

Problems working in semi and full-time virtual teams: Comparison of virtual team problems pre and post-Covid 19 epidemic

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ABSTRACT,

Worldwide companies are continually changing due to dynamic market conditions and technological progress. Respectively, traditional workplaces comprising of collocated employees and face to face communication become replaced by virtual teams. As 15 semi-structured interviews revealed, before the COVID 19 outbreak, most individuals worked in semi-virtual teams construct, using face to face communication and electronic communication mediums to collaborate. Notably, in the recent corona times, where strict hygiene rules and contact prohibitions split working teams, managers perceived the advantages of virtual teams, and transit teamwork to full-time virtual setting. Even before the COVID 19 outbreak, experts emphasized that more than half of the transitions to virtual teams fail do not meet their strategic objectives.

Additionally, neither does recent literature adequately describe what challenges employees in semi and full-time virtual teams face and how the transition to entirely virtual ones, evoke new problems. Nor does business executives have clear expectations. To tackle this literature gap and shape executive expectations on the issues in full-time virtual teams this study presents a two-folded methodology. Firstly, a literature review of 53 articles, identifies issues in semi-virtual teams before the COVID 19 outbreak. On this basis, 15 semi-structured interviews with individuals of different full-time virtual teams are conducted to investigate what problems due to the transition to full-time virtual settings. At the final stage, both outputs are combined to reveal how existing problems in semi-virtual teams develop due to the development of full-time virtual team constructs. In the results part, propositions are presented that emphasize the improvement, deterioration, and newly emerging problems in full-time virtual teams.

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Keywords

Virtual teams, semi virtual teams, full time virtual teams, virtual team performance, problems in virtual teams, virtuality.

1. Introduction

Economies and workplaces are constantly changing and are subject to incremental development and improvements. Inspecting the recent trends across industrial and continental boundaries, internationalization, globalization of demand, markets, and process, shape the interest and strategic objectives of business executives. Undoubtedly this globalized business environment enhanced with continuous improvement of electronic communication technologies (Gaudes, Hamilton, Marsh, & Hilary, 2007) demands interoperability between partners, suppliers, and companies worldwide. So experts ensure that working across boundaries has become the new norm (Zakaria, 2018). The strategic expansion of operations geographically invigorates the necessity of culturally, physically, and organizational distributed work teams (Wong & Burton, 2000) consisting of diverse members aligned by a specific competitive objective.

Workplaces in the 21 century (Nydegger & Nydegger, 2008) are increasingly technology-driven, whereby employees utilize computer and scientific technology to collaborate and connect with partners (co-workers) and departments around the world (Mayhew, 2020). To enable fast decision making and flexible work structures across boundaries organizations give rise to now-ubiquitous virtual teams (Jimenez, Boehe, & Caprar, 2017), "who collaborate towards a common goal under conditions of geographical, temporal or organizational dispersion so that communication and coordination are predominantly based in electronic communication media" (Handke, Klonek, Parker, & Kauffeld, 2019). Jointly academicians and practitioners agree that "Virtual teams will be a fixture of the workplace in the future" (Hacker, Johnson, Saunders, & Thayer, 2019).

In 2016, recent studies revealed that 85% of the respondents regularly worked in a virtual team setting (RW3, culture wizard, 2016), this corresponds to 1.3 billion people working virtually (Zuofa & Ochieng, 2017).

Not surprising, since virtual teams are observable in a variety of fields, ranging from R&D problem solving, even to the existence in noneconomic organizations (Buhlmann, 2006). In general, a variety of benefits can be gained through the deployment of virtual teams. Virtual teams primarily enable the on-demand workforce availability of knowledge and expertise around the world. Moreover, higher performance can be coupled with increased employee satisfaction by providing the opportunity to flexible work from home and achieving an optimal work-life balance (Sundin, 2010). "In this respect, virtual teams are becoming a modern way of organizing groups across organizational boundaries" (Senquiz- Dias & Ortiz- Soto, 2019) to cope with the increasing reliance on computer-mediated communication and dispersion of valuable company assets.

1.1 Problem Statement

But the rapid transition from traditional face to face teamwork to virtual collaboration does not proceed without difficulties. Experts even present evidence that at least half of such GVT do not fully meet their strategic objectives due to inability to manage the complexities

arising from global virtual collaboration" (Jimenez, Boehe, & Caprar, 2017). Among the countless reasons, academicians argue that neither companies nor employees are change resilient (Power, 2018). Consequently, HRM studies recently revealed that people are not ready to give up face to face communication and transit entirely to the virtual world (Stratone & Vatamanescu, 2019). This situation illustrates that research concerning virtual team performance and hindrance is still infantile, and the Virtual Team's own set of arising management challenges is not sufficiently addressed or solved by current research (Hacker, Johnson, Saunders, & Thayer, 2019). Additionally, most academic research is laboratory-based (Hambley, O'Neill, & Kline, 2007) and only tested among student groups. Recent articles mainly focus on how teams can work together efficiently, "but the various management challenges of keeping virtual teams together and maintaining team spirit has attracted comparatively little attention" (Acker, Keeping your virtual team together over the long term, 2020).

The COVID 19 pandemic even increased the need for modern literature to identify management challenges related to virtual team performance because organizations across the world suddenly have to work remotely from home, and an increasing number of employees now engage in full-time virtual teamwork (Mysirlaki & Paraskeva, 2020). This unprecedented occurrences "has made it more critical than ever before to face the challenges that come with being a part of a virtual team." (Mindtools, 2020).

Given this transition, managers and employees are clueless about how projects can be continued in full-time virtual teams what new advantages or problems hinder/ improve project execution. The core of this uncertainty is the rapidity and the lacking academic and managerial studies about virtual team problems and its reasons.

Due to the actuality and complexity of the topic, this study tries to tackle the current literature gap by investigating what problems employee experience working full time in virtual teams. First of all, this study entails a twofolded contribution, because through a literature review problems in semi virtual teams are collected and considering the team performance dimensions budget, time and quality, listed. Secondly 15 semi-structured interviews with employees and managers are conducted to highlight how hindrances concerning team performance developed, due to the transition to full-time virtual teamwork. In the end, propositions on problems impeding team performance in full-time virtual teams are formed to explain why certain problems altered and propose a starting point for academics and managers for further investigations.

1.2 Research Project Motivation

My motivation to research the topic of working full time in virtual teams is to clarify how problems in project teams developed, altered, or solved through the transition to full-time virtual team settings. Due to the recent COVID 19 epidemic, virtual teams became an appropriate solution for the majority of businesses to ensure customer satisfaction and continuous supply chain performance (Koop, 2020), by "interacting with partners & employees across graphic, organizational and other boundaries." (Martins, Gilson, & Maynard, 2004). Nevertheless, an increasing number of companies are contemplating full-time virtual teams as a

long-term work solution, rather than a provisional application. The problems managers have to expect, and concerning team performance are presented in this research. This thesis constructs propositions about team performance in virtual teams, which can provide a starting point for managers and researchers to investigate correlations and mitigation strategies to improve virtual teams. Lastly, I am feeling compelled and honoured to conduct this research around virtual teams because of the actuality and ambiguity of this topic. In the end, I hope to identify new problem sources and inspire studies to conduct further research in the domain of virtual teamwork.

1.3 Research Objective

This paper aims to deploy a problem-based approach by focusing on the existing problems within virtual team conglomerations. Aforementioned the reliance on primary computer-mediated communication tools in conjunction with the increased spatial, cultural, and geographic disparity between co-workers inevitably causes difficulties (Shameem, Kumar, & Chandra, 2017). Central to the thesis, is the assumption that the transition of work teams into full-time virtual settings lead to a development concerning existing problem hindering team performance. To investigate, which problems infringe team performance in teams before and after the transition to full-time virtual settings, a literature review and semi-structured interviews with employees are conducted. Whereby the overall research question is:

RQ: What problems do employee experience working full time in virtual teams?

1.4 Outline of this Paper

This paper is structured into three parts. Firstly, virtual teams and their characteristics are identified in the theoretical review section. In general, the first section serves as an introduction to the thesis. On this basis, the second part, namely the methodology, justifies the applied method used for the literature review, data collection and data processing of the interviews. The remaining parts are dedicated to an in-depth presentation of the interview results. Moreover, in conjunction with additional literature, new propositions for further research are developed and defended. Concluding, in the conclusion, the author admits several limitations of this research and indicates applications and further research.

2.0 Theoretical Review

Before the study pursues a sophisticated analysis of problems and their developments, it is crucial to understand the characteristics of virtual teams and difference between virtual and traditional face to face teams.

2.1 Virtual Team Characteristics

According to the commonly cited literature, Virtual Team is not an exclusive phenomenon, rather an effective team coordination, which surpasses traditional team composition in the recent years. Whereby advantages of

these team constructs have been subject to many research, but it worth starting this theoretical review part of the paper by contemplating “what is a virtual team?”.

A starting point is to decompose the term virtual teams and consider both aspects separately. The word “team” is strictly unique, describing “a small number of people with complementary skills who are equally committed to a common purpose, goal (...)” (Ebrahim, Ahmed, & Taha, Virtual Teams: a Literature Review, 2011). Moreover, ancient research about team and group dynamics highlighted, that teams display a high level of interdependency and integration among members (Powell, Piccoli, & Ives, 2004). In contrast, members of groups do not rely on each other, instead perform group activities interactively (Cameron & Green, 2019, S. 70-71). This research needs to make a distinction between both concepts, arguing that team members, including virtual teams, are driven by a common purpose and display high commitment (Stratone & Vatamanescu, 2019).

Nevertheless, teams are not permanent (Wong & Burton, 2000) because they are formed when a specific need arise and disbanded after the successful execution (Simons, 1995). Undoubtedly many kinds of teams emerged due to the colocation or dispersion of team members in time and place (Figure 1). As a particular type of organization, Virtual teams are defined as geographically and organizationally dispersed co-workers that are assembled using a combination of telecommunications and information technologies to accomplish an organizational task” (Hacker, Johnson, Saunders, & Thayer, 2019).

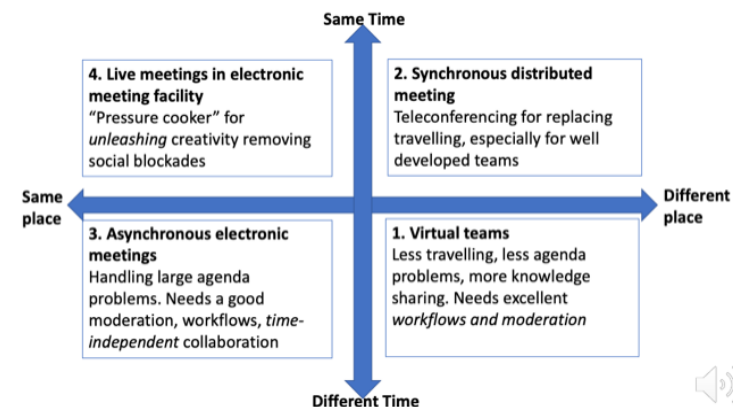


Figure 1 Groupware supports various modes of group interaction source (Valacich & Schneider, 2018)

Teams operating across multiple, even temporal boundaries, are described as global virtual teams. Commonly, both virtual team forms, are coined by a lack of physical and personal contact (Pinto, 2018), thus demanding the use of information and communication technologies (Gilson, Maynard, & Young, 2014) to interdependently collaborate toward a joint objective. Especially these discontinues concerning temporal, spatial, organizational relationship, and culture (Hacker, Johnson, Saunders, & Thayer, 2019) characterise virtual teams. In consideration of Table 1, both team specific and unique virtual team characteristics are presented.

Characteristics of virtual teams	Descriptions
<i>Common Criteria (specific to virtual teams)</i>	Geographically dispersed Driven by common purpose Enabled by communication technologies Involved in cross boundary collaboration
<i>Other characteristics (criteria for all teams)</i>	Is not a permanent team Small team size Team member are knowledge workers Team members may belong to different companies

Table 1: Table of Characteristics
source: (Ebrahim, Ahmed, & Taha, *Virtual Teams: a Literature Review*, 2011).

2.2 Difference between traditional and virtual teams

In the first part, virtual teams have been described concerning team-specific characteristics. In this section, the term virtual is investigated in depth. Therefore, it is essential to consider what factors decide whether teams are conventional or can be labelled as virtual. At the beginning of the last decade, Bell (Bell, 2002), among the first experts, investigated the differences between both types. In his groundwork, he distinguished traditional and virtual teams based on two overarching components, namely spatial distance and communication (Bell, 2002). Virtual teams display a distributed workforce whose connection is based on technological mediated communication mechanisms, such as email or webex. In conventional teams, employees are located close to each other, which allows face-to-face communication. Despite these early contributions of Bell, most experts today are aware that virtual teams cannot be treated as a dichotomous concept (Hertel, Geister, & Konradt, 2005). Instead, experts recognize team virtuality as a multidimensional variable (Dixon & Panteli, 2010) and determinant of teams as virtual ones. Such assumptions treat virtuality as a continuum ranging from face to face to pure virtual teams (Fiol & O'Connor, 2005). Consequently, the classification of a team as more or less virtual does not solely depend on the level of spatial and temporal dispersion. (Kirkman & Mathieu, 2005).

According to Kirkman, the team virtually is composed of three dimensions describing the level of technology usage among teams. The first dimension is the extent to which team members use virtual tools to coordinate and execute team processes (Gilfillan, Robinson, & Barrowman, 2020). The more teams communicate using virtual appliances, the higher the resulting level of virtuality. Based on this reasoning, Kirkman refutes the common assumption that virtual teams have to be geographically dispersed. Instead, collocated teams, containing a high reliance on virtual communication tools, can be labelled as virtual as well as their dispersed counterparts. Secondly, the authors consider the extent to which digital media convey the information needed for the team to be capable (Derks & Bakker, 2013). The synchronicity of team member virtual interaction finalizes the classification of virtual teams. Thirdly, asynchronous exchange, which involves a time lag to prepare read and process the

information, is concerned with a higher level of virtuality than synchronous one.

Beyond the dispersion level, the team virtually allows academia to consider the extent of virtuality in organizations to identify pure virtual, face-to-face, or even hybrid teams. These combine the best of both worlds by complementing face to face interchange with the virtual exchange of information. In brief, face to face and virtual teams can be distinguished considering the level of dispersion (place and time) and virtuality (technology use).

3.0 Methodology

3.1 Research Design

To answer the overall research question and thus identify what problems employees experience in full-time virtual teams, the research possesses a two-fold methodology. The exact steps of this research are visualized in Figure 2.

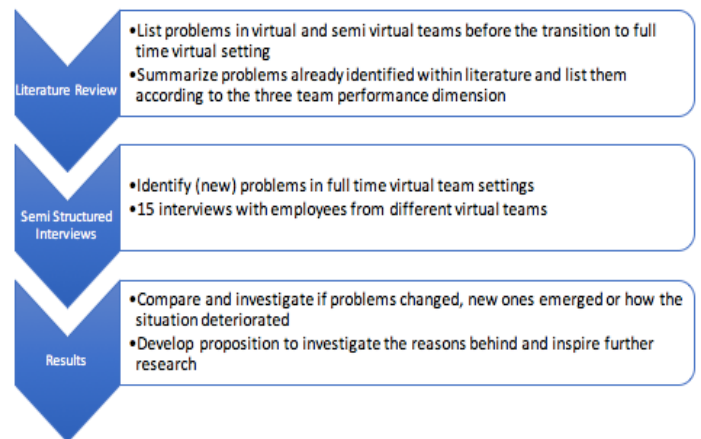


Figure 2 Research Design

The first step of this research is to conduct a literature review to identify problems within virtual teams before the corona epidemic. Due to the fast-changing nature of virtual team literature, articles before 2017 are neglected. A detailed description of the entire procedures can be considered in the upcoming parts. The literature review identifies problems in semi-virtual teams because before the transitions, only a minority of virtual teams operated entirely through virtual means. The majority of companies and virtual organizations still persevered weekly contact and thus display a hybrid structure comprising elements of traditional face to face exchange and purely virtual teams. On this basis, Result 1 is constructed, which summarizes the problems in these semi-virtual team constructs as a reference for the later comparison.

Afterward, 15 semi-structured interviews with representatives from different virtual teams were conducted. The semi-structured interviews especially try to reveal what problems in full-time virtual teams, employees & managers are now facing.

So one requirement is that interviewees should have worked in semi-virtual teams before the corona crises and now experience teamwork in full team virtual team

settings. This nexus between problems in semi-virtual and full-time virtual teams are displayed in Result 2.

In the last part, the study checks whether these new problems are exclusive in full-time virtual teams or whether problems identified in semi-virtual teams are still applicable. So problems in both constructs are comparatively displayed and improvements, deteriorations, and emerging problems outlined.

The unique purpose of the third part is to find reasons and explanations for the development of problems. Unfortunately, does this research possess several limitations so that only propositions regarding the problem in full-time virtual teams can be developed. These propositions should summarize the essential findings and inspire academics and managers to focus more attention and research on full-time virtual teams and problems.

The authors voluntarily decided to create propositions because the small sample size does not allow to generalize statements. In contrast, proposition, "suggest a link between two concepts in a situation where the link cannot be verified by experiment "(Clay, 2018).

In this sense, the propositions try to spur further research in the domain of virtual teams. Specific examples and limitations new researchers have to respect in handling this research are indicated after the result part.

3.2 Theoretical Framework

The central part of this qualitative research is dedicated, to investigate how problems, employee experience in virtual teams, developed, due to the transition to full-time virtual teams. This transition is facilitated through the recent COVID 19 epidemic, which forces companies and employees to work from home and execute their tasks via virtual teams. In general, the problems are identified in relation to virtual team performance. Unfortunately, virtual Team performance is rarely conceptualized, defined or only in conjunction with a single variable (Lippert & Dulewicz, 2017). Inspired by the suggestions of my supervisors, the author deliberately decided to expand the scope of this research by integrating traditional project management literature. After the initial desk research using the keywords, team performance, team effectiveness, and project performance, it was striking that the project management triangle (Figure 3), can serve as a suitable alternative. The "iron triangle" consists of three dimensions, which measures project success and performance (Pollack , Helm, & Adler, 2018). Similar, problems emerging during the project can be classified. Throughout the literature, cost, time, and quality are the three dimensions most cited. For this unique purpose, the three dimensions are applied to virtual teams, and the scope limited to team performance problems instead of individual member-specific problems.

Time

The first dimension considers the amount of time attributed to complete a project within a team (Westland, 2018). In this category, issues, extending or postponing the project execution, are collected and analysed.

Budget

Is concerned with the financial constraint of a project team (Westland, 2018) and highlight what problems in virtual teams increase the budget beyond its initial planning.

Quality

The quality dimensions investigate what must be done to produce the desire project outcome and identify what issues impaired the virtual team performance in terms of the expected standard.

This framework serve as theoretical foundation for the literature review and the interviews. The main advantage of this classification is that in project teams can be considered from three distinct perspective, so a variety of team performance hindrances can be considered and investigated.

To investigate how virtual team performance is hindered concerning the identified dimensions, a literature review and interviews with 15 respondents are conducted. The exact procedures and classification is sophisticatedly described in the next section.

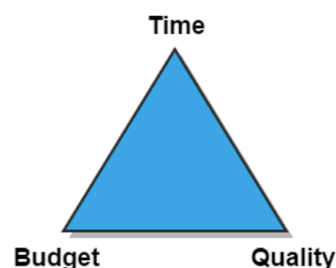


Figure 3 Project Management Triangle

Source: (Huchthausen, 2015)

3.3 Literature Review

Since the emergence of virtual teams, the advantages in telecommunication technologies in nexus with the continued globalization, increase the amount and quality of theoretical consideration on global virtual teams (Ale Ebrahim, Ahmed, & Taha, 2009). Whereby theories quickly evolve and become outdated.

To present a recent list of problems, which exert influence over virtual team performance, this part is based on an extensive literature review of 713 papers across four databases. At first place, Scopus, and web of science were used as a primary database, due to their multidisciplinary orientation. Later on, PsycINFO and business sources elite were added, to include papers originating from a behavioural and management, economics domain. In the case of hardly accessible documents, google scholar was utilized to find alternative access methods or papers.

Throughout all databases, the main keyword is virtual teams in conjunction with specific Boolean operators (virtual teams AND team performance, VT AND team effectiveness, VT AND team outcomes, VT AND team output). Those keywords were found during earlier desk research, dictionary applications and snowballing through recent literature. Problems or challenges are not selected as keywords, because during the research design, the search results did lead to the same results as the above mentioned keywords, whereby a higher number of unsuitable papers emerged. Consequently, problems and challenge are incorporated as an inclusion criteria in the later assessment. The complete list of articles was further thinned out, by neglecting all materials before 2017, due to the intended actuality of this thesis and the fast progress of virtual team literature.

To eliminate noise, the Boolean operator NOT was deployed to excluded other domains than management, decision making, economics, and business. A complete list of exclusion and inclusion criteria is provided in Table 2.

After deciding whether all relevant keywords very mentioned in the abstract and duplicated were removed, a total of 89 articles remained for close examination. During the additional assessment, all items deviating from the review topic and not contributing to the identification of problem sources within virtual team performance, were eliminated. In conclusion, 53 papers were included in the literature review. The whole literature review structure is presented in Table 3(Appendix).

Content wise, the identified problems of the literature review in relation to the team performance dimensions are displayed in Table 4. The table summarizes the top three problems of each performance dimensions and in the key findings column shortly explain each hindrance in semi virtual teams.

3.4 Semi- structured Interviews

After problems in semi-virtual teams have been identified via a literature review of 53 papers, semi-structured interviews are conducted to investigate problems in full-time virtual teams. The author voluntarily decided to conduct interviews because, during the research and publication of this thesis, the world was still distressed by the coronavirus. So, neither articles nor website reports about the effects and problems of working full time in virtual teams. The sole opportunity to receive valuable information and feedback was to talk to employees and managers from different companies. Consequently, the second research part, highlights problems in full-time virtual team settings and presents how the daily routines of individuals are altered due to the epidemic situation. In the following parts, the research is continued by presenting the exact data collection procedure and analysis.

3.5 Data Collection

The covid 19 epidemic is a reason for the existence of this study, but simultaneously, the most significant burden because working remotely on a bachelor thesis limits the possibilities to conduct interviews and find suitable partners. This is why upfront; the sample size of this study was limited to 15 respondents from different virtual teams. The only criteria are that respondents should at least work in virtual teams for one year and ideally work in a hybrid team setting.

Moreover, NGOs and academic professionals were excluded from the study to provide confidential information about problems within business virtual teams. Before the semi structured interview, all potential applicants received an invitation to the meetings to provide mutual understanding and consensus. Most of the candidates were found using LinkedIn with the keywords; virtual team, semi-virtual teams, and remote working. The author strictly adhered to the selection process to eliminate repetitiveness through responses from employees in similar virtual teams.

In the end, interviews with employees from 6 different nationals were performed (Table 5). Besides, representatives from well-known car manufacturers to

leading semi circuit and pharmaceutical companies were integrated. In this course, a wide range of problems and development were able to collect. A complete list of employees nationalist, industries and positions is provided in Table 5 (Appendix).

During the interviews, a combination of descriptive and predictive question were deployed. On the one hand, the descriptive questions aim to validate virtual teams' background information, the findings from the literature review and investigate if and in what kind of team respondents are working. On this basis, interviews could have been excluded, in case that requirements are violated. In the predictive part, employees were asked to explain what problems their team is facing and to predict how the transition to full-time virtual teams, influence the initial issues. The complete questionnaire is attached in the appendix.

Regarding confidentiality, each candidate was interviewed individually, and none of their initials will be published in this thesis. Above all, the recordings taken during the meetings will be deleted after the bachelor thesis has been submitted and will only be used for academic purposes.

3.6 Data Analysis

The questionnaire follows a distinct procedure so that problems can be directly traced to the iron triangle's corresponding dimension. So, the semi structure interviews closely follows the same procedure and presentation style as the aforementioned literature review. This allows, in the later stage to compare both lists and invigorate what problems newly emerged and how the transition to full-time virtual settings improved or deteriorated the team performance.

4 Result

4.1 Problems in Semi virtual teams

In this section, the result of the literature review are displayed. Aforementioned, the literature review only focused on papers from 2017 until the present to highlight problems that employees and managers faced before the COVID 19 outbreak. In this time, virtual teams are expected to be semi-virtual. This team types, describes the scenario where virtual team members mostly work at a distance from each other, but occasionally have the opportunity to meet face to face" (IGI Global, 2020). But as indicated in the theoretical review section, virtual teams are not a dichotomous concept, which distinguishes between traditional face to face and pure virtual teams, instead does the level of virtuality determines to what extent teams are virtual. This review focus on teams that display a high level of virtuality and use computer-mediated communication methods as their primary communication channel but still integrate face to face communication. So, semi virtual team members communicate with others via phone or mail, but once or twice a week, seek the personal contact to build relationships with partners or discuss important information informally with colleagues (Afferbach, 2019). The corona crisis detrimentally changed this team structure, which will be the object of the second part of the analysis.

Number	Criteria	Reason for Exclusion
1	Pre 2017 articles	Virtual team literature is evolving fastly, and thus variables coining VT performance alter from year to year. To include recent research and update the audience about current trends/problems influencing virtual team performance, literature before 2017 will be excluded. Prior contributions, despite their importance, are neglected and treated as obsolete.
2	“ Virtual Teams/Dispersed Teams” not mentioned in abstract	This study exclusively focuses on problems affecting performance within virtual teams. Other teams-related organizations, which vary from the characteristics of virtual ones, are not addressed in this review.
3	Subject areas that are not “business” related	This thesis is constructed on behalf of the finalization of an undergraduate study in International Business Administration. To fulfill the academic purposes/ interest, articles describing virtual teams in non-organizational contexts are not suitable for this study.
Number	Criteria	Reason for Inclusion
1	Nexus to virtual team performance	Thus eligible studies are required to provide a clear nexus to overall team performance and highlight how performance is deteriorated or improved due to the existence of a certain factor or challenge.
2	Mention challenges or problems	This literature review's primary purpose is to summarize already identified problems and issues within semi and virtual teams. Besides describing a variable, the paper must also critically reflect the problems employees and managers within virtual teams are facing.
3	Proven Research	Papers are included, whether the effect on team performance has been proven successfully. Valid hypothesis needs to be developed and tested through roughly to ensure validity and reliability. If the research is based on a structured and comprehensible literature review and produces an arguable model, the paper will also be integrated.

Table 2 Inclusion/ Exclusion Criteria

As indicated problems are presented in team performance context and thus categorised according to the three performance dimensions, budget, time and quality (Table 4), to investigate problems from three different perspectives and ensure that nearly complete and comprehensible list of problems before and after the covid 19 epidemic can be produced.

In general, one problem that all teams, despite their classification faces, is the lack of awareness and dedicated academic effort. The majority of papers, read and analysed for this review, all agree that challenges concerning virtual team performance did not receive the attention of research

or practical studies ((Morrison- Smith & Ruiz, 2020). Only a small share of scholars, considered the problems in virtual team performance as a useful starting point.

Dimension	Problems	Key Findings	References
Time	Dispersion Communication Knowledge sharing Coordination/Planning	Cultural, geographical and linguistic differences reduce face to face contact Dispersed team members may be segmented and thus team cohesion and wellbeing distorted. In an dispersed working team tacit knowledge exchange is infringed and communication is hampered by miscommunication & interpretation. Broken flow of information due to miscommunication and interpretation. In addition employees argue that no clear roles, responsibilities are assigned and performance management systems are missing.	(Presbitero,2018);(Zakaria & Yusof,2020) (Taras, et al., 2019); (Presbitero,2020) (Henderson & Stackman, 2018); (Mockaitis, Zander, & De Cieri, 2018) (Jimenez, Boehe, Taras, & Caprar, 2017) (Serrat, Managing Virtual Teams , 2017) (Senquiz- Diaz & Soto, 2019) (Kauffmann & Carmi, 2020) (Parlami & Dibble, Teaming: Are two communication modes better than one?, 2018) (Newman , Ford, & Marshall, Virtual Team Leader Communication: Employee Perception and Organizational Reality, 2019) (Lin , Chiu, & Liu, 2017) (Chiravuri, 2018) (Demirel, 2020) (Dulebohn & Hoch , Virtual teams in organizations, 2017) (Jimenez, Boehe, Taras, & Caprar, 2017) (Eaidgah, Abdekhodae, Najmi, & Maki, 2017) (Jimenez, Boehe, Taras, & Caprar, 2017); (Serrat, Managing Virtual Teams , 2017)
Budget	Technology Infrastructure	“The technology-based interaction often leaves team members feeling more distant and anonymous as well as confused and without a clear sense of purpose” ¹ . Moreover ,do academicians identified that employees are technophobic and do not possess the necessary skills and available technologies to execute project successfully.	(Lauring & Jonasson, 2017) (Lin , Chiu, & Liu, 2017) (Demirel, 2020) (Jimenez, Boehe, Taras, & Caprar, 2017)
Quality	Leadership	“Lack of personal connection with geographically dispersed members, difficulties monitoring activities and preferences, making virtual leadership more challenging; geographically dispersed environment also makes it more challenging for shared and emergent leadership among virtual team members” ²	(Maduka, Edwards, Greenwood, Osborne, & Babatunde, 2017), (Robert Jr., L., & You, S. 2017) (Gross, 2018) (Meghana & Vijaya, 2019) (Nordbäck & Espinosa, 2019) (Mysirlaki & Paraskeva,2019) (Liao, 2017) (Sedrine, Bouderbala, & Nasraoui, 2019) (Han , Kim , Beyerlein , & Derosa, 2020) (Lauring & Jonasson, 2017)

¹ (Lauring & Jonasson, 2017)

² (Eisenberg & Krishnan, Addressing Virtual Work Challenges: Learning From the Field, 2018)

	Trust	In the recent business environment, where teams consists of dispersed work teams with reduced personal contact, longer lasting trust is difficult to build up. Perceived mistrust, lacking social interaction and performance management hamper the quality of collaboration and virtual team effectiveness.	<p>(Tavoletti, Stephens, & Dong, 2019) (Hoch & Dulebohn, Team personality composition, emergent leadership and shared leadership in virtual teams: A theoretical framework, 2017) (Ford, Piccolo, & Ford, 2017) (Flavian , Guinaliu, & Jordan, 2018) (Zakaria & Yusof, Crossing Cultural Boundaries Using the Internet: Toward Building a Model of Swift Trust Formation in Global Virtual Teams, 2020) (Jaakson, Reino , & McClenaghan, 2018) (Breuer, Hüffmeier, Hibben , & Hertel , 2020)</p> <p>(Hacker, Johnson, Saunders, & Thayer, Trust in Virtual Teams: A Multidisciplinary Review and Integration, 2019) (Lippert & Dulewicz, 2017) (Hoch & Dulebohn, 2017) (Wei, Thurasamy, & Popa, Managing virtual teams for open innovation in Global Business Services industry, 2017) (Eaidgah, Abdekhodae, Najmi, & Maki, 2017)</p>
	Social loafing	“Social loafing is a tendency for individuals to make less effort when they work collectively than when they work alone or coactively” ³	<p>(Tavoletti, Stephens, & Dong, 2019) (Penarroja, Orengo, & Zornoza, 2017)</p>

Table 4 Problems in semi virtual Teams

4.1.1 Time

Concerning the time adherence of virtual teams three unique problem have been identified . These three are dispersion, communication/ information sharing and coordination/planning. All of them have been considered to hamper the project execution in time and lead to incompatible schedules, communication break downs (Morrison- Smith & Ruiz, 2020) which increased the number of required working hours.

Dispersion

Based on the characteristics and difference between virtual and traditional face to face teams (Section 2.1;2), it is evident that virtual ones comprise individuals from throughout the globe and enable communication by information and computer-mediated communication technologies, for example, the phone or Webex etc. As a result, teams have to work across geographical, temporal, and cultural boundaries. Despite the advantage of on-demand expertise and workforce availability throughout the planet, dispersion also evokes challenges. First and foremost, time zone and geographic dispersion presents the most immediately obvious hurdle (Jimenez, Boehe, Taras, & Caprar, 2017), because virtual teams comprising members from diverse countries cannot synchronously communicate and exchange information. This point is in detail, addressed in the communication part below. Moreover, cultural and linguistic dispersion hampers the

creation of a positive climate within teams (Mockaitis, Zander, & De Cieri, 2018). In this manner, teams are proved to be significantly less successful and unable to exploit the advantage of the increased internationalization (Henderson & Stackman, 2018). Reasons for this lacking virtual teaming are the increased coordination costs and information losses (Taras et al., 2019) (Presbitero, Foreign language skill, anxiety, cultural intelligence and individual T task performance in global virtual teams: A cognitive perspective, 2020). In addition, virtual team members tend to segment employees based on their culture or linguistic adherence. So employees obeying an individualistic culture, tend to preserve individuality rather than collectively strive for project success. Besides the culture, the similar attraction theory advocates that "people are attracted to others who are similar, rather than dissimilar (Encyclopedia, 2020). The same goes with language differences, which often leads to social categorization and finally harm the team dynamic (Jimenez, Boehe, Taras, & Caprar, 2017). Naturally, the higher the number of boundaries, degree of team balance, and isolation of team members due to cultural orientation, etc., the higher is the perceived negative effect on team performance. Moreover, most managers and academicians highlight that those problems are not sufficiently mitigated because different approaches to manage dispersion in virtual teams exists and no universal solution is available (Magni, Ahuja, & Maruping, Distant but Fair: Intra-Team Justice Climate and Performance in Dispersed Teams, 2018).

³ (Penarroja, Orengo, & Zornoza, 2017)

Communication/Knowledge Sharing

Besides the higher dispersion in semi virtual teams also the limited face to face contact deteriorates communication and the corresponding exchange of information because of the inability to interact via facial gestures (Pearlson, Saunders, & Galletta (2016). These missing verbal and visual cues (Lin, Chiu, & Liu, 2017), augment misinterpretation and decrease team cohesion. Moreover, unique and tacit knowledge, which you can only get from personal experience (Cambridge Dictionary, 2020), can no longer be elicited (Chiravuri, 2018). So employees feel less committed and engaged in the team (Senquiz- Diaz & Soto, 2019) (Kauffmann & Carmi, 2020) (Parlami & Dibble, Teaming: Are two communication modes better than one?, 2018)(Newman, Ford, & Marshall, Virtual Team Leader Communication: Employee Perception and Organizational Reality, 2019). Consequently, entire online communication restricts participation, feeling of mutual responsibility, and the formation of trust (Dulebohn & Hoch, Virtual teams in organizations, 2017). But also in semi-virtual teams, it is not guaranteed that the right and tacit information can be shared adequately. Explanation is granted by the media richness theory, which ranks computer-mediated communication applied in semi and full-time virtual teams as a lower medium than traditional face to face interaction. This means that phone calls or videoconference, as daily interaction medium, maintains contact between members in the team but do not “reproduce the information sent over it without loss or distortion” (Campus- Ard, 2020). As an example, serve phone calls, where visual cues cannot be incorporated in the information exchange, and thus the communication is limited. In the same way, shares of personal or tacit information becomes unconsidered and forgotten, which lead to a distortion of team dynamics and superior extra hours. To summarize, communication is a key challenges in every workplace (Development, 2018), but in virtual teams communication tend to be more formal than in collocated work teams. Therefore, informal chats and tacit knowledge exchange decreases (Eisenberg & Krishnan, Addressing Virtual Work Challenges: Learning From the Field, 2018). So in dispersed teams it is difficult to develop a shared cognition between members, who do not understand each others contexts, norms and collaborative interaction is hindered (Eisenberg & Krishnan, Addressing Virtual Work Challenges: Learning From the Field, 2018).

Coordination/Planning

Concluding from the two problems analysed below, most semi-virtual teams have to cope with a “broken flow of information” (Serrat, Managing virtual teams, 2017). As indicated, misleading communication requires additional coordination and planning efforts (Taras et al., 2019). Moreover, a variety of papers argued that members in virtual teams before the corona crisis suffered from a lack of understanding and role ambiguity. Hence, in most organizations, no evident team culture or standards were in place, which made the assignment of responsibility or performance monitoring more difficult. Due to this unorganized teamwork, different procedures, protocols, goals, and performance appraisal systems developed within the teamwork. So that supervision becomes difficult, and dispersion significantly increases.

4.1.2 Budget

Technology Infrastructure

The most prominent challenges having a detrimental effect on the virtual team project budget, are exclusively related to technology. This dimension only focuses on the problem with a direct impact on the budget; the aforementioned and third dimension problems also have an undeniable effect on the budget but indirectly. In contrast, outcomes of the literature review augmented that technology comprising the skill of working with communication technologies and technology-based interaction in virtual teams demand additional investment and hinder the adherence to the budget limitations. Among the reasons, academicians and experts repetitively highlighted that “technical delays” emerged due to the unavailability of required state-of-technology and lack of bandwidths of technologies in place (Jimenez, Boehe, Taras, & Caprar, 2017). Hence, participation and commitment of employees decreases (Lauring & Jonasson, 2017) and conflict & tensions arise (Jimenez, Boehe, Taras, & Caprar, 2017) because team members do not know how to solve the task or even do not have a clear idea about the technology in place and the purpose. Mainly the first reasons, namely, lacking technical skills and “technophobia” (Demirel, 2020)

among team members is a problem in semi virtual teams. Kaplan and Haenlein, recently coined members in virtual teams as not “digital native” as the technological development may demand.

This distrust is also fuelled by asynchronous communication due to time zones and location differences among members (Operate Remote, 2019), making it more difficult to collaborate in virtual teams. Another reason worsening the communication and usage of technology-mediated communication application is the fast progress of information and computer-mediated communication technologies. Members continuously have to keep track of new technologies and skills they have to acquire (Punj, 2006)

So, in teams with a higher virtually members demand extra training or technical equipment to participate in the virtual teamwork, which directly has an immense effect on the budget and planning in virtual teams.

4.1.3 Quality

Complementing the list of problems concerning semi virtual team performance. The third dimension focuses on hindrances concerning the expect quality of team outcomes. In the worst scenario, this even leads to a failure of project and teamwork.

Leadership

Due to the increasing use of technology to communicate and the reduced face-to-face contact of virtual team members, the role of leaders and skills significantly changed (Maduka, Edwards, Greenwood, Osborne, & Babatunde, 2017, (Meghana & Vijaya, 2019)

Commonly cited problem of leadership in virtual teams is the environment, which harms the quality of working relationships (Leslie, Luciano, Mathieu, & Hoole, 2018)and collaboration (Kunos & Kariman, 2019).

The term environment concerning leadership challenges, refers to the dispersion of personalities, management of teams across time, organizational and geographical

boundaries, which makes virtual leadership pivotal to virtual team effectiveness (Liao, 2017).

Also virtual team leaders often have to cope with interpersonal challenges, because individuals do not feel compelled or engaged enough to contribute to the project outcome. This point is elaborated, in the social loafing part, where the problem with unmotivated and unproductive employees is investigated. To mitigate these problems and integrate each members in the virtual team work, each virtual team demands effective leadership, which fostered behavioural integration, collaboration and manages conflicts between members.

Beside the socio emotional needs of members, leaders needs to be task focused (Ford, Piccolo, & Ford, 2017), to deploy a better coordination, organization of work, roles and responsibilities. (Mysirlaki & Paraskeva, Emotional intelligence and transformational leadership in virtual teams: lessons from MMOGs, 2019). In this manner, current coordination and control problems can be solved. Hence, previous papers advocated the necessity of new e-leadership strategies; specifically, most researchers argued that a transformational leadership style (Bass, 2003) would intermingle the required mechanistic and organic leadership characteristics ((Nordbäck & Espinosa, 2019). A direct result of better coordination and social integration, is to improve the individual and team satisfaction and motivation among members, which in recent semi virtual teams is lacking (Eisenberg & Krishnan, Addressing Virtual Work Challenges: Learning From the Field, 2018).

Trust

In the fast progressing virtual environment, the traditional mechanism by which trust was built is not applicable anymore. Setting up a capable team in with team members, fully trust each other has become a complex task (Alsharo, Gregg, & Ramirez, 2017). Despite, trust is perceived as a critical determinant factors of team performance (Mackenzie, 2010), because trust is an emergent state of teams, which resulted from shared perceptions and experiences among all team members (Breuer, Hüffmeier, Hibben, & Hertel, 2020). According to the definition, trust is the willingness to be vulnerable to the actions of other” (Mayer, Davis, & Schoorman, 1995), which diminish if fewer visual cues are conveyed and misunderstandings in teams increases (Nydegger & Nydegger, Challenges In Managing Virtual Teams, 2008) Especially in the virtual teams, the ad hoc nature of work (Altschuller & Benbunan-Fich, 2013), formed on-demand and ceased after the job has been complete, deteriorated the development of long-lasting relations. In this context, the term swift trust, becomes increasingly important. Most of the modern literature contributions focus on the creation of swift trust and its corresponding antecedents. Considering the contemporary literature, swift trust is characterized as more fragile and quickly formed among members.

But once deepen connections among employees have been progressed, a durable kind of trust replaces swift trust (Zakaria, 2018). The transition and general development of swift trust is still not sufficiently described.

Social Loafing

Considering the quality of virtual team output, in recent years the problem of social loafing became prominent. According to the definition, “social loafing is the tendency for individuals to make less effort when they work collectively than when they work alone or coactively” (Tavoletti, Stephens, & Dong, 2019)

(Penarroja, Orengo, & Zornoza, 2017). So employees deliberately do not finish their assigned share of work in virtual teams, because of an often missing performance management system of leaders (Eaidgah, Abdekhodae, Najmi, & Maki, 2017), mistrust and lacking motivations and commitment (Lippert & Dulewicz, 2017)

4.2 Problems in full time virtual teams, within the covid 19 epidemic

By considering 53 papers from 2017 to 2020, problems within semi virtual teams have been identified and categorically presented. The most commonly cited problems were linked to the virtual team specific characteristics (Section 2.1). On this basis, it is obvious that semi virtual teams, already struggle with the higher degree of virtuality in team work and interesting to investigate what problems teams are going to face if the virtuality in teams increases. Exactly this analysis, is the next step of this paper. Through conducting interviews with 15 respondents throughout different positions, industries and teams (Table 3) problems concerning the three team performance dimensions are revealed (Table 6).

Before the COVID 19 epidemic and the resulting transition to full-time virtual teams, nearly all the respondents worked in semi-virtual teams.

These results originate from the first part of the questionnaire, where respondents deliberately explained their daily routines concerning teamwork, team member dispersion, and technology use.

Concerning dispersion, all employees agreed, that team members are geographically and even temporally separated. The reasons were diverse, ranging from remote workers to commuters, who regularly flight to partners to execute projects. Surprisingly, at the beginning of the year, before the transition, teams enabled communication solely through mobile phones or email. Only five respondents already worked with video

conferences mediated by enterprise systems like Webex or Microsoft team. One explanation is that the majority of virtual teams still maintained face to face communication through regular office visits, usually once or twice a week. Thus according to the definition, 15 teams can be initially labelled as semi-virtual teams. Due to the corona crisis and the strict hygiene conditions, the face to face communication diminished. All employees now worked dispersed from each other and solely communicated through virtual means. Likewise, the contact via phone decreases rapidly, whereas more companies and employees discovered video conferences as their primary communication channel. Consequently, all teams transit from a semi-virtual team to a full-time virtual one.

<i>Full Virtual Team</i>	<i>Key Findings</i>	<i>Source (Interview or Expert Number)</i>
<u>Time:</u> Dispersion Communication/ Information Exchange Coordination/Planning	Due to time zone differences, calls and emails can not be directly processed, and thus delay increases. Additionally, different cultures and hierarchies hamper communication and demand cultural intelligence and standard rules & procedures "Tacit knowledge gets lost". Besides, inter-organizational communication is difficult because diverse organization deploys different communication mediums. So upfront planning and standards are required to agree upon a medium and train employees, respectively. Employees have difficulties managing their time, and most do not know their exact role and responsibility. So, they lose the big picture.	Expert 1, 10, 14 Expert 1, 2, 3, 4, 5, 8,9, 10, 11 Expert 1, 3, 4, 6, 7, 8, 9, 10, 15
<u>Budget:</u> Technical Infrastructure/ Dependency	Remote working conditions require a significant investment in new computers, the establishment of communication medium, and employees' education to exploit the latest technologies.	Expert 1, 3, 4, 6, 8, 9, 10, 13, 14, 15
<u>Quality:</u> Trust Social Loafing; Employee engagement (Social Isolation) Leadership Anxiety & Mental Health	Distrust between employees, because in the social distance to each other, members doubt the abilities and motivation of other employees. It became easy to hide behind the screen, and due to lacking performance monitoring, employees take the opportunity to achieve credit for the other's work. In general, in full-time virtual teams, introverted employees have difficulty raising their voice and getting lost unintentionally. Leaders as facilitators of change do not possess the required leadership skills. Beside simple competence, leaders need to acquire soft skills to engage, motivate and care about employees. Moral and mental health problems of employees. The social isolation, the increased pressure and the uncertainty of the situation deteriorates members well being. Some even fear, a dismissal because the perception may evoke that some jobs are redundant.	Expert 1,8 , 9, 13, 14 Expert 1, 2, 4, 5, 6, 8, 12, 15 Expert 1,3, 4, 7, 9, 10, 15 Expert 1, 7, 10, 15

Figure 7 Problems in full time virtual teams

4.2.1 Time

Dispersion

Problems concerning team dispersion put the team cohesion to the test due to the increased number of remote working and physical distance between team members.

On the one hand, due to "time zone differences, emails and memos can only be processed in the following day, which makes an immediate request for information impossible (Expert 1, 9)." On the other side, "cultural conflicts and language differences are a huge problem"

(Expert 10). Expert 1, summarized the situation and presented the following example "working with my American colleagues is simply, but Asian colleagues, do not even respond during video conferences, because they have to ask their boss for approval that employees can participate in the video conference and information can be shared" (Expert 1). Based on this example, it is evident that working throughout different cultures and hierarchies in full-time virtual teams, distort the information exchange, and requires additional time and effort to create standards and procedures.

Communication/Information exchange

Throughout the semi-structured interviews, one problem was repetitively stressed by numerous interviewees, namely communication & information exchange. Independently the respondents answered that "tacit knowledge gets lost" (Expert 1,4) because personal contact is eroded and the team communication is fully mediated via video conferences. The respondents added that valuable "coffee chats" (Expert 5) about personal belongings or experiences of other members are missing. The respondents, especially the salesman or employees in strategic sourcing and consultancy, insisted that "negotiations with partners and colleagues are more difficult because the mimic and gesture can not be observed and no one is trained or prepared for these circumstances" (Expert 3). Astonishingly, most interviewees concluded that communication within the companies is successfully mitigated, and elaborated that the most problems concerning information exchange exists in inter-organization connection. The reasons are that there is no nexus between inter-organizational communication technologies because different companies prefer different mediums, and it isn't easy to agree upon one common standard (Expert 11). Consequently, this asynchronous communication between various organizations leads to miscommunication, information loss, and demand planning and agreement before the project initiation.

Coordination/Planning

Speaking of coordination and planning in full-time virtual teams, "planning is key" (Expert 1), "to keep track of your schedule and meetings" (Expert 3). The coronavirus did not solely change the team structure but also altered the daily routines of employees (Expert 8), who are no forced to work from home. Under these circumstances, planning is closely connected to "how to divide your time" (Expert 10). Most employees transit from a structured workday to remote working with increased flexibility, so that time management became a paramount concern (Expert 6). Moreover, due to the decreased face to face contact throughout projects and project initiation, the respondents highlighted that "employees get loose of the big picture" (Expert 10), because meetings and agendas are not prepared or updated (Expert 3).

In the same way, performance is often insufficiently measured and monitored; consequently, tasks are not aligned and understood (Expert 7). Finally, this translates into more rework and additional sprints to improve the project.

4.2.2 Budget

In contrast to the time and quality dimension, the interviewees experienced difficulties in arguing what problems specifically exert influence on the budget adherence in virtual projects. To be explicit, all experts, told me that "at this point the effect of the coronavirus on the costs within virtual teams cannot be assumed, but at the end of the year, after all KPIs are considered, the management will investigate how much the crisis cost us" (Expert 13). This limitation is incorporated in the limitations and further research part and is one of the weaknesses of this thesis (Section 6).

Despite nearly all interviews, revealed that additional costs would be incurred due to technology-related problems. The core of this problems are

"outdated communication, that does not allow remote working and full time virtual team work at all" (Expert 15), because remote and full time virtual teams work require a significant investment in new computer, the establishment of communication platforms and education of employees (Expert 1,8,9,11,13). If those infrastructural conditions are not granted, the communication is limited, and projects cannot be executed in the predetermined time, quality and cost. Also, the necessary org-ware is lacking in the most virtual teams this study investigated. Org-ware are the "mechanism to learn the skills to use the thing (technology)" (Aukes, 2020).

According to respondent 10, these new rules, about how to use technologies, what is allowed and what is not allowed, are also essential and most neglected in full-time virtual teams. Those rules can prescribe standards of communication and regulate whether abbreviation in communication channels is permitted or not. However, "if those clear guidelines are not incorporated, everyone communicates as he wishes to do, and no clear structure and procedure are obeyed" (Expert 10). In this manner, the quality of the information is regulated, and a costly redesign of the project are avoided.

4.2.3 Quality

Leadership

Leaders are considered to be the facilitators of the intended coordination and planning in virtual teams (Expert 15). But leaders in current virtual teams do not possess the required hard and soft skills (Expert 10), demanding to integrate employees, care about individual & organization wellbeing, and transit the teams throughout these rough corona times. Interview respondent 10 elaborated on these points and introduced four essential skills of leaders that are indispensable in full-time virtual teams. The core skills are

"being able to manage your time and the time of someone else (...), being very open and very clear in your communication and integration, (...), be transparent and explain things in the way you would talk to your sister."

In the recent situation, leaders do not embrace this proactive attitude and rather neglect individual satisfaction, trust and interpersonal relations between group members.

As expert concludes "current leaders do not keep the team together" (Expert 7).

As a result, Expert 3 reports that in his team, there is no transparent top-down communication, and employees have no clear understanding of their purpose and duties. This significantly harms the projects and emphasizes superior planning.

Social Loafing

In close connection to planning and trust issues, is the problem of social loafing. In ancient literature, the concept was only addressed circumstantial, due to the transition to full-time virtual teams, social loafing gained prominence. In this study, 7 out of 15 reported that social loafing is an issue in full-time virtual teamwork, because "people achieve credit for others work" (Expert 1), and "some employees are naturally motivated, whereas others are lazy and freeriding" (Expert 5). The reasons for these incidents are numerous, ranging from lack of motivation to contribute to disinterest in joining projects. In common, in full time, virtual circumstances, integration and discipline are seldom existent. In this way, introverted individual's employees get lost and can hide behind the screen (Expert 5). Other employees sharing the reluctant attitude of work could copy this behaviour, and so the quality of work deteriorates. Whereby Expert 5 ensured that in full time virtual teams, "if all do their bit the same quality as in face to face teams can be expected" (Expert 5).

Anxiety & Mental Health

The COVID 19 crisis does not spread threats around communities but also increases anxiety among virtual team members. Due to the new situation, many companies reduce their operations to the core activities and perceive that some additional events and jobs are superficial. After the COVID 19 crisis, some interviewees fear to be dismissed to compensate for the financial loss and redesign the supply chains (Expert 1). Besides, the crisis not only harms the team well-being but also deteriorates the individual moral and mental health because employees have to take care of their children and do not have time for flexibility or privacy. To deliver the same quality of work expert 15, demands the incorporation and improvement of psychological safety within full-time virtual teams. The term describes "the belief that you won't be punished when you make a mistake" (Delizonna, 2017). Leaders achieve this extra confirmation through a psychological contract, where each member explicitly knows what is required and what they can expect as a return. Hence, studies suggest that employees are more likely to engage in moderate risk-taking are more creative and open-minded (Delizonna, 2017). Currently, psychological safety and contracts are not granted, and as indicated, employees well-being is often ignored or not sufficiently addressed.

Trust

Similar to semi-virtual teams, the higher the level of virtuality, the more difficult it is to develop trust (Expert 1,8,9,13,14). Expert 14 highlights that in full-time virtual teams, the core reason for distrust among team members is that "you do not know something about the personal basis of employees". Working remotely or dispersed, individuals tend to disbelieve in the abilities and competence of other team members (Expert 13), because the progress, individual contribution and performance cannot be monitored or regulated. On this basis, distrust in virtual teams emerges and hamper the quality or even the execution of virtual team projects.

4.3 Results & Interpretation

After problems in semi and full-time virtual teams have been, investigated, this final result part provides a nexus between both before mentioned products. This nexus (Table 7), highlights with colours how problems in semi-virtual teams developed, due to sudden transition to full-time virtual teams. Considering table 7, a green font represents improvement, because the former problems in semi virtual teams improved due to the transition to fully virtual teams. In contrast the red colour, describes problems, which became worse, due to the higher virtuality. Complementing the two colours is orange, which highlights how & what new problems employees are facing in full time virtual teams.

In this manner, the overall research question is answered, and new issues within full teams, similar to improvement and deterioration, are considered. Accordingly, reasons for the development, advance or decline in conjunction with additional literature evidence are provided. "Once you understand the challenges faced by remote team members (and the management challenges you'll face in bringing them together), you can begin to develop a formal plan for minimizing confusion and miscommunication while maximizing collaboration, clarity, and performance" (Del Vecchio, 2020). Considering this statement, the part ad hand summarizes the main challenges of working in full-time virtual teams. Besides, those problems are classified as newly emerged, improved, or deteriorated from the existing problem in semi-virtual teams. As a result, managers can build sharp expectations of how the transition to full-time virtual teams will impact the team performance. Also, academicians, are provided with a recent summary of the most significant contribution to the virtual team challenges literature.

Semi Virtual Teams	Full Virtual Team
Time: Dispersion Communication/ Information exchange Planning	Time: Dispersion (Productivity, Cultural Difference) Communication (Information Loss, outside) Information exchange (tacit knowledge) Planning
Budget: Technology Infrastructure	Budget: Technology Infrastructure Technology Dependence
Quality: Trust Leadership Social Loafing	Quality: Trust Leadership Social Loafing Anxiety (Replacement, transition)

Colours in comparison to semi virtual teams
 Green: Improvement
 Red: Deterioration
 Orange: Emerging Problems

Figure 7 Problem development from semi to full time virtual teams

4.3.1 Time

Dispersion

The dispersion of team members is one of the intended effects of the proactive corona mitigation strategies. But as indicated in product 1 & 2, disadvantages and advantages received equal attention during the interviews. To highlight how the dispersion problems in virtual teams, improved and what aspects deteriorated in full-time virtual teams, two propositions are developed.

The first one addresses the improvement of virtual team dispersion. Employees of former semi-virtual teams are convinced that a higher distribution and resulting remote working, create a more private, relaxed, and focused working environment (Expert1,2,4,9). This is the primary reason why 80% of the respondents indicated that their productivity increased immensely during the time working in full-time virtual teams (Figure 5).

Productivity in full time Virtual Teams

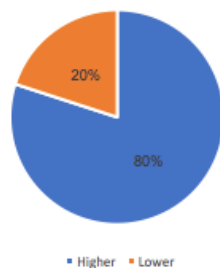


Figure 5 Productivity in full time virtual teams

The “friendly, more concentrated, and less side-tracked working environment coupled with flexible time management, let team members conduct the work quicker and more accurately, observed Expert 5. In accordance, recent journals argued that “ they do not waste time and energy in commuting each day and work flexible for the comfort of their home (McIvor Martin, 2020). This leads to the following proposition.

Proposition 1a: In full-time virtual teams, interviews respondent revealed that the dispersion and geographical decomposition of work teams lead to higher productivity in terms, because individuals experience a higher work-life balance and work in a more focused, calm and relaxed atmosphere.

But expert 10, humbly insisted that the challenges concerning dispersion and full-time virtual team should never be underestimated (Expert 10).

Again, before mentioning the challenges of dispersion, it should be marked that 15 interviews are not a proper basis to generalize statements, so these propositions should be investigated in detail in further research.

Speaking of challenges, due to the transition of semi-virtual to full-time teams, cultural dispersion and conflicts, are worsen. It became obvious that communication is interrupted through cultural dispersion (McIvor Martin, 2020). Expert 14 elaborated this point by highlighting that emails sent to Asian countries in the corona crisis were only able to answer 6 to 7 hours later. This phenomenon is called asynchronous communication, and will be

addressed in the communication/ information exchange part. According to expert one, working with especially Asian colleagues was proof that different cultural hierarchies and perception demand common standard and interaction procedures. As a reminder, the interviewees complained that Asian co-workers always demand their managers' approval before they can participate in virtual discussion, so in video conference, requests often remain unconsidered. So “setting up meetings and on boarding new team members are processes often more complicated and potentially more challenging to accomplish when you are juggling different time zones, language, cultures and equipment setups (Del Vecchio, 2020).

In conclusion, as indicated by semi-virtual teams, cultural dispersion problems are not an emerging problem. Due to the actuality of dispersed teams, cultural conflicts become more important, and thus the following proposition can be presented

Proposition 1b: Cultural Dispersion in full-time virtual team became a crucial problem, because communication is asynchronous and hard to maintain.

Communication/Information Exchange

Precedent to this interpretation section, where the author focuses attention on the reasons and development of problems from semi-virtual to full-time virtual teams, jointly, both analyses referred to miscommunication and lacking information exchange as the core problems in full-time virtual teams. Reasons were the reduced face to face contact between members so that mimics and gestures could not be interpreted, and visual cues are neglected. In contrast to semi-virtual teams, due to the COVID 19 crisis, most employees engaging in full-time virtual interaction changed their preferences in the communication medium. Considering Figure 6 (Appendix) it is evident that interview respondents preferred phone or email as the communication medium in hybrid virtual teams. Only a 40% already used video conference for bearing the distance between co-workers. Within the corona crisis, nearly all employees transit to video conference as the primary communication medium. From a theoretical perspective, the media richness theory, supports this development, because video conference allows the transmission of vocal and visual cues. In this manner, the gesture and mimic of colleagues can be reproduced to an extent. Still face to face communication is the optimal exchange method, which is hindered in full-time virtual teams.

Astonishingly, due to the transition to video conference as the communication medium of choice, all respondents independently agreed that the information exchange improved. In conjunction with establishing a more focused work environment, the transfer of information became faster, quicker, and attainable from everywhere (Expert 1). Notably, the respondents working in the sales or technical domain were euphoric about the functionality of video conference to share images of problems or potential solutions between employees without calling each other independently (Expert 4, 5,11). Also, Expert 8, described that in virtual teams, the information exchange is only limited to significant knowledge, which are inevitable for the project execution. So, superficial details or information that could cause a decrease of attention on essential aspects are voluntarily left out. Based on this experience, Expert 12, concluded that the formal internal communication

improved, because meetings had a clear purpose and outcome. Consequently, the following proposition can be developed from the results.

Proposition 2a: In full-time virtual teams, the internal communication in teams and companies improved because the information exchange focuses on core information and neglects superficial shares of knowledge.

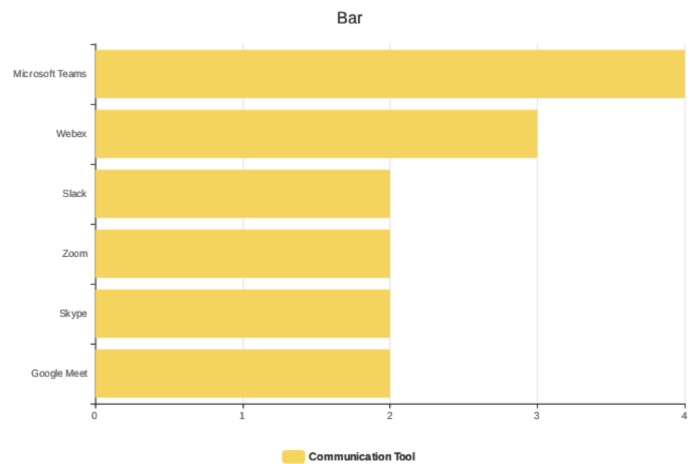
In contrast, miscommunication and loss of tacit knowledge (Expert 1) are still significant issues, because video conference via skype, Webex or Microsoft teams possesses a higher media richness but are dependent upon technologies and worsened through communication errors. Hence, mimics and gestures are sometimes hard to interpret (Expert 3). Those "missing snippets of information" (Expert 5) and the focus on the most critical information during the conversation leads to the loss of tacit knowledge or experience. (Expert 4). Nearly no informal coffee chats are possible anymore, and thus the whole communication is now scheduled and conducted through formal meetings (TUM, 2020). Within those official meetings, questions and answers cannot be provided flexible (Expert 13), and if concerns arise after team meetings, those cannot be answered anymore. Consequently, recent articles revealed that team members can not engage directly with their colleagues (...) and may feel disconnected, less creative, and even less productive (Deloitte, 2020).

The lack of shared know-how might not impact current project performance but harms the whole team's intellectual capital in the long term (Diptee & Diptee, 2013).

Besides, full-time virtual teams also have to cope with asynchronous communication and lacking alignment between communication tools, within but primarily in inter-organizational virtual teams. Starting with asynchronous transmission, in dispersed teams, talents are 24/7 available throughout the globe (Pullan, 2016), but managers have to account for cultural and time dispersion. Not all members can be presented in the video conference at the same time. Thus, team members use asynchronous communication because colleagues respond to messages when they are available. Through this gap of communication and the additional delay, full-time virtual teams sometimes have to wait before the information is confirmed and issued to the requested party (Expert 1).

Based on the interview results in semi-virtual teams, all individuals agreed that phone and email provided an ideal opportunity to connect with members from different companies to exchange information. This became the universal standard. In a full virtual team setting, where various companies prefer different communication mediums, such as slack, Webex, and Microsoft teams (Expert 5,15), those standards and rules diminished (Expert 1). Taking the statement of Expert 7, who comprised a variety of communication mediums from the pure phone calls to 3 different video systems. The respondent mentioned that for own teams, slack is used, zoom is appropriate for international teams, and google docs is always required to keep track of the documentation (Expert 7). Other interviews reported a similar kind of mix, but throughout the 15 interviews, no overarching or agreeable system could be determined. In consideration of figure 7, it becomes evident that different virtual teams prefer various communication tools.

Figure 7 Preferred Communication Tools of the 15-full time virtual teams



In most cases, those different procedures are not aligned, and the external communication with clients, partners, and other team members has been severely deteriorated (Expert 11). Recent literature procrastinated that lacking technology alignment between members and organizations hamper virtual team collaboration (Bjorn & Ngwenyama, 2014), because miscommunication and interpretation of information threaten not only the time adherence but the team's effectiveness and project execution in general (Liao, 2017).

This leads to the following proposition about communication & information exchange in full-time virtual teams.

Proposition 2b: In full-time virtual teams, the communication within companies might improve, but the inter-organizational communication and information exchange deteriorated. Communication tools between teams are not aligned, and formal video conferences lose their personal characteristics so that tacit knowledge gets lost.

Planning

"Unfortunately, during the recent novel coronavirus pandemic, hundred of thousands if not millions of workers and team managers have had to make the transition with no preparation whatsoever, putting so many cases setting them up to fail." (Sookman, 2020). The experts interviewed confirmed this statement, because COVID 19 encouraged the establishment of full-time virtual teams. Thus, new work routines emerged (Expert 8), which demand new skills, preparation, and planning from members and especially leaders. Whereby planning cannot be considered as an automatic procedure; rather, additional planning and organization demand superior investment and endeavours (Expert 1,11,13). If companies deployed an insufficient structure, in which employees do not know their roles, responsibilities and receive no continuous feedback, "workers may feel disconnected from the corporate culture and hierarchy, and their productivity may suffer without clearly defined expectations and roles" (Del Vecchio, 2020). As indicated, a clear agenda must be communicated and also an agreement between leaders and managers established (Expert 3).

Considering each problem individually, virtual team members do not have clear roles and responsibilities (Expert 7). Thus, they do not adequately understand their tasks, and employees often lose the bigger picture. (Expert 10). Besides the lacking clarity of goals and objectives in virtual teams (Expert 15), an essential part of coordination and planning is performance measurement (Expert 8). Without this missing detail, members lose track of deadlines (Expert 4) and the general timeline (Expert 14). Moreover, the lacking accountability of employees can be a challenge while managing virtual teams, since there is no direct supervision" (McIvor Martin, 2020) which potentially result in demotivation and social loafing. This performance management, coupled with a clear scope, should be provided through agreements between managers and leaders (Expert 15). There should be stated what employees and managers expect (Del Vecchio, 2020) and what deadlines, milestones, and structured the employees have to obey. Expert 14 elaborated "to manage virtual teams; you need to understand the boundaries and impose clear rules and procedures, especially concerning technology". The expert insists that managers have to be transparent because normal rules reduce uncertainty and improve team performance (Ferrazzi, 2014). On the other side, planning should also secure that everybody is heard in virtual teams (Expert 15) because it becomes eminent from this interpretation section that employees face a multitude of problems that potentially reduce employee engagement and integration. To tackle these issues, there is a "need for backlogs and constant refining" to ensure that individuals and managers work on the most valuable things, and no problems intertwine (Rehberg, Danoastro, Kaul, & Stutts, 2020) Proposition 3a summarizes the abovementioned problems and development in full-time virtual teams.

Proposition 3: In full-time virtual teams, employees often experience the absence of clear roles, rules, procedures, and supervision. Consequently, employees lose the big picture of the project and feel disconnected. To integrate all employees and ensure that everyone in the project has the same knowledge, planning is essential to reduce uncertainty and provide a clear direction.

4.3.2 Budget

Due to the COVID 19 crisis, employers were encouraged to perform all team projects virtuality. As a result, employees suddenly worked remotely and became members of full-time virtual teams. In respect of the first two result parts, it becomes evident that problems affecting the budget adherence of virtual teams are concerned with the technology infrastructure that companies, individuals possess, or requires.

In a full-time virtual team context, where video conference become the primary communication mechanism, connection problems (Expert 2,3) or the availability of required office space and equipment (computer, webcam, internet connection) hindered the performance of virtual teams. Hence the technical & organizational circumstances are not ideal, because noise and broken connections deteriorates individual and team performance. Throughout the literature, the term task- technology fit often emerges, to describe that team performance decrease when they require different kind of technical functionality, which cannot be provided by current technologies (Aiken,

Gu, & Wang, 2013). In this case, companies and employees experience a low task technology fit since equipment and infrastructure is not appropriate.

Besides the hardware, even in semi-virtual units, individuals are technophobic and do not acquire the necessary soft skills to exploit the available technologies. As a result, Expert 14 reported that new skills have to be obtained digitally. Otherwise, employees may be demotivated, due to the high responsibility of setting up their schedule and resolving technical problems (Acker, Keeping your virtual team together over the long term , 2020). This description leads to the following proposition concerning technology infrastructure problems.

Proposition 4a: In full-time virtual teams, the technological infrastructure comprising hardware and orgware, is lacking, and demand companies to invest in technical equipment and training methods.

Following the proposition, the interview ensured that companies and individuals were mostly unprepared to transit their communication into full-time virtual settings. As a result, to mitigate the risk of the COVID 19 crisis and remain competitive, higher investment and attention must be allocated to the technology infrastructure's issues.

Additionally, one problem, which exclusively ignited in full-time virtual teams, is the technology dependency. In former times, before the coronavirus, technology problems could be easily mitigated by conducting meetings face to face or phone conversation. Today, essential meetings are dependent upon the technological availability and functioning. So if one person loses their internet connection, this is inconvenient. In the worst case, dead servers leave the team unable to access their project files and unable to execute the project before deadlines, which would cause a financial disaster (Del Vecchio, L.2020). That's why companies have to be aware of their communication format and their technology dependency.

Proposition 4b: Full-time virtual teams become technology-dependent, because face to face contact is impossible, so in case of connection problems or errors, projects cannot be executed and even fail.

4.3.3 Quality

Leadership

Clear structures, planning, and understanding of applicable technologies in fully virtual teams are necessary. Another factor which is inevitable in virtual teams, despite their level of virtuality, is leadership, because virtual team leadership is pivotal to virtual team effectiveness. In semi-virtual teams, the literature recognized that, through the lack of personal connection, virtual leadership has become more challenging. Leaders encounter difficulties to build trust and organize team work efficiently. In a more complex, volatile, and virtual working environment, the relation between leader and members are put to the test, because employees face unexpected moral & mental issues, which culminate into mistrust, miscommunications, and feeling of disengagement (Expert 1, 10).

Nevertheless, managers are perceived as facilitators of virtual teams (Expert 15), who lead video conferences to inspire a conversation & ensure the integration of all members. Still, this ideal type of leader is rarely observable in practice because Expert 3 reported that in most teams, leaders do neither transparently deploy a top-down communication nor engage in planning or trust-building activities. A simple reason is that leaders are mostly unprepared. "This is most apparent when it comes to rating virtual team leadership: 58% of employees feel that their team leaders are not adequately prepared to manage their team in the virtual environment" (Sookman, 2020). So, the leader member relationship is coined by poor communication (Sookman, 2020) and mistrust, because leaders tend to have a general lack of understanding of how to work virtually and thus neglect to address & manage the greater level of team diversity, personality traits, cultural differences and difference to semi virtual teams (Sookman, 2020)

On the one hand, most leaders in a virtual team setting need to possess specific skills to manage virtual teams. Expert 15, described that leaders should "be able to manage your time and the time of someone else (...), be very open and very clear in your communication and integration, (...), be transparent and explain things in the way you would talk to your sister." In practice, those skills are mostly missing, and managers tend to approach full-time virtual teams with the same skills and attitude as being responsible in face to face organizations. To mitigate these disadvantages and create mutual trust between employees and managers, a leader must be proactive because members "would like to be integrated and guided" (Expert 7). Besides, team leaders must be hypervigilant, ensuring that their messages are clear, understandable, and trigger the intended outcome (West, 2020). Therefore manager should deploy a combination of complimentary task and relationship-oriented behaviour (Nordbäck & Espinosa, 2019)

The tasked-focused skills are strongly related to planning, described in the section (4.3.1), and include identifying and communicating the overall objective, roles, and responsibilities. In this manner, leaders can develop a shared vision to work towards (Rehberg, Danoastro, Kaul, & Stutts, 2020). Also, leaders are mostly criticized for their lacking relationship-oriented behaviour. To improve longer-lasting trust and enhance collaboration, leaders are obliged to "take warning signs from the team seriously and actively encourage team members to voice concerns" (TUM, 2020). In general, relationship-oriented behaviour aims to strengthen the relationship between members and leaders, which is strongly required in a fully virtual team due to the decreased trust and accusation of constant monitoring. In this context, modern literature often expressed the demand for emotional intelligence to remedy the bond between members and managers. Emotional intelligence comprises the skills to comprehend emotions and regulate themselves and their team (Mayer and Salovey, 1997). According to expert 15, a good role model for effective leadership in the virtual team is google. Their leaders pay attention to individuals, and with virtual coffee chats, personal kick-off, or even home-delivered gifts like plants, the team can share satisfaction and bear each task. On the other hand, the managers are also very transparent concerning their emotion and their planning, so that every member understands their role and leader's aspiration & expectation. For average companies,

however, leadership is still an issue in full-time virtual teams, through which projects or hindered or even fail.

In conclusion, proposition 5 invigorates that leaders have difficulties adapting their leadership style to a full-time virtual team structure. As a result, especially the relationship-oriented behaviour is lacking, because managers do not perceive and act upon the rising individuals problems and anxiety of team members. Consequently, employees are not granted a psychologically safe working environment, which is addressed in detail in section 4.3.3

Proposition 5: Especially in entirely virtual teams, task-focused and relationship-focused behaviours coin leadership as useful. Both characteristics should be deployed complementary to ensure transparent planning and communication as well as the recognition and mitigation of negative emotions and threats of individuals. But in reality, leaders neither deploy a top-down communication nor consider warning signs that individuals encounter personal problems. Consequently, miscommunication and mistrust hinder the project execution in virtual teams.

Trust

Besides the formal planning, "trust is crucial" (Expert 3), to foster collaboration and achieve overall team effectiveness (Mackenzie, 2010). In the fast progressing virtual environment, the traditional mechanism by which trust was built are no longer applicable. Setting up a capable team with team members fully trusting each other has become a complex task (Alsharo, Gregg, & Ramirez, 2017). The results of the interviews, likewise the outcomes of the literature analysis, emphasized that semi and full-time virtual teams encounter problems in building trust within organizations. The decrease of face to face contact with members, and diminished visual cues increase miscommunication and ultimately deteriorate the development of longer-lasting trust. In full-time virtual teams, the complete absence of virtual cues and personal contact further complicates the creation of trust why scholars do not expect full-time virtual teams to reach the level of long-lasting trust. Instead, virtual teams should at least develop swift trust, a preliminary stage of trust, fragile and more quickly formed among members. Reasons why even the development of a more fragile kind of trust is difficult, are described by Expert 1, 8, 13, 14, who independently described that in full-time virtual teams, members solely operate to full fill a goal and do not care about personal relationships. Due to this reason, teams are not aligned, and members lack trust, which will ultimately impact the quality of teamwork in virtual teams" (McIvor Martin, 2020). Due to this lacking personal basis, employees have difficulty assessing whether individuals are genuine and doubt their competence and abilities (Expert 14). In this context, where no communication despite formal interaction is fostered, introverted individuals often cannot be integrated (Expert 4), and the engagement and integration of employees is hindered (Expert 6). Concluding Expert 1 emphasizes that virtual teams exist to full fill a common purpose but do not act as an aligned unity (Expert 1). On this basis, the following proposition concerning the trust problems in full-time virtual teams can be stated.

Proposition 6: In fully virtual teams, employees do not know something about the personal basis of others; due to this reason, the development of trust is infringed, and teams can solely developed a form of swift trust.

Social Loafing

Based on the lack of supervision and clarity of objectives in full-time virtual teams, social loafing increases. Expert 5 mentioned that naturally, "some employees are engaged others are lazy", thus in some teams, the work of a few employees carries the majority of the team's output. Expert 1 was even more explicit and shared his team experience, where individuals receive credits for other peoples work. The most obvious explanation is that employees can easily hide behind the screen" Expert (5) and, due to the lack of trust, do not feel compelled to contribute to the team's object. Besides, "research shows that team members reduce the effort when they feel less responsible for output" (Ferrazzi, 2014). So, the level of trust, planning, and accountability influences individuals' tendency to engage in social loafing. These attitudes significantly harm the quality of projects and threaten team cohesion. Therefore, future academics should investigate the following proposition more closely

Proposition 7: The higher the level of virtuality, the higher is the possibility that individuals do not contribute to the team's success as they are supposed to do. Reasons are various and comprise the problems this paper already discussed, namely, trust, disengagement, and the fact that it became easier to hide behind a screen.

Anxiety & Mental Health

Despite the planning related issues, in full-time virtual teams, unlike other team designs, interpersonal, and personal issues (Del Vecchio, 2020) jeopardize successful team performance. Research suggests that, "42% of virtual team members feel frustrated and overwhelmed by virtual collaboration and communication technologies" (Sookman , 2020). These feelings manifested into various forms of moral disengagement, for example, social loafing and free riding. These trends are confirmed through the semi-structured interviews, which revealed that due to the transition to full-time virtual teams, individuals have to cope with unexpected circumstances. In general, considering the change management literature, "individuals do not experience these changes consistently and uniformly" (Cameron & Green, Making Sense Of Change Management , 2017). Facing this unique situation of working in full-time virtual teams for the first time, "some feel isolated, some adapt quickly" (Expert 14). This was also repetitively mentioned throughout the interviews, because some employees reported increasing anxiety among the workforces (Expert 15) and fear to be replaced, monitored continuously by managers (Expert 1,5).

In contrast, others claimed that the transition to entirely virtual teams was not a difficult task (Expert 5). Moreover, working in silos (Expert 5) or remotely increased the stress level of individuals because new routines have to be established and skills acquired. Expert 15 concluded from all these issues that the underlying reason, causing lacking motivation, feeling of isolation, and disengagement, "is psychological safety and how people feel safe and being included in the conversation" (Expert 15). The commonly

cited definition of psychological safety provided by Amy Edmonson's describes a shared belief held by members of a team that the team is safe for interpersonal risk-taking and an implied sense of candor " (Congelosi, 2020). In most interviewed teams, a psychologically safe environment was not present due to social loafing and trust problems, which were investigated before. Thus, recent journals assume that through a lacking psychological safe work environment, valuable feedback and ideas of individuals are neglected. As a result, the quality of teams decreases (Berkeley Lab, 2020). In contrast, "psychologically safe team members feel confident to appropriately speak up, admit you don't know an answer, ask any questions, respectfully challenge an idea, offer a new perspective, and/or share your personal experience without the fear of being judged, embarrassed, or shame" (Congelosi, 2020)

Despite the role of psychological safety as a critical predictor of team performance/ effectiveness (Berkeley Lab, 2020) creating such an environment is no easy feat. Working in entirely virtual teams made the situation even more complicated (Congelosi, 2020). Therefore the following proposition can be translated from these results

Proposition 8: Within the transition to full-time virtual teams, the personal contact with employees ceases. How individuals cope with this situation depends on their personality traits and formers experience. In this new situation fuelled by the COVID 19 crisis, many employees have difficulties accepting the new position and facing unexpected personal problems related to motivation, engagement, and anxiety. Some feel threatened to be dismissed after the crisis and continuously monitored. A common reason for these problems is a lacking a psychologically safe working environment, where individuals can contribute freely and exert their full potential without anxiety.

5 Conclusion

The purpose of this research is to identify problems managers and employees can expect when transitioning to a full-time virtual team to answer the following research question: RQ: What problems do employees experience full working time in virtual teams? The assessment of virtual team problems is conducted concerning the budget, time and quality dimension of team performance, to indicate the issues directly affecting team effectiveness. Comparing challenges in semi and entirely virtual teams invigorated, how problems developed due to the transition and the recent COVID 19 crisis.

Following the theoretical guideline and procedure of the research, after virtual teams are characterized, and the difference toward other projects is outlined, a literature review comprising 57 articles investigates team performance problems in semi-virtual teams. Semi virtual or even called hybrid teams consist of members, who mostly work at a distance from each other, but occasionally have the opportunity to meet face to face (IGI Global, 2020).

The main reasons hindering semi-virtual team performance can be attributed to the reduced proximity of team members, time, linguistic and cultural boundaries.

Communication across these boundaries, lost tacit knowledge, and, consequently, delays or cultural conflicts broke the flow of communication & information. Thus initial planning and investment in technology interaction, skills, and infrastructure were demanded. Besides the task-related challenges, the lack of personal connection also led to mistrust within the team and increased social loafing, because employees harvested credit for other people's work without contribution.

Due to the recent COVID 19 crisis and the inevitable advancement of modern communication technology, more companies are transitioning to fully virtual teams, mediating communication complete through video conference technologies. The characteristics of entirely virtual teams are cross-boundary collaboration, diminished face to face contact of employees, and pure reliance on communication technologies. In the absence of face to face interaction, 15 semi-structured interviews with respondents from around the world and industries were performed, to highlight whether similar problems as in semi-virtual teams are applicable or managers and employees have to adapt their expectations. In entirely virtual teams, it became eminent that most of the existing issues in former team constructs are still observable. Table 8 lists the proposition of full-time virtual team challenges, according to improvements and deterioration of existing issues. The last category embraces newly emerging issues, which were exclusively mentioned in fully virtual teams and are the central part of the future research recommendation (Section 6). This conclusion's main contribution is to provide a coherent picture to the audience and summarize the most obvious problems and improvements.

Considering the improvement section in Table 8, the experts in conjunction with literature evidence provided the suggestion that virtual teams' productivity is higher in full time than former team constructs because distractions are eliminated, and employees are granted a higher work-life balance. Moreover, expert independently confirmed that the internal communication became more efficient because in structured formal meetings, only the most critical information and knowledge were subject to the discussion, so redundant information was neglected.

Nevertheless, employees still face a variety of challenges in full-time virtual teams. Beginning with the decreased personal contact and the higher level of dispersion and virtuality, experts observed difficulties in building trust and motivation, due to missing personal basis. In an environment where most interactions are formal, interpersonal communication is lacking, and tacit knowledge gets lost. Speaking of communication, especially inter-organizational projects, encountered difficulties because the different communication technologies are no longer aligned. In semi-virtual teams, unwritten standards obliged the usage of phone or email as the primary communication medium. In recent times, coined by the emergence of video conference technologies, no clear champion can be identified. Hence, the role of planning, technology infrastructure, and leadership as critical predictors of team performance,

augmented. But modern companies and leaders are not prepared enough. As a result, teams have to invest in new hardware and acquire additional skills to work with the latest equipment. In terms of leadership and planning, the experts demand clarity of roles, responsibilities, and procedures, so that members can follow a clear vision. Moreover, leaders have to acquire new emotional skills to detect moral and mental health problems early on.

Besides the deterioration of existing problems due to the higher virtuality in teams, managers are also confronted with new, exclusive problems, which firstly appear in entirely virtual teams. The dimension embraces two overarching issues. The first one is technology dependency; unlike semi-virtual teams, the communication entirely bases on computer-mediated communication technologies. In the case of computer errors, interaction only hardly be mitigated or restored. Aggravating these circumstances is the lacking technological infrastructure, which increases the probability, magnitude, and complexity of failures. In the worst case, when files are not accessible, deadlines have to be postponed, or the whole project must be ceased. Also, relationship-oriented problems demand additional attention in full-time virtual teams because, in unexpected, volatile, and new situations, employees react differently to different external stimuli. So, leaders have to contemplate each member's position and condition individually to reduce social loafing and increase the level of trust within teams. If personal anxiety to be replaced and an increased stress level, due to the COVID 19 crisis is neglected, valuable contributions and feedback from individuals are limited, resulting in hampered virtual team performance. Expert 15 investigated this challenge in detail and, based on her experience as a remote consultant, pointed out that a psychologically safe environment where members feel integrated, heard, and understood is strongly demanded in entirely virtual teams. In this context, individuals have no fear of opening up, sharing their emotional problems, and contributing effectively and motivated to the project outcomes.

In sum, in full-time virtual teams, task and relationship-related challenges can be assumed to hinder team performance. Considering the three research results, the transition and development of problems from semi to full-time virtual teams is depicted. The majority of issues in entirely virtual teams, were already described in semi-virtual team literature, but worsened due to the higher level of virtuality. Additionally, the new situation evokes new challenges, namely technological dependency, and individuals' moral & mental health problems. To tackle the issues, the establishment of a psychologically safe work environment should be contemplated. More about the potential solution and how the output of this research can be useful for managers and academicians is presented in the upcoming future research part.

Lastly, again the author is compelled to address that those propositions can be treated as through roughly tested statements because the outcome relies on only 15 semi-structured interviews. A complete list of limitations and further research is acknowledged in the next part.

Category	Proposition
Problem Deterioration	<p><i>Proposition 1b: Cultural Dispersion in full-time virtual team became a crucial problem, because communication is asynchronous and hard to maintain.</i></p> <p><i>Proposition 2b: In full-time virtual teams, the internal communication within companies might improve, but the inter-organizational communication and information exchange deteriorated. Communication tools between teams are not aligned, and formal video conferences lose their personal characteristics so that tacit knowledge gets lost.</i></p> <p><i>Proposition 3: In full-time virtual teams, employees often experience the absence of clear roles, rules, procedures, and supervision. Consequently, employees lose the big picture of the project and feel disconnected. To integrate all employees and ensure that everyone in the project has the same knowledge, planning is essential to reduce uncertainty and provide a clear direction.</i></p> <p><i>Proposition 4a: In full-time virtual teams, the technological infrastructure comprising hardware and software, is lacking, and demand companies to invest in technical equipment and training methods.</i></p> <p><i>Proposition 5: Especially in entirely virtual teams, task-focused and relationship-focused behaviors coin leadership as useful. Both characteristics should be deployed complementary to ensure transparent planning and communication as well as the recognition and mitigation of negative emotions and threats of individuals. But in reality, leaders neither deploy a top-down communication nor consider warning signs that individuals encounter personal problems. Consequently, miscommunication and mistrust hinder the project execution in virtual teams.</i></p> <p><i>Proposition 6: In fully virtual teams, employees do not know something about the personal basis of others; due to this reason, the development of trust is infringed, and teams can solely developed a form of swift trust.</i></p> <p><i>Proposition 7: The higher the level of virtuality, the higher is the possibility that individuals do not contribute to the team's success as they are supposed to do (social loafing). Reasons are various and comprise the problems this paper already discussed, namely, trust, disengagement, and the fact that it became easier to hide behind a screen.</i></p>
Problem Improvement	<p><i>Proposition 1a: In full-time virtual teams, interviews respondent revealed that the dispersion and geographical decomposition of work teams lead to higher productivity in terms, because individuals experience a higher work-life balance and work in a more focused, calm and relaxed atmosphere.</i></p> <p><i>Proposition 2a: In full-time virtual teams, the internal communication in teams and companies improved because the information exchange focuses on core information and neglects superficial shares of knowledge.</i></p>
New emerging Problems	<p><i>Proposition 4b: Full-time virtual teams become technology-dependent, because face to face contact is impossible, so in case of connection problems or errors, projects can not be executed and even fail.</i></p> <p><i>Proposition 8: Within the transition to full-time virtual teams, the personal contact with employees ceases. How individuals cope with this situation depends on their personality traits and formers experience. In this new situation fueled by the COVID 19 crisis, many employees have difficulties accepting the new position and facing unexpected personal problems related to motivation, engagement, and anxiety. Some feel threatened to be dismissed after the crisis and continuously monitored. A common reason for these problems is a lacking a psychologically safe working environment, where individuals can contribute freely and exert their full potential without anxiety.</i></p>

Table 8 Proposition Deterioration, Improvement and new emerging problems in full time virtual teams

6 Limitations and further research

This study is based on a literature review of 57 articles and 15 semi-structured interviews with employees and business executives. The author admits that neither the literature sample nor the sample size of the meetings is large enough to generalize statements or hypotheses. Instead, the result of this study are propositions concerning problems in full-time virtual teams, which need to validate by longitudinal experiments or observations. Another advantage of long term studies about virtual teams is the possibility of reliable track problems infringing on the budget adherence of virtual teams. As indicated during the Section 3.2, all interviews encountered difficulties to elaborate issues exclusively affecting the attained budget, because of the actuality of the transition. At the end of the year, after the full effect of corona on the project team's financial situation is feasible, studies potentially try to identify whether costs increased or decreased due to the transition to full-time virtual teams.

As aforementioned, there is also a degree of overlap between problems in the performance dimension, which are not mutually exclusive attributable to one specific project management domain.

This means that issues could also fit in multiple categories. Based on the scope and the purpose of this research, the problems were classified according to the most suitable dimension. Respectively, arising issues from 3 different perspectives are investigated. project management domain.

Throughout the thesis, the gap in current literature became the subject of discussion and progressed this study. Due to the existing literature gap and the topicality of this topic, in the result & interpretations part, non-scientific journals had to be included. Their origin is not academic, but the quality is perceived to foster this research and indicate where problems in full-time virtual teams emerge.

Additionally, the last limitation of this thesis considers the lack of actual testing and practical observation. Primarily the interviews purely rely on the experience, perceptions, and goodwill of employees to share reliable what problems they encountered and how issues changed. A longitudinal observation to consider what solutions can effectively mitigate or hinder team performance issues is recommended in the further research. General and specific elaborations of new research are depicted in the upcoming part.

At the moment, academicians and managers have not used their full potential to investigate virtual team performance problems. Due to the fast-changing technology and environment, problems stated in semi or face-to-face teams cannot be assumed to hinder team performance in entirely virtual teams equally. Most of the contributions are laboratory-based, reflecting upon students' experience and neglecting employees and managers working in virtual teams. So, the overall research trend is to focus on problems hindering team performance in full time virtual teams and solutions.

Speaking of problems, it worth highlighting that all resulting proposition developed in this research, needs to be tested to provide reliable and valid results. The most effective method is to conduct longitudinal observations or review case studies of teams transitioning to full-time virtual settings. In the same manner, managers and academicians could focus on potential mitigation strategies a majority of problem sources. A specific

suggestion of this research is to highlight the emotional dimension of individuals in virtual teams. Closely related to the emotional aspects is the concept of emotional intelligence and psychological safety and collective knowledge to investigate how individuals can be integrated, and negative feelings of isolation tackled. The study at hand, found that psychological safety, combined with new leadership and additional planning efforts, possesses the potential to mitigate problems in full-time virtual teams. Nevertheless, psychological safety and emotional intelligence are rarely addressed in modern literature, for example, on Scopus, less than 100 papers incorporated psychological safety. Further research should acknowledge the fact that new leadership skills are required and individuals became the centre of virtual team concerns. With the explicit focus and investigation how individual's concerns, worries can be collectively resolved and the creation of a long lasting psychological safe working environment, teams and companies are entitled to.

7 Research Contribution

This research contributes to the existing knowledge of virtual teams by identifying recent problems, direction within full-time virtual teams, and evaluate how issues develop during the transition to a full-time virtual setting.

The methodology of this research is two-fold, because firstly a literature review of 57 articles was conducted to summarize problems in semi-virtual teams, academics, and managers already considered. As a common standard throughout this paper, the issues identified were related to a suitable dimension in the iron triangle framework, which considered project performance according to budget, time, and quality adherence.

After the contemporary literature has been investigated, the next step is to focus on problems in full-time virtual teams. Due to the COVID 19 crisis and the rapid development of communication technologies, at the moment, managers of semi-virtual teams are forced to transition to full-time virtual teams or contemplate it. The second part of this analysis, adhering to the iron triangle dimensions, presents the problems current employees and managers face, working in full-time virtual teams.

In the last section, problems in semi and full-time virtual teams are jointly considered to identify how issues developed, due to the transition. For each problem, propositions are developed, highlighting whether old problems deteriorated, improved in full-time virtual teams or why and what new problems emerged. As a result, improvement and disadvantages in full-time virtual teams are presented and explained.

So, the research fills the gap in the literature and inspires academics further to focus and test the proposition concerning problems in full-time virtual teams. The study also emphasized that psychological safety became a key concern and added a layer of complexity to the existent virtual team research. Likewise, managers from companies also profit from this research through the presentation of problems in fully virtual teams and the particular explanation of deterioration, improvement, or new emergence. Based on this, managers can alter their

expectations and investigate mitigation or preparation strategies.

8 Acknowledgement

At the end of this thesis, I would love to address a few wholehearted and lovely words to my supervisors, friends, and family, who paved the way for this thesis. Undoubtedly this thesis was not the easiest experience of my academic profession, but the most remarkable in terms of personal growth, time management, and practical research.

Due to the corona situation, the whole circle was split apart and forced to work remotely on the thesis. Only through the everlasting motivation and incentive of Dr de Visser, Ms. Kayzer, and Dr. Wijnhoven, this thesis has been made possible. They coined this thesis through a nexus of honesty, proactive feedback, motivation, and the most crucial attribute, availability.

For this unique time and the possibility of working on a unique topic and meeting exceptional people, I want to say thank you.

Besides my academic assistance, which I appreciated, I also want to mention a few phrases of abbreviation over my friends and family, who took the time and dedication to guide & motivate me. Through their commitment and valuable lessons, I was able to complement this thesis in time unexpectedly and, hopefully, with the intended quality.

For the future, I hope that I can assimilate all the positive characteristics and abilities I experienced throughout this valuable time and maybe one day treat young students with the same openness, ambition, honesty, motivation, and commitment I received from Dr de Visser, Ms Kayzer, and Dr Wijnhoven.

Appendix

Table 3 Literature Review Procedure

Search String	Scope	Number of Entries
<i>Search Protocols for Scopus</i>		
virtual teams AND team performance	Keywords, Abstract	121
virtual teams AND team effectiveness	Keywords, Abstract	66
virtual teams AND team output	Keywords, Abstract	5
virtual teams AND team outcomes	Keywords, Abstract	43
<i>Search Protocols for PsychNo</i>		
virtual teams AND team performance	Keyword, Abstract & Title	36
virtual teams AND team effectiveness	Keyword, Abstract & Title	23
virtual teams AND team output	Keyword, Abstract & Title	19
virtual teams AND team outcomes	Keyword, Abstract & Title	3
<i>Search Protocols for WebofScience</i>		
virtual teams AND team performance	Keywords, Abstract	138
virtual teams AND team effectiveness	Keywords, Abstract	37
virtual teams AND team output	Keywords, Abstract	44
virtual teams AND team outcomes	Keywords, Abstract	7
<i>Search Protocols for Business Source Elite</i>		
virtual teams AND team performance	Keyword, Abstract & Title	123
virtual teams AND team effectiveness	Keyword, Abstract & Title	28
virtual teams AND team output	Keyword, Abstract & Title	18
virtual teams AND team outcomes	Keyword, Abstract & Title	2
Total		713
<i>Duplicates</i>		140-
<i>Criteria</i>		484-
Total (Abstract)		89
<i>Removed after complete reading</i>		41-
<i>Additional database</i>		5+
Total suitable for review		53

Table 5 Interview Respondent Statistic

Frequency Distribution of Demographic Variables		
Character	Frequency Distribution N(%)	Value
Gender	Female	3 (0.2)
	Male	12 (0.8)
Country (Interviewees)	Netherlands	1
	England	2
	Germany	9
	French	1
	America	1
	Russia	1
Job Roles	Salesforce	2
	Strategic Sourcing	2
	Quality Management	1
	Service Engineering Consulting	1
	Financial Accounting	2
	Business Development Management	1
	Marketing Management	2
	Human Resource Manager	1
	Agile Coach	1
	Engineering Manager	1
	Main Business	Car industry
Pharmaceutical		2
Chemicals		2
Semi conduct computers		4
Logistics		1
Information, Technology Services		1
Consultancy		3

Questionnaire:

Fact Sheet

Date:

Company:

Name:

Position:

Introduction

Thank you for the opportunity to conduct an interview. The purpose of this short discussion is purely academic and leads to the finalization of my bachelor thesis. As indicated in the request, I am researching challenges employees are currently facing, working full time in virtual teams. A couple of questions about your daily routines in these teams will be asked, whereby a response will be appreciated but is not required. The whole interview will be recorded on permission, and the results are later used to identify commonalities between different virtual teams. Individual results will be treated confidentially by anonymizing each output.

Validation/ Background Information

1.1 Can you give me a brief description of your team?

Probe: What are the functions, goals, size?

1.2 Do you regularly have to collaborate with colleagues in the same project team, who are geographically dispersed?

Probe: Do you even have to work across time zones?

1.3 Do you use computer-mediated communication technology (for example, Microsoft team, Webex) to communicate with those dispersed co-workers daily?

If yes: What tools do you use, and how often per day? Are you still using face to face interaction?

VT problems: Team performance dimension; before the transition to full-time virtual teams.

2.1 According to your expertise, what is the biggest problem working in virtual Teams?

Team level (Iron Triangle)

2.2 What problems are hindering the project execution in terms of time?

Probe: Could you elaborate a little bit more about the socio-emotional process (trust, cohesion, relation) or task processes (share leadership, communication, collaboration)?

2.3 What problems in Virtual teams have the highest effect on the budget?

2.4 What factors are infantile when the intended quality of virtual team projects can not be achieved?

Individual Level

2.5 Do you feel comfortable working in virtual teams?

Probe: Why not?

2.6 Why are team members not committed in virtual teams?

Contingency Question: working full time in virtual teams

3.1 How has your daily teamwork changed working full time in virtual teams?

Probe: Do you use computer-mediated communication methods more often?

3.2 What new problems emerged due to full-time virtual teamwork?

Probe: Are the old problems still applicable or even solved?

3.3 Can the same quality of the project be expected?

Probe: Yes, why, or why not?

3.4 What new problems threaten the performance in terms of budget and timing?

Individual Level

3.5 Do you feel less committed to the virtual team?

3.6 How does your wellbeing altered and affect the overall performance of virtual teams?

3.7 How do you think the corona crisis can be exploited as an opportunity?

Probe: Do you think that teamwork could be done purely virtual? What have you learned through this crisis, that could benefit the team and your performance?

Do you have some questions or recommendations?

Figure 6 Descriptive Interview Results

Semi Virtual Teams; 2019				
Interview Number	Dispersion			Technology Use
	Geographic	Temporal	Face to face communication (whole team)	Prefers Communication Medium
Interview 1	X	X	Yes, 2 or three time a week	Phone, Email
Interview 2	X	/	Yes, daily	Phone
Interview 3	X	/	Yes, once a week	Phone, Email
Interview 4	X	X	Yes, once a week	Video conference (Webex etc.)
Interview 5	X	X	Yes, two or three time a month	Video conference (Webex etc.)
Interview 6	X	/	Yes, once a week	Phone
Interview 7	X	X	Yes, twice a month	Video Conference (Webex etc.)
Interview 8	X	/	Yes, three times a week	Phone
Interview 9	X	X	Yes, daily	Phone
Interview 10	X	X	No	Video conference (Webex etc.)
Interview 11	X	/	Yes, daily	Phone
Interview 12	X	/	Yes, once or twice a week	Phone
Interview 13	X	/	Yes, twice a week	Phone
Interview 14	X	X	No	Video conference (Webex etc.)
Interview 15	X	X	No	Video conference (Webex etc.)

Full time virtual Teams, 2020				
Interview Number	Dispersion			Technology Use
	<i>Geographic</i>	<i>Temporal</i>	<i>Face to face communication (whole team)</i>	<i>Prefers Communication Medium</i>
Interview 1	X	X	No	Video Conference
Interview 2	X	/	No	Video Conference
Interview 3	X	/	No	Video Conference
Interview 4	X	X	No	Video Conference
Interview 5	X	X	No	Video Conference
Interview 6	X	/	No	Video Conference
Interview 7	X	X	No	Video Conference
Interview 8	X	/	No	Video Conference
Interview 9	X	X	No	Video Conference
Interview 10	X	/	No	Video Conference
Interview 11	X	/	No	Video Conference
Interview 12	X	/	No	Video Conference
Interview 13	X	/	No	Video Conference
Interview 14	X	/	No	Video Conference
Interview 15	X	/	No	Video Conference

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