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KNOWLEDGE SHARING IN VIRTUAL TEAMS

The significance of psychic distance

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ABSTRACT

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Organizations are increasingly turning to the use of virtual teams as a way of responding to the rapidly changing demands of global work. Using virtual teams allows companies cost-efficient access to employees with a diverse range of expertise. However, previous studies have shown that virtual teams struggle particularly with practices related to sharing knowledge. Most research thus far has attributed these challenges to the physical separation of team members.

This research will study the knowledge sharing practices of virtual teams through a novel perspective by considering the concept of psychic distance, a subjective conceptualization of distance. In the past, the concept of psychic distance has been applied to the internationalization decisions of firms. Psychic distance encompasses the individual's perceptions of similarity or difference to distant others. These perceptions are moulded by individual, environmental and cultural factors. High psychic distance is perceived to restrict the communication and interaction of individuals, both being essential elements in organizational knowledge sharing. Thus, the objective of this research is to evaluate the significance of psychic distance in relation to knowledge sharing in virtual teams. More specifically, the research will focus on the processes of socialization and interaction as essential components of knowledge sharing in virtual teams.

The research was conducted as a case study focusing on four virtual teams within an industrial organization. The empirical data of the research was collected through seventeen semi-structured interviews conducted with the members of four virtual teams. From the interview data, four themes emerged in relation to the knowledge sharing practices of virtual teams. First, members of virtual teams described varying communication habits and the conflict situations arising from these variances. Second, the value of team-level interaction was emphasized as a means of constructing a collective identity. Third, team members described challenges related to the socialization and training of distant newcomers. Fourth, a significant connection was established between the socialization lifecycle of the team, and the changes in communication and interaction between team members.

This research provides a novel insight into the relationship between psychic distance and the knowledge sharing practices of virtual teams. The results of the research suggest that the existence of psychic distance between individual team members limits the interaction and socialization processes of virtual teams, demonstrating the significant role that psychic distance holds in relation to intra-team knowledge sharing. However, the results also reveal a possible connection between psychic distance and the lifecycle of virtual teams, suggesting that psychic distance between team members is lowered as the team progresses in its lifecycle. This research acts as an initiator for further research concentrating on psychic distance in virtual teams.

Keywords: Virtual teams, psychic distance, knowledge sharing, interaction, socialization

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1 INTRODUCTION

1.1 Background and objectives of the research

Virtual teams have become the norm in companies across the globe. Due to the changes in the nature of conducting business, increased competition brought on by globalization, a general shift from product to service orientation and a faster working dynamic induced by technological advancements, virtual work has been increasing steadily in organizations (Bell & Kozlowski, 2002, p. 14). This is especially true in some sectors or industries, such as engineering, software development, information technology and consulting (Gilson, Maynard, Jones Young, Vartiainen, & Hakonen, 2015, p. 1323). Virtual teams allow organizations to utilize expertise from around the globe in a more cost-efficient manner (Klitmøller & Lauring, 2013, p. 398), thus providing organizations with an economical access to a diverse set of human resources.

Researchers widely agree that organizational knowledge sharing is a crucial element of successful business performance. Organizational knowledge sharing allows for the integration of individual-level knowledge into collective knowledge for the use of the entire organization (Alavi & Tiwana, 2002, p. 1032). However, prior research also suggests that knowledge sharing is one of the tasks that virtual teams most struggle with. Alavi and Tiwana (2002, p. 1031) suggest that virtual teams have challenges with the development of a transactive memory, achieving mutual understanding, sharing and preserving contextual knowledge and overall weak organizational ties. Such challenges may be partly due to the limited interaction between the members of virtual teams. Both Nonaka (1994) and Levesque, Wilson and Wholey (2001) highlight the importance of interaction in the knowledge sharing practices of the team. Nonaka (1994) links interaction to the creation of collective organizational knowledge, while Levesque and colleagues (2001, p. 136) link interaction to the construction of shared mental models, which help the team to build a common understanding of their objectives and ways of working. Moreover, interaction is important in the creation of a collective team-wide identity that enhances the cohesion and collaboration within the team (Furst, Reeves, Rosen, & Blackburn, 2004, p. 8)

Furthermore, Ahuja and Galvin (2003) and Oshri, Kotlarsky and Wilcocks (2007) link interaction between team members to the socialization processes of virtual teams. Even though virtual teams experience limited face-to-face contact between individual team members, the

socialization of newcomers requires interaction between team members in order to negotiate common ways of communicating (Oshri et al., 2007). The socialization processes impact how team members later communicate and interact together and are therefore meaningful to successful knowledge sharing. Another factor affecting knowledge sharing is the perceived interpersonal similarity between individuals. Makela, Kalla and Piekkari (2007, p. 2) suggest that organizations may experience uneven flows of knowledge due to the perceived differences between individuals, as individuals prefer to communicate with those alike themselves.

With the increased use of virtual teams in organizations, research on virtual teams has thrived over the past 20 years, extending to multiple fields of study (Raghuram, Hill, Gibbs, & Maruping, 2019, p. 309). Nevertheless, the research conducted thus far is still confined to a narrow selection of topics. Indeed, Raghuram and colleagues (2019, p. 309) also suggest, that research on virtual work has tended to occur in siloes of different types of virtual work. For example, there has been an extensive focus on the physical distance between team members (e.g. Baralou & Tsoukas, 2015; Kauppila, Rajala, & Jyrämä, 2011; Staples & Webster, 2008). By concentrating on the physical aspects of distance, researchers have framed virtual teamwork as a physical challenge. However, with the development of information technology, employees are able to utilize a growing number of synchronous communication methods that allow team members to overcome challenges related to the physical dispersion of individuals. Moreover, Wilson, Boyer O'Leary, Metiu and Jett (2008, p. 980) suggest that considering solely the physical aspects of distance, researchers provide only a partial view of how individuals see their work environment. As individual perceptions form a significant part of the individual team members' realities and impact the way people conduct their work, the focus of virtual team research should be shifted to the individual's experiences related to virtual work.

This research will approach the study of virtual teams through a novel perspective, by linking the concept of psychic distance to the study of virtual teams. Psychic distance describes the perceptions of an individual person and how they view the differences between themselves and distant others (Sousa & Bradley, 2006, p. 51). Psychic distance perceptions are influenced by a variety of different factors such as cultural differences, institutional differences, geographical differences, country-specific perceptions, language differences and general experiences (Ambos, Leicht-Deobald, & Leinemann, 2019, p. 663). The concept has also been linked to the mere-exposure effect (Ambos et al., 2019; Håkanson, Ambos, Schuster, & Leicht-Deobald,

2016), suggesting that exposure to distant others through different means may reduce the psychic distance between the two.

The concept of psychic distance has been utilized mostly in research on firm internationalization decisions but has not been connected commonly to intra-team relations (Sousa & Bradley, 2006, p. 49). However, in intra-team collaboration, members of virtual teams make decisions on a continuous basis on how to communicate with their colleagues across distances. This, in turn, affects the knowledge sharing processes within the company. Therefore individual perceptions of the differences or similarities of distant team members may impact the intra-team knowledge sharing of virtual teams and should be examined in greater depth.

This study will address the gap in the existing research by focusing on psychic distance perceptions in virtual teams. The research aims to explore how subjective, personal perceptions of distant others affect the knowledge sharing practices between individuals in virtual teams. By doing so, the research will connect the concept of psychic distance to virtual teams, exploring the individual experiences of team members in order to understand how individual perceptions of distance affect knowledge sharing within virtual teams.

The main research question of the study is:
What is the significance of psychic distance in knowledge sharing between members of virtual teams?

This research question has been broken down into the following sub-questions.

> *1. What challenges do virtual team members experience in terms of intra-team knowledge sharing?*
> *2. What is the role of psychic distance in the interaction and socialization processes of virtual team members?*

The first sub-question aims at investigating the team members' experiences in knowledge sharing in order to identify connections to the concept of psychic distance. This will allow a deeper understanding of how psychic distance impacts knowledge sharing in virtual teams. The second sub-question aims at investigating the link between psychic distance and the interaction and socialization processes of virtual teams. These processes contribute to the knowledge sharing functions within the team. Therefore, it is important to consider these factors in more

detail in relation to psychic distance. By answering these sub-questions, the significance of psychic distance in relation to knowledge sharing in virtual teams can be evaluated in detail.

This research bridges several fields of study by connecting the concept of psychic distance with virtual team research and knowledge sharing research. Because much of the existing qualitative research on virtual teams has been conducted in "laboratory" settings (i.e. student groups etc.) (e.g. Magnusson, Schuster, & Taras, 2014; Polzer, Crisp, Jarvenpaa, & Kim, 2006; Trainer & Redmiles, 2018), this research contributes to a smaller body of literature based on existing virtual teams. While laboratory studies are often easier to control, they also lack some of the unique and nonreplicable characteristics that case studies of actual operating teams are able to bring forward. One example of these attributes is team permanency. Many of the existing studies focus on temporary teams because team permanency is difficult to replicate in laboratory settings. This underlying difference in the dynamics of the team can have a great impact on the team members actions and experiences. Therefore, the study of permanent virtual teams can introduce significant new aspects to the field of virtual team research.

The study also brings novel information about knowledge sharing in virtual teams by concentrating on an abstract concept of distance. As prior research has been criticized for focusing too heavily on distance as an objective phenomena (Siebdrat, Hoegl, & Ernst, 2014; Wilson et al., 2008, p. 980), this research responds to the call for integrating abstract concepts of distance to research on virtual teams. Furthermore, this research contributes to psychic distance research by focusing on individual-level experiences. Distance is often treated in research as a group-level phenomenon, assuming that all members of virtual teams experience distance in the same way (Wilson et al., 2008, p. 980). Wilson and colleagues (2008, p. 979) suggest a more dyadic consideration of distance as a concept that forms through the interworking of different factors. Since decisions in organizations are made by individuals, researchers should study distance on the individual level instead of an organizational level (Nebus & Chai, 2014, p. 9). This approach is also in line with the suggestions of Sousa and Bradley (2006, p. 51) who emphasize that psychic distance concerns individual perceptions, and should be studied as such.

1.2 Key concepts and the scope of the research

The next section will shortly describe the key concepts and terminology utilized in this research. Many of the concepts utilized in this study are complex and have been defined in various ways by prior research. In order to provide a clear understanding of the perspective that this research utilizes, it is necessary to review the central concepts of the study and their definitions in relation to this research.

Virtual teams

Researchers have utilized a variety of labels to describe geographically, organizationally, temporally or in other ways distributed teams. Terms such as virtual teams, distributed teams and remote teams have been used interchangeably by researchers. Furthermore, virtual teams have often been associated with topics like global work (Reiche, Lee, & Allen, 2019), virtual work, teleworking and computer mediated work (Raghuram et al., 2019). Most virtual team researchers utilize the definition brought forward by Townsend (1998, p. 18), stating that "virtual teams are groups of geographically and/or organizationally dispersed co-workers that are assembled using a combination of telecommunications and information technologies to accomplish an organizational task." This definition approaches virtual teams through three variables. Firstly, they are groups of people aiming towards the same goals or objectives, also known as "organizational task". Secondly, their members occupy geographically and/or organizationally varied locations. Third, they use information technology as their main method of communication.

Psychic distance

Psychic distance describes the perceptions of an individual person on how they view the differences between their home country and a foreign country. It is based on the individual perceptions impacted by a person's national culture, values, geographical and institutional distance, personal background and many other aspects. Since psychic distance is based on individual, subjective perceptions, this study will employ individual-level of analysis. (Sousa & Bradley, 2006.) A detailed examination of the concept of psychic distance will be provided in the literature review in Chapter 2.

Knowledge

Organizational knowledge research often distinguishes between different types of knowledge reserves. Nonaka (1994, p. 15) identifies two types of knowledge, explicit knowledge and tacit knowledge. Explicit knowledge is information that one can "express in words and numbers", while tacit knowledge comes from the "action, commitment and involvement in a specific context" and is more difficult to share. Holste and Fields (2010, p. 128) further elaborate on tacit knowledge, explaining that while explicit knowledge is something that has already been codified and thus is easily shared among members of the organization, tacit knowledge consists of all other knowledge. Tacit knowledge is very difficult to share as it is, by essence, "highly personal". While tacit knowledge is difficult to share, it is also the most valuable type of knowledge for many organizations (Holste & Fields, 2010, p. 128). Specifically in the organizations of today, where information and knowledge play an ever-larger role and many specialist organizations base their competitive strength on tacit knowledge. Researchers have not reached a definite distinction between knowledge and information. For this research the definition of Wang and Noe (2010, p. 117) will be employed, describing knowledge as "information processed by individuals including ideas, facts, expertise, and judgements relevant for individual, team, and organizational performance".

Knowledge sharing

Researchers have used several different kinds of concepts and terminology to discuss knowledge sharing and flow of knowledge in organizations. Wang and Noe (2010, p. 117) differentiate between different types of movement of knowledge; knowledge sharing, knowledge transfer and knowledge exchange. All of these concepts involve the exchange of information and know-how in order to facilitate the collaboration of problem solving, innovation or implementation of policies and procedures. Knowledge sharing can take place in-person or via different electronic or non-electronic means of communication. Georgiadou and Siakas (2012) utilize the concept of knowledge management, whereby data is converted into information and further into knowledge. Alavi and Tiwana (2002, p. 1030) further separate knowledge management into three overlapping processes; knowledge creation, which occurs in social interaction within groups, knowledge codification in which the previously created knowledge is formalized and communicated, and lastly knowledge application; the exploitation of created knowledge. Knowledge application requires the integration of knowledge, whereby individual level knowledge is converted into group-level knowledge. With the variety of concepts and definitions in the field of organizational knowledge management, this paper will

consider knowledge sharing to be the movement of information and know-how between organizational members in order to achieve the organization's objectives.

Culture

Culture is an essential part of knowledge sharing and cooperation within virtual teams, particularly when considering multinational organizations. Culture has also been the focus of some studies on virtual teams (e.g. Zakaria, Amelinckx, & Wilemon, 2004) and must be recognized as an essential factor in knowledge sharing and collaboration in virtual teams. However, due to the extent of the topic, this study will not focus extensively on the concept of culture, but rather will consider it a significant influencer in individual psychic distance perceptions, as suggested by Sousa and Bradley (2006).

1.3 Structure of the research

In this section, the structure of the study will be outlined. In order to provide sufficient information on prior research, a detailed literature review will be presented in Chapter 2. The literature review will give a brief description of the attributes of virtual teams. After this a detailed evaluation of the use of distance in organizational research will follow, resulting in the review of the concept of psychic distance in more detail. Following this, a review of knowledge sharing literature will be presented, focusing on its particular challenges in virtual teams and the connection between team member interaction, interpersonal similarity and socialization processes. The literature review will be concluded with an analytical framework connecting the reviewed concepts to the objectives of the study.

Chapter 3 will concentrate on the methodological aspects of the research. The chapter will explain the chosen research method and give a detailed account of the data collection and methods of analysis. The chapter will also provide a summary of the case organization and outline the limitations of the research methodology.

Chapter 4 will describe the empirical data collected through interviews from the case organization. This data will be presented through the four themes that have emerged during the analysis. Empirical evidence will be presented and described in detail in this chapter.

Chapter 5 will present the discussion section, where empirical data will be analysed in respect to the literature review and the theoretical framework. The discussion will go through the themes that have emerged from the empirical data and relate these themes to the objectives of the study, the research questions and to the concepts of psychic distance and knowledge sharing. The theoretical and practical contributions of the research will be evaluated, and lastly, suggestions for future research endeavours will be made based on the results of the research.

2 KNOWLEDGE SHARING AND THE ROLE OF PSYCHIC DISTANCE IN VIRTUAL TEAMS

This chapter consists of a literary review of prior research related to virtual teams, psychic distance and knowledge sharing. The chapter begins with a review of virtuality in organizations, discussing the different dimensions of team virtuality. After this, a brief review of the concept of distance in prior research will be given, discussing varying metaphorical concepts of distance and focusing finally on the concept of psychic distance. A review of the prior research on knowledge sharing will also be presented. In the knowledge sharing-section, the impacts of interaction, interpersonal similarity, and the team's socialization and lifecycle will be discussed in relation to knowledge sharing. Lastly, the chapter will present an analytical framework for this research against which the empirical evidence will be reviewed.

2.1 Team virtuality

Bell and Kozlowski (2002) consider virtual teams as groups of people working toward the same goals, where one or more members are organizationally or geographically dispersed from the rest of the group, and where majority of the team's communication occurs via information technology. In defining the virtuality of organizational teams, Bell and Kozlowski (2002) introduce four possible dimensions of virtuality. These dimensions are temporality, boundary crossing, lifecycle and team member roles. When each dimension is viewed as a continuum, and a team can be positioned along any point in the continuum, combinations of the different dimensions become endless. How a team positions on each of these dimensions will have an effect on the structure of the team, as well as on the leadership functions required by each dimension. (Bell & Kozlowski, 2002, p. 31.) According to Bell and Kozlowski (2002), each dimension of virtuality brings some challenges to the leadership functions of virtual teams. Understanding that virtuality can vary across different dimensions is an important factor, because it helps to comprehend the complexity of virtual work and virtual teams.

The temporality of virtual teams concerns how the teams cross different spatial and temporal boundaries. As previously stipulated, virtual teams concern those groups where members are physically dispersed. Such spatial distribution often leads to accompanying temporal

distribution which can occur through two different ways. Firstly, spatial distribution can result from members working in different time zones. Working in different time zones often results in at least partly asynchronous communications which in turn create temporal distribution between team members. Secondly, spatial distribution can also be concentrated within a single time zone, but temporal dispersion can still occur if communication methods between members are asynchronous. (Bell & Kozlowski, 2002, p. 29.)

Since virtual teams can span across several boundaries, the second dimension of virtuality is the boundary spanning attribute of virtual teams. Virtual teams can cross cultural boundaries by integrating different cultural backgrounds into the team. They can also cross organizational boundaries if teams consist of members from different organizations. This is often the case when organizations outsource certain tasks. Virtual teams can also cross functional boundaries, when team members come from different functional departments of an organization. Project teams are one example where functional boundaries are often crossed. (Bell & Kozlowski, 2002, p. 31.)

A third dimension of virtuality is the team members' roles. Members can have several different roles within various virtual teams, or alternatively, team members can be part of only one, stable team with a single role (Bell & Kozlowski, 2002, p. 35). Lastly, the various lifecycles of virtual teams can be considered as the final dimension. Teams can be created as temporary work groups with a single task to resolve, they can be long-term teams that work together for an indefinite period of time, or they can be a hybrid between these two extremes (Bell & Kozlowski, 2002, p. 33).

When studying virtual teams, it is important to consider the variety of team compositions. As demonstrated here through the research of Bell and Kozlowski, the attributes of virtual teams are dynamic and multidimensional. The study of virtual teams needs to take this into consideration. This current study concentrates on permanent virtual teams crossing national and cultural boundaries.

2.2 Distance in organizational research

An underlying element when discussing virtual teams is the *distance* between team members. By definition virtual teams consist of geographically dispersed members. The dispersion of team members, which can be both spatial and temporal, creates a separation between colleagues, thus restricting face-to-face contact. Reduced contact in turn can result in weaker social ties between team members (Kotlarsky & Oshri, 2005, p. 39). The physical separation is also the reason that virtual team members use information media as their main communication method. As previously noted, spatial distance can also lead to temporal distance through inhibited synchronous communication (Bell & Kozlowski, 2002, p. 16). However, in addition to a physical distance, members of virtual teams can experience subjective forms of distance. These subjective perceptions of distance will be discussed in more detail next.

2.2.1 Literate versus metaphorical conceptualizations of distance

Distance is often discussed in terms of a physical, measurable span between two points. Particularly in virtual teams, studies have focused on the concept of physical distance (e.g. Kahya & Seneler, 2018; Hoegel & Prosepio, 2004; Hoegel, Ernst & Prosepio, 2007). However, in addition to distance as a physical, objective concept, some researchers have introduced abstract and metaphorical conceptualizations of distance. In such cases the concept of distance is used to imply dissimilarity between points of interest (Ambos & Håkanson, 2014, p. 1). In fact, some researchers (e.g. Zaheer, Schomaker, & Nachum, 2012, p. 20 & Nebus & Chai, 2014, 9) suggest that the majority of organizational studies have used the term distance in a far too superficial manner, that concepts such as psychic distance and cultural distance have focused too much on the "distance" part of the concepts and not enough on the metaphorical dissimilarity that is implied by the term.

However, the use of distance in order to imply dissimilarity is not without its critics. Some researchers argue, that this association between distance and dissimilarity is misleading. Zaheer and colleagues (2012, p. 20) claim that the comparison between distance and similarity or dissimilarity implies that faraway things are more dissimilar than nearby things, while this is clearly not always the case. They also suggest that the term psychic distance and how it has been used in literature implies that similarity is something to aspire to, when in fact some studies

show that dissimilarity can be more beneficial than the superficial similarity of group members. (Zaheer et al., 2012, p. 20.) Siebdrat and others (2014, pp. 774–775) also note the same when stating that objective distance does not automatically lead to experiences of reduced closeness and subjective distance. Shared values and beliefs are essential in determining closeness between members. Feelings of closeness between co-located members are more often the result of shared values, for example based on nationality (Siebdrat et al., 2014, pp. 774–775).

Contrary to the majority of researchers, who have assumed mainly negative implications of distance on virtual work, the research of Klitmøller and Lauring (2016, p. 278) suggests that distance (or dissimilarity) may also have positive effects on virtual work. They utilize Trope and Liebermann's (2010) construal-level theory (CLT) which considers people's constructions of mental conceptualizations of distant entities, such as memories. CLT proposes that people consider distant others by developing abstract mental images, or "construals" of them. The more physical and psychological distance increases, the more abstract these construals become. Psychological distance tells of a personal, subjective perception of something being distant or near-by to one's self. (Trope & Liberman, 2010, p. 440) According to Klitmøller and Lauring (2016, p. 278) CLT suggest that distance can also cause positive perceptions in employees. The authors suggest that distant individuals may construe situations more objectively at a distance , causing their perceptions to be more optimistic. (Klitmøller & Lauring, 2016, p. 283.) This suggests that distance can also impact virtual teams in positive ways. According to Magnusson and others (2014, p. 287), some research suggests that higher psychic distance between two countries may even result in better performance, because the managers will put additional effort into the collaboration, acknowledging the potential challenges brought on by the differences. Wilson, Boyer, Metiu and Jett (2008, p. 774) discuss two paradoxes experienced in dispersed work; "the paradox of close-but-far and the paradox of far-but-close", suggesting that objective distance does not automatically result in reduced feelings of closeness.

Terminology related to abstract concepts of distance have been used more commonly in other areas of international business. Concepts such as cultural distance, psychic distance and institutional distance have been mainly used to describe the challenges that organizations face in foreign trade, foreign direct investment, joint ventures and networks of organizations (Sousa & Bradley, 2006, p. 49); inter-organizational operations in general. However, these concepts have scarcely been applied to the intra-organizational context, such as virtual teams. One exception is Schomaker and Zaheer (2014), who have linked psychic distance to intra-

organizational knowledge transfer in their study of communication between geographically dispersed manufacturing units.

In terms of intra-organizational communication and collaboration, terms such as subjective distance and perceived distance have been utilized instead of psychic distance. Siebdrat and others (2014) utilize the definition brought forward by Wilson and colleagues (2008), of perceived proximity as a basis for their concept of subjective distance; “an individual’s perception of how close or how far another person is” (Siebdrat et al., 2014, pp. 768–770). Their results suggest that instead of objective distance between team members, team member’s national diversity is an important factor in team level subjective distance. Their results also propose that teams with a wider selection of nationalities will feel less close than those with a more homogenous selection of nationalities. (Siebdrat et al., 2014, p. 774) According to Wilson and colleagues (2008, p. 984), perceived proximity consists of two dimensions; a cognitive dimension and an affective dimension. While the cognitive dimension refers to one’s mental assessment of the distance between two members, the affective dimension refers to the non-conscious or non-rational feelings of closeness (Wilson et al., 2008, p. 984) .

2.2.2 Psychic distance

The metaphorical concept of distance utilized in this research is psychic distance. The term *psychic distance* was initially utilized by Beckerman in 1956 in their analysis of export patterns within Europe. While Beckerman does not define the term psychic distance explicitly, they introduce it to literature by implying that in addition to objective geographical distances, international trade decisions are made taking into consideration the psychic distance, the ease of doing business based on language, potential for personal contact, similar habits and so forth. (Beckerman, 1956, p. 38). This underlined the relevance of individual experiences and perceptions in organizational decision-making processes. After Beckerman introduced the term, the concept of psychic distance was adopted to the study of firm internationalization in the Uppsala School (Magnusson et al., 2014, p. 284). During this time, psychic distance was defined as “the sum of factors preventing the flow of information from and to the market. Examples are differences in language, education, business practices, culture and industrial development.” (Johanson & Vahlne, 1977, p. 24.) While the term was adopted by the Uppsala School, the concept lost its connection to individual perceptions, and was mostly considered an objective, country level concept, concentrating on cultural and institutional differences

(Håkanson et al., 2016, p. 309; Magnusson et al., 2014, p. 286). As a result of this, the use of psychic distance in research has been rather limited to topics concerning internationalization of firms. These studies mainly suggest, that the way firms enter new markets is directly related to the psychic distance between the origin and the target market and that firms often favour those markets to which they have a smaller psychic distance. (Magnusson et al., 2014; Sousa & Bradley, 2006, p. 50.)

In their quest to achieve clarity and an accepted definition for the concept of psychic distance, Sousa and Bradley (2005, p. 44) have gone back to the linguistic origins of the terms. The word *psychic* originates from Greek and refers to the "soul or mind". Hence psychic distance refers to the distance that "exists in the mind of the individual and depends on how the world is perceived". It is then the individual's perceptions of how similar or different they consider the other (country) to be, that creates psychic distance between the two (Sousa & Bradley, 2005, p. 44; Sousa & Bradley, 2006, p. 51). Since psychic distance concentrates on individual perceptions, the study of psychic distance should be conducted at the individual-level of analysis (Sousa & Bradley, 2006, p. 51). According to Magnusson and colleagues (Magnusson et al., 2014, p. 286), the psychic distance between two people is the result of their subjective perceptions of the differences in "business practices or the cultural, political, geographical and/or economic environments".

Sousa and Bradley (2006) compare and contrast the concepts of cultural distance and psychic distance. Both concepts describe a distance that exists between a home country and a foreign country. The difference between the two concepts is in the level of analysis. Psychic distance is based on an individual's perceptions of the world and the distance between home and a foreign country. Cultural distance however, refers to a higher level of analysis, concerning differences in the cultural values between countries. Therefore, while psychic distance should be studied at the individual level, cultural distance exists at the group-level. (Sousa & Bradley, 2006, pp. 51–52.) This important distinction separates the two concepts and at the same time establishes a connection between them. As culture influences individual perceptions, cultural distance affects psychic distance. (Sousa & Bradley, 2006, p. 53.) The distinction between the level of analysis is important in terms of organizational actions as well; since psychic distance is an individual level construct Sousa and Bradley (2006, p. 60) suggest that it can be influenced by actions on the individual level. This can be actions such as increased visits to the point of interest or cross-cultural training (Sousa & Bradley, 2006, p. 60). In general, these are actions

that are aimed at reducing uncertainty and creating familiarity by bridging the distance between the individuals.

Håkanson and Ambos (2010, p. 198) consider psychic distance to be created through environmental stimuli, more specifically it is based on the knowledge that a person possesses about the foreign country. Such knowledge may be affected by not only cultural, but historical and linguistic as well as other environmental factors. In fact, Child, Rodrigues and Frynas (2009, p. 202) suggest that past researchers using culture as the sole indicator of psychic distance are grossly oversimplifying the multifaceted concept of psychic distance. In terms of virtual teams, research has thus far considered cultural diversity and its effects on the team's performance (Magnusson et al., 2014, p. 285). However, studies have not considered individual team member's perceptions of their differences, even though these perceptions can play an important part in the communication and interaction of team members and may affect individual and group processes in virtual teams. (Magnusson et al., 2014, pp. 288–289.)

A recent study by Ambos, Leicht-Deobald and Leinemann (2019, p. 666) suggests, that an individual's perceptions of psychic distance are affected by the country-level economic, cultural, institutional and geographic differences. In addition to these macro-level factors, individual factors have also been seen to affect perceptions of psychic distance. Håkanson and Ambos (2010, p. 198) have suggested that psychic distance is influenced by personal factors, such as values, motivations and past experiences, while Ambos and others (Ambos et al., 2019, p. 666), link psychic distance perceptions to exposure and familiarity in relation to a common language. A common language not only makes communication easier, but it also increases familiarity between distanced individuals. In addition, it may provide access to improved cultural understanding and a wider understanding of the thought processes of distant others. (Ambos et al., 2019, p. 666.) This is related to the mere-exposure effect, also linked to psychic distance by Håkanson and colleagues (2016, p. 316). According to their study, exposure effects psychic distance perceptions, but that different means of exposure have a different impact. (Håkanson et al., 2016, p. 316). The mere-exposure effect also plays a part in explaining why psychic distance perceptions are often asymmetrical (Håkanson et al., 2016, p. 316) as individual's personal experiences and exposures to distant others mould their psychic distance perceptions.

Closely related to this is also Wilson's (2008, p. 985) discussion on how communication frequency and depth can impact the perceived proximity of distant others. Wilson suggests that frequent communication increases the cognitive salience of those distant from us. Distant others then come to mind more readily, hence reducing the perceived distance. Deep communication increases the cognitive elaboration of distant others, meaning that one is more easily able to imagine details about distant others. This in turn also increases the cognitive salience of those distant to us, and reduces perceived distance. (Wilson et al., 2008, p. 986.)

Some researchers have considered the term 'distance' problematic, due its associations with linearity and symmetry. Nebus and Chai (2014, p. 9) suggest a new model of psychic distance, where the term distance has been replaced by three dimensions; awareness, perceptions and understanding. By transforming psychic distance into a multi-dimensional concept, the authors claim to overcome some of these common, yet mistaken associations. (Nebus & Chai, 2014, p. 9.) Contrary to Nebus and Chai (2014), Håkanson and Ambos'(2010, p. 196) research suggests that geographical distance has a significant impact on the perceptions of psychic distance. Therefore, distance should not be completely separated from the concept of psychic distance.

In line with Magnusson and others (2014, p. 286), this study will follow the definition of psychic distance provided by Sousa and Bradley. In this view, psychic distance is the "Individual's perception of the differences between the home country and the foreign country" (Sousa & Bradley, 2006, p. 51). The study will therefore refer back to Beckerman's original definition of psychic distance in relation to individual perceptions where a person's perceptions are formed by a combination of various different factors.

2.2.3 Impacts of psychic distance

Distance in general, and in this case psychic distance, are often considered to result in negative implications on the interactions of individuals and organizations. International trade researchers often conclude that psychic distance can cause decision makers to avoid diversifying to those locations (Child et al., 2009, p. 200). As outlined previously, distance often refers to the differences between two objects. Differences between countries are construed negatively, as they can reduce trust and increase uncertainty between individuals. (Magnusson et al., 2014, p. 284.) High psychic distance has been connected with challenges in building working relationships with distant others (Sousa & Bradley, 2006, p. 62). As opposed to organizations

and decision makers, members of virtual teams often cannot choose their team members. However, communication and knowledge sharing within the organization is based on individual members' actions. Individual members then have a significant impact on how much interaction and contact they take with their distant colleagues. Therefore, one could speculate that a high amount of psychic distance could challenge the intrateam relationships within virtual teams. Perceptions of dissimilarity between team members can cause uncertainty and act as barriers to communication and interaction.

An opposing stream of research utilizing the concept of the "psychic distance paradox" has also emerged, claiming that in some cases increased psychic distance can lead to better results, as firms take more effort and care when venturing to countries with higher psychic distance. (Magnusson et al., 2014). The results of Magnusson and colleague's study (2014, p. 300) support the psychic distance paradox, where higher psychic distance leads to more effort in the part of the participants, and therefore improved performance. They also suggest, that the greater alertness that working with diverse people requires, might lead to a better and more careful evaluation of the situation, eliminating the effects of surprises. Hence the authors suggest that psychic distance may in fact have some positive ramifications. (Magnusson et al., 2014, p. 301.)

2.3 Knowledge Sharing in Organizations

There is a wide consensus among researchers that knowledge sharing has significant positive implications for organizational performance (e.g. Cummings, 2004, p. 360; Holste & Fields, 2010, p. 128; Wang & Noe, 2010, p. 117). The field of knowledge research is extensive, resulting in a multitude of terminologies and definitions. Terms such as knowledge management, knowledge transfer, and knowledge sharing have been utilized in organizational knowledge research, with varied definitions accompanying. Researchers have also proposed various definitions for the concept of knowledge. For the purpose of this paper, the definition of Wang and Noe (2010) will be utilized, as it combines various different aspects that knowledge researchers have proposed in terms of what constitutes knowledge. Therefore, knowledge is "information processed by individuals, including ideas, facts, expertise, and judgements relevant for individual, team, and organizational performance" (Wang & Noe, 2010, p. 117).

Knowledge management can be understood as the process by which data is converted into information which is further converted into knowledge (Georgiadou & Siakas, 2012, p. 574). Alavi and Tiwana (2002, p. 1030) have further extended the definition of knowledge management to consist of the creation, development as well as the utilization of knowledge in organizations. In their definition, knowledge management consists of three overlapping processes; knowledge creation, which occurs in social interaction within groups, knowledge codification, in which created knowledge is formalized and communicated, and lastly knowledge application, the exploitation of created knowledge. Knowledge application requires the integration of knowledge by combining multiple individual's knowledge into group-level knowledge. (Alavi & Tiwana, 2002, p. 1030.)

Researchers have approached the topics of knowledge movement and the development of knowledge in varying ways. Nonaka and Takeuchi (1995, p. 62) describe the development of organizational knowledge through knowledge conversion, which entails the interaction of tacit and explicit knowledge in order to create new knowledge. According to Nonaka and Takeuchi (1995), there are four modes of knowledge conversion. First, the process of socialization, where tacit knowledge is converted into tacit knowledge. Second, is the process of externalization, whereby tacit knowledge is converted into explicit knowledge. Third, is the process of combination, where explicit knowledge is sorted, added, combined and categorised into more explicit knowledge. Lastly, the process of internalization, where explicit knowledge is converted into tacit knowledge in the form of shared mental models and technical know-how. (Nonaka & Takeuchi, 1995, pp. 62–69.)

Wang and Noe (2010, p. 117) have approached organizational knowledge by differentiating between three different types of movement of knowledge; knowledge sharing, knowledge transfer and knowledge exchange. All of these concepts involve the exchange of information and know-how in order to facilitate the collaboration of problem solving, innovation or implementation of policies and procedures. Wang and Noe (2010, p. 117) consider knowledge sharing to be the movement of information and know-how from one organizational member to another in order to achieve the organization's objectives. Knowledge sharing can take place in-person or via different electronic or non-electronic means of communication. Knowledge exchange on the other hand considers both sharing and searching of knowledge. (Wang & Noe, 2010, p. 117.) This is rather close to the definition of knowledge sharing by Ellison, Gibbs and Weber (2015, p. 105), that describes knowledge sharing to be the exchange of "information,

advice or feedback" between individuals. According to Wang and Noe (2010, p. 117), knowledge transfer consists of both sharing and receiving of knowledge, but is often used in group-level analysis, rather than individual level analysis, like knowledge sharing and knowledge exchange. This comparison of definitions emphasizes the varied terminologies used to describe the movement of knowledge. This paper concerns the movement of knowledge between team members, and therefore will utilize the term knowledge sharing as defined by Wang and Noe (2010).

2.3.1 Knowledge sharing in virtual teams

Alavi and Tiwana (2002, p. 1032) describe four challenges virtual teams experience in relation to knowledge sharing. First, virtual teams experience challenges in developing a transactive memory. Transactive memory is related to individual team members' knowledge of who knows what in the team. It acts as a type of "directory" for knowledge within each individual's mind. The development of such a directory requires direct interaction between team members as well as observing the functioning of team members. Since virtual teams have limited direct interaction, they can have difficulties in forming a team-wide transactive memory system of who knows what. (Alavi & Tiwana, 2002, p. 1032) This can cause challenges to the collaboration of team members. Second, virtual teams experience challenges in the creation of a mutual understanding, or "common ground". This is the joint understanding between team members of what the others know and what they don't know. Like transactive memory systems, the development of mutual understanding requires interaction and joint problem-solving. (Alavi & Tiwana, 2002, p. 1033.) Third, virtual teams experience challenges in sharing and maintaining contextual knowledge. A shared contextual knowledge is usually created through shared experiences. Members of virtual teams that reside in various locations are deprived of the shared experiences of conducting their business together. Inability to share contextual knowledge can result in miscommunication and misunderstanding of each other's behaviour. (Alavi & Tiwana, 2002, p. 1034.) Last, virtual teams have challenges in creating strong ties between team members. Weak ties between team members can create challenges in sharing knowledge. The possibility of strengthening the ties in virtual teams is connected to the IT-resources and the possibilities that they provide in interacting with distant colleagues. (Alavi & Tiwana, 2002, p. 1035.)

Closely related to the creation of a mutual understanding between team members is the formation of a collective identity, discussed by Furst and colleagues (2004, p. 8). A team wide collective identity consists of a "shared commitment to a common goal" (Furst et al., 2004, p. 8). The existence of a collective identity is important as it helps team members to commit to the team. Particularly in virtual teams, where team members are dispersed, the team's collective identity binds the team members together and helps them resist local pressures when they are separated from their team mates. (Furst et al., 2004, p. 15) In a sense, the collective identity creates a feeling of belonging with the team. Alavi and Tiwana (2002, p. 1032) concur, that the knowledge a team possesses resides within individuals as teams do not have a unified mind. In order to create group-level knowledge and conduct effective team work, teams require an atmosphere that supports interpersonal interactions where joint application and problem solving can occur in order to integrate knowledge into group-level knowledge. (Alavi & Tiwana, 2002, p. 1032)

Sole and Edmondson (2002) suggest that virtual teams experience challenges in the creation, transfer and application of knowledge in relation to situated knowledge. Situated knowledge is knowledge based on ways of working in a specific location. This is also a type of collective knowledge that accumulates through shared work practices in the physical and social locales that team members work in. (Sole & Edmondson, 2002, pp. 18–20.) Situated knowledge has many similarities to Kotlarsky and Oshri's (2005) concept of collective knowledge. Both consist of unspoken, taken-for-granted knowledge that accumulates through practice. However, while collective knowledge is related to member's participation in tasks and rituals, situated knowledge is tied to practices in a specific locale. Both concepts can be related to virtual teams and the challenges experienced when team members are dispersed across multiple locations.

Some researchers have also discussed the positive implications of virtuality on knowledge sharing, perceiving virtuality as an advantage to teams. Qureshi, Fang, Haggerty, Compeau & Zhang's (2018) recent research contradicts the challenged situation of virtual teams emphasized by Alavi and Tiwana (2002). Qureshi and colleagues suggest that IT-mediated social interaction supports knowledge sharing between team members even more than face-to-face social interaction. This is because IT mediated communication leads to employees socializing with a more diverse and competent selection of colleagues. (Qureshi et al., 2018, p. 946.) Zakaria and others (2004, p. 17) note, that virtual teams can provide many potential benefits for organizations. The diversity of virtual teams can promote creativity and cohesion among team

members, members of virtual teams may be more accepting of innovative or different ideas. Such things can be an essential trait in creating a competitive advantage for global organizations. (Zakaria et al., 2004, p. 17.)

2.3.2 Significance of team member interaction

Based on Nonaka (1994, p. 23) and Curçeu (2008, p. 633), social interaction is one of the basic elements of knowledge sharing. Kauppila, Rajala and Jyrämä (2011, p. 398) even incorporate the element of interaction to their definition of knowledge, in which knowledge is described as "a practice or communal activity created jointly in social interactions within a given context, either through shared practices or in a community or communities of practice…". Nonaka (1994) notes that interaction is necessary in order to create and share knowledge and is particularly important in sharing experiences between team members, a process through which tacit knowledge is shared and created. Alavi and Tiwana (2002, p. 1032) add to this, by noting that frequent and easy interpersonal interactions are required in order to facilitate the integration and application of knowledge in organizations. Virtual teams operate under conditions where interaction between team members is limited. When team members meet rarely, or in some cases never, such can have negative implications on the knowledge sharing practices of these teams.

Both Zakaria and colleagues (2004, p. 18) and Baralou and Tsoukas (2015) discuss the interactive, dialogical element of knowledge within virtual teams. While Zakaria and colleagues (2004, p. 18) relate the communicative aspect of knowledge sharing to the communicators' cultural contexts, which impact on how the messages between the communicators are interpreted, Baralou and Tsoukas (2015) discuss the dialogical nature of knowledge creation in relation to the use of information technology as the main method of communication in virtual teams. Baralou and Tsoukas (2015, p. 610) find that knowledge creation emerges in organizations through three distinct dimensions; "dialogues with real others, quasi-dialogues with invisible others and quasi-dialogues with virtual artefacts". By quasi-dialogues, the authors refer to asynchronous dialogues between team members. Particularly the difference between face-to-face and virtual communication identified by Baralou and Tsoukas makes an interesting distinction in the communication methods. Face-to-face communication consist of dialogues with real others, where the communicators are exposed to all the information provided by their physical senses and psycho-emotional

reactions. (Baralou & Tsoukas, 2015, p. 610.) However, in quasi-dialogues with invisible others, communicators materialize through stand-alone details, such as voices, visual pictures or words on a screen. Through these details, individuals construct various realities. (Baralou & Tsoukas, 2015, p. 611). This is often the case in virtual teams, where team members may have not met face-to-face, so communicators construct mental images of their distant colleagues based on the details that they have gathered in communications with each other. Such images can be misleading, containing inaccurate information and can hinder knowledge sharing between team members.

Interaction is essential in developing a collective understanding of the expectations of the team and ways in which the tasks will be performed (Levesque et al., 2001, p. 136). In various streams of research this collective understanding has been referred to as common ground, knowledge convergence and as shared mental models (SMM) (Van den Bossche, Gijselaers, Segers, Woltjer, & Kirschner, 2011, p. 284). According to Maynard and Gilson (2014, p. 9), a virtual team must have two different levels of SMM. Team members must share an understanding of the team's tasks as well as an understanding of how the team operates (Maynard & Gilson, 2014, p. 9.) Mohamed and Dumville (2001, p. 93) and Levesque and colleagues (2001, p. 136) stress the role of group interaction in the development of shared mental models. Through interaction, team members can develop a shared understanding of their "goals, related tasks, work habits and patterns, as well as each member's expertise" (Levesque et al., 2001, p. 136). The interdependence of tasks within the team is one aspect, which may affect how the team interacts together, thus having an impact on the development of SMM (Levesque et al., 2001, p. 136).

In their research on SMM, Levesque and colleagues (2001) showed that as interaction decreased due to task differentiation, the development of SMM also suffered. Individuals completing interdepend tasks require a shared understanding of the tasks as well as how these tasks will be completed. Therefore, shared mental models are essential in teams where task interdependence is high. When task interdependence is high, individuals also interact more, supporting the development of SMM. (Levesque et al., 2001, p. 136.) According to Furst and colleagues (2004, p. 8) finding common ground is also essential in the creation of a collective team identity. A collective identity is constructed through team members interacting with each other and can involve the development of a shared language, jargon, symbols or logos that unite

the members of the team and remind them of each other and their objective. (Furst et al., 2004, p. 15.)

Even though interaction is an essential element in developing shared mental models, all types of interaction may not support such development. According to Maynard and Gilson (2014, p. 15), the development of the team's SMM may be affected by the types of technologies used for communication within the team, depending on how the interaction between individuals occurs via these technologies. Technologies that allow for multiple simultaneous conversations may cause distractions and thus inhibit an individual from processing detailed information in order to form SMM (Maynard & Gilson, 2014, p. 21). One example of such communication is the use of instant messaging. In such an application, an individual can have several conversations at the same time. The use of different communication methods simultaneously can also be distracting. For example the use of intrusive information technologies, such as instant messaging, can take attention away from other communication methods, such as e-mail and telephone. Members of virtual teams are constantly required to balance and alternate between different communication methods.

When knowledge is transferred between individuals, it becomes collective knowledge. Collective knowledge contains implicit information about the norms and shared meanings, and is gained through participation in the organization's "tasks and rituals". (Kotlarsky & Oshri, 2005, p. 39.) This suggests that such knowledge may be difficult to build in cases where team members have never even met and/or are located a great distance apart from each other both geographically and culturally, as is often the case in virtual teams. The circumstances of virtual teams often restrict the formation of a mutual understanding, which in turn constraints the communication between team members (Alavi & Tiwana, 2002, p. 1032). According to Ocker and Fjermestad (2000, p. 8), the quantity of communication is one key determinant in the performance of distributed teams. High-performing virtual teams were seen to communicate significantly more with their distant team members. In addition, these team members also spent time summarizing their work. Ocker and Fjermestad (2000, p. 8) studied the number of lines transmitted specifically, noting that high-performing virtual teams communicated more lines to their distant team members.

Frequent and close interactions between team members are also necessary in order to form strong social ties which can support knowledge sharing. The lack of strong ties, in turn, can

lead to an uneven sharing of knowledge and an asymmetrical accumulation of knowledge between team members. (Alavi & Tiwana, 2002, p. 1034.) Oshri and colleagues (2008, p. 594) divide the factors affecting knowledge sharing in virtual teams to two groups. Firstly, technology related factors, which they claim are critical but do not guarantee successful knowledge sharing by themselves. The second group of factors are human related factors, such as trust and interpersonal ties (Oshri et al., 2008, p. 1034). The development of both require a certain amount of interaction between members of the organization.

Kotlarsky and Oshri (2005, p. 39) have proposed social ties and knowledge sharing as important factors in creating successful collaboration within virtual teams. By interviewing members of virtual teams in two large companies, Kotlarsky and Oshri (2005) found that social ties are a considerable factor in the collaboration of virtual teams. Especially face-to-face meetings in the beginning stages were seen as an important way to build social ties between virtual team members through the formation of rapport and trust. (Kotlarsky & Oshri, 2005, p. 44.)

Another topic which has been linked to increased communication and interaction is the interpersonal similarity of individuals. Researchers have studied the effects of interpersonal similarity on the flow of information between people and groups of people. Makela, Kalla and Piekkari (2007, p. 7) differentiate between interpersonal similarity, which describes the alikeness of two people based on some characteristic and interpersonal homophily, which refers to the proneness of alike people interacting with one another. According to their study, interpersonal homophily is the result of interpersonal similarity in individual characteristics, similarity in national-cultural background, shared language and similarity of organizational status, among other factors. (Makela et al., 2007, p. 8)

Marschan-Piekkari, Welch and Welch (1999, p. 438) also suggest that interpersonal similarity through a shared language can act as a facilitator to communication, and that conversely barriers can be created between those outside of this language similarity. According to Zakaria and others (2004, p. 18) successful communication across cultures requires all parties to be able to deliver and receive messages in a way that makes them understandable in the other party's cultural context. If cultural contexts are not understood, messages passed between the two parties can lose their meaning and hence restrict knowledge sharing. However, it is important to note that the effects of cultural differences on knowledge sharing have received mixed results in past research. Klitmøller and Lauring (2013, p. 399) note that according to some research,

cultural differences may actually improve knowledge sharing instead of hindering it, as they provide a setting in which tacit, context related knowledge can be expressed explicitly quite comfortably. The differences in culture are reduced because involved individuals have an awareness for them. They are then able to take them into consideration in the communication and interaction, hence improving the flow of information between them. (Klitmøller & Lauring, 2013, p. 399.) Such results hint at a phenomenon similar to the psychic distance paradox.

Makela and colleagues (2007) suggest that interpersonal homophily leads to the clustering of individuals sharing alike characteristics. Information flows within clusters are more efficient, but more difficult between clusters and individuals outside of clusters. Therefore interpersonal homophily can also result in challenges and restrictions to knowledge flows within the organization. (Makela et al., 2007, p. 14.) Closely related to this is the discussion on interpersonal similarity based on demographic characteristics introduced by Lau and Murnighan (1998) in their theory on group faultlines. Faultlines create rifts between clusters of individuals based one or more attributes of the members, such as gender, age or race (Lau & Murnighan, 1998, p. 325). Based on this theory, similarity in demographic attributes can cause a group to divide into subgroups based on those attributes. Lau and Murnighan (2005, p. 655) have further suggested that faultlines based on demographic attributes may be most significant during the formation of the group and that after the group members familiarize with each other, faultlines may be re-created based on deeper characteristics and values of the team members.

Gruenfeld and others (1996) describe the difference between naturally formed groups and artificially formed groups. According to research, groups that form naturally often do so on the basis of members' similarity, proximity and prior acquaintanceship. In such cases, groups are non-diverse, and while similarity often aids in good communication and interaction, the information shared between the members is often redundant to the other members. On the other hand, groups formed artificially by joining diverse people together possess a more varied knowledge reserve. However, due to member dissimilarity, the group members themselves are not effective in recognizing and sharing the diverse knowledge that each individual possesses. (Gruenfeld et al., 1996, p. 1.) Gruenfeld (1996, p. 2) notes that researchers have often observed team members overemphasizing common knowledge, while underemphasizing diverse knowledge.

2.3.3 Significance of socialization and team lifecycle

In terms of the team's overall knowledge sharing capabilities, the team lifecycle and team members' socialization should also be considered. Both Oshri, Kotlarsky and Willcocks (2007, p. 26) and Ahuja and Galvin (2003) discuss the socialization process of virtual teams. According to Oshri and others (2007, p. 26), the socialization process refers to the ways in which individuals learn the "behaviours, attitudes and knowledge" required in order for them to take part in the organization. Through socialization team members learn how to collaborate and communicate together (Oshri et al., 2007, p. 26).

Ahuja and Galvin (2003, p. 162) suggest, that there may be two different socialization processes present in virtual teams; socialization of task-related context and socialization of social contexts. While the socialization of task-related contexts are fairly straight forward in virtual teams, it is the socialization of social contexts which cause challenges. Their research found that virtual communication methods were particularly ineffective in sharing knowledge about the tacit and sensitive team norms. The authors suggest that there are two different types of information exchange behaviours; information seeking and information providing, and that the length of employment determines which type of behaviour an individual will participate in. In traditional co-located teams, newcomers obtain information related to norms by observing their team members, but in virtual teams newcomers need to actively seek this type of information. (Ahuja & Galvin, 2003, p. 175.) In relation to the knowledge sharing power of socialization processes, an interesting find in Ahuja and Galvin's (2003, p. 175) research was that, contrary to expectations, more experienced employees were not significantly more active in providing information to their newer team members. This suggests that senior team members weight the costs and benefits of sharing information and consider the time utilized for information providing a "cost"(Ahuja & Galvin, 2003, p. 175).

Furst, Reeves, Rosen and Blackburn (2004) have investigated the challenges that virtual teams experience at different stages of development, reflecting on the team's overall lifecycle based on Tuckman's (2001) model. The model consists of four stages of team development; Forming, storming, norming and performing (Furst et al., 2004, p. 7). The first stage, forming, is important in the formation of trust and mutual expectations. Team members learn about each other and the tasks that they will conduct. In virtual teams, trust development is slower and due to reduced face-to-face communication team members acquainting with each other may take

more time and a risk for making misinterpretations and stereotyping others is greater. (Furst et al., 2004, p. 8.) In the second stage, storming, team members work through conflicts in order to agree on roles and responsibilities among themselves. In virtual teams, once again the developments are slower due to reduced interaction. Reduced face-to-face communication creates a risk of conflicts extending for longer periods. Due to this, working through conflicts in virtual teams can be more challenging than in traditional teams. (Furst et al., 2004, p. 9.) In the third stage, norming, team members negotiate and agree on the ways in which they will conduct their business, divide responsibilities and roles and the social ties between team members become stronger. At this stage, virtual teams may have particularly challenges in agreeing norms related to communication methods, speed and frequency of communication and agreement on what platforms to utilize. (Furst et al., 2004, p. 9.) Lastly, in the Performing-stage, team members work together, supporting and encouraging each other to complete the project. In this phase members of virtual teams may experience challenges in communicating with each other, have issues due to free-riders and pressure challenges due to local challenges that compete for team member's attention. (Furst et al., 2004, p. 10.) Furst and colleagues (Furst et al., 2004, p. 17) note that managerial interventions are a significant factor in the performance of virtual teams and managers have the possibility to intervene in order to assist the team in moving on to the next stage of development. In the case of interventions, timing of the intervention accordingly with the developmental stage is significant in successful team development. (Furst et al., 2004, p. 17.)

Due to the specific circumstances of permanent or long-term virtual teams, Oshri and others (2007, p. 40) suggest, that virtual teams need to re-socialize at some point during their lifecycle. As communication between remote team members occurs through virtual methods and the amount of communication may fluctuate, social ties may "fade away" (Oshri et al., 2007, p. 28). Based on their study of the socialization processes of three global virtual teams, Oshri and others suggest a framework for the socialization of virtual teams consisting of three stages. The first phase, *Introduction*, takes place when the virtual team is established or when a new team member is introduced. This initial stage includes introduction of the norms, attitudes and behaviours of the group, and the negotiation of processes related to work and communication. (Oshri et al., 2007, p. 42.) The second phase, the *Build-up*, consists of team members developing their socialization process through face-to-face meetings. During this stage the distant team members can further negotiate their work practices and communication processes, evaluating their meaning in terms of both the local and global organizational setting.

Meanwhile, interactions between team members assist in developing or refreshing the norms and attitudes related to their work. (Oshri et al., 2007, pp. 42–43.) The last phase, *Renewal*, refers to the re-socialization of team members. When virtual teams are in existence for lengthy periods of time, they need to reassess their communication and work-procedures every now and then through the renewal. This stage requires team members coming together and reflecting on their current situation in order to renegotiate their work and communication processes according to the present needs of the team. (Oshri et al., 2007, p. 43.)

2.4 Analytical Framework

Virtual teams operate dispersed across cultural, national and organizational boundaries. Most of the communication conducted by virtual teams occurs through the use of information media. Therefore, the face-to-face interactions between members of virtual teams are limited in comparison to traditional co-located teams,. (Bell & Kozlowski, 2002, p. 15.) Such an environment can create challenges to intra-team knowledge sharing (Alavi & Tiwana, 2002) due to limited interaction and communication of team members. Researchers by large agree that interpersonal interaction plays a significant role in enabling knowledge sharing between individuals (Alavi & Tiwana, 2002, p. 1032; Nonaka, 1994) and lack of interaction is also one of the reasons suggested for the challenges in knowledge sharing in virtual teams (Georgiadou & Siakas, 2012, p. 573). Reduced face-to-face contact and differing work contexts challenge virtual teams in sharing situated knowledge (Sole & Edmondson, 2002), in developing a transactive memory, in creating mutual understanding, in sharing contextual knowledge and in creating strong ties that help collaboration within the team. Interaction is also linked to the development of shared mental models, which are necessary in order for the team to function effectively together (Levesque et al., 2001). Knowledge sharing is a vast area, and these are only examples of some of the challenges that virtual teams experience.

In terms of interaction between team members, one area of interest in prior research has been interpersonal similarity as a facilitator for improved interaction. Similarity based on language or cultural background, for example, can lead to a better flow of information between team members (Makela et al., 2007, p. 14; Marschan-Piekkari et al., 1999, p. 438) and improved understanding between individuals (Zakaria et al., 2004, p. 18). Interaction between individuals can also be connected to the socialization of team members. Socialization is the process through

which individuals learn the rules of interacting together as a group (Oshri et al., 2007, p. 26). Ahuja and Galvin (2003, p. 26) introduce two different but simultaneous processes of socialization; task-related socialization and socialization to the social context of the organization. While knowledge sharing consists of both task-related knowledge and knowledge of the social context, it is particularly the knowledge related to social context which impacts the amount of interaction between team members. According to Oshri and colleagues (2007, p. 26), members of virtual teams negotiate the ways in which they communicate together as part of their socialization process. Furthermore, throughout the team's lifecycle, as team members leave and enter the team, teams need to re-establish their socialization and renegotiate the ways of collaborating together (Oshri et al., 2007, p. 26). Both interpersonal similarity and socialization can impact the level and depth of interaction within virtual teams and could therefore be linked to the knowledge sharing processes of virtual teams.

The objective of this study is to shed light on virtual teams' knowledge sharing by focusing on the role of psychic distance in the team's knowledge sharing practices. Psychic distance encompasses an individual's perceptions of their difference to others. Prior research has suggested that the psychic distance between two individuals is impacted by individual factors (Beckerman, 1956; Håkanson & Ambos, 2010; Sousa & Bradley, 2006), cultural and institutional factors (Ambos et al., 2019; Magnusson et al., 2014), environmental factors (Ambos et al., 2019; Håkanson & Ambos, 2010), social factors (Ambos et al., 2019; Håkanson et al., 2016; Nebus & Chai, 2014), geographical distance (Ambos et al., 2019; Håkanson & Ambos, 2010) as well as exposure and familiarity (Ambos et al., 2019, p. 666) with distant others. Based on this, the concept of psychic distance can be understood as a conceptualization of the complexity of how employee perceptions of distant others are formed. Utilizing the concept of psychic distance also encompasses an understanding of the asymmetry in perceptions between individuals (Håkanson et al., 2016). Psychic distance from team member A's perspective to team member B may be different than psychic distance from team member B's perspective to A, depending on the individual factors that have moulded these perceptions.

Table 1 summarizes the main theoretical concepts of this study, further dividing the main themes into sub-themes. Based on these previous findings, an analytical framework will be presented which describes how this research has approached the research topics.

Table 1 Summary of the main theoretical concepts and their sub-themes

Main Concept	Sub-theme	Reference
Psychic Distance	Perceptions of similarity or difference	(Sousa & Bradley, 2005) (Sousa & Bradley, 2006) (Magnusson et al., 2014)
	Individual (personal) factors	(Beckerman, 1956) (Sousa & Bradley, 2006) (Håkanson & Ambos, 2010)
	Cultural and institutional factors	(Magnusson et al., 2014) (Ambos et al., 2019)
	Environmental factors	(Håkanson & Ambos, 2010) (Ambos et al., 2019)
	Social factors (e.g. familiarity)	(Ambos et al., 2019) (Nebus & Chai, 2014) (Håkanson et al., 2016)(Nebus & Chai, 2014)
	Geographical distance	(Håkanson & Ambos, 2010) (Ambos et al., 2019)
	Mere-exposure effect	(Ambos et al., 2019)
Knowledge sharing	Interpersonal similarity	(Makela et al., 2007) (Marschan-Piekkari et al., 1999) (Lau & Murnighan, 1998) (Lau & Murnighan, 2005)
	Interaction as part of knowledge sharing	(Nonaka, 1994) (Alavi & Tiwana, 2002) (Curşeu et al., 2008) (Baralou & Tsoukas, 2015)
	Transactive memory systems	(Alavi & Tiwana, 2002) (Oshri et al., 2008)
	Collective identity	(Furst et al., 2004)
	Shared mental models	(Maynard & Gilson, 2014) (Van den Bossche et al., 2011) (Mohammed & Dumville, 2001) (Levesque et al., 2001)
	Situated knowledge	(Sole & Edmondson, 2002)
	Virtual team socialization	(Oshri et al., 2007) (Ahuja & Galvin, 2003)
	Virtual team lifecycle	(Furst et al., 2004)

Prior research has often connected the challenges that virtual teams experience in knowledge sharing to the physical separation of team members. However, this setting contributes to a superficial understanding of the situation, as it does not take into function the underlying social and psychological factors which are affected by the separation of team members. This research looks deeper into the interaction between team members, integrating the concept of psychic

distance to knowledge sharing in virtual teams. A visualization of the main concepts of this research can be found from **Figure 1**. The purpose of the visualization is to demonstrate the interlinking connections between the concepts discussed in this research and to provide a simplification of the analytical framework of this research paper.

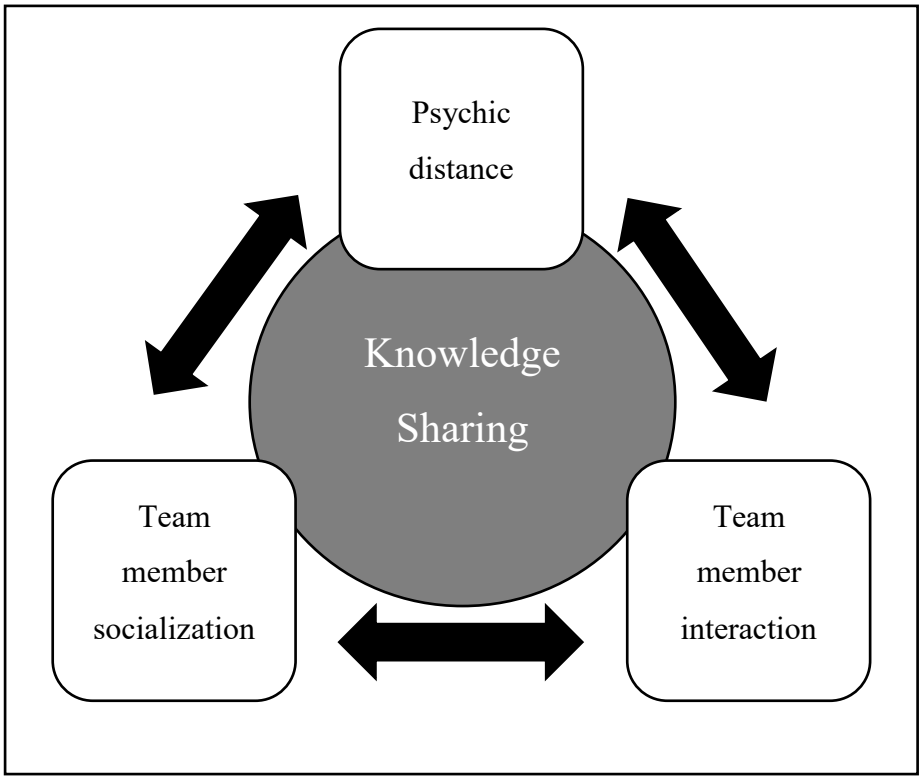

Figure 1 The main concepts of the research

In Figure 1, knowledge sharing is seen as a central function in virtual teams. Based on prior research, the processes of interaction and communication as well as team member socialization are important enablers of successful knowledge sharing between members of virtual teams. Interaction between team members is necessary in order to integrate individual-level knowledge into group-level knowledge (Alavi & Tiwana, 2002) and socialization is an on-going process in virtual teams in order to establish functioning ways of communicating and working together as a team (Oshri et al., 2007). A link between the two processes can also be observed. Interaction between team members is needed in order to advance team member socialization and vice versa; socialization processes are used to negotiate ways to interact and communicate together. However, affecting these two simultaneous processes is the existence of psychic distance between individual team members. According to research, psychic distance

or the perceived differences between oneself and others can challenge the formation of relationships between individuals. High psychic distance between individuals can make them weary of communication with each other, thus restricting interaction, socialization and other processes that require interpersonal relationships in organizations. As psychic distance is impacted by factors such as cultural distance, institutional distance and geographical distance, therefore virtual teams can be considered more susceptible to the impacts of psychic distance than traditional co-located teams. In addition the unfamiliarity of team members in virtual teams and the reduced exposure to the distant team members are both factors which could impact the perceptions of distant others. Both Baralou and Tsoukas (2015, p. 610) and Trope and Liberman (2010, p. 440) discuss the tendency of employees to create mental images of their colleagues based on the information they have, no matter how lacking in detail it is. In virtual teams the information about distant others is often lacking in detail, moulding the perceptions of distant colleagues. Therefore this research suggests that psychic distance restricts knowledge sharing in virtual teams by reducing communication and interaction and challenging the socialization processes of virtual teams.

The purpose of this research is to investigate the role of psychic distance in relation to the knowledge sharing practices of virtual teams. This will be done by conducting a case study of four virtual teams within an industrial organization. This research topic has been approached through two sub-questions. First, the research aims at describing and evaluating the challenges in knowledge sharing experienced by virtual teams. By understanding these challenges, possible connections between them and the existence of psychic distance could be analysed. This can assist in determining how psychic distance impacts knowledge sharing in virtual teams. Second, the research aims at investigating the role of psychic distance in relation to team member interaction and socialization processes of virtual teams. By analysing these relationships, it may be possible to determine whether psychic distance does in fact restrict knowledge sharing in virtual teams, and whether socialization impacts the level of psychic distance between individuals.

Prior research has established that psychic distance is an individual-level concept, and should therefore be studied at the individual level (Sousa & Bradley, 2006, p. 51). Thus the setting of this study concentrates on the individual team members, considering their personal experiences on knowledge sharing in virtual teams. Prior research has also established that both cultural and geographical distances play a large role in an individual's psychic distance perceptions (e.g.

Ambos et al., 2019). Therefore, in order to identify the presence of psychic distance between individuals, it is well-founded to consider contexts where cultural and geographical distance are high. In order to satisfy these requirements, the empirical results of this research have been collected from four teams with members located in Finland, India and China. It can be reasonably assumed that the cultural and geographical distance between these locations is significant, therefore emphasizing the appearance of psychic distance perceptions in individual team members.

3 METHODOLOGY

This chapter will describe and explain the methodology used for the research. The chapter will first explain why a qualitative case study approach was selected for this research. Secondly, a description will be given of the subject of the study, Company X, giving details and background on the organization and the selected teams. Third, the empirical data collection will be described, including justifications for the chosen methods. Fourth, the chapter will describe the process of data analysis, giving detailed explanations of how the empirical data was analysed. Lastly, limitations of the research will be outlined.

3.1 Qualitative approach

The focus of this research paper is to explore and understand the perceptions and experiences of individual virtual team members. This type of analysis is best conducted through a qualitative approach. Marschan-Piekkari and Welch (2004, p. 6) note that while qualitative methods are often still underrated in international business research, they do present many benefits. In exploratory research, where the objective of the study is to uncover new truths, qualitative research is often a more suitable option (Hirsjärvi, Remes, & Sajavaara, 2015, p. 161; Marschan-Piekkari & Welch, 2004, p. 6; Marshall & Rossman, 1999, p. 60). Qualitative methods are also often better when there is a need to take into consideration deeper underlying factors, such as cultural and social considerations. Specifically researchers may obtain more accurate results through qualitative interviews when taking into consideration cultural considerations that can affect trust and relationships. (Marschan-Piekkari & Welch, 2004, pp. 6–8.)

Qualitative research methods also help to obtain information about complex issues (Marschan-Piekkari & Welch, 2004, p. 8) and to develop a comprehensive understanding of the interviewee's experiences and perceptions of a particular phenomenon (Marshall & Rossman, 1999, p. 60.) Since the objective of this research is to understand individual subjective perceptions of distance and knowledge sharing in virtual teams, a qualitative approach is most suitable. As the teams included in this study consisted of members from various countries and

cultural backgrounds, qualitative methods allow for the needed flexibility in order to obtain richer and more detailed empirical evidence.

The study has been conducted as a case study of four teams within a single department of an organization. Yin (2009, p. 18) describes the definition of a case study in terms of the scope of the research, explaining that a case study concentrates on a "contemporary phenomenon in depth and within its real-life context…". The contemporary phenomenon in this research is virtual teams, and the study concentrates on the knowledge sharing processes and the impacts of psychic distance on those processes. Yin continues the definition "…especially when the boundaries between the phenomenon and context are not clearly evident". Such is the issue with psychic distance and its significance in terms of virtual team knowledge sharing.

Conducting the research as a case study of a single organization is justified, as the objective is to evaluate the significance of psychic distance in relation to the knowledge sharing of virtual teams. According to Marschan-Piekkari and Welch (2004, pp. 109–124) single cases should be used when the objective of the research is to "confirm, challenge or extend" an established theory. In this case, the research aims at extending the theory of psychic distance to virtual teams and evaluating its significance. A single case approach will allow for a more in depth study of the phenomena in question (Gerring, 2007, p. 37; Yin, 2009, p. 4). In this particular case, a single case approach will allow for a deeper understanding of the individual perceptions within the organization, since the objective of the research is to focus on individual team member's perceptions. The study of teams within a single organization also allows to exclude the impacts of differing organizational cultures and dynamics, to an extent. If the research included teams from various organizations, it would be difficult to exclude or identify the impacts of organizational differences. This is particularly important because the focus of the research is on psychic distance, which consists of an individual team member's perception of dissimilarity with their distant colleagues.

By interviewing team members and managers of virtual teams, the study approaches the topic of knowledge sharing in virtual teams through individual level of analysis. This level of analysis has been chosen in order to provide a view of the perceptions and experiences of individuals within the organization. Doing so, allows us to consider the underlying reasons for individual members practices and activities, and how they impact the team as a whole. Mäkelä and Brewster (2009, p. 592) support this, by noting that "people's ability to create, retain and

transfer knowledge is based on individuals". Furthermore, studying psychic distance requires an individual level of analysis, as it refers to the individuals subjective perceptions of distant others. (Sousa & Bradley, 2006, pp. 51–52). For this reason, the study has been conducted by interviewing team members and managers of virtual teams

3.2 Subject of the study – Company X

The study has been conducted by interviewing some of the team members and managers of four different virtual teams within one department of a multinational organization, Company X (pseudonym used). Company X is a multinational industrial organization with operations in more than 60 countries around the globe. The company provides both products and services in the industrial sector. The four teams selected for the study are all part of one department within Company X. All four teams consisted of team members based in three locations; Finland, India and China. Company X originates from Finland, and team members located in Finland generally have a longer work history with the company. Some have been employed at various positions in the organization for decades. Offices in China and India have been established more recently, during the past decade, and the team members based in those locations generally have a slightly shorter work history with the company. The use of virtual teams has become a norm in the organization, providing cost-savings, better access to multiple markets and global expertise.

The teams selected for the study are at various stages in their lifecycle. Three of the teams have been in operation for several years, while one team is newly formed, a result of a recent operational restructuring within the organization. All of the teams operate on a permanent basis. The teams have also various amounts of experience in virtuality, with two of the teams having more than ten years of experience in operating virtually, while the other two teams have adopted virtual work more recently. Studying teams in different stages of their lifecycle allows a deeper understanding of communication between members can develop within the team. It also allows for a comparison of the perceptions of employees between more established and experienced teams and the newer and less experienced virtual teams.

All four teams involved in the study are structured in a similar fashion; The team manager, leading the whole team, is located in Finland. Team members in China and India, have their

own respective local team leaders, but overall responsibility for team's performance is with the team managers based in Finland. In some teams, the local team leaders may have subordinates in multiple teams, so team leaders in distant locations often operate multifunctionally with several different teams. Team members are usually part of only one team, with the exception of one interviewed member who was operating with a dual team membership.

Communication within the teams can be described as "multimodal" and "polysynchronous", since it occurs through different modes of virtual and face-to-face interactions and different levels of synchronicity are present simultaneously (Baralou & Tsoukas, 2015, p. 595). Team members communicate via e-mail, Skype (both instant messaging and call-function), Microsoft Teams application, telephone and via organization-specific tools. Recently the organization has started to transfer to the use of Microsoft Teams, an application which will replace the current functions of Skype in the future and which also brings new functions available for the team members. The application offers various functions from instant messages, calls, and group information sharing through a social media type setting.

Table 2 shows an evaluation of the main communication methods used by employees of Company X in communicating with their virtual team members. Communication and interaction within virtual teams is heavily reliant on the use of ICT. Different methods of communication have different attributes which affect their usability and how communicators are able to interact with each other. Baralou and Tsoukas (2015, p. 598) describe the ICT used in organizational dialogue on three dimensions: synchronicity, rehearsability, and reprocessability. Synchronicity refers to how well communicators are able to communicate simultaneously. Rehearsability refers to how well the communicators are able to rehearse or polish the message before transmitting it to the receiver. Reprocessability refers to how well the communicators are able to reprocess or reuse the message. (Baralou & Tsoukas, 2015, p. 598.) The evaluation in table 2 is based on a synthesis by Baralou and Tsoukas (2015, p. 599), and it gives an indication of the different aspects of the communication methods.

In terms of synchronicity, e-mails are evaluated to be the least synchronous, while audio communication is seen as the most synchronous. In terms of rehearsability, audio communication is seen least rehearsible, because the communicators have very little opportunities to practice or fine-tune the message. E-mails on the contrary, provide the communicator with ample opportunities to alter the message before dispatch. Lastly, in terms

of reprocessability, audio communication is seen as low, while e-mail is seen as high. Information passed on through e-mails are easy to forward and utilize in future communications. Instant messages are in the middle of the other two communication methods for the most part. The use of instant messages also varies between people, and while some use it as a synchronous means of communication, it can also be modified to be used more asynchronously, much like an e-mail message.

Table 2 The characteristics of the communication methods used in Company X

	Synchronicity	**Rehearsability**	**Reprocessability**
E-mail	Low	Medium-High	High
Instant message	Medium-High	Medium	Medium
Audio (Skype/Phone)	High	Low	Low

(Modified from Baralou & Tsoukas, 2015, p. 599)

The selected teams all have members in three locations; Finland, China and India. In comparing the experiences of team members, utilising only a selected amount of different cultural backgrounds in the study helps to get a deeper understanding of the member's experiences. It also allows the consideration of cultural factors as part of the process, when interviewees comprise of multiple members of the same cultural background. Being able to separate cultural differences between team member's experiences, also allows for a closer understanding of individual differences between team members.

Since all teams within this study exist within the same organization and the same department, they are mostly exposed to similar organizational pressures. Cultural differences between different nationalities should be downplayed due to the common organizational culture. This will allow for a more fine-grained understanding of the perceptions of members of virtual teams. For example, most recently all organizational members have undergone the same cultural awareness courses, which were organized by the department during the month of May 2019. All parties have also the access to the same tools of communication, which will allow comparisons to be made in terms of perceptions, preferences and habits.

3.3 Data collection

The primary method of data collection for this study was interviews with the members and managers of the selected virtual teams. Interviews were chosen as the main method of data collection because of their suitability with the research topic and the research questions. This study considers individual team members as the subject of the study, because the purpose is to understand individual experiences and perceptions. For this purpose, interviews are a suitable method of collecting empirical evidence, as they allow the researcher to learn about the thoughts, feelings, experiences and beliefs of the informants. Furthermore, interviews allow to deepen the interviewer's understanding by asking additional questions and explanations based on the interviewee's answers. (Hirsjärvi et al., 2015, p. 205.)

Interview methods can normally be divided into three main categories; structured interviews, theme (semi-structured) interviews and open (in-depth) interviews (Hirsjärvi et al., 2015, p. 208). For the purpose of understanding subjective views of team members, a structured survey would be unsuitable, because it does not allow for the needed flexibility in conducting the interviews and picking-up topics based on the interviewee's responses (Hirsjärvi et al., 2015, p. 209). In semi-structured interviews, topics can be covered systematically and comprehensively, while still maintaining an atmosphere of informality (Eriksson & Kovalainen, 2008, p. 82). Yin (2009, p. 107) identifies such an interview as a "focused interview". Like with in-depth interviews, focused interviews too can be conversational and open, but they are shorter and more concise than in-depth interviews. Unlike in-depth interviews, which operate without a clear interview questions, focused interviews are conducted with a set of questions that guide the interview. (Yin, 2009, p. 17.)

Yin (2009, p. 106) suggests that case-study interviews be conducted conversationally, where the interviewer will guide the interviewee but also allows for flexibility and fluidity while still conforming to the original line of inquiry. Accordingly, this research was conducted as a semi-structured interview, where the interview guide consisted of open questions to which the interviewee was asked to elaborate on, and to describe their own experiences. The interview guide was constructed based on the main themes of the literature review. In order to gain the trust of the interviewees, and obtain a more reliable understanding of their perceptions, the interview guide has been constructed as a flexible base that can be adjusted during the interview

process according to the respondent's answers. A flexible interview guide facilitated the informal atmosphere during the interview session. Furthermore, this allowed for changes in the order of the questions, in order to facilitate a logical advancement during the interview situation. (Kallio, Pietilä, Johnson, & Kangasniemi, 2016, p. 2960.) Thorough follow-up questions were planned in order to ensure that the necessary information was obtained in those cases where the interviewee was unable to elaborate on the topics independently. These follow-up questions were employed by the interviewer on a need-to basis, in order to obtain in-depth comments from the interviewees, in those cases where their elaborations were deemed insufficient by the interviewer. Such an approach is supported by Eriksson and Kovalainen (2008, p. 82) and Kallio and colleagues (2016, p. 2960).

The semi-structured interview guide was constructed based on prior research on virtual teams and knowledge sharing processes in virtual teams. According to Kallio and colleagues (2016, p. 2959), using previous knowledge from a literature is a valid and often used method of constructing the interview guide for semi-structured interviews. After the first interviews, the interview guide was slightly modified by adding a few more topics which seemed relevant based on the first interviews. These topics included discussions on team meetings with the virtual teams, and a general question about the benefits and challenges experienced by the interviewees in their virtual teams. Detailed interview guides can be found from the appendices. Interviews were conducted during the months of May and June of the year 2019. In total, 17 interviews were conducted. A summary of the interview details can be found from **Table 3**.

Interviews were conducted on fourteen members of virtual teams, two team leaders and one higher level manager. While the study concentrates on the perceptions of members of virtual teams, interviews with managers and team leaders were necessary in order to obtain a complete understanding of the choices and arrangements within the organizational structure. Interviews lasted from 20 to 70 minutes, creating a total of 574 minutes of taped interviews. All interviews were recorded and transcribed verbatim, approximately 1-3 days after the interview was conducted. The interviews resulted in 116 pages of transcribed text (font Times New Roman 12 pt with line spacing of 1). Interviews with team members in Finland were conducted face-to-face at Company X's offices. Interviews with team members in distant locations (China and India) were conducted via the Skype call-function. The team members were of various nationalities, and interviews with Finnish nationals were conducted in Finnish language, while

interviews with other nationalities were conducted in English. In total, six of the interviews were conducted in Finnish and the remaining eleven interviews were conducted in English.

Table 3 Details of the interviews

Team	Role	Language	Length of interview (min)	Interview method	Location of interviewee
A	Team member	Finnish	33	Face to face	Finland
A	Team member	Finnish	69	Face to face	Finland
A	Team member	English	23	Skype	India
A	Team member	English	21	Skype	India
B	Team member	English	37	Face to face	Finland
B	Team member	Finnish	20	Face to face	Finland
B	Team member	English	24	Skype	India
B	Team member	English	28	Skype	India
C	Team member	English	42	Face to face	Finland
C	Team member	English	20	Skype	India
D	Team member	English	23	Skype	China
D	Team member	Finnish	67	Face to face	Finland
D	Team member	English	27	Skype	India
D	Team member	Finnish	31	Face to face	Finland
N/A	Team leader	English	32	Skype	India
N/A	Team leader	Finnish	44	Face to face	Finland
N/A	Manager	English	33	Face to face	Finland

3.4 Methods of analysis

The process of analysing qualitative data often advances through stages, deepening the quality of the analysis step-by-step throughout this process. As the interview data was transcribed verbatim, initial stages of the analysis were conducted during the transcription process. Transcriptions were uploaded to the ATLAS.ti software upon completion. According to Marshall and Rossman (1999, p. 153) these initial stages of data analysis consist of the researcher familiarizing themselves with the empirical data by going through the transcriptions multiple times. Koskinen, Alasuutari and Peltonen (2005, p. 231) also stress the importance of the researcher's familiarity with the data, achieved by multiple readings of the interview transcripts. Transcribing the interviews verbatim, allows the researcher to begin familiarizing with the interview data already during the process of transcription. Conducting the

transcriptions immediately after the interviews improved their accuracy and allowed the interviewer to add observations made during the interviews into the transcripts. Because the interview data was added to the ATLAS.ti software, this allowed for marking and organizing of the initial observations.

The analysis of the interview data was conducted by making use of the Gioia methodology, introduced by Gioia, Corley and Hamilton (2013). The Gioia methodology aims at not only assisting in the analysis of qualitative data, but also in making the analysis more explicit for the readers. In such, the methodology helps qualitative research in achieving validity and transparency of the thought processes and the chains of reasoning behind the inferences made in the research. This transparency is pursued through different stages of analysis, represented in a visual form. The methodology is based around the analysis of human behaviour in organizations through the use of the informants own experiences. These experiences are brought forward prominently in the data analysis. (Gioia et al., 2013, p. 3.) Such is also done in this research, by presenting the empirical data through the informants' personal comments. The Gioia methodology utilizes different levels of analysis from first-order analysis to second order themes and finally to second order aggregate dimensions (Gioia et al., 2013, p. 6). This step-by-step advancement in the analysis process is quite similar to the suggestions of King and Horrocks (2010), as they propose to progress through the analysis through three stages; descriptive coding, interpretive coding and identifying overarching themes.

In this research, the initial coding was conducting through the use of the ATLAS.ti software. By reading over the interview data multiple times, significant topics in relation to knowledge sharing in virtual teams were identified. These consisted of experiences and challenges of knowledge sharing described by the interviewees, as well as their descriptions of the practices and habits in communicating with their distant colleagues. This initial stage of analysis resulted in a significant amount of superficial data and notes about the interviews. The next stage was to advance in the analysis by identifying themes (Gioia et al., 2013, p. 6) and meanings behind the initially highlighted codes (King & Horrocks, 2010). This was done by clustering or grouping the first-level codes in the ATLAS.ti software, allowing codes to be viewed one by one and the grouping of codes further into larger categories. During this phase, interviewee's observations and experiences of knowledge sharing were grouped into similar clusters. While this was done, connections between the theory and the empirical data were also drawn. This allowed the data analysis to progress from superficial observations to a deeper level of analysis.

Lastly, the analysis of the data progressed to connecting the second order themes into aggregate dimensions (Gioia et al., 2013, p. 6) or overarching themes (King & Horrocks, 2010). This required making inferences between the results and the possible existence of psychic distance in the interview data. According to King and Horrocks (2010, p. 150) themes are "recurrent and distinctive features of participants' accounts, characterising particular perceptions and/or experiences, which the researcher sees as relevant to the research question". The themes that emerged from the interview data were related to the knowledge sharing experiences of the team members. These themes were then mirrored to the literature on psychic distance, in order to identify the significance of psychic distance in the team member's experiences. During the analysis process, a data structure was created based on the Gioia methodology (Gioia et al., 2013), showing the development of the empirical data into deeper level themes. The data structure has been broken down into individual themes which are presented in Chapter 4 of the study. The broken down data structures act as a visual representation of the inferences and conclusions drawn from the interview results (Gioia et al., 2013, p. 6).

3.5 Limitations of the methodology

The main limitations concerning this methodology are related to the interviews conducted with distant interviewees. Interviews with team members located in Finland were conducted face-to-face. This made it easier to create an informal atmosphere with the interviewee and achieve a level of trust where the interviewees were willing to share their personal experiences. Interviews with team members located in China and India had to be conducted via Skype interview, due to the financial and time constraints of the research study. Because of the different interview methods, it is possible that differences exist in the empirical results based on the quality of the interaction between the participant and the interviewer. Marschan-Piekkari and Welch (2004, p. 13) note, that the results of personal interviews are heavily impacted by the interviewer. Particularly the interviewer's prior understanding can cause the interviewer to reflect their own thoughts and frames in the interview situation (Marschan-Piekkari & Welch, 2004, p. 13). In attempting to limit this, the research questions of this study were constructed as open as possible to allow the interviewee an opportunity to share their experiences Furthermore, as Marschan-Piekkari and Welch (2004) and Makela and others (2007) concur, the researcher always plays an instrumental part of the qualitative data collection and the social context under study.

The current study interviewed 2-4 team members from each of the four virtual teams. The study could have further benefited from interviewing the entire team and narrowing the study to fewer teams. However, by interviewing a select few members from each team, the research was able to include four teams, which gives a valuable understanding of the different lifecycle phases of the teams, and how this might affect the perceptions of the team members.

In terms of the language used, the interviewer is fluent in both Finnish and English languages, which is why interviews were conducted in these two languages, based on the preference of the interviewees. Such a process was decided in order to allow the interviewee in selecting their strongest language. However, potential limitations may exist in the interpretation of meanings from some of the interviewees. As Wilson (2004, p. 426) notes, “Standard English as spoken in India and the UK are not identical”. There may be differences in the associations and interpretations related to specific terminologies, which may be missed by someone who is not familiar with them. In addition to linguistic issues, King and Horrocks (2010, p. 149) remind that in interview studies the technical terminology and professional jargon used by the interviewees may be a challenge. However, it is important to note that the researcher of the study has a background with the organization selected for the study and is therefore familiar with most of the technical and organizational jargon presented in the interviews.

4 TEAM MEMBER EXPERIENCES OF SHARING KNOWELDGE IN VIRTUAL TEAMS

This chapter will describe results of the empirical data collected through semi-structured interviews at Company X from members and team leaders of virtual teams. The results focus on the virtual teams members' perceptions and experiences of knowledge sharing within the team. Through the interviews, four themes emerged concerning knowledge sharing within the teams. These themes were the variances in communication habits of team members, the creation of a collective identity through team level interaction, the challenges related to the socialization of distant newcomers and finally, differences in the communication and socialization of team members depending on the age of the team, reflecting the different stages of a team's lifecycle. These results will be discussed in more detail in this chapter. With each theme, a section of the data structure discussed in Chapter 3 will be presented. The data structures provide a visual aid of the results and summarise how the data results have led to the conclusions made during the analysis

4.1 Variance in communication habits

During the interviews, team members described the ways in which they typically share information with their colleagues. The descriptions show variances in team members' communication habits particularly in terms of the selection of the communication media. Members of virtual teams utilized three different communication mediums; audio communication by phone or Skype (both referred to in the text as "audio communication"), written communication through instant messaging (IM) and written communication through e-mails. It is possible to consider these communication methods by comparing their level of synchronicity. From these three methods, audio communication can be considered most synchronous, as it provides an opportunity for simultaneous communication. Instant messaging has the opportunity to provide almost simultaneous communication and instant feedback, but whether it is utilized as such is determined by the users themselves. It can also be utilized asynchronously, much like e-mails and text messages.

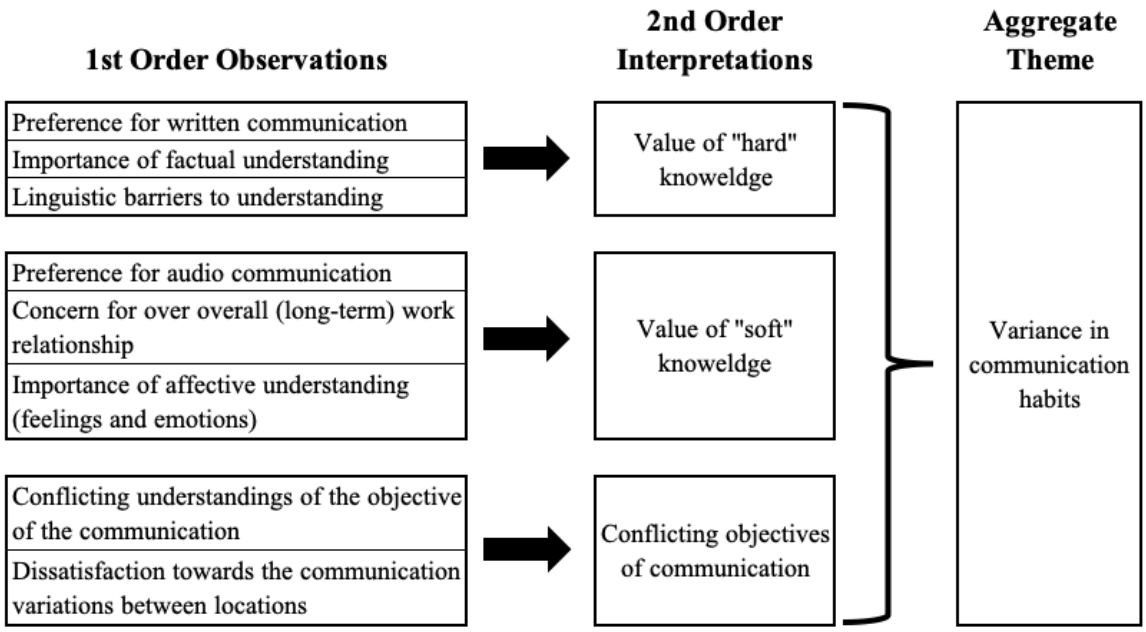

Figure 2 Data structure: Variance in communication habits.

Through the interviews, some variances in communication preferences can be distinguished between the different locations. These variances have been summarized in the data structure presented in **Figure 2**. While these variances are not straight forward or absolute, they may provide a clue as to the reasons behind the varying preferences. Many of the interviewees based in Finland described written communication (e-mail and IM) as their preferred method of communication with distant colleagues, while interviewees in India often considered audio-communication most preferred when communicating with colleagues in Finland, and e-mail when communicating with colleagues in China. Team members in China were noted to utilize e-mail above all other communication methods when communicating with their distant colleagues. The comments given by the interviewees in relation to their communication habits, gave clues of the underlying values and preferences that affected the communication within the team. Describing their communication methods, many interviewees highlighted the importance of ensuring full understanding of the communicated topic. Interviewees described how they select the communication method as a way to ensure that the recipient of the information receives all that is necessary to comprehend the topic. However, team members had varying perceptions of what it meant to *fully understand* something. One distinctive difference in the interviewee's explanation was the value of exact information, i.e. "hard information" versus the value of affective, emotional information, i.e. "soft information".

4.1.1 Value of "hard" knowledge

Two interviewees based in Finland describe how they communicate with their distant colleagues. Both describe their preferences in using written forms of communication to share information with their distant team members. While neither of the interviewees rejects the advantages of audio communication, neither acknowledges it as a preferred choice of communication with distant colleagues either.

> *"No I don't call them, so it's mainly just e-mail and skype [IM] with them [distant team mates]. But yea, why couldn't I call them too."*

> *"For me it's a bit like, I just want to use Skype [IM], but I guess a call is good sometimes, and then you can handle several things somehow easier."*

Both interviewees acknowledge audio communication as a possibility, yet their comments clearly indicate their reservation towards it. One reason for the reluctance to use audio communication with distant team members may stem from challenges in understanding their distant colleague's dialect, described by the other interviewee.

> *"The Indians speak fast, and the Chinese speak quietly. It's not really, it's a bit unclear[…]Now when I was there with the Indians, so they really do have quite a fast way of speaking, and probably they even take it down a notch, when Finnish people are visiting, but still, for my ear it's a bit, English is probably not, FOR EITHER party, so good, so you always have to ask like 'what do you mean' and 'can you repeat that', and then through Skype [Audio], well, it's even more often that you have to ask like 'what did you say' and you are sort of left with this uncertain feeling that did I hear them right, but I don't feel like I want to ask them again for the fifth time."*

As the interviewee describes, there are linguistic challenges in communicating with their distant colleagues. The interviewee describes the uncertainty that is present in audio discussions, as the distant team members have difficulty in understanding each other. They may be concerned that critical information is lost in verbal communication due to differences in dialect and terminology. These challenges are emphasized in face-to-face and audio communication and can be one reason why the Finnish team members prefer to utilize written forms of communication. Written communication provides a level of certainty and clarity. One could also construe, that this preference for written forms of communication in order to reduce uncertainty, is a sign of the type of knowledge that is most valued by the Finnish interviewees; factual, "hard knowledge". Written forms of communication allow for detailed descriptions and facts, and due to the traceability of e-mails and instant messages, they offer a possibility to refer to the information at a later time or pass on information unchanged. E-mails and IM's have a

higher reprocessability and rehearsability (Baralou & Tsoukas, 2015, 599) than audio communication.

In addition to challenges of achieving mutual understanding of the facts through audio communication, the interviewee refers to the potential uncomfortable social situations that misunderstandings and repeated clarification between team members can cause. Another team member gives a similar description of the linguistic challenges of communicating with their colleagues in teleconference meetings.

> *"We don't understand it [distant colleagues spoken explanations]. So when it starts from over there [points to the meeting room microphone], I don't DARE to, I have always thought that damn it, should I say 'hey, speak slower', but we never said it, and the accent and everything, so it's really, really difficult. And I have always thought that it's just me, but now I have noticed since we have had these meetings […]so the others don't understand either. We look at each other here, and then we are like (makes a confused expression), and then I say 'okay' [interviewee laughs] and then. So that happens really often. So it's really like, I have sometimes wondered whether they understand us better, but it sounds like they understand us because they start explaining things straight away"*

As such, one can see from both interviewees comments that they restrict the use of audio communication with their colleagues, in order to reduce the challenges related not only to accurate transfer of information, but also to reduce the challenges related to social interactions with distant team members. These comments show, that a number of factors affect the chosen method of communication within virtual teams. Perhaps even more so, than with co-located teams. This affects how and what information is shared between the team members.

4.1.2 Value of "soft" knowledge

On an opposing perspective, some team members described audio communication as the best method to communicate with their distant team members. These interviewees described audio communication particularly useful in obtaining a deeper understanding of the communicated topic, through the use of follow-up questions and social cues of the receiver. India-based interviewees often described audio as their preferred method of communication. An India-based interviewee describes how they prefer to communicate with their distant colleagues.

> *"Yea, I speak directly to them. Like here in one conversation we have discussion in one monthly meeting, so I will call in skype only, so we can speak directly, it means they can understand what I'm expecting about a delivery. But whereas, sending a mail is not the correct way, so I prefer always skype call."*

The interviewee's experience is that audio communication provides a superior way to achieve mutual understanding between the communicators. They consider audio communication as more "direct", allowing them to share more extensive amounts of information. In addition to achieving a mutual understanding of the topic, audio communication was seen as a superior way to capture information about the counterpart's emotional state in reference to the topic being discussed. Another interviewee, also from India, noted that audio communication helps to sense social cues and to interpret the mood of their distant colleagues. They compare it to the communication with their co-located colleagues, noting that audio communication is the next-best alternative to face-to-face communication, allowing for an easier transfer of affective information.

> *"In the message we cannot grasp the mood of the other virtually, with the other side, we can just, in what mood they'll be, we cannot able to find. So in [India] we will sit together, so obviously we are able to find what mood the, we can ask them. Likewise, so if it is in skype [IM] we may not know how he is feeling in the other side, and so, obviously there will be quiet, some, if it is in call, means it will be better than the messaging."*

The interviewee feels that audio communication allows them to understand the emotional state of their colleagues better. Written forms of communication allow for very little, if any clues of the counterpart's feelings and emotions, unless explicitly stated in the text. While audio communication without the use of video does not allow for facial and other visual cues, it does provide an understanding of the tone of voice and the manner of speaking of the counterpart, giving an indication of their affective state. Audio communication can also give additional valuable information for example about the formality of the situation.

Similar social aspects are conveyed by another interviewee, also related to communication with distant others. While some interviewees felt that audio communication was a challenge due to the language issues, this interviewee describes how they prefer audio communication for this very same reason.

> *"English, it's the kind of second language, not mother tongue anyway. We have to think in good sense. Maybe he didn't feel it… and… and especially if you can call them, it will help, because your tone, make them feel it's not so big deal, or not so serious problem."*

They describe how audio communication allows the communicator to use other means in addition to words to describe and convey the general mood and tone for the topic. According to the interviewee's description, audio communication can help to express the tone and other

implicit aspects that might otherwise be challenging to express, particularly for non-natives. The interviewee also describes the benefits of phone calls in relation to building a working relationship. Because of audio communication's ability to convey the tone of the communication more easily, they consider it as a more advantageous means of building a social relationship with the counterpart.

> *"If I call them, then it's faster and then next time, the conversation is really, really nice and the reply is really like, you can feel the smile, behind it."*

The comment shows how the interviewee consider communication with their team members as a long-term process. They consider the working relationship developing through the communication instances and perceive audio communication as a means of building this relationship in a way that written communication cannot.

It is obvious that different means of communication all have their own advantages and disadvantages. It is also most likely true, that individuals will consider the communication method in terms of the type of information that needs to be communication. However, according to many of the interviewees' comments, individuals also hold certain preferences for communication methods. While written forms of communication can be useful in transferring accurate and fact-based information (Hard knowledge), audio communication help to convey the social cues and emotions of the participants (Soft knowledge). Looking at the differences in communication preferences may help us to understand what kind of information the respective team members consider valuable or important in terms of communication.

These variances in communication preferences and values can also be a reflection on the cultural backgrounds of the participants. Some cultures may emphasize non-verbal communication, which places an importance on the social cues and general tone of the conversation. Audio communication provides a means for expressing this type of information. Other cultures rely more on verbal communication, emphasizing the importance of factual information. These can be transmitted better through written forms of communication. This also highlights the underlying challenge present in communicating between different cultural backgrounds. Members of different cultures have a different consideration of what "understanding each other" means, and hence may have difficulties in communicating with each other. It is therefore possible that the selection of a communication method is influenced

by both a person's individual preferences as well as the values that are emphasized by their cultural heritage.

4.1.3 Conflicting objectives of communication

Another aspect related to the means of communication between team members is the significance of the topic. Interviewees seem to have varied understandings of how the significance of the topic is related to the means of communication. Some interviewees describe phone calls as a good way to communicate smaller, less significant topics in passing.

> *"yea, during the calling you can also mention other things, not only this particular item case, cause the other, background you understand better their side of the situation. How they handle this way, cause the e-mail has, you can write many, if you want, but in the words you speak faster and then, they also can, by the way mention this and by the way mention that."*

The interviewee describes phone calls as a fast and efficient method to handle less significant topics, where written forms of communication might be more troublesome. In some ways the description indicates the interviewee's perception of audio communication as a means of sharing greater amounts of knowledge than written communication. However, some other interviewees seem to perceive phone calls as a means of higher-level communication. A Finland-based interviewee, describes the communication habits that they have observed from their distant colleagues:

> *"Sometimes I feel like, do they [distant colleagues] just want to chat on the phone, even though there is no more, or that there is no need to, and then I feel like for every little thing they are like 'shall I call you, shall I call you', and I'm like 'there shouldn't be any need to, you just do it like this'."*

These two different ways of perceiving the objectives of audio communication set the stage for potential conflicts between individuals communicating across distances. While one team member perceives audio communication as a useful way to communicate a variety of topics with their distant team members more effectively, another team member considers the same mode of communication to be reserved for focused discussion. The comments portray a sense of confusion about the rules of communicating between locations. Members of the virtual team may possess differing thresholds for audio communication and crossing each other's thresholds may lead to conflicting situations and misunderstandings. A sense of irritation is palpable in the description of the Finland-based interviewee, they almost seem to feel offended or intruded on by their distant colleagues communication attempts. During the interviews, the interviewee

describes how the amount of phone calls from their Indian colleagues was overwhelming in the beginning stages of establishing the team.

> *"Umm, so now we have sort of, because in the beginning they used to call, like they wanted to talk about EVERYTHING […] the people in India, so now we have tried to decrease it so, or like because we told [manager's name] that, I just can't, can't do it, I'm like constantly either writing to someone or SPEAKING, or sometimes BOTH."*

The Finland-based team members of the team consider the amount of audio communication from their Indian colleagues to consume excessive time and effort on their part. This is why they have attempted to reduce the work load by establishing a recurring weekly meeting where specific topics will be discussed. Questions related to these topics should be reserved for the weekly meeting where they will be handled all at once, instead of one-by-one on a daily basis. The purpose of this is to redirect the communication of certain topics to a specified time and by doing so, save time and effort. Another Finland-based team member describes similar observations, again emphasizing the notion that phone calls are reserved for larger, more serious issues.

> *"Weeeell, from different cultures I have now learnt that Indians for example really prefer to call ALL THE TIME, when they have [laughs] even one little question they will quite quickly message that 'Shall I call you', but it's created some challenges because we can't all be like on-call, so we have had to deny them sometimes."*

These comments portray how members of the virtual teams have conflicting understandings of what communication methods should be used for different purposes. While some may consider audio communication as fast and efficient, thus utilizing it for quick questions, others consider audio communication as reserved for the discussion of more significant topics in depth. From the comments it is easy to see how these differences in communication habits can create challenges in virtual teams. The team's Finland-based members have attempted to restrict the communication from their India-based members, as their understanding of the communication methods do not meet. Conflicting perceptions of the means of communication within the team can result in misunderstandings and difficulties in achieving mutual understanding. The comments demonstrate how the different objectives of communication and the different values between the individuals can create conflicts or challenges to sharing knowledge within virtual teams.

The empirical data shows that individual members of virtual teams utilize different types of communication methods. This may be partly due to individuals valuing different types of information, some valuing “hard knowledge” and others valuing “soft knowledge”. Such values may be based on individual characteristics or cultural differences. The differences in communication methods were also observed to cause potential conflicts in communication. Individuals have different understandings of what information should be communicated and how it should be communicated to their team members. These variances can pose potential conflicts, as individuals’ objectives for the communication situations differ. Individuals expressed feelings of frustration and confusion in trying to understand the actions of their distant team members. When the chosen communication method does not match the counterpart’s preferences or needs for communication, achieving a mutual understanding between the two locations may be a challenge, as seen in the case of team D, where communication has been actively restricted between the locations.

4.2 Creation of a collective identity through team-level interaction

The second theme which emerged from the empirical evidence was team-level interaction and the role that this interaction plays in the communication between distant team members in virtual teams. The development of this theme from the empirical evidence is summarized in **Figure 3**. In terms of knowledge sharing, team-level interaction emerged as a significant theme. Even though the opportunities for face-to-face interaction are often restricted in virtual teams, many of the interviewees recognized the value of group interaction. Several interviewees also highlighted the need for more interaction between team members and suggested different ways in which this could be achieved. Interaction between team members was facilitated through teleconference meetings (audio communication) and the use of the organization’s social media (written communication). The interview results revealed how team members used team-level interaction in the construction of a collective identity. Team member’s mutual understanding of the situation was linked to the team’s interaction. Particularly the informal interactions and the leader’s role emerged as significant factors in team level interaction.

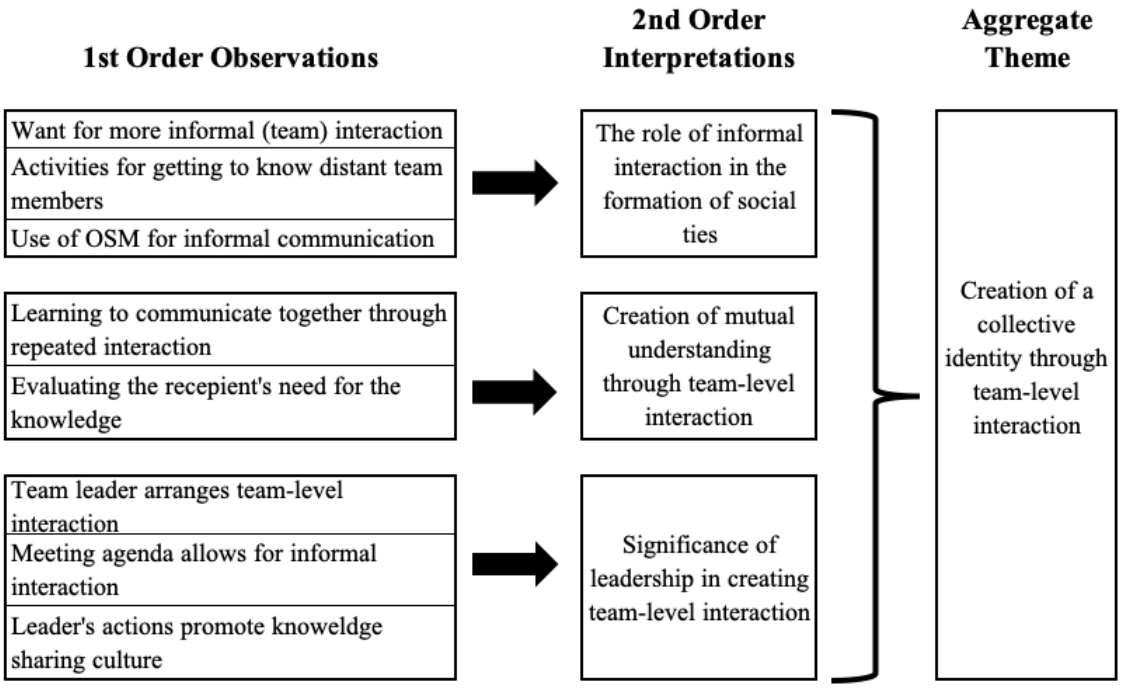

Figure 3 Data structure: The role of team-level interaction

Team meetings were normally conducted through the Skype teleconference function. The fact that many of the interviewees also expressed hopes for more frequent team meetings reflects on the value attributed to these meetings. Interviewees described various ways in which team meetings were utilized in order to share knowledge with distant team members. Meetings were useful in sharing expertise, ideas and innovations and conducting the planning and scheduling needs of the team. On a deeper level, team meetings were also seen as a venue for informal interaction, where team members learn to interact together, and create social ties and a mutual understanding. From the four teams included in the study, three were conducting regular recurring team meetings with the entire virtual team and all interviewees considered the team meetings an integral part of the team's knowledge sharing process. Team D, which has been most recently established, was not holding regular team meetings with the entire team, instead team meetings were held separately in the different locations. Interviewed team members of team D also expressed their wishes that common team meetings for the entire team could be introduced.

A member of team A describes how team meetings can be used to share expertise and technical knowledge related to their work.

> *"We've sometimes discussed it here, mainly in conversations with [name of team member in the same location] that, if we had team meetings more often, then,*

> *some of these things might come up, more often, not perhaps so much of that, like, related to daily cases but more generally technical things related to our job and, that would be one way [to improve communication within the team].”*

While team meetings for team A are currently taking place monthly, the interviewee feels that more frequent team interaction could help the team members to share expertise with their distant colleagues. The interviewee speculates that increased sharing of expertise through the team meetings could help the overall communication within the team. The comments show that the interviewees value the team meetings as a medium for sharing knowledge and expertise with their colleagues. Team meetings can enhance team learning by providing a venue for more experienced team members to share their expertise with the less experienced members in distant locations. By sharing expertise in team meetings, team members not only learn information that is shared, but valuable information on who shares what. This can contribute to each team member’s understanding of the different areas of expertise within the team, and thus help in seeking knowledge between the team members.

4.2.1 Significance of informal interaction

In addition to formal team meetings, the interviewees placed great importance on the informal team-level interaction. The interviewees comments show, that informal interaction is needed in order to get acquainted with distant colleagues on the team-level, and to create social ties within the team. A member of team A discusses the need for more informal interaction.

> *“I’ve heard that some teams hold, for example on Mondays, like even just a half hour or something like that, to just check together what is coming and what has been done. So, this we don’t have, and I think that would be a pretty, pretty good idea. It would be sort of more relaxed […] So that we would have, would have a little bit of some kind of free conversation, so maybe we might get to know one another.”*

The interviewee explicitly states that they would like to increase the amount of informal team-level interaction, in order to get to know their team members better. While these comments tell us what the individuals want, they also give an indication of what the individuals perceive is lacking in the current team-level interaction. By mentioning that there is a need for a more relaxed meeting time, the interviewee suggests that the monthly team meeting is a more formal event. If the team meetings are tightly planned, with a strict agenda, there is no opportunity for informal conversations between team members to create social bonds. As with the communication methods discussed in the previous section, here too exists a division between

the sharing of “hard knowledge” and “soft knowledge” between team members. Strictly planned team meetings provide the opportunity to share hard, factual knowledge, but they may not provide the venue for sharing softer knowledge in order to build social ties between team members. The interviewee’s expressed the need for a venue to share informal information and build social ties between team members, in a setting that has been approved by the leader.

Opportunities for informal conversations between distant colleagues can be difficult to find, and the interviewee suggests that more frequent team meetings could provide one solution to this. Team A has taken some actions to improve the interpersonal relations between the distant team members, through an introductory activity.

> *“Last autumn after the holidays we had the first team meeting of the autumn so that, we had from each one, [the team leader] had collected them, so we had like a photo and then we had put like some hobbies and things. So that was kind of fun, so we went through those first, so even though some were familiar already but then there were some, somethings, but that was quite nice.”*

Since members of virtual teams may have less opportunities for spontaneous informal conversations, it can be difficult to form social ties and relationships with distant team members. The introductory activity described by the interviewee, has been used as a way to connect distant team members on an informal level. It is an artificial way to share non-work-related information with colleagues. In co-located teams such information might be shared more effortlessly in normal everyday conversations, lunch- and coffee breaks or chitchatting in an elevator. Since virtual teams are to some extent deprived from these informal everyday conversations between team members, informal information can be shared through activities in order to aide in the formation of social ties. By sharing informal and sometimes personal information, team members may feel more cohesive and have a lower threshold for intra-team communication and knowledge sharing.

A member of team B shares their experiences on building social ties with their distant team members.

> *“I have four colleagues in India, I don’t talk to everyone every day. But, two colleagues, we are in some project all the time, so I talk to them every now and then, but the other two, I really talk only when there is an information sharing session or something like that. Um, there is still some kind of a hesitant, because they don’t know me so well, but maybe when time goes and when I see them on, we are on a real project and they get to know and then they make the ice break [laughs]. So it needs some time.”*

The interviewee shares how they have developed working relationships through interaction with two of their distant colleagues. Meanwhile, they have a more formal and withdrawn relationship with the other two distant colleagues, with whom they have had less interaction. Both interviewees emphasize "getting to know" their team members, demonstrating how they place importance on the social ties within the team. By acquainting with their colleagues through shared discussions and interaction, the processes of communication and knowledge sharing within the team become easier.

In addition to meetings through teleconference, team members described how organizational social media can be used to create spontaneous and informal interactions. The organization has recently begun the use of Microsoft Teams application (later referred to as Organisational Social Media, OSM). The application offers various functions from instant messages, calls, and group information sharing through a social media type setting. While the application will take over the functions formerly provided by Skype, each team is able to determine how they wish to utilize the application in their day-to-day operations. The interviewee describes and shows the interviewer how they have started to utilize the application in their team's daily communication. They emphasize that OSM is used for "everyday conversations", informal communication between team members.

> *"Then this is our […] team, so this kind of a noticeboard. So as you see I'm kind of a moderator here, so when we have some topic ongoing here, and I'm feeling that our team is not informed enough, then I put that information: 'hey, here is some [issue] which is very difficult or something going wrong, so if you happen to notice [any cases] so please inform us'. So, like, this kind of conversations, everyday conversations, every day, so there is, I believe that not necessarily an e-mail should be sent every time, it can be this our team, so we can be more flexible putting here things […]"*

During the interviews, many interviewees emphasized the challenges related to sharing informal, day-to-day information that normally comes up in face-to-face conversations between co-located team members. When communicating across distances, individuals need to consider the information they share, it's significance, the audience it concerns, and the mode of communication used in sharing it. Often small, informal pieces of information may be left outside of the team-level communication if they are deemed to insignificant. In addition, the value of this information to the receiver is often not explicit. Individuals possessing information have to make judgements of whether or not the information should be shared with their distant team members and how it should be shared. If the information does not cross the individual's

personal threshold for communication through e-mail or phone, it might not be communicated to the distant colleagues. However, these small, less significant topics or issues may constitute to the team members understanding of each other's contexts, as well as the overall "big picture". It can also result in the development of uneven knowledge between locations. When added together, small and insignificant topics can build up to significant amounts of knowledge sharing missing from the distant team members. Organizational social media (OSM) can be used to create informal interactions in order to share information and knowledge more easily with distant others.

A member of team D notes, that while co-located team members sometimes discuss matters face-to-face, the team together has made a point of attempting to share these "hallway conversations" in their team's OSM-site for their distant colleagues.

> *"Well of course we sometimes happen to share information face-to-face here too. But now we have the Teams site, and there are also our Indian and Chinese colleagues. So we try to put all these, and actually we have emphasized that, and strived that ALL what we discuss here in the hallways, so we should put them there too, because otherwise they don't, the people on the other side of the globe don't KNOW what we are discussing here."*

By hallway conversations, the interviewee refers to the spontaneous and informal discussions that team members can have when co-located. By utilizing the informal social media channels, the information remains informal, a type of "by-the-way" information. In some ways, the use of OSM has allowed the team members to artificially recreate these informal hallway conversations with their distant colleagues. By highlighting how OSM is used to share informal information, the interviewee also demonstrates that most team members are aware of the communication missed by their virtual colleagues and make an additional effort in sharing this information with them when it is made possible by the tools in use. This may be a reflection on the knowledge sharing culture of the organization, and the desire for team members to communicate and share knowledge with their distant team members.

In addition to sharing information informally, the OSM provides a channel to share information with the entire team. This has become valuable particularly in team training situations, where informal and low-level information needs to be communicated to the entire team quickly. Another member of team D describes how OSM has helped them in sharing team level topics more easily.

> *"So initially we used to share the information via e-mail and skype during the initial stage, but once Microsoft Teams has been introduced, we try to chat and put all the things in the formal group. That one information can be seen and learned by many others in the same group. So, they can also comment on the new trainings or things they knew. So, it will be more helpful to each other in getting the new things and sharing the new ideas. So the newly implemented tool Teams, it's fully in sharing information to all the team members, rather than individual ones. I think it's wonderful."*

The team members in all of the teams describe how they are beginning to use the organizational social media (OSM) as a venue to recreate spontaneous and informal conversations between distant team members. The OSM provides a way for team members to collectively share information in an informal, spontaneous and inobtrusive way. Through OSM, information can be shared with the entire team, with a possibility for further discussions and feedback from the recipients. OSM is also indifferent to temporal boundaries, as it does not require recipients to be online in order for the initiator to start a discussion, unlike instant messaging. Discussions can be started and joined at any point in time, and members can either choose to participate or not participate in the conversations. The interviewee's comment portrays enthusiasm in being able to communicate more efficiently with their distant colleagues. This portrays how team members indeed want to communicate with their distant team members but require efficient tools to enable it.

4.2.2 Creation of mutual understanding through team-level interaction

Team-level interaction was also perceived as a key factor in the creation of a mutual, team-level understanding. An interviewee from team C describes how the team's communication has developed over the years it has been in operation. The team has started out with more frequent team meetings, and then reduced them as the operations have normalized and the topics to cover in the meetings have decreased.

> *"I would say that it took about three years to learn this, this process. Or that we started to understand each other and, and they [the distant colleagues] were able to get a clear picture of our processes and, now those processes which are clear, are really working well and we speak, like we understand each other and all this talking on the phone has gotten a lot easier, now that we know each other. And the speaking on top of each other has decreased, so in the beginning there was A LOT of that, it was…difficult, EVERYONE would speak, and then everyone would be quiet, and then everyone would speak. But now, now we have somehow learned, I don't really know how, but it's gotten a lot better."*

According to these experiences, repeated team-level interactions have assisted in developing and improving the communication between the different locations. The interviewee does not speak only of a factual process or task understanding, but the understanding of how the distant colleagues think and how they communicate with each other. The interviewee's description shows how repeated communication and interaction has improved the team members' ability to read each other. Not only the verbal cues but also non-verbal cues related to how individuals communicate. Since team meetings in virtual teams are communicated through teleconference tools, meeting participants are deprived of the visual cues such as eye contact and other facial expressions which help to indicate the speaker in the meetings. In the beginning of the team's lifecycle, team members had not formed collective habits for operating their meetings, and being deprived of the visual cues, the initial meetings experienced difficulties in communication. However, the description also shows how communication has improved through repeated interaction. Through repeated interaction, participants have learned operate together virtually. The interviewee is not sure how this has happened, indicating that no explicit actions were taken, but that instead the team's communication has improved gradually over time. It may be a reflection on the team member's social ties forming and virtual interaction becoming easier as team members learn how to communicate together. Through repeated interactions, the team members can build their own ways of interacting together as a team. For example, finding ways to take the remote team members better into consideration during meetings or stating verbally things that would not be stated in face-to-face meetings in order to accommodate for the remote participants. Through repeated and frequent interaction, participants can learn to better understand each other's dialects, terminologies, and social cues. This in turn can improve the overall communication of the team. In a sense, the team members have learned to "speak the same language" and a mutual understanding exists between the team members.

Team D has been most recently established and is still in its forming stages. The team members located in India have mostly joined the team and the company only a few months prior to the interview, when the team was established. The team does not currently conduct any global team meetings, but rather team meetings are conducted in each location separately. Without a common team meeting, individual team members are concerned that their distant colleagues are not able to share their opinions with the team and team leader. A member of team D explains how common team meetings would allow the distant colleagues to voice their mind.

> *"I'm not sure if, at some point it might make sense that we had COMMON, like meetings, because also, at least I feel quite much like, if WE here [in Finland] have a team meeting, then for example [the team manager] asks how it's been going with [certain tasks], and I reply according to my opinion, then should we have [meetings] like so that we are all there in the same meeting and they too [give their opinion]."*

The interviewee's comments reflect how team members would like to give their distant colleagues an opportunity to participate in common discussions and in the formation of a shared mutual understanding. There is a concerned that their distant team members do not have an outlet to share their opinion with the rest of the team. The comment shows that the members of these virtual teams are concerned about their distant team members' opinions and look for a venue where these can be discussed together as coherent group.

In addition to helping improve the factual understanding, the interviewee also describes how team meetings could help to construct a mutual understanding between team members in different locations and support the development of cohesion and identification between the team members. They ponder about the information shared in these meetings, and whether their distant team members need or understand the information discussed there.

> *"If you think about it there's probably a lot of things in our team meeting that they [distant team members] don't NECESSARILY have to know or even if they know would they understand, but then again there could be things that, that could be good to, and perhaps they would themselves feel more like a part of the team."*

In considering knowledge sharing within a team, one of the considerations that team members seem to have is the usefulness and necessity of the information communicated. It may sometimes be difficult for a team member to recognize which information is useful for their distant colleagues. The interviewee describes how some information may be "*good to know*". In pondering the usefulness of information, the information provider is taken all of the responsibility of deciding whether a piece of information is useful to the recipient or not. This is opposed to open team meetings, where information is shared freely and recipients of the information take responsibility of deciding whether or not they will utilize the shared information. Team meetings can be a useful venue for sharing general information, that could be potentially useful for the colleagues but is not necessarily needed by each team member. Participants of the meeting can then decide whether the information applies to them.

This type of information sharing is also essential in the construction of a transactive knowledge system. Team members make references in their mind as to different areas of expertise between their team members based on the knowledge they share in the meetings, and then utilize this information later on to retrieve information based on their need. In addition, the sharing of all kinds of knowledge with distant team members can help in improving the team cohesion, as distant team members feel more part of the team when they are aware of the topics that their remote counterparts are dealing with, even if they do not have a direct impact on the distant team members.

4.2.3 Significance of leadership in creating team-level interaction

The interviewee's comments reflect the value that they attribute to team-level interaction. However, they also indicate that most team members rely on the team leader to arrange team-level interaction. A member of team B describes how ideas and new best practices are shared in their team.

> *"Mostly the ideas and practices are shared instantly. If it can be shared. So if a colleague finds a new way to answer, so it can be shared via e-mail. […] And we can share it in team meeting also. In team meeting there is a section for gentle topics. There we can share our ideas and our findings during that one month."*

The interviewee mentions how ideas can be shared in the team meeting, as there is a specific time lot allocated for "gentle topics". This emphasizes the significant role of the meeting facilitator in creating opportunities for interaction and communication in the meetings. The allocated time slot gives consent for the attendees to introduce a variety of topics to be discussed in the team meeting and can be a way to induce interaction and participation from team members.

In both teams A and B, team members recognise the need for organized collective interaction, in order to improve the knowledge sharing and communication within the team. While several interviewees in both teams highlighted the need for more interaction on team level, the interviewees seemed to take a passive stance in arranging this. The responsibility of arranging the interaction is seen mostly as a leadership task and seems to fall on the manager. The leaders of virtual teams play an important role in recognizing the need for increased communication and interaction and providing these opportunities to the team members. The managers and team leaders act as facilitators during the meetings, facilitating the interaction between the locations.

The passive stance that the interviewed team members have adopted in arranging team interaction may also be a reflection on the organization's culture. If individuals do not feel that informal communication and knowledge sharing is approved by the organization, they may not take steps to advance this type of communication themselves. Once again, the significant role that leaders play in normalizing and encouraging informal interaction between distant team members is emphasized.

Based on the empirical evidence, the virtual teams utilize team-level interaction in order to create a collective identity. This collective identity is partly based on the mutual understanding of each other's contexts, created through team-level interaction. Team meetings, both formal and informal, act as venues for team-level interaction, helping to develop the team's cohesion. It can even be said, that through team-level interaction, the teams develop a collective identity, acknowledging also their distant colleagues.

In the creation of team-level interaction, in addition to team meetings, the use of OSM and the significance of the team leader's role were highlighted. OSM allowed for informal interaction that was used to simulate the hallway conversations which are a part of the knowledge sharing processes of co-located team members. In terms of the team's leadership, the role of the leader was highlighted as the enabler and facilitator of team-level interaction, in that the leader created spaces and opportunities for team members to share knowledge with each other. Furthermore, the team leader also has a role in developing the organization's knowledge sharing culture in a more permitting direction.

4.3 Challenges in the socialization of distant newcomers

The third theme that emerged from the empirical data was related to the challenges of socializing distant colleagues. **Figure 4** depicts how the empirical evidence has been interpreted into the aggregate theme.

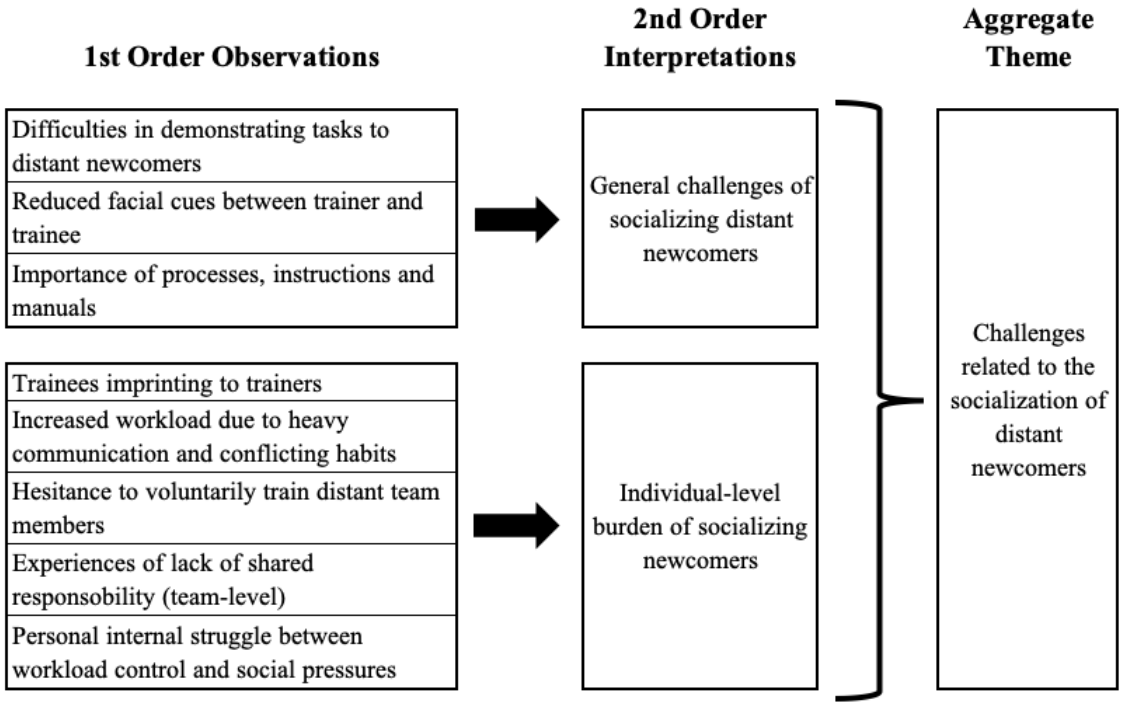

Figure 4 Data structure: Challenges related to the socialization of distant newcomers.

Trainings and the socialization of distant newcomers is an important way to transfer expertise and knowledge across locations between members of virtual teams. In virtual teams the physical distance between team members, as well as time differences between locations can create additional challenges to the training of distant team members. This was a topic that was highlighted by several of the interviewees. Particularly the training of newcomers in distant locations during the formation stage of the team was a topic of concern. When the first new members join the remote locations, there may not be co-located experts to conduct the training and socialization. Therefore, the initial orientation and training are often conducted by their Finnish team members. Normally an experienced team member from Finland will travel to the new employee's location to conduct the initial training, lasting generally from a few days to a few weeks. After this period of hands on training, the trainers return to their locations and the socialization and training of the newcomer continues virtually. Often the training and socialization of the first remote team members was seen as the biggest challenge due to the missing co-located expertise.

The challenges related to the training of newcomers were related not only to the actual training for the tasks, but the general socialization of the new comers to the ways of communicating and working in the team. These challenges materialized usually after the trainers had left and the newcomers were expected to start operating independently. Responsibilities were eased on to

the new employees, but still this period was seen as a challenging time. The challenges related to this training period were two-fold. Firstly, interviewees described challenges related to the physical distance between the trainer and the trainee. Secondly, interviewees described the burden of training distant newcomers, bore by the trainers themselves. These two topics will be looked at in more detail next.

4.3.1 General challenges of socializing distant newcomers

In virtual teams an obvious challenge related to training colleagues originates from the physical separation of the trainees and the experts. Being physically separated from each other, the trainers experienced difficulties particularly when the training involved demonstrating how tasks are completed. A member of team D described their experiences of a recent training of newcomers.

> *"At least I felt that it is much easier to teach them so that they are right next to you. Even though you try to say it in Skype or you do it so that they share their screen and do the tasks, but it's still different if I say in Skype 'go to the left, left, left, NOOOOO, too much, right, right, right', or if I could be right next to them and say 'go there and [do] like this'. (pointing with finger) […] and probably it's that you are able to see their face and see their style, or at least for me, I got a kind of understanding of the people, like who might need more instruction and who learns a bit faster"*

In addition to the challenge related to physically demonstrating a task, the interviewee speaks of the lack of visual cues and expressions of the trainees due to the physical separation. The reduced possibilities to interact with the newcomers face-to-face diminish the trainer's ability to achieve confirmation of the trainees understanding. Another interviewee describes their experiences of training distance team members, noting that because of the missing facial expressions and other social cues, the trainer has more difficulties in understanding the trainee's level of comprehension.

> *"When we're face to face, then I can see when they really get it. […] from their facial expressions and…and the conversation and questions are much easier. But when you teach something new from here [to other places], so you just tell it and then they say 'yeees'. And then you don't really know if, if it sunk in. You only see it when you look at the new cases and understand that it didn't sink in at all."*

From the descriptions of the interviewees it seems that nonverbal communication plays a significant role in the training and socialization of team members. Trainers utilize the trainees' facial expressions and other nonverbal signals during the training process in order to construct

an understanding of the trainee's level of comprehension. When these visual cues are lacking, trainers have difficulty in forming an understanding of the necessary additional trainings. A member of team D explains how they experience the difference between training someone in-person or via technology.

> *"And the same thing was in [other location], so like normally they always just say 'yes' on the phone, and if you ask in a way that they are not able to answer just 'yes', then quite often they are able to explain it how I want to hear it, but then when I'm there, I'm able to see if they say 'yes', and then they start to explain it, the facial expression is such that I know that ok I should probably try to explain this in a different way"*

The interviewee's comments show that those performing the training of their virtual colleagues are taking into consideration more than just the physical challenges that virtual communication involves. They are also taking into consideration the social aspects of training team members across distances. This includes cultural considerations, where team members have to rely on information other than written or voiced out comments. This might mean facial expressions that signify confusion in the recipient of the information. Such action requires a higher level of emotional intelligence from the trainers of distant team members.

While difficult for the trainers, the physical separation can also challenge trainees receiving virtual training. Due to the physical distance, trainees may not have a sufficient support system in their local office, as most of the experts are located in Finland. Since the support system might be insufficient in their local office, instructions and manuals play an important part in the beginning stages.

> *"Well, the first thing is that we have clear processes and that we have instructions, work instructions. Yes, that is the beginning and end to everything. So if these things are ok, then everything works quite well."*

The interviewee describes having clear work instructions as the first critical area of introducing virtual teams. Work instructions provide a reference point for the newcomers, an initial support in the case of difficulties.

4.3.2 Individual-level burden of socializing distant newcomers

Aside from the physical challenges of training and socializing distant newcomers, interviewees described another challenge. This was the burden experienced by the training individuals on a more personal level. Training or socialization of distant colleagues was often viewed as a

cumbersome, time consuming and an often-unrewarding task by those who were involved. Interviewees described a lack of collective, team-level responsibility in the training tasks.

One of the main concerns related to the training of distant newcomers was the time it consumed on an individual basis. Socialization and training of distant newcomers were seen as a longer process than training of co-located newcomers. An interviewee describes the training experiences in their team, highlighting the length of the training period as a major challenge compared to co-located teams.

> *"The bad things is that the learning time is A LOT longer than if the person was sitting, if the new person was sitting right here in the same place. […] So here they would learn in like a few months but there is takes, after like two years they are pretty good. So it is really prolonged quite much."*

By learning time, the interviewee refers to the time period that newcomers take to become fully functional team members. As the learning period is longer for the distant members of virtual teams, a significant effort is required on the part of the trainees. Individuals involved in training distant team members saw a clear juxtaposition between the short- and long-term benefits of training their distant colleagues. In the short-term view, training takes time and effort, but in the long-term there are benefits of a well-functioning colleague if they have been trained sufficiently first. Since the training time of distant colleagues is much longer than co-located ones, the juxtaposition is emphasized in virtual teams. This juxtaposition was highlighted by the fact that the burden of training distant colleagues fell on a few team members, but the benefit of well-trained colleagues was experienced by the entire team.

During the learning period (the time it takes for a team member to become a fully functional part of the team), team members conducting the training (trainers) perceived the newcomer's questions as the most laborious aspect of the task. After the newcomers had received the direct training for their tasks, they started to carry out these tasks on their own. During this period, newcomers encountered issues or challenges where they had to ask for help from their colleagues. As the newcomers had no co-located colleagues to direct these questions to, they directed these questions to their distant trainers by contacting them through audio or written communication. This resulted in an increased workload for the trainer as they strived to carry out their own work and simultaneously acted as the contact person for their distant colleagues.

> *"Yea it's really good that they ask, that's not the…but uuuumm, it causes me scheduling challenges, because I'm trying to do some things, and then I get continuously interrupted,*

While trainers accept that questions and assistance are part of the learning process, the amount of questions was so great that it disrupted the trainers from conducting their normal day-to-day tasks. Interviewees felt that this challenge of increased workload was only directed at those team members who conducted the training of newcomers because newcomers were seen to mostly utilize the contacts that they had made during the initial face-to-face trainings. A member of team D explains this.

> *"I think for the Indians it's really important to have that personal contact, and now that they have only met […] me and [name of team member], like face-to-face, so they want to ask us. And it's really difficult to get them to ask the others."*

According to the interviewee's experiences, the team members in India place a greater importance on personal relations, and for this reason they feel more comfortable asking their questions from the two people whom they have met face-to-face. This suggests that the Indian colleague's psychic distance between the two trainers have decreased, probably due to the face-to-face interaction during the initial training. Some interviewees utilized the term "imprinting" in reference to this situation. Several interviewees in Finland noted that once they had been involved with the training of virtual team members, the newcomers would "imprint" onto their trainers and contact solely them for any issue they had, even knowing of the other experts in the team. Imprinting was perceived as a problematic phenomenon by the trainers as it created extra work for the individuals and contributed to their constrained work schedules.

> *"And then of course there a bit of this imprinting. So if I tell them that let's go through these or let's check these again, that someone else had taught them before, then it's a bit like… I'm not sure if it will lead to all the questions coming to me after that."*

The increased workload resulting from these questions is perceived so heavy that in the worry of getting more questions, individual team members are abstaining from voluntarily teaching their distant team members tasks that would require additional training. The imprinting of newcomers to their trainers was seen as a challenge due to the time consumed by the additional questions that were directed at the trainer. Many of the interviewee's descriptions portray an experience of the individual burden that this imprinting resulted in, with a lack of team-level responsibility in the socialization and training of newcomers. In the fear of being stranded alone with the resulting aftermath of the training, team members are reluctant to take on more training responsibilities or taking responsibility of training topics which they notice as problematic or

unclear. Such experiences of individual strain seem to be prohibiting the open sharing of knowledge between locations. A member of team D describes their experiences.

> *"Well now probably everyone has held trainings for them, but in the beginning, I felt it was really annoying that it was just ME, which lead to that all the questions came also to just one person. And then when you get situations where someone here says something like 'why don't they [distant newcomers] know how to do this or do that', and then when you're the one who has to teach them something in Skype, then maybe you understand that, it's not really that easy, it's like an hour, and then everyone is supposed to know everything."*

Their comments reflect a sense of frustration for the training process and their own role in the socialization of newcomers. The comment reflects the lack of appreciation experienced by those team members involved in the training of distant newcomers. The interviewee expresses feelings of frustration and dissatisfaction toward the lack of collective responsibility in the training tasks.

> *"Yes, and the thing is that, it's not really like anyone one of ours', like nobody wants to do it like it [training the new remote team members] was their main task. Because everyone is sort of like…they want to do something new and to learn something."*

This interviewee describes the lack of understanding from other team members in Finland. The difficulty of the training process was not recognized by those that were not directly involved in it. Training in general was perceived as an undesirable task. These negative perceptions of the training task may impact the knowledge sharing within the team negatively, as team members refrain from taking on training tasks and sharing knowledge with newcomers.

The conflicting communication methods in different locations emphasized the issues that arose from trainees imprinting to their trainers. The amount of questions and contacts from the newcomers was highlighted by the fact that they were inclined to utilize different channels of communication than their trainers. Phone calls from distant team members were seen as obtrusive and distracting, while distant team members perceived them as the best way of getting answers to multiple questions quickly. A Finland-based member of team D mentions the challenges related to the inquiries from their distant colleagues.

> *" it's become like a strain, TOO MUCH of a strain, so we tried to prohibit it a bit."*

In fact, the interviewee mentions, that due to the burden of the questions from remote team members, the members in Finland attempted to limit the amount of questions. They assigned follow-up meetings to the most critical processes and informed their remote team members to

collect questions related to these topics, in order to go through all the questions in the weekly meeting. In addition to this, the teams have approached this issue by attempting to direct the communication between distant team members to their OSM site. However, perhaps due to the imprinting of the trainees, they are inclined to utilize personal forms of communication, such as IM and phone calls.

> *"And of course sometimes it feels quite frustrating too, because of course we have told them to write [their questions] there [Team-organization's social media], but then when you see that new ones are coming up all the time, so you get this feeling that you have to find the time to answer them too. But I guess it's better than if they put them, because at one point the Skyping was continuous, the bombing and the. That if you don't answer right away, then 'have you checked this already' and you're like 'I CAN'T do eight hours of just answering these questions'"*

The comments show the conflicted feelings of those involved in training newcomers. While they recognize that asking questions is an important part of the learning process, the additional work load and time that is consumed in answering these questions is seen as a great burden by the trainers.

> *"Although that is why we had the idea of putting everything in Teams, so that anyone can answer, but then they [Indian colleagues] do it so that really often they write in Teams but then you can also tag people there"*

The interviewee describes how OSM could help the virtual team members to ask questions from their distant team members. The new tool provides a lower threshold for communication within the team. However, the interviewee notes, that at the moment many distant team members still utilize the "tag" function within the tool, in order to direct the question to a specific individual. "Tagging" results in an alert being sent to the person that has been tagged for the comment. Since the fear of imprinting is still present, once a certain team member has been tagged to a specific comment, other team members, while being able to see the comment, often still refrain from responding to it. In the comments from the interviewees, one can sense a real struggle of the distant team members in trying to find a way in which to work together and negotiate the ways in which the team members communicate and collaborate together. One interviewee also describes the internal personal conflict that they struggle with when trying to find ways of working with their distant team members.

> *"Even though I'm like 'damn it, I WON'T answer, THIS TIME I won't answer, I'm going to do something else', but then I CAN'T HELP myself. So by the end of the day I'm like 'I can't NOT say anything' and then I end up doing it [answering their message] and then afterwards I'm like 'why did I do it?' Like an eternal problem, at first I'm all tough 'I won't do it' and then seven hours later I'm like 'oookay [making a remorseful expression]'"*

The interviewee explicitly recognises the time constraints related to the communication with their distant team members and attempts to achieve some kind of separation by first refusing to reply to their contacts in an effort to conduct other tasks. However, after an internal struggle, they give in to the social pressure and respond to the communication.

Team D has also taken action in order to reduce the work load that has resulted from training of virtual colleagues to new tasks, has been repeating meeting calls, which have been allocated to certain large processes that result in a number of inquiries. A member of the team describes how certain larger processes have been assigned their own meeting calls. Distant team members can collect and save-up questions related to these processes so that they can all be handled during one weekly meeting call. This has been done in order to save time and handle similar cases in one instance.

> *"Yea, we have these, for those which are sort of bigger new processes, so we have these follow-up calls reserved once a week, so like these follow-up phone calls, where we go through all their questions. But well, with different cultures I've now noticed that the Indians for example would like to call ALL THE TIME, whenever they have something (laughs), even one small question, they really easily send you message like 'shall I call you', but this has sort of caused challenges for us, because we can't all be on call on the phone all the time. So we have had to partly deny them [from calling]. So that once a week we will go through them, and if they have questions outside of that they would write them in Team, so there is a like a wall there and the whole team can see it, so you also don't get duplicate things."*

The interviewee describes how the weekly meeting calls have also been a way to compromise between the needs and preferred working habits of the members in different locations. It allows for the Indian team members to utilize voice calls, which many have noted to be their preferred method of communication. Simultaneously, it attempts to restrict phone calls to a specific time frame, in order to accommodate for the work load of the trainers in Finland.

Those team members that performed the training and took part in the socialization of distant team members reported of challenges related to the physical distance between the team members. The physical challenges were related to the lack of face-to-face contact and the resulting challenges in demonstrating tasks and reading the reduced facial expressions of the trainees. The importance of clear instructions and manuals was recognized by the interviewees. However, interviewees also shared experiences of a personal-level burden related to the training of distant newcomers. These were related to the increased workload that the training resulted in, not the least due to the imprinting of the distant newcomers to their trainers. Furthermore,

the personal-level burden was increased by the perceived lack of team-level responsibility of the training of newcomers. Individual trainers felt that they had to struggle alone with the time consumed by the trainees' contacts, which were increased due to the "imprinting" effect. Meanwhile, the interviewees' experiences also reflected the different objectives of the communication between locations, further accentuating the strain experienced by the trainers. Trainers perceived the burden related to this task as an individual one, that was not shared by the rest of the co-located team.

4.4 Team socialization and lifecycle

In addition to the previously mentioned themes, the empirical evidence also suggests a connection between the stage of the team's lifecycle and the level of psychic distance between team members. We can see clear distinctions in the challenges experienced by teams depending on their age. Such differences can also be reflected in the team's socialization processes. In this section, a brief outline of the different stages of team socialization will be given, based on the framework introduced by Oshri and colleagues (2007, p. 42). In addition, a brief discussion of the different stages of a team's lifecycle will be presented, relating each stage to specific challenges that teams may experience. A summary of the socialization framework and the placement of each team along with related evidence have been provided in **Table 4**.

Table 4 Evaluation of the team's phase in the socialization framework

Phase of Socialization framework	**Team**	**Evidence**
1. Introduction	Team D	- Newly established team - Communication procedures are not yet established. Processes are being negotiated as part of the socialization process of the newcomers. - Remote counterparts have different understanding of the ways to collaborate - Team composition is still not fully realized by remote counterparts - Challenges in communication with remote counterparts
2. Build-up	Team B and team C	- The team members meet face-to-face from time to time. - Team members are satisfied with the communication procedures - Team members collaborate with their team members and do not report of any challenges related to differences in team - The teams have surpassed the challenges related to the introduction phase but have not yet reached the need for renewal of socialization.
3. Renewal	Team A	- The team has surpassed the original challenges of transforming to a virtual team. - Team members are experiencing new challenges in their communication processes. - Team members in different locations are not in full agreement of the ways in which communication occurs. - Due to the team's turnover, a new process socialization between team members is necessary

Based on the Socialization framework by Oshri and colleagues (2007)

Considering the four teams involved in the case study, team D has been established most recently. The team is clearly still in the introduction phase of the socialization process. The team is adjusting to their new composition, and team members are in the process of acquainting with each other. Due to this, the team's composition is not yet fully recognized by their team members, and individuals had difficulties in recalling their distant team members.

> *"We're here, hang on (whispers names, counting), eight, if you count the manager. […] and maybe, about the same over there [other location]. I can find*

> *the exact figures somewhere but, I think it's fifteen…to…no, twenty sounds like too much…*
> *[Interviewer: And you have people in India and China, right?]*
> *China, oh wait a minute, right there's China too [listing names quietly], well I guess there could be almost twenty then. I can't remember [how many are in India], I'm thinking could it be even eight to ten?"*

As the team goes through this first phase of socialization, they will slowly come accustomed to each other by interacting and communicating together. The team member's experiences of communication with each other demonstrate, that the team is still searching for shared ways of communicating together. Lines of communication are currently in the process of being established, as team members work through the communication issues. This is strongly present in the team members' descriptions of distant colleagues' socialization. Interviewees described how the team is still in the process of negotiating the communication practices between the locations. Some of the interviewees also discussed of the attempts to direct the communication from phone calls to the use of OSM and specified weekly meeting calls. These are clear examples of team members negotiating and working through differing communication methods in order to establish shared processes that satisfy the needs of all members. As team members negotiate the ways of working together, they will slowly move through the first phase of the socialization process.

Team's B and C seem to be positioned in the build-up phase described by Oshri and colleagues (2007, 43). Both teams are satisfied with their current communication and collaboration procedures. Team members trust each other and do not perceive any significant barriers to knowledge sharing. These can be signs that the teams have managed to negotiate appropriate methods of communication and that team members are able to collaborate without challenges. We can recall an interviewee from team C recalling of the difficulties in communicating when the team was first established. Members of team C experienced difficulties in teleconference meetings, as team members spoke on top of each other and had difficulties in communicating with each other. The team has managed to overcome these challenges in communication through interaction and frequent communication. As the team members have interacted together, they have inadvertently negotiated shared ways of communicating, thus resulting in the harmonization of the team collaboration. The team has managed to overcome the initial communication challenges and have advanced to the build-up phase of their socialization process. This consists of the team member's face-to-face contacts in order to deepen their socialization processes (Oshri et al., 2007, p. 43). An interviewee describes the team's current

state of communication, recalling how face-to-face meetings have strengthened the team's internal trust. Face-to-face meetings are perceived as significant in creating social ties within the team and improving the trust and communication within the team.

> *"it [trust] has strengthened. So, like when I visit there, so of course the first time we are pretty much strangers, but the second time we are REALLY buddies and like really old friends."*

Similarly, team B is in the build-up phase, where they have negotiated the communication practices within the team and are now in the process of strengthening those practices through face-to-face meetings. They are now attempting to reach a deeper level of understanding and cohesion in their work as a team. A member of the team explains how they feel that face-to-face meetings with their remote team members would help to develop the team's mutual understanding of the work and collaboration.

> *"Because when they come HERE, we can show them that, I believe that still some things are not umm, they don't understand some things still, what's happening here, and we still have a feeling, many people here have a feeling that our [distant] colleagues didn't understand all the process happening here. So in that way, when we call them here, we can have a very DEEP understanding, or DEEP training on what they are REALLY missing"*

Face-to-face meetings are seen as an integral part of creating a mutual understanding between team members, having a collective knowledge of the direction of the team and the ways in which they will approach their objectives.

Lastly, team A seems to be approaching the renewal phase. Members of team A described the various communication challenges during their meetings. The team is not new, and it has most definitely surpassed the introduction phase and most probably also the build-up phase, having experienced several face-to-face visits within the team. However, the team is currently experiencing communication challenges between the locations. A Finland-based member of the team describes the communication within a weekly meeting, held between some team members from each location.

> *"Well, actually [Finland] speaks and the others listen, there's not much participation from there, or they don't participate from the other locations. We're not, we're not trying to drive it in that way but then that's the way it is, in practice, so actually they don't participate much by their own initiative, so almost always [we] have to ask like if we want something or like it might be that we throw a question in the air but then for a while we hear nothing and then we have to ask 'so what do you guys for example in India think about this'"*

A lack of participation from distant colleagues creates frictions in the collaboration between members of team A. Another team member explains how the turnover in the team has resulted in challenges to collaboration. The effects of turnover can be one reason why the team needs to negotiate new ways of communication and collaboration. Phase two of Oshri and colleagues (2007, p. 42) framework describes the build-up of socialization through face-to-face meetings. While team A has conducted face-to-face meetings some years ago, the resulting benefits of these meetings to the team's communication has since suffered due to team's turnover.

> *"I haven't met, I visited like, three years ago in India, and at that time I met the people there, and that was really nice to see them but now after that maybe three people have changed. And in China, I have never been, but last autumn two colleagues visited us in Finland, but one of them is now on maternity leave and there is one new one, so in India and China both, there are people that I haven't met."*

Due to turnover, team members have left and new team members have joined the team. In addition, as tasks, ways of working and collaborating evolve, team member's social ties and connections may fade. In order to re-establish the connections and shared ways of communicating, the team needs to re-negotiate their ways of working together. The team members need to re-confirm how they will collaborate with their distant others to conduct their work as a team and to agree on mutually satisfactory communication methods. This will play a part in the formation of shared mental models and the development of a mutual understanding between team members.

In addition to identifying the team's stage of socialization, a connection between the themes that have emerged in this study and the overall lifecycle of the team can be identified. The emerged themes can be summarized as communication, interaction and socialization of newcomers. The empirical evidence suggests that there is a link between these themes and the development of the team throughout its lifecycle. **Figure 5** shows a conceptualization of the different stages of a virtual team's development and how these stages relate to the themes that have emerged from the empirical evidence. The lifecycle stages are based on the framework of Oshri and colleagues (2007) and Tuckman's (2001) model of group lifecycles.

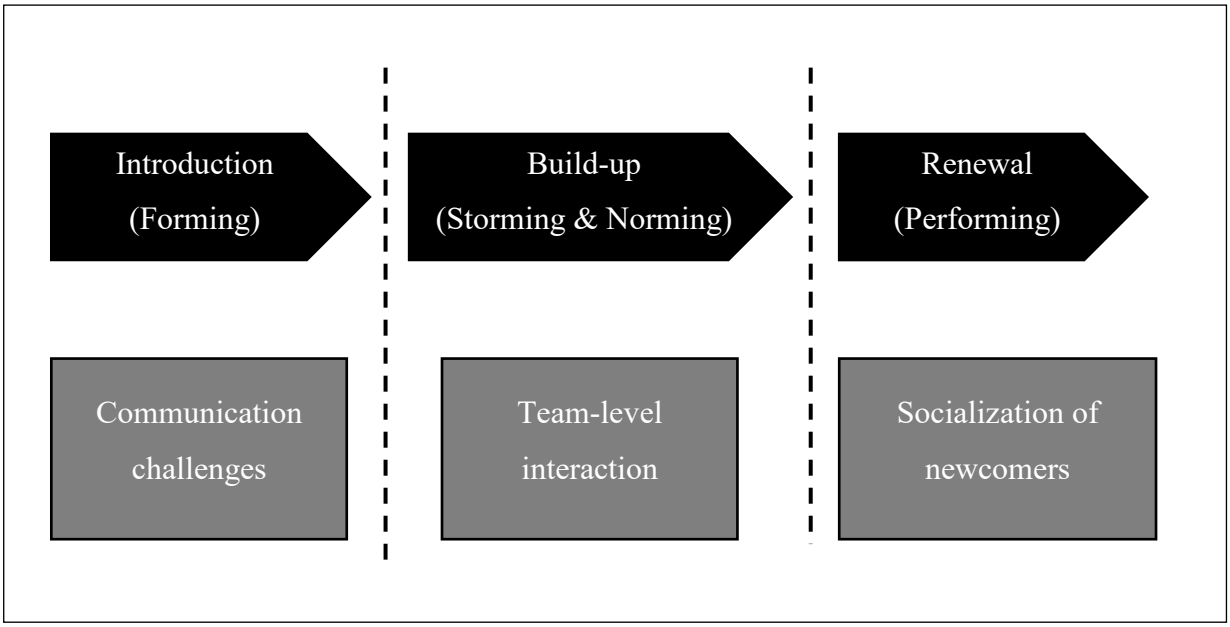

Figure 5 Team's lifecycle development and connection to the themes of the research

The communication challenges in the empirical evidence seemed to be related to the beginning stages of the team's lifecycle. Team members were still searching for ways to communicate together, and team's described varying ways of communicating together. Challenges in communication were also experienced by team A, a team considered in the renewal phase. However, these communication challenges were not as significant as those in the beginning stages of the team's establishment. Team-level interaction was seen as fundamental by all teams and interviewees. However, the interaction seemed to take effect and was perceived more satisfactorily by those teams which were more advanced in their development and had worked together for some time. This suggests that team's may be able to utilize the advantages of interaction only after they have worked through the initial challenges of communicating together. As teams have established shared ways of communicating and collaborating, they are perhaps more efficient and purposeful in their interactions, thus resulting in the build-up of socialization. The result of the build-up phase should be a deeper level of socialization between team members, and the establishment of the team's norms. Last, the process of socializing newcomers normally occurs as part of the continuous process of the team. As new members enter the team, a renewal of the team's ways of communication and collaboration is needed, not solely for the purpose of the newcomer, but also to reaffirm the team's shared understanding of the norms and common ways of working.

5 DISCUSSION

This chapter will connect the empirical findings presented in Chapter 4 to prior research and the analytical framework from Chapter 2. The emergence of psychic distance will be discussed and related to the knowledge sharing practices and the team's socialization and general lifecycle. The results will be considered in reference to the research questions stated in Chapter 1, and the significance of psychic distance will be evaluated in relation to the knowledge sharing practices of virtual teams. After analysing the data and reassessing the analytical framework, the theoretical contributions and practical implications of the research will be presented. Lastly, suggestions for future research endeavours will be given.

5.1 Re-assessment of the analytical framework

The purpose of this research was to investigate the significance of psychic distance in the intra-team knowledge sharing processes of virtual teams. The study has been conducted as a case-study, concentrating on four virtual teams within a multinational organization. Seventeen semi-structured interviews were conducted in order to gain information on the communication and knowledge sharing experiences of individual members of virtual teams. From the empirical interview data, four central themes were discovered in relation to the knowledge sharing experiences of the interviewees. These were the variances in communication habits, the significance of team-level interaction in the construction of a collective identity, the challenges related to the socialization of distant newcomers and finally, the lifecycle development of the team as a whole.

The results of the study have been shortly summarized in **Table 5** below. The table shows the main themes that emerged from the empirical evidence and how these themes related to psychic distance (column A) and to knowledge sharing (column B). Lastly, column (C) identifies the stage of a team's socialization lifecycle that best reflects the challenges associated with each emerged theme. In the following section, each theme will be discussed individually in more detail, relating it to the concept of psychic distance, to its potential implications on knowledge sharing and its link to the team's lifecycle.

Table 5 Summary of the results

Theme	(A) Connection to psychic distance	(B) Implication on knowledge sharing	(C) Reflection on the socialization lifecycle stage
Variance in communication habits	A manifestation of psychic distance between individual team members	Negative: Restricts knowledge sharing and the creation of shared mental models by limiting the flow of information and the construction of a mutual understanding	Introduction
Creation of a collective identity through team-level interaction	Potential to reduce psychic distance	Positive: Knowledge sharing can improve if psychic distance is lowered through team-level interaction	Build-up
Challenges in the socialization of individual distant newcomers	Increased interaction between newcomer and trainer reduces the psychic distance from newcomer to trainer.	Positive: Newcomer has a contact person to facilitate knowledge sharing. Negative: Trainer's workload increased due to increased interaction with newcomer. Increased strain may have negative impacts on knowledge sharing.	Renewal
Team socialization lifecycle	Psychic distance reduced due to team-level socialization	Knowledge sharing and communication improvements need team-level actions.	---

The first theme, variances in communication habits, described the team members' differing preferences for communicating with their distant colleagues. Individual team members experienced linguistic barriers as well as challenges related to the cultural background and the varying norms of communicating in different cultures. While some interviewees preferred more asynchronous communication methods that allowed the transfer of "hard knowledge", other

interviewees placed greater value on synchronous communication methods, more focused on sharing "soft knowledge". These differences in communication preferences can be connected to cultural variances as well as individual preferences and hence may be a manifestation of the psychic distance between individual team members. Communication methods seemed to be at least partly determined by the underlying cultural values of the individuals. As Sousa and Bradley (2006, p. 53) analyse, culture is one of the components of psychic distance. Therefore, the existence of cultural differences can be a sign of existing psychic distance between individuals. The results of this research indicate that the cultural backgrounds of the team members can have an impact on individual members' values, which can lead to varied communication preferences between individuals, indicating the existence of psychic distance between team members. Particularly so, if individual team members perceive themselves as different from their distant colleagues based on their varying communication preferences.

Varying communication habits between individuals could also restrict the intra-team knowledge sharing between members of virtual teams. Some interviewees expressed feelings of dissatisfaction due to the differing communication habits of their distant team members. As such, psychic distance could be perceived to limit knowledge sharing between distant team members. Varying communication styles and preferences can restrict the acts of providing and seeking information between individuals, which in turn can limit the formation of a mutual understanding between the locations. Related to the socialization processes of newcomers, Ahuja and Galvin (2003, p. 175) suggest, that newcomers in virtual teams need to take an active role in seeking information related to the norms of the team. However, as seen in the case organization, varying communication methods can limit this exchange of information between individuals. As differing communication preferences could restrict interaction between distant team members, it could also inhibit the formation of shared mental models, for which interaction is a critical component (Levesque et al., 2001, p. 136; Mohammed & Dumville, 2001, p. 93).

The challenges caused by the individuals' varying communication habits are also characteristic of the introduction stage of Oshri's socialization framework and can therefore be linked to the team's lifecycle. According to Oshri and colleagues (Oshri et al., 2007, p. 42) the emergence of communication challenges is normally at its highest in the introduction phase when the team is established. Team members experience challenges in cultural differences and language barriers (Oshri et al., 2007, p. 42). Similarly, Furst and colleagues (Furst et al., 2004) describe

the forming, storming, norming and performing lifecycle of virtual teams. They emphasize that the early stages of a virtual teams are difficult, as members lack the frequent and informal interaction that is present in most co-located teams. The formation of trust between team members plays a significant role in the team's communication. While in co-located teams trust is formed through social and emotional ties, in virtual teams the formation of trust requires more tangible actions, such as common ways of communicating and keeping up with agreements and timetables. (Furst et al., 2004, p. 8.) Therefore the challenges related to the communication methods are at their highest when the team members are still in the process of creating cohesion and negotiating shared ways of working together.

The second theme from the empirical evidence was the use of team-level interaction to construct a collective identity. Team-level interaction was discussed in reference to team meetings by teleconference and the use of OSM. Both of these were seen as ways to increase communication and enhance the mutual understanding between distant team members. Team meetings provided a formal venue for sharing information, interacting with team members and an opportunity for team members to share their expertise. These interactions between team members help to create a shared understanding of the team's goals and the way they will reach these goals (Levesque et al., 2001, p. 136) and, as mentioned previously, are closely linked to the construction of shared mental models (Van den Bossche et al., 2011, p. 284). In addition to team meetings, OSM was significant in improving the interaction between team members. OSM provided team members with a virtual venue for sharing informal information and creating collective knowledge, while providing also the opportunity to react and give public feedback to information shared by others. OSM then acted as a substitute for informal face-to-face interaction between team members. OSM also aided in passing on low-level information more effortlessly than with traditional virtual communication methods.

Interviewees valued informal interaction and felt that they could get to know their colleagues better by interacting with them in an informal setting. Informal interaction was created at the team-level through the use of OSM and collective teleconference meetings, though all teleconference team meetings were not considered as informal venues. The attempt to acquaint and familiarize with distant colleagues through informal interaction may be a way for the team members to lower the psychic distance between each other. Communication between individuals can help to increase the cognitive salience of the distant team members and lead to easier cognitive elaboration of distant team members (Wilson et al., 2008, p. 985). It can also

be linked to the mere-exposure effect, discussed by Håkanson and colleagues (Håkanson et al., 2016, p. 316). Based on the mere-exposure effect, repeated exposure to certain objects (or individuals) will make them more appealing (Håkanson et al., 2016, p. 310). As such, repeated interaction creates exposure, which in turn can reduce the psychic distance between the individuals. Individuals expressed a need to lower the psychic distance between each other by increasing informal interaction and saw a clear connection with informal interaction and the improvement of collaboration within the team.

Furthermore, interaction and familiarization with distant team members can also be linked to uncovering of interpersonal similarities between individuals. As virtual team members exist and operate at a distance from each other, they do not have the regular exposure to their team members that co-located teams enjoy. When team members are co-located, they are inadvertently exposed to each other, and thus may rather effortlessly get to know each other. Since members of virtual teams do not automatically have an opportunity for such interaction, these interactions need to be created "artificially". Research has shown that interpersonal similarity can be linked to knowledge sharing (Makela et al., 2007, p. 7). Furthermore, frequent interaction is a way to identify these similarities between individuals (Furst et al., 2004, p. 8). Through informal interaction team members can familiarise with each other and find similarities that improve the cohesion of the team. This helps in the construction of a collective identity that binds the team members together and gives them a clear direction in their work (Furst et al., 2004, p. 15). Cohesion and shared commitment are particularly important in virtual teams, where team members are separated from each other. Dispersed members of virtual teams may be particularly prone to the pressures from local co-existing teams. A collective identity within the team can help team members to commit to the task from a distance.

Leadership was a significant factor in the initiation and maintenance of interaction between team members. While most of the interviewed team members recognized the positive results of interaction, most also took a passive role in organizing interaction. Interviewees also expressed hopes that their team leader would arrange more interaction between the team members. This demonstrates the significant role that leadership plays in improving knowledge sharing between team members. In addition, this may be a reflection on the organizational knowledge sharing culture of the company. If the perception of team members is that managers might consider the informal interactions between team members negatively as a cost instead of a benefit, individuals may be reluctant to take an active stance in creating such interactions. Team

members look to the team leader for their approval, and hence take a more passive stand in arranging these interactions. Such an observation emphasizes the role leaders hold in the reduction of psychic distance between team members in an effort to enhance knowledge sharing. Therefore, the leader's role can be observed as particularly significant in influencing the culture of the team and organization in order to advance knowledge sharing.

In relation to the team's socialization lifecycle, the use of team-level interaction in the development of a collective identity reflects characteristics of the build-up phase of Oshri's (2007) framework. Team members utilize "intensive interpersonal interactions" in order to advance the socialization of the team (Oshri et al., 2007, p. 42). Interaction helps team members to familiarize with each other, to their ways of working and to share information and expertise. In the build-up phase, team members work through conflicts and create common norms for their work (Oshri et al., 2007, p. 42). Conflicts commonly associated with the early stages of the team development can be prolonged as communication is conducted mostly through electronic means (Furst et al., 2004, pp. 8–9). In the case organization individuals experienced challenges due to varying methods of communication between team members. This was particularly evident in the most recently established team, where team members had difficulties in relating to each other's contexts and understating their distant colleagues communication attempts.

The third theme that emerged from the empirical data was related to the challenges that the team members experienced in terms of the socialization of distant newcomers. Individuals described the physical challenges of being located apart from each other, as well as the social challenges resulting from the individual burden of training and socializing distant colleagues. In terms of the physical challenges, no clear link can be made between psychic distance and the challenges to training distant colleagues. It would seem that the challenges related to the physical distance were just that; the physical distance alone acted as a restricting factor in the knowledge sharing between distant team members. However, trainers also described social challenges of training newcomers, more specifically the imprinting of distant newcomers to their trainers and the burden and time management issues that resulted from acting as a trainer. During the socialization of newcomers, the trainers inadvertently acted as a link between the newcomer and the rest of the team. The distant newcomers referred to their familiar trainer for most, if not all of their communication needs. This may reflect a reduction in the newcomer's psychic distance towards their trainer. Trainers were often the only people that the newcomers

had physically met and they provided a natural link to the rest of the team. Based on this, the psychic distance between individual team members may be impacted by the socialization processes of the organization. Psychic distance could be reduced as the socialization processes increase the newcomer's cognitive salience and cognitive elaboration of the trainer. Oshri and colleagues (2007, p. 42) suggest administering a contact person to newcomers during the socialization process, in order to aide in sharing knowledge between the team and the newcomer. However, as observed in this case study, individual trainers who acted as a contact person between the newcomer and the team, considered this task a great burden and described the lack of support in conducting the task. The experiences of the trainers are also an indication of the asymmetry of psychic distance between two individuals (Håkanson et al., 2016). While the trainee's psychic distance to the trainer was lowered, simultaneously the trainer's psychic distance to the trainee was not reduced to the same extent. This resulted in difficulties in communication between the two individuals.

In terms of the team's socialization lifecycle, the challenges associated with the socialization of newcomers reflect the characteristics of the renewal stage of Oshri's socialization framework. As Ahuja and Galvin's (2003, p. 162) research indicated, newcomers had particular difficulties in obtaining knowledge related to the team's norms. Such information is difficult to obtain through virtual methods as it would normally be information that newcomers in co-located teams acquire through observation (Ahuja & Galvin, 2003, p. 175). Similar challenges were witnessed in the empirical data of this research. Newcomers had difficulties in adjusting to the norms of their distant team members in terms of the communication methods and frequencies. Ahuja and Galvin (2003, p. 175) also suggested that passivity in providing information by the more experienced team members may be related to the costs of the time utilized in providing information. This experience of the long- and short-term benefits and the cost of training distant newcomers was particularly tangible in the empirical evidence of this research. Senior team members described their frustrations related to the communication difficulties with their distant newcomers. Communication between distant individuals was sometimes seen as a "cost" on the time available for the trainer's other tasks. As newcomers enter the team, the team composition and the dynamic of the team is altered. This creates a need for a renewal of the team's communication methods and objectives of their work. As Oshri and colleagues (2007, p. 42) highlight, a renewal of the team's socialization processes is required in order to maintain a shared understanding between team members as time progresses. As the team members leave and enter the team through natural turnover and tasks and objectives of

the work evolve, team members need to renew the objectives of their work and the methods to pursue those objectives. This includes re-establishing the ways of communicating, team member's roles and objectives of their work.

An interesting finding from the empirical data was the link between the team lifecycle and the development of psychic distance. The teams selected for this study were at different stages in their lifecycle. This allowed the possibility to note distinctive attributes in communication and interaction based on the team's lifecycle stage. The results of the study were connected to Oshri and colleagues' (2007) framework of virtual team socialization and the development of communication and interaction with the team. The attributes observed at different stages of a team's lifecycle can be related to the existence and changes in psychic distance within the team. The results indicate that psychic distance between team members develops and is reduced based on the lifecycle of the team. The different stages of development could be clearly identified from the empirical data based on the team member's challenges in communication. The empirical evidence suggests that psychic distance is reduced on an individual level as part of the socialization process, as well as on the team-level throughout the lifecycle of the team. It is possible that interaction plays a key role in lowering the psychic distance between team members of virtual teams. However, the evidence does not distinguish whether the reduction of psychic distance is the result of developments in the team's lifecycle, or whether it is the antecedent for the team in moving along in the lifecycle.

The objective of this research was to investigate the significance of psychic distance in virtual team knowledge sharing. In evaluating the significance of psychic distance, the research paper outlined the knowledge sharing challenges experienced by members of four virtual teams. Additionally, the research paper has focused on interaction and socialization in virtual teams, and the relationship of these processes to the development of psychic distance. The empirical data from the case study indicates that psychic distance is a significant factor in virtual teams. However, the link between psychic distance and knowledge sharing is complex, not the least due to the multidimensionality of both of the concepts. Psychic distance is affected by a multitude of factors, both external and internal to the individual. Meanwhile, knowledge sharing is also a complex topic, affected by many different aspects of intra-team dynamics. Some examples of such dynamics are interaction between team members, interpersonal similarity and team member socialization. Based on this research, it would seem that the tie between psychic distance and knowledge sharing is significant in that many of those factors

that improve knowledge sharing can also have the potential to reduce the psychic distance between individuals. An example of this was the increased interaction between team members and its effects on reducing psychic distance. This was seen on team-level interaction as well as on individual-level interaction in the case of newcomers and their trainers. Another example is the socialization of team members and its effects on reduced psychic distance. Socialization requires interaction and communication which can lead to reduced psychic distance.

However, the results do not definitively indicate whether reduced psychic distance is the antecedent or the result of knowledge sharing. The results of this research suggest, that interaction between individuals is in connection to improved knowledge sharing and reduced psychic distance. However, it is unclear whether the team's interaction decreases the psychic distance between dispersed team members, and hence knowledge sharing within the team is improved or whether team-level interaction results in increased knowledge sharing between team members which, in result reduces the psychic distance between team members. One possible explanation for the results is that as the team members interact with each other, their perceptions of each other's differences reduce and the psychic distance between team members decreases.

However, the results also indicate that increased psychic distance caused tensions in the communication between team members. Different perceptions of the objectives of communication and knowledge sharing can mean that distant team members drift into conflicting situations. These conflicting situations resulted in actively reduced communication between team members. This was seen quite clearly in one of the teams, where team members had taken action to reduce communication from their distant team members by prohibiting contact on certain topics. Based on the assumption that psychic distance is reduced though interaction, the potential conflict situations that result in reduced communication can be a threat to the reduction of psychic distance between distant team members, and therefore to the knowledge sharing practices of the team. Overall, the results of this research suggest that reducing psychic distance between team members can hold significant implications for the performance of virtual teams.

5.2 Theoretical contributions of the research

This research makes a unique contribution to the large body of research on virtual teams by connecting the two siloes of psychic distance research and the research on the knowledge sharing processes of virtual teams. These two fields have remained mostly unconnected in prior research. Psychic distance research has been mainly related to the internationalization decisions of firms (Magnusson et al., 2014, p. 284), and has barely been discussed in terms of virtual teams. However, the elements present in virtual teams are often closely related to those present in the internationalization activities of firms. In the internationalization processes, psychic distance has been regarded as a restriction to the internationalization decisions and actions of individual managers (Sousa & Bradley, 2006, p. 62). Similarly, psychic distance can be seen as a factor that restricts the communication between dispersed members of virtual teams. This important connection between psychic distance and intra-organizational relations introduces the need for a deeper understanding of the concept of psychic distance. It highlights the need for researchers to find new ways to evaluate the existence of psychic distance in order to improve intra- and inter-organizational communication and organizational knowledge sharing. In addition, in today's organizations the divide between intra- and inter-organizational actors is becoming more and more blurred. Companies are outsourcing operations, and organizational members are required to interact with different types of partners, team members, customers and mixtures of these elements. Understanding the underlying impacts of psychic distance is essential in this new environment.

The research follows the suggestions of Sousa and Bradley (2006, p. 52) in studying psychic distance on the individual level. As many studies on psychic distance, this research too, recognizes the connection between culture and psychic distance. According to the results of this research, culture seems to be one component which can affect the psychic distance between individuals. However, it would seem that the cultural implications on psychic distance could be reduced through active interaction and communication between individuals. Teams that communicated frequently experienced less conflicts in communication habits between locations. Thus team-level interaction seemed to affect the knowledge sharing and communication positively. Therefore, this research supports the notion of Sousa and Bradley (2006, p. 53), that actions on the individual level can be used to reduce psychic distance between

individuals. Interaction between team members on both individual- and team-level were perceived to decrease the psychic distance between team members.

Magnusson and others (2014, p. 301) suggest that psychic distance can create awareness of the differences between individuals. This heightened awareness in uncertain situations can be the cause for positive ramifications of psychic distance (Magnusson et al., 2014, p. 301). The results of this research contradict the notion that psychic distance in itself could result in positive effects on communication and knowledge sharing between distanced team members. On the contrary, as seen with the variance in communication preferences, psychic distance between individuals caused challenges and conflict in communication. While individuals recognized each other's differences in communication habits, this did not seem to ameliorate the challenges that they experienced. Psychic distance in itself does not seem to create awareness of the differences, but instead the communication and interaction between individuals may improve their understanding of each other's contexts and reduce the challenges in knowledge sharing. This research suggests that psychic distance is reduced when individuals communicate, interact and become aware of not only each other's differences, but also the underlying similarities which would not become apparent without interaction.

In terms of knowledge sharing, the research supports existing studies, which suggest team member interaction to be a significant factor in knowledge sharing (Alavi & Tiwana, 2002, p. 1032). This research highlights the importance of leaders in arranging opportunities for team members to interact in virtual teams. Teleconference team meetings and the use of organizational social media were seen as effective ways to interact with team members, but often seemed to require managerial coordination. OSM allowed team members to interact individually and as a group, despite the challenges of time zones and differing work schedules. Regular team meetings created team-level interaction and team cohesion, both of which act to advance knowledge sharing between team members. In addition, the research connects interpersonal interaction to the reduction of psychic distance, which has not been discussed in past literature. Hence, this research acts as an initiator for more research into this direction.

This research also explores a new angle in organizational research by connecting psychic distance to a virtual team's socialization processes and the team's lifecycle development. The results suggest that the virtual team's lifecycle and level of socialization are factors affecting the degree of psychic distance between individuals. The results support Oshri and colleagues

(2007) three staged framework for socialization, suggesting that members of virtual teams go through stages of negotiating and establishing ways of communication and collaboration within the team. The results also connect the degree of socialization to reduced psychic distance based on team-level interaction and knowledge sharing. The connection between psychic distance and the team's lifecycle is a particularly significant contribution in terms of permanent virtual teams. Prior literature has often focused on virtual teams as temporary arrangements. However, a significant portion of the virtual teams today exist on a permanent basis. It is important to recognize that after the establishment of a virtual team, it's communication and interaction processes are not static. The interaction between team members is a dynamic process, changing continuously based on the team's evolving composition. The research takes steps in recognizing the effects of the team's lifecycle phase in relation to socialization and psychic distance. Such a connection has not been established or investigated in prior research, and therefore may be a significant factor in understanding the psychic distance between members of virtual teams.

While the connections made in this research still require more investigation, overall the research provides meaningful steps in advancing the research on virtual teams and stepping away from the heavily covered topics of physical distance and its effects on virtual teams. Physical distance does not capture the full extent of virtual teams as a dynamic group of individuals. Furthermore, highlighting physical distance suggests that virtual teams are inherently at a disadvantage to traditional co-located teams. Introducing the concept of psychic distance to virtual team research is a step recognizing the social aspects of virtual team work and finding ways to take advantage of these social aspects.

5.3 Practical implications of the research

This research suggests that while psychic distance may impact the knowledge sharing processes of virtual teams, it may also be affected and reduced by targeted actions within the organisation. One significant factor seems to be the interaction between team members. The study demonstrated that both team-level interaction and individual interaction could have an impact on reducing psychic distance between members of virtual teams. If such is true, organizations could be well worth in trying to increase and improve the level of interaction between members of virtual teams.

In advancing interaction, the role of management can be seen as significant. Management can promote team-level interaction through two different mechanisms. They can arrange for venues for interaction, such as team meetings and other gatherings where team members can interact and share information. Particularly informal interaction held a significant role, as it helped the team members to build relations and social ties with their distant others. This in turn will promote communication and knowledge sharing between the locations. In addition to taking actions in arranging these interactions, the management can contribute to the organizational knowledge sharing culture by promoting interaction and leading by example. Managers can thus implicitly convey their approval for informal interaction between team members in order to advance knowledge sharing.

As Sousa and Bradley suggest (2006, p. 60), since psychic distance is an individual level construct it can be impacted by actions that target the individuals. Magnusson (2014, p. 302) suggests the use of cross-cultural trainings in order to create interaction and explicit knowledge about cultures. Oshri and colleagues (2008, p. 610) also suggest trainings in order to construct a shared language and understanding between the teams. Allowing team members to communicate and interact in different ways helps to create a cohesive and mutually understanding team of individuals. Trainings of all sorts which improve interaction between team members could reduce psychic distance and improve knowledge sharing between team members. Additionally, Ocker and Fjermestad (2000, p. 8) suggest that the quantity of communication between team members plays an integral role in the success of virtual firms. Communication between team members and location should be encouraged, and manager's should take an active role in promoting intra-team communication and knowledge sharing.

In terms of deepening the level of socialization within the virtual team, both Oshri and colleagues (2007, p. 42) and Furst and colleagues (2004) have highlighted the importance of face-to-face interaction. Face-to-face interaction between dispersed team members can help to create social ties and stronger bonds between dispersed individuals. Face -to-face interaction plays also a significant role in the development of the team's shared communication methods and ways of conducting their work. Borgatti and Cross (2003, p. 441) suggest that alternative interaction to face-to-face communication can also help in the development of relationships that enhance knowledge sharing and access to knowledge. The utilization of video conferencing facilities or photos can also help distant team members to recognize their colleagues and help retain information related to the expertise of each team member. Simple solutions such as using

a facial image on the instant messaging profile can help the distant team members to recognize the caller and associate them to certain expertise. This could be particularly helpful for distant newcomers, who seem to be challenged in collaborating with their team members in other locations.

In terms of the socialization of distant newcomers, Oshri and colleagues (2007, p. 42) suggest the utilization of contact persons and "mini-teams". When using single contact persons for newcomers, managers should provide support in terms of time management. Training and socializing distant colleagues can consume excessive amounts of time as seen in this study. This can negatively impact the willingness of team members to act as trainers and to provide information to the newcomers. "Mini-teams" may be a good alternative for single contact persons, as they can assist in dividing the task of socializing distant team members among several individuals. This will reduce the individual burden that can be experienced by those with the responsibility of training and socializing distant newcomers. It can also help to reduce the psychic distance between the newcomer and their distant colleagues, thus advancing knowledge sharing within the team.

In terms of advancing the organizational knowledge sharing culture, it is important that team members feel permitted to take part in informal interaction with their colleagues. In the case organization, the planning and mobilization of the OSM was implemented by the team members themselves. As team members were able to take part in planning how the team utilizes the OSM functionalities, it may act as a tool for the team to negotiate on the ways of intra-team communication. This will help the team in achieving a deeper level of socialization through common action. Furthermore, the construction of common communication methods may act to empower team members in sharing knowledge and interacting without managerial direction or coordination. Such may help to promote a positive knowledge sharing climate within the team.

5.4 Suggestions for future research

This research raises several topics that may be fruitful for future research purposes. In terms of team level interaction, the research indicates to some valuable further research potential. Future research endeavours could help to establish a clear connection between interaction and psychic distance. While this research suggests that intra-team interaction can help to reduce psychic

distance, future research endeavours could investigate how different forms of interaction impact psychic distance in virtual teams. Virtual teams utilize a number of different methods to interact with each other and understanding which methods of interaction create the most significant changes in psychic distance could be a valuable contribution to the research on virtual teams.

According to the results of this study, team members valued team meetings as a source of team-level interaction. Future studies could benefit from concentrating particularly on the effects of informal team-level interaction on the development of psychic distance. As this study indicates, informal interaction could improve team cohesion, the creation of social ties and ultimately affect knowledge sharing within virtual teams. These ties should be evaluated more closely through future research. Additionally, with the emergence of various organizational social media applications, researchers could further evaluate how these have affected the sharing of informal information within virtual teams. Such studies could provide valuable information not only in relation to the improvement of communication within virtual teams, but also give suggestions on how further OSM applications could be developed to help these teams conduct their tasks.

The relationships between psychic distance and knowledge sharing in virtual teams has only been scratched. Most prior research insinuates challenges that psychic distance may cause, but the relationship between knowledge sharing and psychic distance is still somewhat hazy. In order to evaluate the effects of psychic distance on virtual teams more closely, a quantitative study should be conducted, where psychic distance is evaluated based on its multiple antecedents. Only when the multidimensionality of psychic distance is taken into consideration, it's effects can be comprehended.

Lastly, the study of psychic distance in virtual teams could greatly benefit from a long-term longitudinal study of the social ties in permanent virtual teams. A longitudinal study could provide a clear link between the virtual team's lifecycle and the changes in psychic distance between individuals. The results of this study suggest that there is a link between a reduction of psychic distance and the team's lifecycle development. However, establishing such a connection would need more detailed research. As team members interact and social ties develop, what happens to individual perceptions of psychic distance? Such studies could shed light on the relationship between a team's lifecycle and psychic distance and give an indication of whether psychic distance is something that inherently decreases based on the team's

developmental stage. Such a longitudinal study of virtual team's lifecycle could also introduce completely new theory since the lifecycles of virtual teams have not really been studied aside from the framework of socialization provided by Oshri and others (2007) and Furst and colleagues (2004). While the study on virtual teams is extensive, the introduction of psychic distance can bring forth a multitude of new research directions, and the concept's relation to intra-team communication should be further evaluated.

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APPENDICES

APPENDIX 1: Interview Guide for Managers/Team leaders

"The interviews will be conducted anonymously. While the interview is recorded, this is only to assist in the note taking process. Once the interview recording has been transcribed, the recording will be destroyed (1-3 days after the interview). All information will be treated anonymously, and the company name, team names, interviewee names, nor anyone else mentioned during the interview, will not be explicitly discussed in the research paper. Transcriptions will also be done by these standards, and all names will be dis-included from the notes."

Instructions for the interviewee:
- I will ask interview questions which I have formulated before-hand. Please answer them as extensively as you can.
-Please let me know if you do not understand the question, I can rephrase the question.
- Some questions may seem quite open and broad, please answer what you feel is most relevant for the topic. There are no right or wrong answers, I want to know what you think about these things.

1. As you know, my research topic is related to virtual teams, where team members are located in more than one location. Could you please briefly elaborate on how virtual teams are used in your organization and why?

2. What do you see as the greatest benefits of using virtual teams in your organization (opposed to traditional teams)?

3. According to your experience, what kinds of things affect the success of virtual teams?
    a. *What do you feel should be considered when managing teams with members dispersed in multiple locations?*

4. What do you see as the biggest challenges in the virtual teams in your organization at the moment?
    a. *What kinds of actions has the organization taken (or is planning to take) to overcome these challenges?*

5. Could you tell me more about how information is shared within the virtual teams in your organization?
    a. *Are there challenges in sharing information?*
    b. *Could you please elaborate on what type of information is particularly challenging to share?*
    c. *Could you provide some examples?*

6. What kinds of tools do you have in-use for sharing information?

   a. *E-mails, instant messages, social media, other tools?*
   b. *What purposes do these different tools serve?*

7. Have you established rules or standard processes for sharing information?
   a. *Could you please elaborate on these?*
   b. *e.g. e-mail codes of conduct etc.*

8. Would you say that a sufficient amount of trust exists between team members in the virtual teams in your organization?
   a. *Please elaborate on what types of things have resulted in this?*

9. What kinds of actions does the company take in order to facilitate the sharing of information in dispersed teams?

10. This is the end of the interview. Is there anything else that you would like to add or anything that I have left out?

11. Thank the interviewee

APPENDIX 2: Interview Guide for Team Members

"The interviews will be conducted anonymously. While the interview is recorded, this is only to assist in the note taking process. The recording will be destroyed at the end of the research. All information will be treated anonymously, and the company name, team names, interviewee names, or anyone else mentioned during the interview, will not be mentioned in the research paper or the transcriptions."

Instructions for the interviewee:
- I will ask interview questions which I have formulated before-hand. Please answer them as extensively as you can.
-Please let me know if you do not understand the question, I can rephrase the question.
- Some questions may seem quite open and broad, please answer what you feel is most relevant for the topic. There are no right or wrong answers, I want to know what you think about these things.

NOTE: For the interview questions, the sub-questions in italics are supporting questions that are only to be used if the interviewee is unable to understand or elaborate enough on the original question.

1. Could you please tell me a little about the type of work that you do and the team that you are working in?
    a. *How many people are in the team?*
    b. *Where are the team members located? How many team members in each location?*
    c. *Have you met all of your team mates face-to-face?*
    d. *Have you visited the other locations or have your team mates visited your location?*
    e. *What does your job entail?*
    f. *What role do you play in the team?*
    g. *How long have you been part of this team?*
    h. *How long have you worked for this company?*

2. Do you know your team mates on a personal level?
    a. *At your own location/ in other locations?*

3. Which of your team mates do you feel closest to?
    a. *Why is that?*
    b. *Where are they located?*
4. Which of your team mates do you feel farthest from?
    a. *Why is that?*
    b. *Where are they located?*

5. How would you describe your team in general?
        i. *(In terms of closeness, trust, atmosphere etc.)*

6. What do you think about the level of trust within your team?
    a. *Sufficient or need for improvement?*
    b. *Why?*

7. Let's discuss how information is communicated within your team. Tell me about the ways that communication and sharing of information takes place in your team?
    a. *What tools do you use to communicate?*
    b. *How often do you interact with your different team mates?*
    c. *What things make it easy or difficult to communicate with your team mates?*
    d. *How are new ideas and best practices shared within your team?*
    e. *How do your ways of communicating differ when thinking about those who are physically distant from you and those who work in the same office? (Methods/Tools + Frequency*
    f. *How do you feel these ways of communicating affect the team's ability to complete its tasks?*
    g. *How do you think the communication and sharing of information within your team could be improved?*

8. Could you please describe to me a typical situation where you shared information with your team?
    a. *Is it difficult or easy to share information with your team?*
    b. *Why? What kinds of things do you need to consider when sharing information with your team mates?*
    c. *Do your team mates contact you for help or advice? **How** does this usually happen?*

9. When you have a problem, or you need to obtain information from your team mates, what do you do?
    a. *Could you describe a recent situation where you tried to obtain information from your team mates?*
    b. *Were you successful? Was it difficult or easy? What was difficult/easy about it?*
    c. *How do you decide **who** to ask?*
    d. *Is it easy or difficult to know **who** to ask? Why do you think that is so?*

10. Do you feel that your team mates in other locations understand you?
    a. *Why do you think so?*
    b. *How does this affect your work? (doing your job)*
    c. *If no; what do you think could be done to improve the situation?*

11. In general, what kinds of challenges or benefits have you experienced in relation to working in virtual teams?
    a. *"Free word"*

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12. Ending the interview

a. *Is there anything else that you would like to add?*
b. *Was there anything that you expected me to ask you about that was left out?*

13. Thank the participant