2 P5 P8		P1 P4 P7 P9
Percentage	0%	22%	33%	0%	44%

Table 400: Before working from home: There were conflicts regarding the effort that team members put into the project.

When asked about their experiences during working from home, 0 interviewees (0%) indicated that they strongly agreed with the statement, 2 interviewees (22%) responded that they agreed with the statement, 2 interviewees (22%) responded that they were neutral about the statement. 1 interviewee (11%) responded that they disagreed with the the statement and 4 interviewees (44%) responded that they strongly disagreed with the the statement (see Table 401). The interviewees indicated changes, regarding this statement, as a result of working from home. Before working from home, P2 was neutral about the statement. During working form home, he agreed with the statement. Before working from home, P3 agreed with the statement. During working form home, he was neutral about the statement. Before working from home, P8 was neutral about the statement. During working form home, he agreed with the statement. Before working from home, P10 agreed with the statement. During working form home, he disagreed with the statement. The other interviewees reported no changes as a result of working form home.

During	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Frequency	0	2	2	1	4
Interviewees		P2 P8	P3 P5	P10	P1 P4 P7 P9
Percentage	0%	22%	22%	11%	44%

Table 401: During working from home: There were conflicts regarding the effort that team members put into the project.

One interviewee indicated that conflicts arose because people were less pro-active in taking on tasks.

P8: "Conflicts came up because people were less pro acitve in taking up things."

12.4.6 How did working from home during the lock downs impact cross team collaboration from the perspective of software development teams?

Interviewees were asked general questions about the social structure throughout the organisation, collaboration across teams and how they stayed in contact with colleagues outside their own team during working from home. Interviewees were also specifically asked about the effects of working from home on the enabling mechanisms for cross team collaboration (Mutual trust, shared mental models and closed loop communication). Their answers are analyzed in this section.

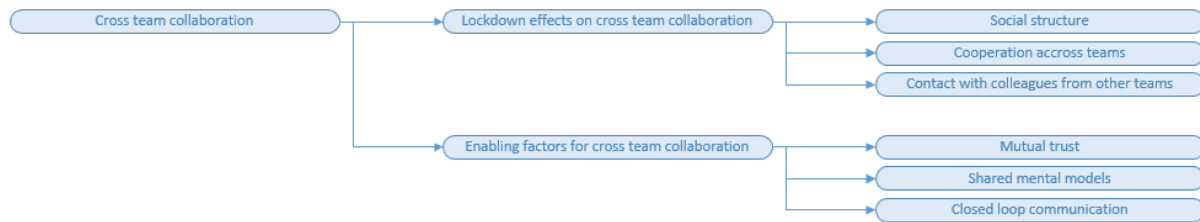


Figure 11: Subjects focusing on cross team collaboration

Social structure throughout the organisation

Interviewees were asked about how they maintained a social structure throughout the organisation. They mentioned various initiatives that their organisations took to maintain a social structure throughout the organisation. 9 interviewees mentioned that their organisations had organized digital social events, 2 interviewees mentioned that people in their organisations worked on multiple teams at the same time, one interviewee mentioned that his organisation organized challenges for their employees, and one interviewee mentioned that teams organized demonstrations for other teams about what they were doing (See Table 402).

Initiative	Interviewees
Digital social events	P1 P2 P3 P4 P6 P7 P8 P9 P10
Working on multiple teams	P1 P7
Challenges	P6
Demonstrations	P8

Table 402: Initiatives to maintain a social structure throughout the organisation

Digital social events

Multiple interviewees stated that their organisation had digital social events, which were organised to maintain cohesion within the organisation. Examples of types of events that were organised are digital cocktail courses, digital escape rooms, digital pub quizzes, digital drinks, digital fitness classes, digital gaming sessions and digital Christmas dinners. Five interviewees indicated that they were positive about these events, two of which also stated that they were not helpful for everyone in the organisation, but certainly for a part of the employees. Two interviewees did not indicate whether they valued these types of events and three interviewees said that their organisation organised digital social events, but that they were not helpful.

P4: "Digital events worked well, not everyone was enthusiastic about it, but most people were positive."

P5: "Virtual social events are a waste of time... ...Virtual social events just dont work. Social events from work are nice, but online they really don't work. I've had these online events with friends in my private life. That did not even work."

Challenges

One interviewee mentioned that his organisation organized challenges for their employees which they could do at home and share pictures of. For example, they had a challenge about cleaning the neighborhood.

P6: "Many events were organised, For example challenges. We had a cleaning challenge in which you could win something by cleaning your neighbourhood."

Working in multiple teams

One interviewee answered that people in his organisation were part of multiple teams which helped them to stay in contact with many people inside the organisation. another interviewee indicated that their organisation worked with groups of people from different teams that worked together on a specific overarching subject.

P7: "We used groups of people from different teams that worked together on a specific subject, for example security or documentation. This helped us to look at things from an organisation wide perspective."

Demonstrations

One interviewee responded that teams gave demonstrations to other teams about what they were working on.

P8: "Teams gave demo's to each other to show what they were working on and ask for input."

Cross team collaboration during working from home

The interviewees were asked how cross team collaboration was impacted during working from home. Two interviewees mentioned that they experienced more long winded meetings and two interviewees explained that their organisation had adopted a more structured and formalized communication between teams. On the other hand, one interviewee stated that communication between different teams had not become more formalized in his organisation. One interviewee stated that his organisation experienced problems with teams prioritizing more closely related teams over others (See Table 403).

Effect	Interviewees
Long winded meetings	P6 P10
Structure and formalization	P2 P4
Prioritization of 'closely related' teams	P5

Table 403: Effects of working from home on cross team collaboration

Long winded meetings

Two interviewees stated that communication became more long winded, one of them, who was used to digital meetings, stated that meetings with teams that were used to in person meetings were long winded because in person meetings tend to take longer.

P10: "We saw that the communication became long-winded, this slowly developed over the first 2-3 months of the lockdown."

P6: "I work together with teams that are not used to virtual meetings, teams that are used to in person meetings plan longer meetings. That was annoying. In my team, most meetings take 30 minutes, for other teams this can be 1 or 2 hours. "

Structure and formalization

One interviewee stated that his organization learned to plan better in their digital platform. Before working from home, the requests for the planning were not complete and clear. During working from home after working from home they became more strict on this. That resulted in clear and complete requests which could all be accessed in the same system. Another interviewee stated that his organisation had a structured approach in which the development team worked together with the customer service team.

P2: "Communication had to be more formalized... ..Before working from home, we already had our work planning in a digital platform. back then it did not work well, because requests were not clear and incomplete. We became more strict on that. That resulted in other teams, putting clear requests in the system so that we did not have to ask for clarification anymore. We stopped handling unclear requests."

P4: "A ticket system made sure that the communication between the development team and the customer service team went well."

Another interviewee stated that in his organisation communication between various teams was not more formalized due to working from home

P3: "We did not really see an effect. Communication between different teams was not more formalized than normal."

Prioritization of 'closely related' teams

One interviewee stated that it was a problem in their organisation that one of their teams favored another team because some members were part of both teams and therefore the teams had more natural interactions. That resulted in more prioritization for that team. Eventually this problem sorted itself out when people went back to the office again.

P5: "We had 2 application teams and one framework team. The cooperation between application team A and the framework team was better because their tasks were more similar and people were a member of both teams. Because application team B was less closely linked to the framework team, the cooperation was less as well. Requests from team B to the framework team got a lower priority which negatively impacted overall productivity... ..Eventually this problem sorted itself out when people went back to the office again."

Contact with colleagues outside your own team

The interviewees were asked how they stayed in contact with colleagues outside their own team during working from home. Two interviewees mentioned that they communicated with other teams via chat applications and one interviewee was happy that emails were used more often. Two interviewees mentioned that they made more use of their phones to communicate with other teams, two other interviewees mentioned that video calls were often used for cross team communication. Two interviewees mentioned that they went back to the office to improve communication and one interviewee stated that he would have liked to have more physical meetings. One interviewee indicated that she used a senior colleague to connect here to colleagues from other teams and one interviewee stated that his team used team-team meetings for cross team collaboration (See Table 404).

Effect	Interviewees
Chat applications	P6 P8
Email	P7
Video calls	P7 P9
Going back to the office	P4 P5
Connecting through a mediator	P7
Structural team-team meetings	P2
Phone calls	P2 P4

Table 404: Contact with colleagues outside your own team

Chat applications

One interviewee stated that their organisation had organisation wide slack channels in which everyone could participate. Another interviewee mentioned that the organisation wide Whats app group had become more active.

P8: "In the beginning communication across teams did not go so well. later on, we communicated via specific channels in Slack, there were channels for teams, divisions and for the whole organisation. That made it easier to ask questions to people in different teams."

P6: "We had a Whats App group that became a lot more active."

Emails

One interviewee found it an improvement that more email communication was used in her organisation, because at the office, she sometimes had to search for people..

P7: "Where you normally had to search for people in the office, now you could just send them an email. That is easier."

Video calls

Interviewees mentioned that they used video call applications to communicate with other teams.

P9: "When we needed to communicate, a Zoom call was set up... ..there was a lot of coordination via Zoom meetings."

P7: "We communicated via MS teams."

Going back to the office

One interviewee went back to the office to help other teams that needed to replace people on site that were at home due to Covid and one interviewee went back to the office to restore communication with other teams. Another interviewee stated that thought that his organisation should have had physical meeting more often than they did.

P4: "I went back to the office to help at other departments that needed help because of the Covid-related absence of other staff."

P5: "I went back to the office relatively quickly. When I was back at the office I moved to a space were people from other teams had their offices. that helped to repair communication and our cross team communication quickly recovered to the required level."

P9: "I think we should have had physical meetings more often, respecting the rules. For example in a hotel meeting room or restaurant."

Connecting through a mediator

One interviewee, who had not yet worked in her organisation for long explained that she worked together with someone who knew the organisation and could connect her to the people she needed.

P7: "I worked together with someone with more experience in the organisation so he always knew who I needed to talk to. He helped me with that."

Structural Team-Team meetings

One interviewee stated that they used structural team-team meetings as a means to communicate across teams.

P2: "We used structural team-team meetings for cross team communication."

Phone calls

Two interviewee mentioned they used telephone calls for communication between teams.

P4: "A lot of the communication to other teams went by telephone."

Mutual trust

Regarding mutual trust between teams during working from home, the interviewees were asked how working from home impacted information sharing between their team and other teams and how working from home impacted their willingness to admit mistakes to- and accept feedback from other teams (see Table 405).

Indicator	More	Equal	Less	Not applicable
Sharing information with other teams	P6 P8	P3 P7 P9	P1 P2 P4 P5 P10	
Admitting mistakes and accepting feedback	P6	P3 P4 P7 P8 P9	P2 P5 P10	P1

Table 405: Indicators of mutual trust between teams during working from home

Sharing information with other teams

Two interviewees indicated that their teams shared more information with other teams during working from home (see Table 405). One of them stated that the situation worsened at the beginning of the pandemic, but that, after a while more information was shared than before working from home, because tickets were more complete. Another interviewee explained that teams were more transparent to each other because everyone was in the same boat due to the pandemic.

P8: "When we just started working from home, less information was shared between teams. after a while it went better than before working from home because tickets were filled with way more information."

P6: "The amount of information, shared with other teams increased during the lockdown. People were more transparent because everyone was in the same boat. That causes you to talk more about certain things."

Three interviewees indicated that the amount of information that was shared with other teams was not impacted by working from home (see Table 405). One of them explained that they already communicated with other teams via email and that it was sometimes easier to get a hold of people because they had more time to be present at reviews. However, that did not impact the amount of information that was shared.

P3: "We already shared a lot of information via email. Because consultants had to spend less time on location, more people were present at reviews. that made it easier to reach people. This had no impact on the amount of information that was shared. "

Five interviewees indicated that information was shared less with other teams when working from home (see Table 405). One interviewee mentioned that a lot of information sharing across teams already went via mail, but that the information that would normally be discussed in a social context after work was not shared anymore. The fact that the informal information sharing between teams stopped was reaffirmed by two other interviewees. One interviewee stated that information sharing within his own organisation only slightly decreased but that information sharing with customer teams became a lot harder. Another interview explained that formal documentation was more important because of working from home. Because of the limitations of digital communication, it was harder to receive clear requirements.

P1: "A lot was already shared via email, but the information that was normally shared in a social setting after work, was not shared anymore."

P10: "Internally information streams across teams did not change much, but you heard less than you would have heard at the office. Information sharing with customers changed a lot. you dont know the people and the organisation, so it is harder to assess whether information is complete and correct."

Willingness to admit mistakes and accept feedback

One interviewee stated that people in his organisation were more willing to admit mistakes and share feedback because communication became more personal.

P6: "The tone became more positive because everything became more personal. When video calling you are in the homes of your colleagues, then you grow more connected to each other"

Five interviewees indicated that working from home did not impact the extend to which people were willing admit mistakes and accept feedback from other teams. Two of them explained that it helped a lot that there ware set moments to give and receive feedback. that makes it easier to accept.

P4: "Working from home did not impact the extend to which people were willing admit mistakes and accept feedback from other teams because feedback always comes at planned moments. Because you know that feedback is coming, it is easier to accept. "

Three interviewees mentioned that people in their organisation were less likely to accept feedback or admit mistakes to other teams during working form home. Possible explanations were the fact that it is harder to be nuanced in feedback via email and that people had a shorter temper because of the Covid-situation.

P5: "Some people are not skilled in giving nuanced feedback via email and that results in a reaction that lacks nuance as well. When you get a negative feedback without nuance, you are less likely to accept it. "

P2: "People got shorter tempers. The admitted mistakes less quickly and did not handle feedback very well. "

One interviewee stated that the statement did not apply to him because they never gave feedback to- or receive feedback from other teams.

Shared mental models

Regarding shared mental models between teams during working from home, the interviewees were asked how working from home impacted the extend to which they were able to anticipate and predict the needs of other teams and the extend to which they were able to identify changes in teams, tasks and team members (see Table 406).

Indicator	More	Equal	Less	Not applicable
Anticipating on- and predicting the needs of other teams		P2 P3 P4 P6 P7 P9	P5 P8 P10	P1
Identifying changes in the teams tasks, or team members	P3	P2 P4 P5 P6 P7 P8 P9	P10	P1

Table 406: Indicators of shared mental models between teams during working from home

Anticipating on- and predicting the needs of other teams

Six interviewees stated that their ability to anticipate on- and predict the needs of other teams remained equal during working from home (see Table 406). One interviewee stated that their team had a product owner to make sure that teams met the needs of other teams and one interviewee stated that working at home can function fine when you set yourself up for it.

P7: "This was not impacted by working from home. Out organisation uses product owners for this kind of thing. "

P2: "Working at home is often used as an excuse, but in my opinion working from home can function fine when you set yourself up for it. "

Three interviewees mentioned that their ability to anticipate on- and predict the needs of other teams became decreased (see Table 406). Two of them explained that this had to do with the limitations in cross team communication.

P8: "We know less about what is happening in other teams, so it is harder to anticipate."

P5: "This was negatively impacted by working from home, because people were less willing to communicate. People were not able to use the lunch to tell others what they were working on. You had to browse through the commits to see what everyone was working on. I and some other colleagues did that but some colleagues did not and thus had no idea what others were working on."

One interviewee said that this statement was not applicable to him.

Identifying changes in the teams, tasks, or team members

One interviewee said that his ability to identifying changes in other teams, their tasks, or their team members increased during working from home (see Table 406). In the organisation of this interviewee not much changed compared to before working from home, teams were kept updated about these things and new people were introduced at reviews. Some contact became better because people were more easily available.

P3: "We were informed about these things via email and new people were introduced during reviews. This is no different from before working from home. some contact has become better because people are better available than when they were working at location. "

Seven interviewees stated that their ability to identifying changes in other teams, their tasks, or their team members remained equal during working from home (see Table 406). They mentioned that this already went well before the pandemic and kept going well during working from home

P4: "This has not changed as a result of working from home. It always went well before working from home and kept going well during working from home."

One interviewee mentioned that his ability to identifying changes in other teams, their tasks, or their team members decreased during working from home (see Table 406). He said that it had become harder to get all the contextual information he needed to make strategic decisions.

P10: "It became harder and more annoying. It depends on whether you are dependent on contextual information to make decisions. When you want to decide on a strategy, you need the right context and complete information."

One interviewee said that this statement was not applicable to him (see Table 406).

Closed loop communication

Regarding closed loop communication between teams during working from home, the interviewees were asked how working from home impacted the extend to which they followed up on sent messages, acknowledged that messages were received and clarified that received messages were the same at the intended message (see Table 407).

Indicator	More	Equal	Less	Not applicable
Following up on sent messages	P1 P8 P9 P10	P2 P3 P4 P5 P6 P7		
Acknowledging that messages were received	P10	P2 P4 P5 P6 P7 P9	P1 P3 P8	
Clarifying that the message received is the same as the intended message	P1 P2 P10	P3 P4 P5 P6 P7 P8 P9		

Table 407: Indicators of closed loop communication between teams during working from home

Following up on sent messages

The interviewee said that the extend to which they followed up on sent messages increased during working from home (see Table 407). One interviewee stated that this was mostly needed when working together with customers. Other interviewees indicated that the extra need to follow up on sent messages was caused by colleagues that were less easy to reach and the fact that it is easier for people to hide behind the Covid-argument.

P1: "Within the organisation this did not really change because it was already standard practice. In cooperation with customers, who you could not see physically anymore, following up on sent messages became more important. "

P9: "When you don't get an answer you will start looking for it trough different channels. For example, Slack, Whats App and phone calls... ...Sometimes people just needed a bit more reminders."

Six interviewees stated that the extend to which they followed up on sent messages remained equal during working from home (see Table 407). One interviewee acknowledged that it was more difficult to get a reaction when working form home, but stated that he did not follow up more often because he already did that a lot. Another interviewee stated that they way in which he followed op had changed form walking to someones desk to sending a message via MS Teams, but that that worked just as well.

P2: "When you walk past someone and you see someone sitting at his desk you hear whether someone reacts. Online that is harder. You have to wait and see how fast someone will react. I did not follow up more during working from home. I have always been more pro-active than others in following up on messages."

P7: "Normally you walk to someones office, but sending a message works just as well. I don't think that working form home impacted how much I followed up on sent messages. "

None of the interviewees said that the extend to which they followed up on sent messages decreased during working from home. (see Table 407)

Acknowledging that messages were received

One interviewee said that the extend to which they acknowledged that messages were received increased during working from home (see Table 407).

P10: "I started to acknowledge that I received someones message more often."

Six interviewees stated that the extend to which they acknowledged that messages were received remained equal during working from home (see Table 407). One of them mentioned that he always tried to answer as quickly as possible.

P10: "This did not change during the lockdown. Before the lockdown, I also tried to answer as quickly as possible."

Three interviewees mentioned that the extend to which they acknowledged that messages were received decreased during working from home (see Table 407). Two of them indicated that they did this less often because they did not want to be disturbed

P1: "I acknowledged that I received someones message less often. When something is important, people will send another email. When working from home, there is no risk that you walk into them and that they ask something directly."

P8: "I reacted less to messages. Sometimes on purpose because I wanted to stay focused."

Clarifying that the message received is the same as the intended message

Three interviewees said that the extend to which they clarified that the message received is the same as the intended message increased during working from home (see Table 407). One of them indicated that they had to do this significantly more when they asked complex questions to customers. Digital messages can be interpreted wrongly and therefore need to be verified more often.

P1: "This changed significantly. Normally, when we have a complex question for a customer, we do this in person. That works way better. Because of Covid, that was not possible anymore. Therefore we, more often, had to verify whether digital messages were interpreted correctly. This might have been the largest change for us. "

Seven interviewees stated that the extend to which they clarified that the message received is the same as the intended message remained equal during working from home (see Table 407). One interviewee indicated that this clarification did not happen more during the pandemic, which caused frustration. Another interviewee also stated that this always went well in his organisation and that there was no more need for it during working from home.

P3: "This was not done enough and that caused a lot of frustration... ...This is not different from before working from home."

P4: "This always went well in our organisation... ...During working for home there was no more need for this than before."

None of the interviewees indicated that the extend to which they clarified that the message received is the same as the intended message decreased during working from home (see Table 407).