Improving geographically distributed collaboration by transforming people’s implicit theories through experiential learning activities

PhD dissertation

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“To be wise is not to know particular facts but to know without excessive confidence or excessive cautiousness. Wisdom is thus not a belief, a value, a set of facts, a corpus of knowledge or information in some specialized area, or a set of special abilities or skills. Wisdom is an attitude taken by persons toward the beliefs, values, knowledge, information, abilities, and skills that are held, a tendency to doubt that these are necessarily true or valid and to doubt that they are an exhaustive set of those things that could be known”

Meacham (1983, p. 187)
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I hope you enjoy reading this dissertation.

Rikke.
Dansk Resumé

Globalt samarbejde er hverdag for nutidens mange multinationale selskaber, og studier i globalt computer-medierte samarbejde udgør et centralt fokus indenfor forskning i informationssystemer. Parallelt med de mange globale muligheder og de nye teknologier materialiserer der sig ligeledes nye spørgsmål og udfordringer. En særlig udfordring i globalt samarbejde er relateret til team medlemmers opfattelse af det globale arbejde, og de måder, hvorpå tæt koblet samarbejde er muligt på tværs af geografisk afstand. Indsigten i de perspektiver som team medlemmer bringer ind i globalt arbejde kan være særdeles nyttig i forsøget på at forstå deres kollaborative adfærd samt de begrænsninger og muligheder, som de oplever knyter sig til denne arbejdsform. I undersøgelsen af hvordan team medlemmers grundlæggende perspektiver guider deres kollaborative adfærd i globalt arbejde, bygges der på begrebsrammen “implicitte teorier”, forstået som antagelser om den grundlæggende karakter af globalt virtuelt samarbejde.

Denne afhandling er dedikeret til en udforskning af, hvordan man kan udvikle geografisk distribueret samarbejde ved at udfordre og ændre folks implicitte teorier om globalt arbejde igennem brugen af en erfaringsbaseret læringsstilgang.

For at undersøge dette forskningsspørgsmål, tages der udgangspunkt en multimetodisk kvalitativ tilgang som bygger på etnografiske såvel aktionsforskningss metoder. Teoretisk er afhandlingen fundet i litteraturen om globalt samarbejde; grænser i globalt arbejde; implicitte teorier; transformation af globalt arbejde samt erfaringsbaseret læringssteori. Forskningsprojektet blev gennemført fra januar 2012 til oktober 2013 i en global forsknings- og udviklings afdeling (R&D) i den multinationale pumpeproducent Grundfos. Grundfos har i løbet af de seneste årter gennemgået løbende globalisering og målet har været at styrke og inddrage datterselskaberne mere og mere særligt i et globalt samarbejde omkring udviklingen af nye produkter. Grundfos’ globale samarbejde i R&D har således været kontekst og kilde til dataindsamlingen og interventionerne i forsknings projektet.

Afhandlingen bidrager til tre forskningssområder. For det første bidrager den til en nuanceret forståelse af hvordan globale team medlemmers fikserede implicite teorier om distribueret samarbejde i sig selv kan udgøre en udfordring for globalt arbejde. Det argumenteres, at fikserede implicite teorier kan udgøre faste stereotyper om distribueret samarbejde, der guider og fastholder en adfærd, som strider mod succesfulde samarbejdspraksisser. For det andet, bidrager
afhandlingen til en forståelse af, hvordan man kan udvikle distribueret samarbejde ved at transformere disse fikserede implicitte teorier til mere plastiske implicitte teorier igennem en fire-faset transformations proces der bygger på erfaringsbaserede læringsaktiviteter. For det tredje argumenteres det for, at en sådan transformations proces, der understøtter et iterativ læringsforløb for organisationen, kan have langsigtet effekt, og der formuleres nogle vejledende principper for at vurdere langsigtede forandringer i actions forskningsprojekter. Tilgangen kalder vi for "Relationel Udgravning" forstået som en systematisk data konstruktion og analyse. Yderligere diskuteres afhandlingen implikationer for forskningen ved at indføre tre sæt teoretiske relationer: (1) forholdet mellem distribueret samarbejde og implicitte teorier; (2) forholdet mellem implicitte teorier og erfaringsbaseret læring, og (3) forholdet mellem distribueret samarbejde og erfaringsbaseret læring. Endelig diskuteres de praktiske implikationer for dette forskningsprojekt.
Abstract

Today working globally is the new norm for many multinational companies. New possibilities for global work, new technologies, new questions and new challenges also materialize with that new norm. One key challenge in global collaboration is people's perceptions of global work and the ways in which closely coupled collaboration is possible across geographical distance. Understanding the perceptions people have in regard to distributed collaboration can be particularly useful in order to understand the challenges of global work. Further, understanding the perceptions people have in regard to their work provides a means for transforming individual’s perceptions of distributed collaboration. This Industrial PhD project takes its starting point in the perceived challenges experienced related to the global collaboration in an international engineering company of Danish origin with subsidiaries in China, US, and Hungary: Grundfos. The PhD thesis is dedicated to exploring how to improve geographically distributed collaboration by transforming people’s implicit theories about global work utilizing the practical experiential learning of concrete collaborative activities.

To investigate this research question, this thesis takes a multi-method qualitative approach bringing together ethnography and action research that applies experiential learning as a strategy for interventions. Conducting research in close relationship with real-life organizations creates a unique opportunity to develop new scientific insights about distributed collaboration while solving practical problems experienced within the organisation. Guided by the research question in combination with the practical needs and interests of Grundfos, the PhD research project introduces a theoretical orientation highlighting the intersections between three research areas: distributed collaboration grounded in Information System research, implicit theories grounded in Social Cognitive Psychology, and finally experiential learning grounded in Educational Theory.

The findings of the PhD thesis add to three research areas of concern. First, the thesis adds to the areas of concern related to understanding the challenges concerning people’s perception in distributed collaboration, which existed within Grundfos prior to any interventions. Here the thesis argues how people’s perceived boundaries about distributed work impact the collaborative practices in global work, as well as how team members risk creating fixed implicit theories about distributed collaboration which are contrary to improving the distributed work practices. Second, the thesis adds to the area of concern related to improving distributed collaboration by transforming people’s fixed implicit theories on global work through planned interventions which
were actively carried out as part of the PhD thesis work in Grundfos. Here, it is argued that transforming the fixed implicit theories to more incremental implicit theories are best done through a four-stage transformation model building on experiential learning principles. Third, the thesis argues that such interventions can have impact on a longer term and guiding principles are formulated in order to evaluate long-term impact of action research. This approach is named “Relational Excavation” as a systematic data construction and analysis rethinking how to conduct long-term evaluation of action research impact. Further, the PhD thesis presents contributions and impacts for research by introducing three sets of theoretical relations: (1) the relation between distributed collaboration and implicit theories; (2) the relation between implicit theories and experiential learning, and (3) the relation between distributed collaboration and experiential learning. Finally, implications for practice are also suggested by this research.
PART 1

SUMMARY REPORT
1. Introduction

This PhD dissertation is based upon an industrial PhD programme funded by the Innovation Fund Denmark, organised as a collaboration between the multinational pump-producer Grundfos, the consultancy Danish Center for Leadership (CfL), and Aarhus University. The empirical setting for this PhD research project was Grundfos, and more specifically the Research and Development (R&D) in Grundfos. During the last decades, Grundfos R&D has undergone continuous globalisation with the aim of empowering and involving its subsidiaries to a much greater extent in the development of new products. To increase effectiveness, one of the key strategic focus areas was to change the mindset of the organisation in order to take full benefit of distributed collaboration. The research was conducted between January 2012 and September 2015, and was organized by spending time in the empirical field at several sites within Grundfos, at the university reflecting upon the findings, and at CfL relating the findings to practical considerations. Specifically, the time spent on the field at Grundfos was between January 2012 and October 2013. The prolonged stay, and the long-term relation with the team members and their daily organizational activities, provided opportunities to adequately grasp and understand the perspectives that global collaborators in Grundfos had towards their work (Bonner & Tolhurst, 2002). In addition, the research was conducted in a highly collaborative manner involving researchers from University of San Francisco, Stanford University, and University of Copenhagen. These contributors took part in the data analysis and writing without being directly involved with the data collection.

The PhD research project has two main interests. First is the practical interest to understand the challenges experienced in Grundfos related to globally distributed collaboration, with the aim of improving their practices. Second is the scientific interest to develop new theoretical understandings of the experienced challenges and to use this as ground to develop new theoretical approaches to transform distributed collaboration in large multinational organisations. Guided by the practical needs and interests of Grundfos, the PhD research project introduces a theoretical orientation which builds on three research areas: distributed collaboration grounded in Information System research, implicit theories grounded in Social Cognitive Psychology, and finally experiential learning grounded in Educational Theory.

This PhD dissertation is a paper-based collection, which means that the results of this PhD thesis are presented within four papers. These four papers constitute the core of the thesis, and together
with this introduction, they create and connect the work. The results fall into two areas of concern: *understanding* the challenges in distributed collaboration and *improving* the conditions for distributed collaboration.

1.1. Contribution to Research and Practice

“If the duty of the intellectual in society is to make a difference, the management research community has a long way to go to realize its potential...The action steps to resolve the old dichotomy of theory and practice were often portrayed with the minimalist request for management researchers to engage with practitioners through more accessible dissemination. But dissemination is too late if the wrong questions have been asked.”

Pettigrew (2001, p.61)

A central mission in this PhD thesis is to conduct research that both advances the scientific discipline and enlightens practice in global organisations. For many years I worked as a business psychologist aiming to help managers improve and deal with today’s changing conditions for managerial work. Growing concerns among practitioners that globally distributed work had become increasingly difficult to manage contributed to my curiosity in this field. However, I experienced that both practitioners and consultants - including myself - were not learning fast enough to keep up with the changing conditions of today’s global technology supported work. I looked for academic studies that could develop practical understandings, and I eventually decided to engage in an industrial doctoral study to understand and with time to help improve globally distributed collaboration in business life. From the beginning, the wish was to engage practice to obtain a deeper understanding of the complexity of distributed work and to involve practitioners in the research problems and questions (Van de Ven, 2007). The stimulation of addressing real problems through the use of scientific knowledge has motivated me throughout this study.

Scientific knowledge on globally distributed teams has grown significantly since the 1990s (Hinds & Kiesler, 2002; Watson-Manheim et al., 2012) and research supports the picture of how globalisation has to an increasing extent made companies rely on globally distributed teams to facilitate collaboration between dispersed organisational locations (Zander et al., 2012). Globally distributed teams are rapidly becoming the principal way of working as globalisation, access to specialists, and advances in information systems technology drive companies to rely on geographically distributed setups (Leonardi & Bailey, 2008). However, existing research along
with practical experience shows that members of globally distributed teams often struggle to be effective in their collaboration (Olson & Olson, 2000, 2014; Steers et al., 2012). Building on the practical as well as the scientific articulation of a lack of knowledge of the changing nature of global teams and what characterizes an effective global collaboration (Wageman et al., 2012; Hinds et al., 2011), this thesis investigates globally distributed collaboration.

Recent literature shows how people’s perceptions of distributed work and its boundaries are dynamic and changing (Hinds et al., 2013; Watson-Manheim et al., 2012). When collaborating globally, modern communication technology challenges previous perceptions of collaboration because it enables team members to be present in interactions with collaborators from distant places and to participate in different interactions simultaneously (Dubé & Robey, 2008). Thus, in distributed collaboration our bodies seem to become the background, while the presence of our minds moves in the foreground. The interest in the perceptions of distributed collaboration has developed rapidly in part because of the technological development (Watson-Manheim et al., 2012). Answering the call for researchers interested in this field (Watson-Manheim et al., 2012, p. 22), I investigate distributed collaboration and in more detail - "the perceptions of that work by the individuals involved" (Watson-Manheim et al., 2012, p. 22). In this thesis, I first build on this recent literature and I propose that further systematic focus on collaborators’ perceptions of global work opens the possibilities for new theoretical explanations of the challenges of distributed collaboration. As a central focus of this thesis, is the possibility that challenges exist in global collaboration because of socially acquired beliefs, or implicit theories, about what interactions are possible or necessary in globally distributed collaboration. If so, understanding of challenges in global work may be improved by focusing on these perceptions and taken for granted beliefs, rather than assuming that they reflect inherent features of distributed work contexts. This perspective, that implicit theories guide a variety of social behaviours has been demonstrated in the social cognitive psychology literature (e.g. Dweck, 2012) and recently in organizational research (Detert & Edmondson, 2011). This thesis thus investigates people’s perceptions and implicit theories as a subtle cause of challenges in global work. It is identified how fixed implicit theories towards distributed collaboration may limit effectiveness, as team members conform to stereotypes that prevent them from engaging in new and more productive collaborative activities. As team members’ stereotyped perceptions in distributed collaboration have only been explored a little so far, I argue that the examination of people’s perceptions has the potential to help us understand new aspects of how and why people are challenged by this way of collaborating.
Second, as another central focus of this thesis, I build on existing studies that show, how tracking team members’ perceptions can help researchers design interventions to transform people’s work practices (Bjørn et al., 2006). I respond to the call for investigating “changes over time in the perception of boundaries and, more specifically, the development of continuities” (Watson-Manheim et al., 2012, p. 22). To address these issues, it is argued how specific implicit theories toward distributed collaborative practices potentially can be transformed. While aiming to transform implicit theories, I conduct interventions building on learning principles and more specifically, on the approach of “Experiential Learning Theory” (Kolb, 1984). I propose that experiential learning theory is a useful theory to identify and guide the design of interventions in order to transform implicit theories, for basic two reasons. First, building on Kolb (1984) I argue that transformation of implicit theories and collaborative practices within distributed collaboration basically is a learning process, and what individuals learn shapes the course of their transformation and future behavior. Second, experiential learning theory provides an approach aimed to help people transform existing beliefs and is as such a theory of learning and intervention-methodology focusing on how new experiences can create the foundation for new knowledge while reconstructing existing knowledge (Kolb, 1984; Kolb, 2014). In this thesis I argue that the transformation of implicit theories basically is a relearning process where experiential learning theory can be applied in order to challenge and transform existing perceptions and collaborative behaviours.

I have one overall research question, which has guided me through the whole process, both during the empirical data collection phase as well as in the theoretical development of the contributions. The overall research question in this thesis is:

*How can we improve geographically distributed collaboration by transforming people’s implicit theories utilizing the practical experiential learning of concrete collaborative activities?*

This research question is of course not simple to answer. However, in the collection of papers and in this introduction, I will attempt to provide the best possible answers considering the different complexities and nuances as well as finding answers for practice and for research. As previously mentioned, the PhD dissertation is, a paper-based collection with it’s results falling into two areas of concern: *understanding* the challenges in distributed collaboration and *improving* the conditions for distributed collaboration.
1.2 The Papers

The four papers, which together constitute this thesis, each contributes to a specific part of the overall research question. The division is illustrated in figure 1. Thus, the findings and contributions from the papers are divided in 2 sections related to the two areas of concern: understanding distributed collaboration (paper 1 and paper 2), and improving distributed collaboration (paper 3 and paper 4). Below, I briefly present how Paper 1 and Paper 2 add to the first area of concern, while Paper 3 and Paper 4 add to the second area of concern.

Looking closer into the papers, Paper 1 seeks to understand how the perceptions of boundaries in globally distributed teams influence the perception of proximity among global collaborators and builds on the interviews of informants in Grundfos from the first year of study. This data is matched with the interview-data from another global Danish-headquartered company. The results presented in the paper show how the perceptions of the three boundaries - technological limitations, temporal dispersion and linguistic differences - pose dynamic barriers that affect members’ communication that again impacts identification and the individual’s perception of proximity. Paper 1 shows how boundaries do not exist as fixed entities in the world, but how the perceptions create discontinuities, which are actually possible to influence and change. To further build our understanding of the perceptions of distributed collaboration, Paper 2 introduces the concept of implicit theories, as stereotyped beliefs collaborators hold about the nature of
distributed collaboration. Paper 2 explores the implicit theories that virtual team members hold and how these implicit theories are related to specific behaviours in collaboration supported by technology. Based on interviews and observations with fifty team members from global teams in Grundfos, we identify three specific implicit theories among global collaborators and illustrate how these different implicit theories are connected with team members’ global collaboration behaviour. Specifically, we find that three implicit theories are: “You can’t build relationships through virtual meetings”, “I can be present at more than one place at a time” and “You can’t have in depth discussions on a virtual meeting”. All these implicit theories had implications for team members’ collaborative behaviour. We find how the diagnostic of people’s implicit theories is critical when planning and executing interventions aimed to improve collaborative practices.

**Paper 3** and **Paper 4** relate to the improvement of distributed collaboration as the second area of concern. Paper 3 is building on the diagnostic, and shows how challenging people’s implicit theories of technology-supported communication makes you able to improve the experience of social presence despite other potential discontinuities. As such, paper 3 explores the process of transforming people’s perceptions of presence through interventions. Paper 3 is based on multiple data sources over the 21 months of the research project. One specific aspect however, was particularly pertinent in the research project - namely the process of continuously re-designing and aligning the workshop activities. In the paper, we present the results and argue that while discursive interventions challenging people’s perceptions are relevant and important, the embodied experience of the activities is essential to be able to transform people's perceptions on presence and improve global collaboration. In **Paper 4** we investigate how to evaluate long-term impact of action research interventions. The evaluation allowed us to discover the extent to which participants had incorporated new strategies into their daily actions. Thus, through our analytical work we identified the ways in which “Mental Attention” was performed as a strategy to enhance social presence among geographically dispersed team members. In our attempt to specify and evaluate the long-term changes, we formulated some guiding principles to inspire other researchers with the same aim of evaluation. We named this approach “Relational Excavation” as a systematic data construction and analysis rethinking how to conduct long-term evaluation of action research impact. Relational Excavation is characterized by following associations and relations from current practices to past interventions with the aim to determine the nature and basis of the detected organisational changes.
The four papers have been written in collaboration with research colleagues and they are all tied together by a shared overall research question and by Grundfos as the shared research setting. The papers include:

**PAPER 1:**

**PAPER 2:**

**PAPER 3:**


**PAPER 4:**
1.3 The Research Field

As the industrial PhD project has its starting point in the immediate experienced problem situation (Rapoport, 1970), this resembles the empirical path of my research project, where the research question has been derived from practical needs and interests (Bringberg & McGrath, 1985). The investigation of my research question is interdisciplinary, which means that I include different research fields. The way in which I draw upon and contribute to these research fields is guided by my research question. The research field of this thesis is the intersection between Information Systems (IS) Research, Social Psychology Research and Educational Theory.

IS Research encompasses many things, and the particular part, which is relevant for my research is the interpretive studies (Orlikowski & Baroudi, 1991). The primary interests of IS interpretive studies start from the position that our understanding of reality is a social construction, and that studying technology is woven into and a product of these social constructions (Walsham, 1996, 2006). Interpretive studies have emerged as an important stand in IS Research and along with this development, IS researchers have analysed the nature of interpretive studies and methods for carrying them out (Walsham, 1995, 2006). One approach to field studies in IS is provided by Klein & Myers in the form of the "seven criteria" (1999), which among others include demonstrating the critical reflections on the researcher role and the multiple interpretations of the participants (Klein & Myers, 1999). When investigating how to improve geographically distributed collaboration by transforming people’s implicit theories, this research project contributes to the field of IS Research by unpacking the perceived challenges of distributed work as well as informing IS intervention studies. Thus, the focus on the social world of the people studied, their construction of reality, and how these constructions can be transformed through interventions, all contribute to a nuanced knowledge in this interdisciplinary field and, at the same time draws on existing IS literature like for example "technological frames" (Orlikowski & Gash, 1994).

The second main research field, upon which I build this thesis, is the field of Social Psychology Research. More specifically I base my thesis on the research constituted by the study of organisational sensemaking processes by Weick (1993), implicit theories (Dweck, 2006, 2012;), as well as, implicit theories in organizations (Detert & Edmondson, 2011; Heslin et al., 2006). Common for these approaches is the interest and focus on how people try to make sense of their social surroundings, and how they may not be aware of their own mindset and the behavioural implications of this. The common interest is to discern the mindset of people by analysing their
behaviour as the mindset is assumed to play an essential role in both organisational (Weick, 1993; Heslin et al., 2006) and social settings (Dweck, 2012). More specifically, this thesis contributes to an extended understanding of how the psychological framework of implicit theories can apply to a real-life organisational setting. Further, this research project develops the implicit theory framework to a new area of concern as to my best knowledge the framework has not yet included distributed collaborative practices.

Finally, the third main research field is as mentioned research in Educational Theory and more specifically experiential learning theory (Kolb, 1984; Kolb, 2014). Experiential learning is sometimes referred to as a set of techniques providing learners with experiences from which they can learn. However, experiential learning is above all a philosophy of learning inspired by what Dewey (1938) has defined as "theory of experience". Experiential learning theory builds on the work of scholars in the 20th century focusing on the central role of experience in human learning and development. The work of John Dewey, Kurt Lewin, William James and Jean Piaget has been especially inspiring serving as foundation for later researchers to develop an understanding of the experiential learning process (Kolb, 1984). Since 1971 when the theory was formulated (Kolb, 1976), there have been several studies using experiential learning theory to develop both practice and theory. Experiential learning theory is an interdisciplinary field of research addressing learning and educational issues in different areas such as psychology, management, education, information science etc. (Kolb et al., 2001). As transformation of perceptions in distributed collaboration to my best knowledge has only been explored a little, I argue that the examination of how experiential learning theory can be applied in order to challenge and transform existing perceptions has the potential to help us develop a theory to guide future intervention research.

Summing up the research field of this thesis, I draw on and contribute to the interpretive studies in IS research about distributed collaborative practices while at the same time combining this with Social Psychology research providing a focus on the framework of implicit theories. Finally, I draw on the research field of Educational Theory providing a guide for how to build intervention activities inspired by the experiential learning approach. Thus, while ensuring an interdisciplinary perspective that is compatible with IS research interests, the implicit theories and the experiential learning approach provide an advanced understanding of the distributed collaborative practices and the transformation of these in real life settings. The Theoretical Orientation Model (see Figure 2) shows how the research field of this research project is constituted in the intersection between
IS research on distributed collaboration, Social Cognitive Psychology research on implicit theories and finally Educational Theory research on experiential learning theory.

![The Theoretical Orientation Model](image)

**Figure 2. The Theoretical Orientation Model**

1.4 The Methodological Approach

Due to the interdisciplinary interests and area of concern, the PhD thesis requires a compilation of different methodological approaches and research strategies for different parts of the work. This thesis draws upon a multi-method qualitative approach (Blaikie, 2010; Robson 2002), which is often used when a series of studies are interrelated within a broad, complex topic referring to an overall research question (Morse, 2003). As will also be clear when reading the individual papers of the thesis, each paper has its own methodological concerns.

1.4.1 The Research Strategies

The four papers included in this thesis represent a progression from inductive, to abductive and deductive research strategies that together address the overall research question while each paper circles around a particular research question related to the area of concern depicted in the paper.
As shown in table 1 the research question in paper 1 is addressed with an inductive research strategy building on an exploratory interview study. Here we examine the perceptions of boundaries in global collaboration from the point of view of team members and managers. Rather than deriving categories of beliefs from a priori theoretical concepts, the research process began with obtaining the team members’ perceptions. Building on this first paper, the research strategy in paper 2 can best be understood and outlined as the abductive research strategy developed by Blaikie (1993, 2010). The abductive research strategy is a distinctive type of qualitative research, which aims to “discover why people do what they do by uncovering the largely tacit, mutual knowledge, the symbolic meanings, intentions and rules, which provide the orientations for their actions” (Blaikie, 2010, p. 89). The abductive research strategy is associated with interpretivism, and the view is that the social world is interpreted and experienced by people and that these interpretations form and direct people’s actions in daily life. Thus, in paper 2, we identify and examine the implicit theories guiding peoples perceptions and collaborative behaviour in distributed work settings.

In paper 3 and paper 4 we address the research questions by developing, refining and evaluating the intervention approach while investigating how peoples perceptions can be transformed and revised through interventions. The research strategy in paper 3 can be said to be deductive, while using theoretical lenses as a research guide. The relevant concepts are identified and tested with empirical data. The research strategy in paper 4 adopts an inductive strategy, which suits its aim of exploring new methods for evaluating long-term impact in action research. Our goal in this paper is not to develop an exhaustive theory of long-term evaluation in action research but rather to initiate new principles for research with the same aim of evaluation.
<table>
<thead>
<tr>
<th>Paper</th>
<th>Research question</th>
<th>Title</th>
<th>Research Strategy</th>
<th>Contribution to Overall RQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lindekle, R. &amp; Klitmøller, A. (Paper 1)</td>
<td>How do the technological limitations, temporal dispersion, and linguistic differences impact the inter-relation between communication, identification, and perceived proximity in global virtual teams?</td>
<td>Being close at a distance: Exploring the perceptions of technological, temporal, and linguistic boundaries to global virtual team effectiveness</td>
<td>Inductive Research Strategy</td>
<td>Shows how the discontinuities of the perceived boundaries are interrelated in a vicious cycle. This negatively impacts global team members’ perception of proximity and their collaboration in terms of communication and internal identification.</td>
</tr>
<tr>
<td>Lindekle, R &amp; Cristea I. C. (Paper 2)</td>
<td>What are the implicit theories team members have regarding global virtual collaboration and how do they behave as a result of these implicit theories?</td>
<td>Perceived boundaries in global collaboration: Exploring implicit theories and their impact on global collaborative behaviour</td>
<td>Abductive Research Strategy</td>
<td>Identifies three implicit theories that team members hold about global collaboration and how they act according to these implicit theories in global virtual collaboration.</td>
</tr>
<tr>
<td>Lindekle, R &amp; Bjørn, P. (Paper 3)</td>
<td>How can we transform people’s perceptions on presence in global collaboration, with the aim of improving the collaborative possibility for working closely with remote colleagues?</td>
<td>Transforming perceptions of presence: Reporting from an action research project</td>
<td>Deductive Research Strategy</td>
<td>Shows how embodied action research interventions turned out to be most effective as activities when challenging participants’ perceptions of presence in global collaboration supported by IS technologies.</td>
</tr>
</tbody>
</table>

Table 1. Overview of research questions, titles, strategies and contributions of the papers
1.4.2 The Multi-method Qualitative Approach

The outset for this project is as mentioned the research question: How can we improve geographically distributed collaboration by transforming people’s implicit theories utilizing the practical experiential learning of concrete collaborative activities? While answering this “how” question, a good understanding of the nature of the phenomena being studied has to be achieved prior to any interventions (Blaikie, 2010). The two areas of concern: understanding the challenges and intervening in practice guided the multi-method qualitative approach. For the part of the work dedicated to understanding the challenges in distributed work, the thesis is inspired by different ethnographical approaches including ethnography (Spradley, 1980), multi-sited ethnography (Marcus, 1995) and virtual ethnography (Hine, 2000, 2008). Spradley (1980) has defined the steps of ethnographic research as a non-linear process moving back and forth between defining the problem, collecting data, analysing data and writing. Multi-sited ethnography differs from classical ethnographic data collection methods by tracking a common research topic through several geographically dispersed field locations for shorter periods of time (Marcus, 1995). This tracking across sites has been important for illuminating phenomena that affected team members’ interactions, but may not always have been easy to observe (Marcus, 1995; Lauring & Klitmøller, 2015). My research has not only been conducted across several sites, but has also been triangulated by the use of online observations (Hine, 2008), portraying social and organisational life as it unfolded both online and offline (see paper 2 and section 3.3).

For the other area of concern dedicated to intervening in practice, I bring in interventionist approaches inspired by action research. I argue that action research is the appropriate interventionist methodology, for basic two reasons. First, action research aims to simultaneously assist in practical problem-solving and expand scientific knowledge, while being performed collaboratively in a cyclical process, and aiming to increase the understanding of a given social situation (Hult & Lennung, 1980, p. 247). In my study, I have especially been inspired by the Collaborative Practice Research approach of Mathiassen (2002). The Collaborative Practice Research approach is one of several approaches in action research such as for instance the Canonical Action Research (Susman and Evered, 1978) or Dialogical Action Research (Mårtensson & Lee, 2004). Another important reason for building on action research is that the Collaborative Practice Research approach opens the possibility that the research process can be
guided by a multi-method methodology (Mingers, 2001) with action research as one approach and other methods (ethnographic methods) as supplementary approaches. Collectively, action research and more specifically Collaborative Practice Research provides rich opportunities to bridge the important gap between research and practice in a cyclical process in combination with other methods (Mathiassen, 2002; Mingers, 2001). The adoption of this approach means that I as in this present research project can combine my two areas of concern – to understand and improve distributed collaboration– into one research question.

1.5 The Thesis Structure

The thesis is structured as follows: After this introduction, Chapter 2 discusses the theoretical orientation for the research study by introducing state of the art research on essential topics, including globally distributed collaboration and its perceived boundaries, implicit theories and experiential learning theory. In Chapter 3, the thesis will make a description of the multi-method qualitative approach, which is the foundation for the work. This includes the research paradigm and the empirical setup in Grundfos, as well as the data collection methods, the data sources, and reflections upon how the data was analysed. Chapter 4 introduces the four papers and their contributions in more details providing the links between the contribution of each paper and the overall research question of the PhD thesis. The writings and presentation of papers subsequently follow the course of the research project. Thus, paper 1 and 2 clearly illustrate how I initially aimed to understand and diagnose the problems of globally distributed collaboration in Grundfos. Paper 3 and paper 4 present how the problem diagnosis is put to use in interventions challenging people’s perceptions in distributed collaboration. Finally, in Chapter 5, I return to the overall research question, where I offer the conclusion on both a theoretical and a practical level in regard to the purpose and contributions of this thesis.
2. Theoretical Orientation

The intent of this section is to present the theoretical orientation which guides the research project. First, I ask how distributed collaboration and its boundaries can be understood according to recent research, then I further present the foundational framework of implicit theories which have guided my research throughout the years. It is argued how there is a risk that implicit theories toward distributed collaborative practices can potentially form significant discontinuities among distributed team members. Implicit theories represent stereotyped understandings among global team members, which can be obstacles for successful global collaboration. It is further argued how specific implicit theories toward distributed collaborative practices can be challenged and potentially transformed. When aiming to transform implicit theories toward globally distributed collaboration, the areas of interest include primarily the activities while participating and being present in mediated communication. While my research relates to ‘the area’ of transforming implicit theories in distributed work, a theoretical understanding of the way I think about transformation is needed. Therefore, when approaching the transformation of people’s perceptions and work practices in global work, I build on the theory of experiential learning (Kolb, 1984). Experiential learning is a philosophy of learning that recognizes the foundational role that experience plays in the process of learning. Experiential learning is presented in the end of this chapter. Before investigating the understanding of experiential learning, the thesis continues with a characterization of the area of concern: distributed collaboration, its perceived boundaries, and implicit theories.

2.1 Distributed Collaboration

Distributed collaboration is a part of daily life in many organizations (Leonardi & Bailey, 2008) and allows specialists from different functional and geographical areas to be on the same team and therefore potentially reduce costs, travel, time and stress (Orlikowski, 2002; Majchrzak et al., 2005; Hinds et al, 2011). Distributed teams consist of an interdependent group of people who reside in different time zones and countries, and who rely heavily on communication technologies to accomplish a shared goal (Maznevski & Chudoba, 2000; Gibson & Cohen, 2003; Horwitz, et al., 2006). The definition of “distributed teams” is often used interchangeably with the term “virtual teams” referring to a how a group of people can collaborate while not being together at the same geographical location (Lipnack and Stamps, 1997). As virtual teams are not restricted by location, they are often likely to consist of team members from different cultural backgrounds. Other researchers have accordingly differentiated the definition from previous studies by adding
the national cultural diversity to the definition and thus refer to “global virtual teams” (Zakaria et al., 2004; Maznevski & Chudoba, 2000).

In existing literature as well as throughout this thesis the concept of globally distributed teams is inevitably intertwined with the concept of globally distributed collaboration (Bosch-Sijtsema et al., 2011). People are engaged in collaborative work when they, in their individual task, change the state of the common field of work and thus have to act accordingly to the works of others in order to accomplish a shared goal (Bjørn et al., 2014; Henderson, Stackman & Lindekilde, 2016). At the core of the conception of collaboration is the notion of interdependence in work (Schmidt & Bannon, 1992), which means the degree to which team members are being mutually dependent in a work setting. Global collaboration varies in interdependencies among team members, and tightly coupled work has traditionally been argued to be difficult to accomplish remotely (Olson & Olson, 2000). However, in current research on distributed collaboration it is shown how people, when collaborating remotely in loosely coupled work, are not forced to interact frequently with each other and therefore risk becoming too unaware of each other (Bjørn et al., 2014). Closely coupled work tasks have been found to be important in making collaboration function at all. Bjørn et al. (2014) showed how closely coupled work forced the team members to frequently interact since they were not able to do their work in any other way. Team members were therefore encouraged to spend the extra time and effort required in articulation of work to make the collaboration function, and accordingly they experienced a stronger and more successful collaboration.

The dichotomous conceptualisation of virtual collaboration defined and contrasted to co-located collaboration has been nuanced during the last decades (Powel et al., 2004). As field studies on virtual work have emerged (Mortensen et al., 2009), it has been recognized that in practice, few teams are neither completely virtual nor co-located. In practice, teams can be placed on a fluid continuum as hybrid teams depending both on face-to-face and mediated communication in their work (Fiol & O'Connor, 2005). Therefore, research on a broader conception of distributed collaboration and its boundaries has grown as a way to unpack the complexities of global work.

2.2 Perceived Boundaries in Distributed Collaboration
Boundaries have traditionally been defined as areas where differences between collaborators are potentially problematic (Watson-Manheim et al., 2012). Geographical distribution is just one of
several boundaries in global work. Boundaries in regard to function, team membership, organisation and time all represent other examples on salient boundaries in globally distributed collaboration (Espinosa et al., 2003). Boundaries can be important as they distinguish one situation from another, and thus they can make order in a given environment (Ashforth et al., 2000). Studies show how boundary-spanning activities may challenge the efficacy and effectiveness in distributed collaboration (Ancona & Caldwell, 1992). Findings from studies on global distributed work however, are in many cases inconsistent and conflicting as boundaries are shown to cause problems in some teams, but not in others (Maznevski & Chudoba, 2000; Watson-Manheim et al., 2012). Recent research argues that the contradicting findings arise in part, from our conception of distributed team conditions as work with a fixed set of boundary effects (Watson-Manheim et al., 2012; Wilson et al., 2008; O’Leary et al., 2014). Thus, the assumption that boundaries are automatically problematic for the individuals crossing them seems to not always to be the case (Watson-Manheim et al., 2012). The focus on multiple boundaries moves beyond the simplified conceptualisation of global virtual teams vs. co-located teams. An important aim is to understand how global work boundaries are perceived and what consequences these perceptions have on daily collaboration (Watson-Manheim et al., 2012).

It is proposed that not all boundaries are problematic all the time depending on people’s perceptions. Traditionally, when studying distributed collaboration, geographical distance as a key boundary has been considered in objective and spatial terms (O’Leary & Cummings, 2007). Slowly however, researchers have started noticing that perceptions of proximity do not increase proportionally with geographical proximity (Hansen & Lovas, 2004). Building on corresponding research on other organisational phenomena such as “time” (Ancona, Goodman et al. 2001), “technology” (Barley, 1986) and “identity” (Burke & Stets, 2009), the emphasis has been placed on the fact that these phenomena cannot be fully understood by objective terms. Thus, a growing field of research shows how perceptions of proximity among distributed collaborators can take place and develop across vast geographical distances (Bradner & Mark, 2002; Wilson, 2008). The research in perceptions of geographical distance challenges the concept of geographic determinism, which expresses that collaboration is a function of the geographical distance, rather than a combination of the geographical distance and the perceptions and the meanings we attach to it (O’Leary et al., 2014).

Building on this approach, it is argued in this thesis that the problems of distributed collaboration are a dynamic challenge, where boundaries such as geography, culture, language, time etc. have an
evolving nature depending on specific circumstances. Watson-Manheim et al., (2012) conceptualise the discontinuities and continuities at a boundary, suggesting that "only when an individual perceives a discontinuity at a boundary is that boundary problematic and that developing continuities can mitigate problems associated with boundaries" (Watson-Manheim et al., 2012, p. 22). Put in other words, we have to investigate in more detail the perceptions of distributed collaboration and its boundaries held by the team members involved. As a consequence of this perspective, Watson-Manheim et al. (2012) posit how scholars interested in understanding virtual teams and managers trying to develop their teams must investigate the specific work practices and the perceptions of those work practices by the team members involved (Bradner & Mark, 2002; Orlikowski & Gash, 1994; Watson-Manheim et al., 2012).

Understanding the perceptions people have in regard to their work can be particularly useful in order to understand the challenges of global collaboration (Dubé & Robey, 2008). Social cognitive psychological and organisational studies have long shown that individuals act on the basis of their perceptions of the world, and in doing so enact particular social realities and endow them with meaning (Berger & Luckmann, 1967; Weick, 1979). Weick (1979) introduced how people’s perception is a process that informs and constrains action and where people try to make things rationally accountable for themselves and others. Recent literature stresses how relatively automatic perceptions serve as a basis for organisational interactions and further how they are used as both a basis for interpreting the social behaviour of others as well as a foundation for generating one’s own behaviour (Junker & van Dick, 2014). Once categorised, people rely on general and stereotyped impressions, rather than on the memory of specific behaviours or incidents. A stereotyped perception is defined as “a plausible interpretation for something one is doing; for an experience one is having or for a situation one is in” (Steele, 19997, p.617). The possibility is that people conform to the stereotyped perceptions through long exposure by enacting them in their behaviour (Lewin, 1941). As the importance of team members’ automatic and stereotyped perceptions in global collaboration are little explored so far, I argue that the examination of peoples perceptions, has the potential to help us understand new aspects on how and why people are challenged by this way of collaborating. In the following section I investigate people’s perceptions by addressing the framework of implicit theories and its potential role in distributed collaboration.
2.3 Implicit Theories

To understand how team members’ perceptions of global collaboration can influence their work, I apply the conceptual framework of implicit theories. Research on implicit theories shows how automatic categorisation processes serve as a foundation for social interactions (Lord & Maher, 1991; Detert & Edmondson, 2011). Implicit theories are defined as beliefs or core assumptions that form an individual’s reality in a given domain and foster behaviour that is consistent with this belief (Dweck et al., 1995a). The adoption of the framework of implicit theories in organisations and the interpretation of information has grown increasingly among both organizational theorists (Engle & Lord, 1997; Junker & van Dick, 2014, Detert & Edmondson, 2011) and social psychologists over the past two decades (Levy et al., 2006; Job et al., 2015). Implicit theories as a research field is situated within an epistemology of constructive approach that explicitly recognizes the dynamic and co-constructive interactions between individuals and their social context, and the conceptual frame is used interchangeably with for instance the “interpretive schemes” (Daft & Weick, 1984; Weick, 1995) or the “mental models” (Senge, 1990). Implicit theories are also comparable to the concept of “technological frames”, which comprise the individual’s perceptions of technology (Orlikowski, 1992). The “technological frame” concept points out that part of team members’ frames regarding the assumptions they use to understand and adopt technology in organisational settings (Orlikowski & Gash, 1994). Studies show how recognising the central meaning of the technological frames is significant to researchers and practitioners in organisational settings (Orlikowski, 1992; Bjørn et al., 2006). While technological frames are concerned with the nature of technology, technology strategies, and technologies in use, the concept of implicit theories is used more broadly and applied in various professional areas (Dweck, 2006). In this section, I present the concept of implicit theories and show how this theoretical framework provides a new way to perceive and unpack the challenges of distributed collaboration.

Research on implicit theories states that individuals’ perceptions of the environment are based on and guided by their implicit theories (Furnham & Henley, 1988; Dweck et al., 1995b; Dweck, 2000; Yzerbyt, Judd & Corneille, 2004). The proposition is that people’s implicit theories, even when not articulated, can play a crucial role in social interaction. Lord & Maher (1991) highlight the importance of implicit theories in social interaction, in which implicit theories are used as both a basis for interpreting the social behaviour of others as well as a foundation for generating one’s own behaviour. Once categorised, people rely on general and stereotyped impressions rather than
on the memory of specific behaviours or incidents. Thus, implicit theories provide a degree of stability and reliability to social interaction in addition to simplifying the demands of information to be processed in social interactions (Heslin et al., 2006).

Implicit theories vary in their degree of rigidity and determinism about a given domain and its attributes (Dweck, 2006). A prototypic rigid implicit theory, also called a fixed mindset (Dweck, 2006), assumes that such attributes are largely stable entities, that tend not to be changeable, while a more incremental implicit theory assumes that these attributes are changeable. A rigid implicit theory is illustrated for instance by the notion that “mediated communication is impersonal per se”. In contrast incremental implicit theories assume that personal or situational attributes are relatively malleable, leading people to experiment with new actions and behaviours in order to succeed in a given domain (Dweck, 2006). Thus people with incremental implicit theories tend to believe that both people and problems can change when there is a devoted effort to learn and apply new behavioural strategies for task performance.

Implicit theory research has been concerned with the issue of the implications of holding a primarily fixed or growth oriented mindset for how one acts or interacts with other people. Thus, Dweck et al. (1995) posed that the fixed mindset that “life domains are unchangeable” made people disinclined to invest in helping or changing the situation. Further, Heslin et al. (2006) find that managers’ predominantly fixed or growth oriented/incremental assumptions about others significantly affects their behavioural engagement towards employees. The evidence that a fixed mindset impedes managers’ acknowledgement of behavioural change, as well as their engagement with employees raises the question whether these fixed implicit theories can be transformed to incremental implicit theories that increase their recognition of employees’ change and their commitment to engage with employees’ development. Even though implicit theories tend to be relatively stable over time (Robin & Pals, 2002), research has shown how they can be transformed in laboratories (Heslin et al., 2006) as well as real-world contexts (Aronson, 2002; Dweck, 2012). Even though implicit theories can be changed, the long-term transformation requires consistent and solid experiences and cognitive resources (Gilbert & Osbourne, 1989).

In this thesis, I investigate how implicit theories potentially challenges distributed collaboration, and how specific interventions transforming implicit theories can be used to improve distributed collaboration in real life settings. The question remains how we can theoretically talk about transforming perceptions in distributed collaboration.
2.4 Experiential Learning

When aiming to transform distributed work I investigate whether team members’ fixed implicit theories on distributed collaboration can be transformed to a mindset that affects and improves their daily collaborative practices. In this section I examine the theory of experiential learning and related research to explore how this theoretical approach can be used when transforming people’s perceptions in globally distributed work settings.

Experiential learning is a philosophy of learning inspired by what Dewey (1938) has defined as a “theory of experience”, recognizing that experience plays a foundational role in the process of learning, an emphasis that distinguishes this approach from other learning theories. In experiential learning theory, learning is defined as "the process whereby knowledge is created through the transformation of experience. Knowledge therefore results from the combination of grasping and transforming experience" (Kolb 1984, p. 41). The experiential learning approach identifies two dialectical modes of grasping experience: concrete experience and abstract conceptualisation. It offers two further dialectical modes of transforming this experience as reflective observation and active experimentation (see Figure 3). Thus, concrete experiences are the foundation for reflections. These reflections are transformed into abstract concepts, which provide a basis for new actions. These implications again serve as a guide to test and create new experiences.

![Figure 3. The Experiential Learning Process](image-url)
Essential in the experiential learning theory is that learning is not about loading people with your knowledge. Learning is perceived as a *relearning* process, which is illustrated by a learning spiral where the learner moves through experiencing, observing, conceptualising, and acting in a repeated process that is responsive to the learning situation and what is being learned. This is in contrast to traditional learning theory where pre-existing ideas are transmitted to the learner (Kolb, 1984). The theory of experiential learning emphasizes that people construct new knowledge from what they already know and believe, based on new experience. Thus, the entire learning process may contribute to double-loop learning characterized by a qualitative new frame of reference (Argyris, 2000). This refers to how learning is best facilitated as a process referring to the learners existing ideas and beliefs about a given topic, so that they can be tested and integrated with new, more qualified ideas. Thus, in the experiential approach new understandings serve as a guide to continuously try out what you have learned, and learning never has a definite end-point.

When aiming to apply experiential learning theory in practice, the open nature of the approach potentially has the consequence that it can be difficult to define the exact shape and design of experiential interventions. Thus, simple participation in a prescribed set of activities does not make the experiential learning process (Kolb, 1984). Experiential learning methodology is a series of working principles, which are required in order to define an activity or intervention to be based in experiential learning. A foundational principle is that experiential learning involves activities, which to some degree implies specific actions and experiences of the involved learner. Based on having these experiences in which the learner must be fully immersed, he/she should be able to reflect on the experiences and to bring his/her own perspectives into play. By obtaining an insight into oneself and his/her interactions with the world, the learner should again be able to try out what is learned. In experiential learning there is an important balance between theories and activities as the learner is the self-teacher. Therefore, it is required that the activities engage people in personally relevant activities to which theory can be applied. When successful, experiential learners experience an openness to reorder their understanding of a topic and apply this in new concrete actions.

While traditional scholastic activities emphasise the learning modes of reflection and abstraction involving little action and little reference to personal experience, experiential learning methodology builds on practical application and personal experience as two additional important learning modes that should be covered through learning activities. This on the other hand, also means that practical experiences cannot stand alone, but need additional activities to stimulate
reflection such as team dialogues, for instance. Dialogical activities should further be linked to the conceptual understanding and abstraction by integrating this new knowledge as a basis for future experimentation.

2.5 Implications of Theoretical Orientation for Improving Distributed Collaboration

Summing up on the theoretical orientation for this thesis, I build on the stream of research on global distributed collaboration, which has grown significantly during the last decades. It has been recognised that in practice, global teams are potentially challenged by multiple boundaries. However, understanding how these boundaries are perceived and what consequences these perceptions have, is still underdeveloped. In this thesis, I investigate in more detail the perceptions of distributed collaboration and its boundaries. I investigate how perceptions - implicit theories – have the potential to help us understand new aspects of how and why people are challenged by this way of collaborating. In distributed collaboration, the implicit theories, which people bring to their work, are proposed to affect the extent to which team members can effectively comply with the requirements of their work. As a foundation for global work, a great deal of collaboration is about using a medium to work with distant others. Thus, existing research shows how global users are dependent on gaining satisfying and productive access to others for a wide range of activities. These activities include getting to know someone, exchanging information, solving problems, making decisions or generating ideas etc. When collaborating, team members tend to develop behavioural routines around the use of technologies resulting in the reinforcement of a stability cycle (Orlikowski, 2000). These routines and habits tend to persist even though the external context explicitly requires a new set of behavioural strategies in distributed collaboration (Gersick & Hackman, 1990). I investigate how disruptive interventions can be the window of opportunity to improve distributed collaboration in real life settings (Tyre and Orlikowsky, 1994). In the interventions, I build on experiential learning theory defining learning as the process where knowledge is built through the transformation of experience. As the interdependence of global teams in Grundfos requires people to communicate and interact in order to develop new ways of collaborating, the focus on developing global collaboration involves a collective and experiential learning process (Edmondson et. al, 2001). Figure 2 (in section 1.3) shows how the research field of this research project is constituted in the intersection between IS research on distributed collaboration, Social Cognitive Psychology research on implicit theories and finally Educational.
Theory research on experiential learning theory. In the next chapter, I present the methodology for this research project including the empirical setting for my investigation.
3. Methodological Approach

3.1 Research Paradigm

According to Klein and Myers (1999) epistemological foundations for IS studies can vary from positivist, critical or interpretive in nature. As mentioned earlier this research project is guided by interpretivism. This means that when aiming to understand reality this can only be achieved through examining social constructs such as language, shared meaning, theories and models. Interpretive studies aim to understand these social phenomena as a way people make sense of the world surrounding them, and this understanding is the guiding principle of this research project. With the interpretive approach this research project’s aim of transforming people’s perceptions is not about truth and getting them “right”. Instead the aim is to derive and present alternatives that can encourage reflection and develop the understanding of the problem situation among the involved practitioners. Often daily routines and activities are conducted in a manner that is taken for granted, and the aim has been to disrupt these routines and stereotyped perceptions in order to help team members reflect and search for new constructs and meanings.

The interpretive approach emphasizes the active role of the researcher and the practitioners in creating knowledge. However, significant for this thesis is the interest not only in understanding the social phenomena, but also to create change and improvement. Dewey, who is one of the primary figures associated with the philosophy of pragmatism, states how pragmatism has a focus not only in people’s experiences here and now, but also in changes and what “might be” (Dewey, 1931). Pragmatism is an interpretive approach holding that truth can only be defined by practical application. This interpretive study thus also is concerned with knowledge that is useful and that can help the involved team members in improving their globally distributed collaboration.

3.2 Multi-method Qualitative Approach

Because of the two interests of this PhD research project - namely to understand people’s perceptions of distributed collaboration and to improve the distributed collaboration while aiming to transform these perceptions - different methodologies are required and a multi-method qualitative methodology has been applied. Adopting a multi-method qualitative approach presents several advantages in order to give a more comprehensive understanding of complex social phenomena (Blaikie, 2010). Thus, the combination of different methods gives me a possibility to triangulate data from different sources, from different theoretical perspectives and from different
groups of respondents. The different supervisors, stakeholders and workplaces also help to ensure environmental triangulation (Robson 2002; Mingers 2001). Second, data from multiple viewpoints are vital to studies of perceptions in particular, as researchers are presented with participants’ and their own engrained perceptions (Bartunek, 1984). Third, the multiple methods allow for a broader set of questions that can be asked (as what, how and why) during the research process. Therefore, different aspects of the social reality of the global workers can potentially be explored. Finally, the multi-method qualitative approach can potentially reveal paradoxical findings and confirm unexpected outcomes due to different methodological angles and perspectives, which might stimulate further investigation (Creswell, 2003; Mingers 2001). In the following section I present the combination of methods and how they fit through the study.

In my exploration of people’s perceptions, I have been inspired by ethnographic methodological strategies (Spradley, 1980, Marcus, 1995; Hine, 2000, 2008). The ethnographers work from an open base – an approach, which is based on a hermeneutic view of the study of human “communities”. Ethnographic studies are exploratory in nature and focus on informal and often implicit social exchanges. Ethnography is a systematic study of people and cultures based on observed behaviour and symbolic meaning relations while aiming to understand how the social context is perceived from the perspective of the people being studied (Bourdieu, 1977). In my study the use of ethnographic methods gave me the possibility to adequately grasp and understand the perceptions and ”insider” perspectives that global collaborators had towards their work (Bonner & Tolhurst, 2002). This is both what they reported as well as what they did and tacitly assumed while engaging in daily activities. The long-term relation with the team members and their daily organisational activities made me familiar with the case and the challenges they faced. The long relationship also gave me the opportunity to do ”member checkings”. Member checkings is a process in which team members are asked to give feedback on the researcher’s account and technical conceptualisation of the organisational phenomena (Blaikie, 2010). It is therefore important to note that the ethnographic exploration has been foundational to the process of understanding daily organisational activities, as well as deriving the implicit theories that team members use to account for what goes on.

As my research question asks how people’s perceptions can be transformed, the need was to go further than the exploration and do intervention research. Inspired by the action research tradition (Baskerville & Wood-Harper, 1998; Rapoport, 1970) and, in particular the Collaborative Practice Research (Matthiasen, 2002), the interventions have the joint purposes of increasing knowledge
and changing aspects of an immediate problematic situation. Action research is characterized by linking practice and research through different forms of cyclical and iterative processes (Matthiasen, 2002; Avison et al., 1999; Coghian, 2001). There is a variation of action research approaches (Susman & Evered, 1978; Matthiasen, 2002; Mårtensson & Lee, 2004) which generally are all organised by first a diagnostic of the practical circumstances and then the executions of interventions based upon theoretical considerations, collecting empirical data about the intervention, and finally reflecting upon the results (Baskerville and Wood-Harper, 1998). The interventions in this research project included three cycles with the phases: diagnosing, action planning, action taking, evaluating and specifying learning (Susman and Evered, 1978). The goal of each cycle was to challenge and transform people’s implicit theories during collaboration supported by information systems technology. While aiming to gain a better understanding of how to transform people’s perception of distributed collaboration supported by information system technology, the methodology on which we were building our interventions is as mentioned the experiential learning theory as developed by Kolb (1984), and introduced in the previous theoretical section of this thesis. Thus, while dialogue was a central part of all interventions, the primary methods of intervention in cycle 2 and 3 were built on facilitating learning based on new experiences in distributed collaboration. Mathiassen et al. (2012) propose a division between framework of methodology and framework on area of concern. The distinction is intended to clarify the meaning of the use of the word “framework” in action research, and aspires to specify the type of theory that is guiding the action research interventions. Thus, while understanding and transforming team members’ implicit theories in distributed collaboration constitutes the “framework of the area of concern” in this research project, the “framework of the methodology” includes the experiential learning approach.

In order to investigate how to transform perceptions in distributed collaboration, real organisations that experience difficulties and are willing to experiment with new ways to solve the immediate problem situations are needed. In the next section I introduce the empirical settings for this research project.

3.3 The Empirical Setting

As previously mentioned, this research project was bound within the empirical of Grundfos. Below I introduce Grundfos and in particularly the R&D department in which I did my data
collection and interventions. Following, I introduce the consultancy CfL and the purpose of their involvement in this research project.

3.3.1 Grundfos

Grundfos is a large multinational corporation of Danish origin. Grundfos was established in 1945 and is today one of the world’s leading pump manufacturers with 18,000 employees working all over the world. The main products in Grundfos are circulator pumps for heating and air-conditioning as well as other centrifugal pumps for industry, water supply and dosing. Grundfos is headquartered in Bjerringbro in Denmark and has 80 subsidiaries in 55 countries. During the last decade, Grundfos has undergone continuous globalization, and the aim is to empower and involve the subsidiaries more and more, particularly in the development of new products in the R&D department. Developing new products in Grundfos is knowledge-driven work and executed by knowledgeable workers across various locations including the United States, China, Hungary and Denmark. In general, the tasks are complex, and planning and collaboration among virtual team members is critical as pump-development involves the exchange and alignment of detailed professional technical knowledge. As distributed team members in the R&D department, mainly engineers, spend time on developing components for a product in collaboration with remote colleagues, they often need to operate in real time to facilitate the exchange of rich and technically detailed information. They do so with the support of several forms of mediated communication including email, instant messaging, telephone, shared documents, and video conferencing. Despite the potential benefits of the globally distributed teams, smooth collaboration and rendering effective results are significant challenges compared to the traditional co-located teams in the R&D department.

Thus, the immediate problem situation for Grundfos R&D concerned the need to develop more efficient and smooth distributed collaboration for the future development of new products. For Grundfos, this research project has dual goals. First, Grundfos wanted to find a way to directly support the involved global virtual teams and managers. Second, Grundfos wanted to develop new tools and knowledge in the field of distributed collaboration, which could potentially support the global work around the whole organisation. Throughout the project, Grundfos has been the empirical place for my research project. To accomplish the dual goals, the R&D department in Grundfos has provided the problem situation and the context for the explorations and interventions. During and after data collection, reflections on research findings were made with the participating collaborators in Grundfos through workshops and online sessions.
Research in a complex topic such as globally distributed collaboration raises an important question of how a researcher might formulate and plan a research study in a way that advances both theory and practice. One could posit that a research topic as this exceeds the capabilities of an individual researcher to study it alone (see also Van de Ven, 2007). Therefore, this research project and its project plan are rooted in a steering committee at the senior management level in Grundfos. The steering committee was established to oversee the project, provide resources and coordinate with the business goals. Thus, by engaging the steering committee and leveraging their different kinds of knowledge, the aim was to producing knowledge that was more penetrating and insightful than if I and other scholars worked on the problems alone. In this project, the steering committee has been the organisational point of contact and engagement with whom I could discuss the steps of problem situation, theory building and problem solving in the research project. The steering committee represented four different departments in Grundfos comprising HR, The HR-Academy, and two branches in the R&D Department. The steering committee was requestor on the project and meetings were held twice a year. Additionally, individual meetings were held with each of the four representatives from the steering committee once a year to review and discuss the research topic, design and development. Dissemination and workshops were held regularly on the research subject for both the steering committee and other interested parties.

3.3.2 CfL – Danish Centre for Leadership

The consultancy CfL (Danish Centre for Leadership) was the other industrial partner of this PhD project. CfL is a professional community of management specialists covering a wide range of leadership disciplines. CfL has about 90 employees who help approximately 900 Danish public and private companies to develop their leadership and learn from each other via CfL. CfL sells courses, networks and consultancy to managers and use internationally validated tools for competence development. My role as a researcher in CfL was to expose and communicate the generated knowledge of the research project at Grundfos to colleagues in CfL, as well as leaders, HR consultants, and the Danish business community in general. The goal of the research project for CfL was to contribute to the CfL consultants’ professional understanding of managing distributed work and to further integrate such expert knowledge in collaboration with customers from the Danish Business community. Thus, the project aimed at not only contributing to the development of global collaboration in Grundfos, but also at preparing other Danish companies to face the challenges of distributed global work.
The research process of this thesis can be characterised as highly collaborative as I have worked on research and practical developmental interventions with consultants and researchers from different institutions. The practical developmental interventions were facilitated by me and by one external consultant from CfL as well as, two consultants from The HR-Academy at Grundfos. During the data collection, project members of the research group met approximately every second month to discuss progress, coordinate developmental interventions, and future actions.

In addition to the research group directly involved with the data collection and the interventions, researchers from University of San Francisco, Stanford University and University of Copenhagen took part in the data analysis to enhance the quality of the research without being directly involved with the company. Some of them have been co-authors on the papers in this thesis. The stakeholders in the project outlined are all presented in Table 2 to give an overview as well as to identify their roles, goals, contributions and importance to the project. The stakeholders are individuals, groups or organisations, which have had an interest in the project. A stakeholder analysis is often recommended as a valuable tool for coping with tensions and to prevent conflicts in a PhD project (Avison & Pries-Heje, 2005). The stakeholder analysis here primarily serves as an overview and a summary of the roles of the involved parties.

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Role</th>
<th>What is the expected outcome?</th>
<th>How can they contribute?</th>
<th>What is their importance for the project?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering committee</td>
<td>Requestor</td>
<td>Knowledge to improve the org. work</td>
<td>Support &amp; sparring</td>
<td>High - project builds on their request</td>
</tr>
<tr>
<td>R&amp;D team members</td>
<td>Informants, participants</td>
<td>Knowledge on their daily work</td>
<td>Reveal the reality of global collaboration</td>
<td>High - source to new empirical knowledge</td>
</tr>
<tr>
<td>HR Academy</td>
<td>Consultants</td>
<td>New tools and knowledge to support the org.</td>
<td>Support &amp; sparring</td>
<td>High - network to spread new knowledge</td>
</tr>
<tr>
<td>CfL consultants</td>
<td>Consultants</td>
<td>New learnings on the subject</td>
<td>Support &amp; sparring</td>
<td>Medium - social support</td>
</tr>
<tr>
<td>CfL</td>
<td>Host company</td>
<td>Improvement of ability to help customers</td>
<td>Financing &amp; support</td>
<td>High – the project builds on them</td>
</tr>
<tr>
<td>Researchers</td>
<td>Co-authors</td>
<td>Interesting research papers</td>
<td>Knowledge, sparring &amp;</td>
<td>High – co-work to finish papers</td>
</tr>
<tr>
<td>Supervisors</td>
<td>supervisors</td>
<td>Interesting research &amp; pay</td>
<td>Knowledge on subject &amp; research</td>
<td>High – help to finalise thesis</td>
</tr>
</tbody>
</table>

*Table 2. The stakeholder analysis*
3.4 The Researcher Role

Aside from the outlined stakeholder roles, my own role has been to initiate, define, plan, and conduct the PhD project. While attempting the difficult task of accessing global collaborators perceptions of distributed collaboration it has been important for me to have a critical view on my own role in this interpretive process (Walsham, 1995). My role in the research project has been that of the involved researcher (Walsham, 1995). This role gave me the possibility to become a part of daily life of Grundfos and to be able to observe and listen to conversations between team members while detecting themes of specific relevance to the research question. The advantages of this has been that I got an inside view which involved confidential and sensitive issues shared between the team members. Inspired by the action research traditions I also developed and documented the transformation approach, and planned and facilitated this at the workshops. Thus, during the process I have on one hand been a researcher participating in the daily organisational life and on the other hand I have been a resource available to both CfL and Grundfos by intervening in the field based on my preliminary results. Baskerville and Wood-Harper (1996) show, that this commitment to a particular problem situation unfortunately in many cases leads to a number of pitfalls and limitations. This can be due to a lack of impartiality on the part of the researcher, or because the research process is mistaken for consulting. To me these concerns have been of relevance in regard to my own involvement, my critical reflection on this involvement, and on my personal interests during data collection and data analysis process (see also section 3.5). The awareness of ethical and confidentiality concerns has also been of high relevance when presenting and publishing my results (Rapoport, 1970). Here the inclusion of other researchers has been an important way to manage the bias of my personal involvement. From the beginning this PhD project has been a formalised collaboration in a written contract of agreement, which has helped me manage the pitfalls and limitations of intervention studies. The agreement described the immediate problem, the scope of the research, as well as the role of the participating agents, etc. The agreement helped me manage expectations and has guided my work in the intersection between the companies and the universities. As both Grundfos and CfL have experience in being a part of research projects and collaborating with universities, there has not been any explicated conflict of interests throughout the research process. In the following, I present the research process and the design of my data collection during the twenty-one months of study.
3.5 Data Collection

My data collection approach has been to devote significant effort to systematic and comprehensive data collection and to build on multiple sources of data in order to explore team members’ perceptions of distributed work. During the time of study, my research process spanned from early research design through observations, interviews, document studies and, interventions.

In order to get a first-hand experience of the daily life of Grundfos’ R&D department, I spent twenty-one months (from January 2012 to October 2013) working from a workspace at the Danish headquarters. I spent half of the daily working hours at Grundfos doing research while engaging with the organisation and supporting them in identifying new strategies to improve their global collaboration. I conducted fifty interviews and worked closely together with two management teams through shadowing and participatory observations, including observations of the organisations internal online platform. In addition, I spent an average of one week at each of the three global sites in China, Hungary, and the US respectively. Written documents and information on the organisation were collected and analysed. I have investigated not only the subjective perceptions of Grundfos’ global team members but also how these perceptions can be transformed through interventions as part of my research. Three iterations of interventions were developed and conducted project based upon the problem diagnosis. All interventions were designed as informed cycles based upon the empirical findings with the aim of improving global collaboration. In the following section, I go into detail with each main data source including semi-structured interviews, observations and documentary sources as well as the specific interventions, the documentation and analysis of my data. Table 3 in section 3.4 shows the main chronological stages of the data sources during the twenty-one months of study.

3.5.1 Semi-structured Interviews

In this research project, semi-structured interviews were chosen in order to capture the rich narratives of the team members’ experiences and perceptions (Blaikie, 2010). The interviews were primarily conducted during the first half of 2012. Data from twenty-nine interviews with managers and twenty-one employees amounted to a total of fifty interviews from both the Danish headquarter as well as from the other three R&D locations (US, China and Hungary). A further ten interviews were conducted as repeat interviews with participating managers from the workshop intervention during Autumn 2013. Interviewees were selected on the basis of experience with
global collaboration. The semi-structured interview was facilitated as a “guided” dialogue between the researcher and the respondent in order to explore the themes outlined in the research question as well as to allow the respondents to break away from the questions in order to bring up new insights and connections. (See appendix 1 for interview guide). The interviews took place either in available meeting rooms or by means of virtual media in the form of virtual meetings. The interviews lasted approximately one hour each. To increase the accuracy of their responses, each interviewee was assured anonymity (cf. Siegel, Waldman et al. 2003).

In regard to the documentation, the interviews were either recorded or, in other cases the researcher took extensive notes of the interviews, which were transcribed on the same day (Eisenhardt 1989). The researcher asked interviewees to review the interview summaries and findings. This was planned to attribute to the validity of the information gathered (Robson, 2002). The interviews were either conducted in Danish or English. Quotations reported in our results were all translated into English, omitting all information that would allow the identification of the informants.

3.5.2 Participant Observation
As mentioned, I spent half of the daily working hours at Grundfos doing research while also engaging with the organisation and supporting them in their aim to improve global collaboration. In order to get a first hand experience, I did participant observations by participating in all types of activities e.g. meetings, lunches, and in general shadowed the employees in their everyday work. The dual purpose of the participant observation was to allow myself to immerse into the organisation under study as to obtain the insider’s perspective on organisational life, and through these activities to change and challenge my prior perceptions (Spradley, 1980). Thereby, participant observation continuously challenged my subjective pre-perceptions of Grundfos, while obtaining a more advanced understanding of the organisation (Bourdieu, 2003). During the participant observations I conducted a descriptive observation (Spradley, 1980), which was useful in the initial phase of the research project in order to get an overall knowledge of the team members in the R&D department and their perceptions of distributed collaboration. Throughout the process, my observations became more focused and selective, guided and directed by a combination of what I learned about the research setting as well as by the interests and background of the research project (Spradley, 1980). The general as well as the focused and selective observations were of great value in my continuous search for a more qualified
understanding of perceptions of global work. Working in the open office environment and participating in informal breaks and meetings allowed for a more general observation of the organisational daily life. As my observations gradually became more focused, I noticed how the physical architecture of the open office environment troubled informants’ presence at virtual meetings. Thus, people often had either difficulties hearing or being heard while attending a virtual meeting, and they had trouble finding a quiet spot for a phone conversation, or difficulties due to technology breakdowns. These experiences guided my subsequent observations, and I started to focus on the informants’ perceptions of presence and proximity. My insights from the observations guided and were contrasted in the semi-structured interviews, where the informants could, for instance, express frustrations regarding their virtual meetings with distributed colleagues. These experiences were in contrast to opinions presented in the initial semi-guided interviews where people only touched on these issues in a more superficial and positive manner.

I used a notebook for all my observations. The notebook was divided into three different sections, which separated “field notes”, “process notes” and “abductive ideas”. Many of the observations were made during virtual meetings, face-to-face meetings or at my desk in the open landscape office where it was easy for me to take notes. In contrast, when I later did the interventions I had to write notes and keywords after the sessions and the debriefing with the other action researchers.

The “field notes” included the informants’ direct statements and behavioural acts in relation to the research topic. The “process notes” included how I perceived the atmosphere, the social actors’ commitment, the mindset e.g. While my notes under action primarily had the character of field notes and the process notes on, for example, “who did what, when and how”, the abductive ideas were themes or ideas that served as a way to reflect on the actions and the interconnections between the theoretical orientation and the observations (Czarniawska, 2007).

3.5.3 Documents Analysis
I included documents in my research as a key to understand the historical and business-related development of Grundfos as an organisation (Prior, 2003). The documentation I built on can be divided into: “historical documents”, “general documents” and “internal documents”. The first category included, three historical company books, which gave me a background and an understanding of the values and historical changes of the organisation. The “general documents” included annual reports, policy documents, the homepage of Grundfos, organisation charts and general information on the business products. The “internal documents” included internal power
point presentations, documents on the global R&D strategy, strategic reports made by managers and internal consultants. Prior (2003) points out how documents need to be considered as situated products, rather than as a fixed thing in the world and states: "The modern world is made through writing and documentation" (Prior, 2003, p.4). Thus, the documents were all studied carefully and the studies of all these documents allowed me to assess facts and formal values of the organisation, but also to deepen my understanding of the references and narratives from the interviews. In this way, the documents have all served as a source of background knowledge for the other data sources that helped me understand and analyse the information gathered through these data sources. This way, the analysis of the documents was used to adjust the questions asked in the interviews and the more focused observations, which were in turn used to qualify the analysis.

3.5.4 Interventions
With the outset of the research question asking how geographically distributed collaboration can be improved through transformational activities, we set out to conduct interventions building on the action research tradition and in particular the Collaborative Practice Research (Matthiasen, 2002). During our problem diagnosis and the exploration of perceptions of global work in Grundfos R&D, we found that there was an acknowledgement that the problem required a change of perspective among the involved global workers (see paper 2 and 3 for a detailed review). Responding to the problem above, we first decided to plan and execute interventions particularly directed at debating and transforming people’s perspectives on global work. By challenging the way participants think about global work, we wanted them to address new ways of collaborating supported by information systems technology.

Based on the problem diagnosis, we wanted to make sure that the interventions were particularly designed for the problems and the audience in mind, taking into consideration the organisational culture of the particular collaborators in the R&D department. Thus, when we first set out to conduct workshops, it was important for us to design interventions which helped the participants to reflect upon their own beliefs and work practices and to use this to further re-consider and improve their collaboration. In designing the first intervention, the focus was on creating an activity where dialogue and reflection were the main methods for learning. The analysis of the individual responses of the first intervention became the basis for the second iteration and the
conclusion was that our terms of challenging and transforming needed to be more affective (see paper 3).

Thus, while dialogue was still a central part of intervention 2, the main methods for this intervention was built on experiential learning principles (Kolb, 1984) utilizing the practical experiential learning of concrete collaborative activities. More specifically, the participants in iteration 2 were engaged in experiential learning activities where they were exposed to: - *Empirical testimony* building on scientific findings presented in a short video that illustrated new perspectives on distributed collaboration as an inspiration to experiment with new collaborative practices. - *Practical exercises*, in which team members experienced and experimented with new ways of collaborating. These exercises involved communication; coaching and virtual meeting activities. - *Alternative reflections*, in which team members collectively reflected on when and how experiences from the practical exercises as part of the interventions could be transferred into new collaborative practices in daily distributed collaboration. Paper 3 treats the cyclic processes of the first two iterations. Comparing the two iterations, it was clear that intervention 2’s anchoring of the reflections to practice afterwards was more successful than in intervention 1. Iteration 2 thus supported the literature on experiential learning (Kolb, 1984), where the learner moves through experiencing, observing, conceptualising and acting in a repeated process.

The findings from the first and second iteration of the action research cycle potentially pointed to the “saturation” criterion and our expectation was that the action research study could be concluded after the third iteration. Thus, our diagnosis and action planning in the third iteration primarily focused on the technical advancement of the video in order to provide a future technical tool without the need of consultants as facilitators. As planned, the workshop was conducted for another management team in the R&D department. The action taking showed how the technical redesign and sharpened professional angle of workshop 3 were implemented with observable increases in process efficiency and solution of quality-related problems. The result of the “evaluating stage” in this iteration again supported the experiential learning approach by Kolb (1984).

The experiences from the three iterations have led us to a number of reflections also presented in paper 3 and paper 4. Comparing the three interventions, it was clear that intervention 2 and 3’s anchoring of the reflections to practical experiences and exercises was essential for learning. (See Table 3 for an overview of the three iterations).
3.5.5 Internal Online-sharing Platform

As a capstone of the three iterations, consultants in Grundfos and I initiated an internal online-group called “Virtual leadership”. In my research I used this online group as a specific data-source for evaluating the interventions as a supplement to the interviews and observations (Hine, 2008). The online group build on the collaborative software Yammer and allow the participants to connect and to share knowledge online (www.yammer.com). In Grundfos, employees use Yammer to post work-related questions and answers. These discussion threads can be either in specific groups or in the company group “All Company” where all Grundfos employees on Yammer can see it. Access to a Yammer network is determined by a user’s internet domain so that only individuals with company email addresses are able to join their respective networks.

In the “Virtual Leadership” online-group, twenty-nine participants from the workshops were sharing their knowledge, initiatives and concerns on global management and collaboration. Here, participants posted questions and answers related to their personal experiences on leading and collaborating globally. Different issues such as presence, the establishment of trust, conflicts, knowledge sharing, alignment agreements on shared work practices and daily communication, and successes in distributed work were discussed and shared in this online group. As researchers, we were able to observe the ongoing online interactions, and to write extensive notes as strategies and discussions unfolded before us. This allowed us to trace and focus our observations, while the online interactions helped us to question our own perception of what was important, challenging, or common strategies among the participants. Analysing the online interactions, we identified new managerial initiatives such as the initiation of an asynchronous technology-mediated workshop designed to discuss strategies for global collaboration in Grundfos. When evaluating our interventions, an important part has been to triangulate and supplement online and offline observations. Or as Hine (2008) puts it: “…we need to move around and beyond online observations if we are to find out what kind of mirror it is for its users: whether it is a fairground distortion, a true reflection, or a flattering artefact in a fairy-tale” (Hine, 2008, pp. 55). This way we combined these insights from the online interactions with the face-to-face observations in order to shape the follow-up interviews with participants. It explicated the strength of analysing the continuous digital communication since it enabled the researcher to follow-up, contrast, as well as guide future data triangulation. My documentation of the activities on the “Virtual Leadership” Yammer group is a direct and anonymized transcription of all the online communication from the beginning of the group in May 2013 until October 2013 where my data
collection ended. In my data analysis, the transcriptions from this portal is treated and coded in the same manner as the other qualitative data in my study.

3.6 Data Sources

During the PhD project, many activities and events have been done related to the different types of data collection and interventions. Below is Table 3 summarizing the data-sources.

<table>
<thead>
<tr>
<th>Activities</th>
<th>No/Hours/Location</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviews:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semi-structured interview with managers (e.g. vice presidents, directors, project-managers)</td>
<td>In total 29 managers US, Hungary, Denmark &amp; China</td>
<td>15.01.12-01.02.13</td>
</tr>
<tr>
<td>Semi-structured interview with team members</td>
<td>In total 21 employees US, Hungary, Denmark &amp; China</td>
<td>28.09.13-01.11.13</td>
</tr>
<tr>
<td>Repeat interviews with participants from workshops</td>
<td>10 interviews with managers US, Hungary, Denmark &amp; China</td>
<td>28.09.13-01.11.13</td>
</tr>
<tr>
<td>Participatory Observations:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participatory Observations in Grundfos office</td>
<td>Participating in meetings, informal breaks and daily worklife in the R&amp;D office</td>
<td>21 months</td>
</tr>
<tr>
<td>Internal online Yammer groups</td>
<td>5 Yammer groups</td>
<td>15.01.12-01.11.13</td>
</tr>
<tr>
<td>Site-visits:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site visit in US</td>
<td>5 Days</td>
<td>July 2012</td>
</tr>
<tr>
<td>Site visit in Hungary</td>
<td>4 Days</td>
<td>September 2012</td>
</tr>
<tr>
<td>Site visit in China</td>
<td>4 Days</td>
<td>September 2013</td>
</tr>
<tr>
<td>Observations of two global management teams</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face-to-face meetings</td>
<td>4 FtF meetings = 13 days In US, Hungary, Denmark &amp; China</td>
<td>15.01.12-28.09.13</td>
</tr>
<tr>
<td>Virtual meetings</td>
<td>9 virtual meetings = 21 hours</td>
<td>15.01.12-28.09.13</td>
</tr>
<tr>
<td>Interventions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workshop 1 Based on reflections &amp; discussions</td>
<td>1 X 2 days workshop with 29 managers Denmark</td>
<td>1.2.13-03.05.13</td>
</tr>
<tr>
<td>Workshop 2 Based on experiential learning principles</td>
<td>2 X 1 day workshop with 11 managers in management team Denmark</td>
<td>03.05.13-28.08.13</td>
</tr>
<tr>
<td>Workshop 3 Based on experiential learning principles</td>
<td>2 X 1 day workshop with 7 managers in management team China</td>
<td>28.08.13-28.09.13</td>
</tr>
<tr>
<td>Development of online tutorial video for workshops</td>
<td>1 tutorial video</td>
<td>03.05.13-28.09.13</td>
</tr>
<tr>
<td>Developed through the iterations of interventions together with Grundfos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluation of the Interventions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analysis of Virtual Leadership Yammer Group</td>
<td>1 Yammer Group with 29 participants</td>
<td>28.09.13-01.11.13</td>
</tr>
<tr>
<td>Document analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Book: Grundfos. Mere end pumper. (Ballisager, 2008)</td>
<td>1 Book</td>
<td>2011</td>
</tr>
<tr>
<td>Book: Arvtageren. (Erhardt, 2011)</td>
<td>1 Book</td>
<td>15.01.12-01.02.13</td>
</tr>
<tr>
<td>Documents, internal &amp; external communication</td>
<td>14 Documents</td>
<td>15.01.12-01.11.13</td>
</tr>
</tbody>
</table>

*Table 3: Data Sources*
3.7 Data Analysis

The analysis of my empirical data has been an on-going process. Since not all of the categories of the inquiry were predetermined from the beginning of this qualitative research process, the important categories and understandings have been constructed as an abductive function of the actual research process (Blaikie, 2010).

The preliminary analysis of my empirical data began with obtaining the team members’ perceptions of their daily global interactions and the boundaries in global collaboration. As part of the analytical steps when aiming to understand the daily accounts of social actors the meaning of these accounts have been explored throughout the data collection. Thus, the in-the-field analysis was continuously guiding the focused and selective observations throughout the data collection process (Spradley, 1980). The preliminary analysis was applied throughout the whole study on vacant hours as either collective discussions or individual notes. During the workshop interventions, debriefing between the involved researchers and practitioners as well as diary notes were an especially crucial way to sort out and analyse the material absorbed during the interventions (Jepsen et al., 1989).

The field notes were subsequently rewritten as computer documents for a systematic transformation of all handwritten notes into pieces of text. When I analysed the data, once done in the field, the preliminary categorisations and reflections functioned as a starting point for a more theoretical conceptualisation of the main themes. Thus, the analysis moved from the first level of constructs (people’s everyday accounts) to the second level of constructs (social scientific categories) (Blaikie, 1993, p. 176). When analysing the typical boundaries presented by team members, the preliminary analysis in this research project moved on to the second level of constructs and penetrated the daily understandings which team members themselves drew upon, generating new social scientific accounts from them.

Throughout the process, my data analysis approach has - to varying degrees - drawn inspiration from ethnographic methodology (Spradley, 1980), the basic steps of thematic network analysis (Attride-Stirling, 2001), the strategies of grounded theory (Strauss & Corbin, 1998), and the use of data reduction method (Miles & Huberman, 1994). The greater cycle of data analysis after the fieldwork involved detailed reading and categorisation of all field notes and interview transcriptions (Attride-Stirling, 2001; Miles & Huberman, 1994). The purpose behind this after-
field categorisation was to ease and facilitate the following focused analyses depending on the data type and the purpose of analysis, by making it workable to sort the empirical data into chunks and themes (see appendix 2 for example of the themes). The themes identified provided the basis for a grouping that became thematic networks, which were clusters of basic themes (see also Attride-Stirling, 2001). Building on the categorisation of data, the analysis for each specific paper was done in various ways and at various times depending on the type of data and the purpose of the analysis as illustrated in Part 2.

In carrying out the data analysis from this qualitative multi-method research project, two main pitfalls have been essential issues for me to manage in reflective ways (Baskerville and Wood-Harper, 1996, Walsham, 2005). The first issue regards the broadness and the amount of data, which could potentially be overwhelming and has therefore been given careful attention. As a result of the multi-method qualitative approach in this study, there has indeed been a great amount and breadth of data. Every observable event, comment, printed document, email, etc. has been a part of my data, and the empirical data analysis has been an on-going and iterative process during this whole research project. While in the field, I was continuously reading my observation notes, interview data and organisational documents etc. as an initiation of the preliminary categorisation. The second essential issue for me in analysing the data regards the critical reflection on my own personal interests during the data analysis process (Kock, 2004; Walsham, 2005). The personal involvement of the researcher in intervention-research is especially likely to push one into interpreting in specific ways due to personal interests (Blaikie, 2010). As pointed out by Miles and Huberman (1994), all that you see in a transcription is inescapably selective, and I found for example, that the key challenge when evaluating the interventions was to identify which organisational changes were actually founded in the interventions, and which were simply a part of the frequent organisational change that formed the every-changing nature of Grundfos. To manage this issue, I have engaged in a range of activities in order to strengthen my qualitative data analysis and interpretation throughout the project. I have shared transcriptions and field notes with other researchers and PhD colleagues to obtain their initial feedback as a way to test the categorisations I developed. Aside from the activities as part of a research community, I also went back to obtain the practitioners’ views on my initial results as a member-checking in meetings, seminars and presentations for the involved practitioners.

In summary, this chapter on research methodology discussed the research approach and methods followed in the research project. I outlined how the research project builds on the interpretivism
paradigm. The methodological stance has been a multi-method qualitative research approach where I have investigated my two areas of concern – to understand and improve distributed collaboration in Grundfos R&D – through one research question. For this purpose, I have been building on ethnographic methods (Marcus, 1995; Hine, 2008) and been inspired by the Collaborative Practice Research approach of Mathiassen (2002). The data sources have been multiple and the analysis has built on an ethnographic and interpretive approach (e.g. Spradley, 1980; Attride-Stirling, 2001). Conducting this qualitative multi-method qualitative study has been a learning process on both a theoretical and methodological level. The next chapter first presents the scientific findings from each individual paper and discusses the answer to the overall research question of the thesis.
4. Discussion of Results
As previously mentioned, this thesis consists of four papers all of which have been a result of the data collection throughout the action research project conducted as an industrial PhD student. Each paper contributes to answering the overall research question. While the papers in their full length are presented in Part 2 of this thesis, this chapter discusses how each paper contributes to the overall focus for the thesis. While turning back to Figure 4 it is shown how each paper relates to the two areas of concern of this thesis. The cyclic process illustrates how challenges in global work can refer to team members’ implicit theories and their unsuccessful collaborative behavioural strategies. When aiming to improve global collaboration, the transformation of implicit theories is a complex way of engaging with the experience of new strategies, as well as reflecting on previous strategies and their guiding implicit theories. Below, the discussions of the findings and contributions from the papers are divided in two sections related to the two areas of concern namely to understand (paper 1 and paper 2) and improve distributed collaboration (paper 3 and paper 4).

![Figure 4. Papers & Areas of Concern](image)

4.1 Understanding Distributed Collaboration
As discussed, the first area of concern in this thesis is to understand the perception of distributed collaboration among global team members. At the outset of Paper 1, the main focus was to get a
broad understanding of how key boundaries impact team members’ perception of distributed collaboration. Rather than gaining an in-depth understanding of the perceptions of a particular global virtual team, we conducted a comparative study building on qualitative interview data, and identified the perceived key boundaries as technological limitations, language difficulties and temporal dispersion in two Danish-owned multinational corporations (MNCs), Grundfos and SWS. Boundaries have been defined as areas where differences between collaborators are potentially problematic with geographical distribution being just one of several boundaries in global virtual work.

The aim of paper 1 was to investigate the impact of perceived boundaries in global collaboration and further to capture the dynamic interrelations that impact perceptions of distance, and thereby potentially team performance. The result of this study showed that perceived distance among global team members is not only a matter of geographical distance, but it is also impacted by technological limitations, language difficulties and time-zone differences. When answering the research question on how technological limitations, time-zone differences, and language difficulties impact the relation between communication, identification, and perceived proximity in global virtual teams we found, that the discontinuities were dynamically interrelated in a vicious cycle. For example, managers told how they felt very far apart when meetings were scheduled at times and places where they had difficulties attending, while at the same time technological limitations and language difficulties were dominating the meeting experience. This again affected the communication and identification among team members. Even though the perception of boundaries in general was experienced similarly across all locations, there seemed to be small differences among team members as individuals in the subsidiaries for instance clearly experienced higher levels of discontinuities related to the boundary of time zones than did the Danes located in the headquarters. All in all, in Paper 1 we aimed to understand distributed collaboration by inductively grasping the everyday concepts and accounts that team members used to describe challenges of their global collaboration and discover the meanings they give to them. As this exploratory description directly reflects what the team members reported as the key boundaries, we were curious to do a further abuctive investigation on the different “theories” they used to account for what goes on in distributed work.

Paper 2 builds on and extends the findings of Paper 1. We assumed that just as researchers generate theories to explain the objects for investigation, people in everyday organisations develop theories about the characteristics of the world surrounding them. Unlike researchers’ theories,
these lay theories are often implicit, meaning they are not always specifically articulated in the minds of people holding them. Thus, in Paper 2 we took the starting point in the understanding that the challenges in distributed work cannot rest solely on the obvious boundaries inherent in global work, such as the ones mentioned above. We further argue that exploring implicit theories about global work has potential to help us understand how and why people are challenged when working globally. Building on Dweck et al. (1995)’s work on implicit theories, this study extends current research and argues that implicit theories play an essential role in setting the cognitive context through which global team members approach their collaborative tasks. Implicit theories in global work, as identified in this paper, concern the assumptions, expectations and knowledge they bring into distributed collaboration. An important aspect of implicit theories is that they typically exist in the background providing guidance, reducing uncertainty of conditions and organising experiences. However, implicit theories can also have constraining implications in that they introduce and maintain possibly negative assumptions and thereby limit creative problem solving. Paper 2 shows the way team members hold implicit theories that can limit what they can do and develop in their daily global collaboration. This paper builds on and extends existing research in three ways. First, using multi-sited ethnography across four sites in the R&D department in Grundfos, it demonstrates how team members approach global work through implicit theories held by the respondents within this research context. Second, this research identifies the significance of three specific implicit theories: (1) “You can’t build relationships through virtual meetings”, (2) “I can be present in more than one place at a time”, and (3) “You can’t have in-depth discussions at a virtual meeting”. While the results are detailed in paper 2, one of the key findings is that the most pertinent implicit theory in the empirical case of Grundfos is: “You can’t build relationships through virtual meetings”. This implicit theory reinforces the importance of relationships and social interaction facilitated by face-to-face encounters. This implicit theory is not surprising, since similar conceptions have been reported in prior research. For example, past research stresses the difficulties of communicating virtually because to a certain extent, technology removes social cues and thereby a joint contextual background that may result in communication breakdowns (Maznevski & Chudoba, 2000; Klitmøller & Lauring; 2013). Nevertheless, as the third contribution, the result of paper 2 shows that team members’ implicit theories reinforce a behaviour that is consistent with their beliefs, which in the end again reinforces these implicit theories. The paper points to the argument that it is not only the boundaries such as geography and time that pose difficulties in global work, but also the fixed implicit theories guiding people’s perceptions and behaviours in distributed collaboration.

Implicit theories bring new nuances to our understanding of distributed work while building on
former research. Thus, former research has identified how people’s different frames of reference impact how people interact in organisations (Weick, 1979). Extending this work, researchers have explored people’s frames towards technology, and coin the concept of technology frames (Orlikowski & Gash (1994). Technology frames explain how people’s perceptions towards technology can be divided into three types of relationships: The nature of the technology, the technology strategies, and technology-in-use. The nature of the technology impacts the way in which people interact with the technology. For example, it matters whether people think about the technology as a single user system or a collaborative technology. Likewise the nature of implicit theories about distributed work highly impacts the ways people collaborate or are able to think about what makes successful collaboration activities in a global contact. While technology strategies concern people’s motivations for why and how to use the technology, implicit theory strategies are of a different kind. For example, implicit theories about cultural differences have been used as a rhetoric argument covering up what are actually coordination problems (Jensen & Nardi, 2014). This way, we can see a risk in how the motivation for using and referring to implicit theories strategies in practice by practitioners can be problematic since it is used as explanatory and thus covers up otherwise emergent problems in distributed work.

Implicit theories in global work is the first theoretical perspective to acknowledge that team members’ perceptual approach is part of distributed collaboration and that some negative reactions to distributed work may have complex underlying motivations other than the boundaries inherent in global work. The final relationship that technology cannot be fully understood prior to practitioners’ technology-in-use practices, shows that to fully comprehend people’s experiences of distributed collaboration, we need to take into account the ways in which people’s experiences of global work are inherently interlinked with their implicit theories about distributed collaboration. Implicit theories become manifested in the way they interact with others at a distance. Thus, the way people think about distributed collaboration impacts how they engage in distributed collaboration.

Returning to the research question of the thesis, the findings have characterised the nature of implicit theories in distributed work into the different types of relations (nature, strategies, in-use) and argued how these relations are interlinked with the concrete experiences of the collaboration. Moreover, I have identified the different types of behaviour, which are linked to the implicit theories. Giving these findings, I argue that to be able to transform people’s implicit theories, we must find ways to address how implicit theories manifest in practice, and use this as a starting
point for designing interventions. Addressing one of the areas of concern in this thesis, namely to understand the perception of distributed collaboration among global team members, I have now demonstrated how implicit theories and perceptions about global work matter, and I have further diagnosed the starting point for the interventions in the R&D department in Grundfos. In the following, I discuss the second area of concern in this thesis, namely how to improve distributed collaboration.

4.2 Improving Distributed Collaboration

The second of the two areas of concern regards how to improve distributed collaboration. In this section, I discuss my findings from Paper 3 and Paper 4, which contribute to our knowledge on how to transform distributed collaboration. More specifically, in Paper 3, I identified new ways to transform the implicit theories people hold about global collaboration with the aim of changing the collaborative possibilities for working closely with remote colleagues. In Paper 3 I build on an action research project where multiple Grundfos R&D team members were participating in several different types of activities designed to facilitate global work, thus improving distributed collaboration. Paper 3 reports from this action research project, zooming in on two action cycles where I tested intervention approaches and techniques with the aim of transforming people’s implicit theories. In particular I experimented with two different types of interventions: Discursive and Embodied. The discursive intervention embraces the implicit-theories’ relations linked to the nature of implicit theories and implicit theory strategies as identified in Paper 2 (see section 4.1). By producing the tutorial-video, which stereotypes and challenges the nature of the implicit theories identified in Grundfos, this discursive intervention serves as a platform for participants to reflect on and discuss the impact of implicit theories for future distributed collaboration. The platform also made it possible to discuss the risk of implicit-theory strategies overshadowing the origin of communication and coordination breakdowns. Communication breakdowns in global work always manifest themselves in specific practices. However, they might be based and grounded elsewhere (Bjørn & Ngwenyama, 2010). Therefore in order to solve communication breakdowns, it requires an in-depth analysis of the implicit-theory strategies within a team. The result of the discursive intervention was that while such techniques are able to produce a platform for reflection on the nature and strategies of implicit theories, it was less successful as a vehicle to transform the implicit theories. Clearly, participants experienced the action cycle activity as beneficial for reflection however finding ways to bring reflections into practice was less obvious.
This finding is further supported by prior research explaining the gap between intention and actual practice (Orlikowski, 1992; Bjørn et al, 2006).

The *embodied intervention* took a quite different form and was fundamentally informed by techniques to bring experiences into-use based upon experiential learning principles (Kolb, 1984). Embodied interventions turned out to be effective in bridging the gap between intention and actual practice. The embodied interventions were organised as activities where the participants were challenged in their implicit theories through embodied collaboration experiences with global colleagues. The focus of the embodied intervention was the implicit theories which participants had concerning social presence in distributed work. Social presence in distributed work is the here-and-now perceptual experience of being close to another person during mediated communication (Schultze, 2010). It was the result of the diagnostic phase (Paper 1 and Paper 2) that led to the focus on social presence, since the result revealed that successful distributed collaboration is dependent upon mutual attention and social presence. The structure of the embodied intervention had a fundamental role in making the collaborative actors experience an enhanced sense of social presence. In this Paper, the embodied experiences of social presence turned out to be a key factor when transforming perceptions of distributed collaboration. It became a key factor because the embodied experience forced participants to not only reflect and discuss future work, but actually gave them concrete enacted experiences together.

While Paper 3 evaluated the short-term success of the interventions as problem solving methods, in *Paper 4* we wanted to examine the ways in which we are able to establish and evaluate the long-term impact of these action research interventions. In doing so, we closely examined the interventions particularly directed at creating successful conditions for collaborative presence in global work. Returning to the organisation six months after the interventions, we identified a strategy to enhance social presence - namely “Mental Attention”. We found that by having interventions focusing on the successful enactment of mental attention in global work, a great amount of initiatives among the managers were taken to make virtual meetings more involving and engaging, where not only *the attention* but also *the actions* of the participants were changed. This included improved delegation of tasks and responsibility during virtual meetings, which necessitated specific roles and task engagement among the participants.

When the team members reported back after a time lapse, their openness and their preparedness to set out new experiments in global work seemed to have increased. Thus, the work practices, especially those reported on the Yammer system, were characterised by new experiments and an
awareness of how to develop global team collaborative practices. Thus, the presence performed enhanced the ability and imperative of not only “being there” but also a requirement for “doing there”. This observation suggested that the embodied and experiential-based exercises influence the implicit theories on an even longer term. While evaluating the long-term impact of our action research interventions, we suggest and demonstrate our analytical approach, which we used to make the long-term impact evaluation: Relational Excavation. Relational Excavation is characterised by following associations and relations from current practices to past interventions with the aim to determine the nature and basis of the detected organisational changes. We argue that the Relational Excavation approach provides the possibility to detect long-term impact of action research interventions, even in highly dynamic organisations with frequent organisational changes.

While our intention in Paper 4 is not to develop new specific guidelines for how to evaluate long-term impact of action research interventions, we believe that tentatively articulating our findings in the form of principles might be a useful way to communicate and thus make it possible for others to continue the work of evaluating long-term impact of action research. In the next section I explain and discuss the model of the transformation process that illustrates how fixed implicit theories were transformed to more incremental implicit theories through experiential learning activities.

4.3 Answering the research question

“The interesting question (…), is whether it is at all possible to change the individual’s frame of reference (i.e. perspective), a de-and reframing characterized by a qualitative discontinual second-order or double-loop change”

(Westenholz, 1993, p. 40)

This section discusses the process of transforming fixed implicit theories and aims to be a direct answer to the research question: How can we improve geographically distributed collaboration by transforming people’s implicit theories utilizing the practical experiential learning of concrete collaborative activities? In this section I elaborate on this transformation process while I revisit the framework of implicit theories and methodologies of our interventions. I propose a model of the transformation process that explains how we succeeded in transforming fixed implicit theories to more incremental implicit theories through experiential learning activities. Based on this model
I discuss some typical ways of both transforming implicit theories and improving distributed collaboration, as suggested by the literature. The chapter ends by revisiting The Theoretical Orientation Model (see figure 2, section 1.3) while illustrating how the present study relates to the intersections that connect Information Systems research on distributed collaboration, Social Cognitive Psychology research on implicit theories and, finally Educational Theory research on experiential learning theory.

4.3.1 From fixed to incremental implicit theories
In this study I found, in line with previous studies (Ancona & Caldwell, 1992), that global team members’ perceived reality was complex and evolving. A given boundary, task, goal etc. was often understood in so many different ways, that constructing a certain order was vital to enabling team members to understand and manage organizational issues (Henderson, Stackman & Lindekilde, 2016). I found, in line with other studies (Weick, 1995) that team members were striving for order and that they reduced complexity by imposing some logics about the world that they were dealing with. However, what I also found was, that when imposing that cognitive order, people also construct it and punctuate it into some specific issue or matter. In this study the construction - the fixed implicit theory - sometimes seemed to actually become part of the problem.

As discussed previously a fixed implicit theory involved assuming that the area of concern was largely determined and thus unlikely to change. When people believed that the area of concern was fixed and unalterable, they were disinclined to try engage and to change behavioural strategies as shown in this study. This is in line with existing literature showing that when people believe that the area of concern is fixed and unalterable, they are disinclined to invest in initiatives or to try to change the status quo (Heslin et al.; 2006). Heslin et al. (2006) however showed how people with incremental implicit theories were more open to new knowledge and experiences, thereby enabling new behavioural responses that were more unbiased reflections of the situation.

Thus, in this study I found that the problem often became the way team members thought about the problem. In order to be able to break out of their previous fixed perceptions, participants needed a new way of approaching issues in distributed collaboration. Achieving the goal of improved global collaboration required a disruptive intervention (Tyre & Orlikowski, 1994). Team members needed to move away from a perception of the problem in simple and fixed
“either-or” terms to more incremental theories. This aim reflects a pragmatic intention of not only moving people out of the mess, but rather to move people toward a formulation of the problem, which calls for new solutions and behavioural strategies. The intent of transforming fixed implicit theories into incremental theories reflects the objective of previous studies, as will be discussed in the section below. Returning to the premise that fixed implicit theories in themselves can pose a problem, I illustrate in the following section how the transformation process pushed the participants to consider and experiment with alternative incremental implicit theories.

4.3.2 The transformation model
Below I explain the model (figure 5) of the transformation process that illustrates how fixed implicit theories were transformed to more incremental implicit theories through experiential learning activities. During the explanation I discuss some typical ways of both transforming frames of reference and improving global work, as suggested by the literature. Seen from an interpretive researcher’s point of view, the scope of the present study was not to change other peoples’ fixed implicit theories at whim – nor is it possible. Instead what I illustrate in the model below is, that the interventions opened the possibility for the participants themselves to apply new incremental implicit theories. The transformation model in practice entailed an interwoven and iterative process through the four stages of the learning cycle (Kolb, 1984). Figure 5 both illustrates the four stages in the transformations process, as well as the contribution of each stage, and it demonstrates how process and product are linked in this present study.
As illustrated in figure 5, stage 1) “Reflective Observation” in the transformation contributed to the identification of the participants’ fixed implicit theories. Here the initially reflection led the participants to identify issues that they recognized as barriers in their daily global collaborative interactions. Many issues appeared as somewhat fixed implicit theories about conditions for global collaboration, which the participants considered unchangeable. These fixed implicit theories were identified to be open for further investigation. Stage 2) in the transformation process “Abstract Conceptualization” contributed to a conceptualization of alternative incremental implicit theories. Thus, building on the video we identified and conceptualized alternative incremental implicit theories based on scientific testimonials. Existing studies on transformation of implicit theories highlight the potential influence of this stage as cognitive induction. Those studies show, that interventions, which simultaneously employ multiple types of cognitive induction methods have been shown to evoke changes in implicit theories that endure over longer periods (Aronson et al., 2012). Such cognitive induction methods are typically combined with what I have referred to in this present study as the discursive intervention methods and include techniques labeled “reframing”, “relabeling” and “paradoxical interventions” (Dweck, 1999; Dube, 2008). Dweck
states that implicit theories are fairly stable, though still transformable by “a compelling or continuing message” (Dweck, 1999; p. 133). This approach is only partly supported by my findings. In this present study I found that it is not only the cognitive inducement of compelling or continuing messages, but in addition the transformation of experiences that served to change the implicit theories. While, the discursive techniques are all based on the idea that accentuating and communicating about behavioural patterns will make people change, I found that those cognitive constraints don’t ease based on discourse alone. In stage 3) “Active experimentation” participants actively experimented with global collaboration activities. It was a critical stage because the embodied experience forced participants to not only reflect and discuss future work, but actually gave them concrete enacted experiences together. When I evaluated the interventions, the participants recognized as the most revealing part the exercises, where the participants had “aha-experiences” involving new incremental theories (stage 4). The experiential session was a disruptive event since the participants realized that their existing routines in distributed work had not been as productive as needed. Disruptive sessions potentially provide team members with the ability to evaluate their collaborative practices and increase their willingness to revise and change their work practices (Tyre & Orlikowski, 1994). Through the stage 3 and 4 the embodied interventions successfully enhanced the transformation of the fixed implicit theories to incremental implicit theories. Following the four stages, the participants were given the opportunity to spend time on addressing and investigating their new frames of reference in their future daily life. The questions here were related to how new behavioural strategies could be implemented as new ways of collaborating globally. Strategies and relevant initiatives were discussed. In line with Kolb’s approach, Weick (1979) explains how reframing calls for a structured and involved process because experiences often appear to be equivocal, and make many different kinds of sense. By obtaining an insight into oneself and one’s future interactions with the world, the participant is able to try out what they have learned in the future.

The transformation model resembles the process model for implementing innovative technology (Edmondson et. al, 2001). Thus, Edmondson et al. (2001) have focused on the implementation of new technology as a disruptive organizational change, which managers and teams purposefully can facilitate with the aim of establishing new work practices (e.g. Edmondson et. al, 2001). In contrast this study focused on a “wider” area of concern – global collaboration- a less limited focus yet still with well defined work-practices surrounding mediated communication that could easily be identified by participants as well as researchers. While the process model emphasize the role of managers and teams when implementing technology, in this present study I have
emphasized a generic model for transformation of fixed implicit theories, which builds the foundation for a descriptive as well as normative transformation theory.

In summary, the model for transforming implicit theories demonstrates the value of linking process and product in interpretive research. Thus, the task has been both to investigate the implicit theories, and especially how these implicit theories are transformed in the cycle of learning. The transformation model shows how incremental implicit theories form the ground for new future experiences – and thereby be a conduit to a more comprehensive and fruitful approach to global collaboration. By challenging and transforming participants’ theories and perceptions, the entire learning process may enable double-loop learning characterized by a qualitative new frame of reference (Argyris, 2000).

This research project set out to answer the research question of how we can improve geographically distributed collaboration by transforming people’s implicit theories utilizing the practical experiential learning of concrete collaborative activities. Above I have illustrated how the transformation model is shown to be powerful when improving global collaboration. The research question for this study has as its starting point embedded dual goals for both contributing to theoretical understandings as well as to practice. In the following sections I’ll unpack and discuss the theoretical contributions, suggestions for future research, and the practical implications of this thesis.

4.4 Theoretical Contributions & and Suggestions for Future Research

Going back to the starting point of the PhD work, I introduced the interdisciplinary research field of this thesis by creating The Theoretical Orientation Model (see figure 2, section 1.3). The Theoretical Orientation Model illustrates the interdisciplinary research field as constituted through the intersections connecting Information Systems research on distributed collaboration (Bjørn et al., 2006; Orlikowski, 2002), Social Cognitive Psychology research on implicit theories (Dweck, 2000; Engle, E. M., & Lord, R. G., 1997), and finally Educational Theory research on experiential learning theory (Kolb, 1984; 2004). It is now time to revisit the model and examine how the important contributions for theory of this thesis are situated within and related to the three interdisciplinary intersections.
Situating my contributions to theory within the intersection between distributed collaboration and implicit theories, my results show that the understanding of distributed work and its boundaries requires not only an acknowledgement of the inherent boundaries (such as culture, language and time-zone differences) of global work, but also of the implicit theories in global work that form the individual’s perceptions and foster consistent behaviour. More specifically I extend research (e.g. Orlikowski and Gash, 1994) into cognitions of global collaborators by proposing that the implicit theories organisational members bring into work are central to understanding global work, and not just the ways in which they think about technologies. As the concept of technological frames has helped us investigate the institutionalised influence of shared technological interpretations (Orlikowski & Gash, 1994; Bjørn et al., 2006) the framework of implicit theories brings additional value by providing conceptual understanding supporting our examination of not only technology frames, but related to the interpretations in the domain of global distributed collaboration - including the collaborative practices mediated by information technology. My research demonstrates that the framework of implicit theory offers an interesting and useful analytic perspective for understanding and behavioural strategies, that are not easily obtained however critical to the field. I do not intend to suggest that boundaries such as time-zone differences do not influence global collaboration. Clearly, experiences of collaboration being delayed by for instance differences in time-zones will influence the perception of being close as well as the communicative behaviour of a global team member, (as shown in paper 1). However, attention to showing how implicit theories develop and shape people’s behaviour contributes to our advancing our understanding of the challenges of global work. Through such a view on global distributed work, the complexities and subtleties of global work can be addressed in ways, which to my knowledge has not been done yet.

My research has identified fundamental implicit theories that organisational members hold in global work, which can serve as the basis for future research. The implicit theories and the methods for deriving these provide inspiration and guidelines for new investigations and articulations of people’s interpretive relations with globally distributed work. In future research, the identification of incongruence and inconsistency in implicit theories between groups of workers (e.g. national cultures) could be an area of future research while eliciting different deeply-held assumptions among cultures, professional groups etc. However, assessing implicit theories as well as incongruence between implicit theories poses a number of methodological challenges and possibilities in order to be able to derive assumptions and related collaborative behaviour. In my work, the implicit theories slowly appeared as inconsistencies between the different accounts of
global work reported by different informants through the many interviews and observations. Attempts to bring to the surface the common implicit theories imply a critical mass of perspectives and participants in order to analyse and derive the theories in use, and to distinguish these from each other across groups. Here the triangulation of multiple methods and data sources is particularly valuable when revealing and discerning implicit theories in the empirical case.

Situating my contributions to theory within the intersection between experiential learning and implicit theories the literature on implicit theories in general have emphasized the stability as well as the mechanisms through which natural change occur (Dweck, 2000). Several theories on learning have described the adaptive learning processes that occur naturally in organizations. However, in this study I propose a transformation model, which should be intentionally managed by organizational actors. Thus, this present research focus on the specific disruptive interventions that purposefully aimed to transform implicit theories. The majority of existing research, which is actually aiming to change implicit theories, builds on scientific experiments. Further, the traditional transformational procedures have been for example to present participants to scientific evidence in films supporting specific implicit theories (Aronson et al., 2002).

The approach in this research project supplements newer research on transformations of implicit theories, stating that transformation is not only a process of providing evidence for new implicit theories but must include well-planned experiential learning processes supporting the participants in enacting new implicit theories (Detert & Edmondson, 2011). Future research could build on these findings and investigate the conditions under which implicit theories and work practices can be transformed in real-life settings. Building on an experiential learning cycle I revealed how organizations can transform implicit theories through the four-step transformation model. Thus, new approaches for conducting interventions in research could be inspired by the transformation model that are shown to be powerful in this PhD project. An area for this future research is also how implicit theories are transformed and influenced in general by, for instance, organisational context, profession, and private life. Despite the use of multiple methods and different interventions in this research project, much work remains to be done to understand the nature and the change process of implicit theories in global work.

Existing research in the intersection of distributed collaboration and experiential learning shows how the alignment of individual technological frames requires the articulation and re-evaluation of people’s experiences of collaborative practices (Bjørn et al.; 2006). Thus, a central finding in the
study of Bjørn et al. (2006) was that the alignment that led to the successful use of groupware by a virtual team built on practical experience, and therefore could not take place at the outset of groupware adoption (Bjørn et al., 2006). These findings are aligned with this thesis’ central conception of learning as a process of relearning where the learner moves through a process of experiencing, observing, conceptualising and experimenting with new actions based on what has been learned. When aiming to improve distributed collaboration, this present research project has emphasised the second-order learning, seeking to transform the implicit theories among global team members. In this study we have sought a transformation and a relearning of the guiding assumptions and beliefs of global team members. However, it could be suggested that the changes that are required in order to improve global collaboration in some contexts would be another kind of transformation – namely a transformation of single loop character. This could for instance be to basically update team members’ technical skills - without any broader implications for changing the mindset, the workpractices and the interactions among global team members. While this single-loop learning is not mutually exclusive with double-loop learning, future research could investigate the conditions under which the different transformation initiatives and approaches hold their legitimacy.

4.5 Implications for Practice
This research has several implications for practice stemming from the empirical studies. First, the findings from the studies point to the importance of the perceptions of organisational members. It is shown that organisations must not underestimate the role people’s perceptions and implicit theories have about the global work since these layman perspectives highly impact their capabilities in engaging in successful collaboration without collocation. This means that organisations should spend time and effort in understanding the current perspectives while intentionally seek to transform team members’ and managers’ implicit theories about work. Such activities will then be able to impact globally distributed work practices in the longer term. While organisational members have little choice in whether participants bring implicit theories about global work, which are counterproductive to distributed collaboration, they do have a choice about whether to proactively investigate and transform these implicit theories improving the collaborative work.

When an organisation engages in global collaboration with the intent to make substantial changes in their business processes, people’s implicit theories on collaboration will likely also require a
transformation. Achieving such a reorientation is difficult. The literature on organisational change is filled with examples of individuals, groups or organisations that have been unable to transform their frames of reference as well as their daily routines when necessary (Gersick and Hackman, 1990). In this study many global team members seemed anchored in implicit theories, which limited creative generation of more efficient alternatives for collaborating globally. My research findings point out that rather than spending resources of high fidelity surroundings for virtual meetings, improvement of global work might be accomplished by creating situations where presence, concentration, and focus are directed at remote colleagues. It is not the technology in itself, which changes the situation – it is the way people engage with the technology and each other in a socio-technical construction. Thus, by creating and enabling new collaborative experiences and patterns in global work, organisational members have the opportunity to change perceptions about global work and improve the outcome in a positive manner. Consequently, to gain value from global collaboration, my research suggests that organisations must prioritise careful migration of people’s implicit theories with concrete collaborative practices in order to improve global collaboration.

The three implicit theories that were important to understand the context of the globally distributed teams in the R&D Grundfos mirror findings from similar studies elsewhere (Caulat, 2010). Other implicit theories about global work can undoubtedly be identified in different organisations, and much can be learned from managers and employees by articulating and recognising these implicit theories. To do so, the findings from my research recommend that early articulation, reflection, and possible transformation of implicit theories may reduce the likelihood of unintended behaviour and delusions in global work. Thus, attempts to bring to the surface the implicit theories and further to state theories that contradict those beliefs, and continuously work to dispel these by modelling, inviting and rewarding new experiments on global collaboration, can all be particularly useful when training and developing the practices of global teams.
5. Conclusion

In this thesis, I explored how geographically distributed collaboration can be improved by transforming people’s implicit theories utilizing the practical experiential learning of concrete collaborative activities. This research question was investigated through my industrial PhD project, where I explored the Danish headquartered pump producer Grundfos using a multi-method qualitative approach. Guided by the research question in combination with the practical needs and interests of Grundfos, the PhD research project introduces a theoretical orientation highlighting the intersections between three research areas - namely distributed collaboration grounded in Information System research (Bjørn et al., 2006; Orlikowski, 2002), implicit theories grounded in Social Cognitive Psychology (Dweck, 2000; Engle, E. M., & Lord, R. G., 1997), and finally experiential learning grounded in Educational Theory (Kolb, 1984, 2004).

Although past research has acknowledged global collaboration as one major challenge in today’s organizations there has been little work on specific interventions, in order to improve global collaboration (Orlikowski, 2002; Hinds et al, 2011). As shown in this thesis, understanding the challenges of global virtual teams cannot rest solely on the acknowledgement of the inherent boundaries such as the geographical and technological challenges of global work. In this thesis, I investigate the implicit theories that global team members bring to work, and I discuss how organizations can improve global collaboration through the four stage transformation model building on the experiential learning approach.

There are four key contributions that this thesis offers. The first contribution is combining and extending existing research (Orlikowski, 1992; Dweck, 2012) illustrating how team members’ implicit theories about the nature of global collaboration and its boundaries can have negative consequences for collaborative practices. As shown, team members seemed anchored in implicit theories, which limited creative generation of more efficient behavioural alternatives. Team members for instance engaged in very formal virtual meetings where there was no room for discussions, and where they ended up perceiving the quality of collaboration as far inferior compared to face-to-face interaction. The second contribution of the thesis is a reiteration of Kolb (1984) s’ experiential learning principles: That is, in order to transform existing implicit theories in global work, the interventions should build on the experiential learning cycle which allows for the learner to move through the four stage transformation model as a repeated process that is responsive to the learning situation and what is being learned. Here it is shown, that interventions
directed at questioning the implicit theories people have on distributed collaboration are best done through embodied experiences. Moreover, the study shows that such interventions can have long-term impact when organised as relearning and experiential activities supporting an iterative learning cycle for the organisation. The third contribution is a contribution to practice and is a consequence of the above: that is, global organisations should seek to identify, and if needed, to reorient team members’ implicit theories regarding global work to ensure that they experiment with new ways of working in order to adjust and improve previous work practices. For example, in the case of Grundfos, the implicit theory, that one needs to be physically present in order to build relationships, represents a barrier that can block valuable collaboration across distances and make the company revert to traditional work forms. The practical implications of the discovery of implicit theories as representing subtle barriers to global collaboration enables organisations to discover; discuss and eventually transform these. Thus, in order to gain value from global teams, companies should plan a careful migration to implement new tools and work arrangements, making sure that new tools are integrated with new ways of perceiving the challenges of global work. Thus, the four-stage transformation model provides a means for influencing people’s perspectives as the globalizing and technological development proceeds.

Looking to the future, many interesting questions regarding global collaborators’ implicit theories and how they affect collaborative practices remain to be answered. This research project has identified an initial understanding of implicit theories in global work that can serve the basis for future work. Thus, the theoretical understandings initiated and developed in this research can be useful for investigating how new generations approach global work with new and other implicit theories in use. The understanding of the transformation process also requires a further investigation of the conditions under which implicit theories change and how these guide changes in collaborative behaviour.
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PART 2

PAPERS OF THE THESIS
Paper 1.

Being Close at a Distance:

Exploring the Perceptions of Technological, Temporal, and Linguistic Boundaries to Global Virtual Team Effectiveness
Abstract

The matter of boundaries such as time, distance, language, culture, organization has long been at the center of attention in research in global virtual teams. However, understanding how the perceptions of different boundaries entailed in global virtual work come to influence communication, identification, and perceived proximity could add to our understanding of the dynamics in global virtual teams. Thus, in this paper we show how the perception of three boundaries of global virtual collaboration (technological limitations, time-zone differences and language difficulties) potentially come to challenge team effectiveness due to their impact on the interrelation between communication, identification, and perceived proximity. Further, our findings also point to the dynamic interrelation among the three investigated boundaries.

Keywords: global virtual teams, boundaries, perceived proximity, communication, identification

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Introduction

Globalization has made the ability of Danish multinational companies (MNCs) to coordinate activities that span vast geographical distances increasingly important. This vast distribution of activities means that MNCs rely greatly on global virtual teams (GVTs) to facilitate collaboration between dispersed organizational units (Jonsen, Maznewski & Davison, 2011; Zander, Mockaitis & Butler, 2012). GVTs consist of individuals who reside in different time zones and countries and who rely primarily on communication technology to undertake organizational tasks (Horwitz, Bravington & Silvis, 2006). From the perspective of international organizations, GVTs have many potential advantages: they allow organizations to tap geographically distributed resource pools and, in an era of global economic crisis, technology-mediated communication offers a cost-effective and sustainable alternative to face-to-face collaboration. Yet, as experienced firsthand by Danish international managers, producing effective results often proves more difficult in GVTs than in co-located work groups. Danish managers therefore need to be properly prepared to handle the virtual challenges of such working methods, not least because GVTs are at the heart of the globalization processes currently pressing Danish firms to perform more effectively. This means that competence in using information and communication technologies needs to be improved among Danish virtual leaders, not least in relation to taking on complicated global knowledge-intensive tasks. While Danish companies have been at the forefront of implementing technological solutions for simple routine work, there is still untapped potential to use digitization for business development and R&D purposes (Ministry of Business & Growth Denmark, 2013).

However, this is by no means an easy task. Thus, according to practical experiences as well as existing research, the boundary of geographical distance between dispersed team members potentially entails challenges that impact GVT effectiveness. Boundaries have been defined as areas where differences between collaborators are potentially problematic, and with geographical distribution as just one of several boundaries in global virtual work. Boundaries in regard to function, team membership, organization and time, all represent examples on salient boundaries in global virtual collaboration (Espinosa et al., 2003). Regarding the boundary of geographic distribution, some studies have shown that communication often deteriorates over spatial distances. The lack of communication has a negative impact on interpersonal relations, including identification between team members. This in turn negatively affects team members’ perception of being emotionally close to each other (Wilson, O'Leary, Metiu & Jett, 2008). O'Leary et al. (2014) show how the lack of perceived proximity again affects communication and identification. Hence,
a vicious circle where team members feel increasingly distanced from each other is likely to occur if members experience communication and identification challenges. Surprisingly, however, this interrelation between geographical dispersion on one hand and communication, identification, and perceived proximity on the other hand have only been scarcely studied in existing literature (Wilson, Crisp & Mortensen, 2013; Wilson et al., 2008). In particular, the notion of perceived proximity has been granted little attention in studies concerned with the interrelation between geographical distance and team effectiveness. Traditionally the literature has conceptualized geographical distance and perceived proximity as similar and overlapping notions. Yet, at stream of research argue that team members can feel ‘far-but-close’ or vice versa and that perceived proximity is as important, but also different from, physical distance for understanding interpersonal virtual interaction (Bradner and Mark, 2002; Orlikowski & Gash, 1994; Wilson et al., 2008). This means that the potential impact that the boundary of geographical distance has on virtual team outcomes is not fixed, but rather dependent on other boundaries and factors that come to influence whether GVT members feel emotionally distant or close to each other. Therefore, understanding how the perceptions of different boundaries entailed in global virtual work come to influence communication, identification, and perceived proximity could add to our knowledge of GVT dynamics. Thus, in this paper we aim to explore how the perception of three boundaries of GVT collaboration (technological limitations, time-zone differences and language difficulties) potentially come to challenge team effectiveness due to their impact on the interrelation between communication, identification, and perceived proximity.

First, even though the use of information and communication technologies enables team members to collaborate it does not mean that the technology necessarily serves as a continuity for the team members. Information systems can create a discontinuity for instance when the needs of the team and the technology are not aligned (Majchrzak et al., 2000). More specifically information and communication technologies can have a negative impact on communication, identification, and perceived proximity, as the narrow media enhances the challenges of miscommunication and misunderstandings (Jonsen et al., 2011; Montoya-Weiss, Massey & Song, 2001). In addition, due to technological challenges i.e. disconnection of the internet, disruptions in the video feed etc. technology can create a discontinuity that could further add to the challenges described above. Second, GVT members are temporally dispersed (Maznevski & Chudoba, 2000). To manage time zone differences, many distributed team members experience that they must work non-traditional hours to be able to attend virtual meetings (Watson-Manheim et al., 2012). The coordination challenges arising from residing in different time zones could potentially add to communication
difficulties, lack of identification, and absence of a sense of proximity between members. Third, due to the global geographical dispersion of the team, members have to interact in a language other than their own. This factor, which has often been neglected in virtual management studies, can have a severe negative impact on GVT effectiveness. Thus, language differences have proven to hamper communication and identification, and also to create a sense of distance between virtual collaborators (Beyene, Hinds & Cramton, 2009; Klitmøller & Lauring, 2013; Wilson et al., 2013). While extant research has focused on the technological, temporal, and linguistic challenges inherent in ICT communication as individual boundaries that could potentially damage virtual communication, no prior empirical study has to our knowledge linked the perception of the three boundaries to identification processes, communication and perceived proximity. This could be an important omission not only for business research, but also for Danish international managers. While it is often not possible or advisable to reduce the physical distance between members due to the organizational advantages of employees being geographically dispersed, it might be possible to enhance communication, identification, and perceived proximity between members, and thereby GVT effectiveness. Thus, we pose the following research question:

How do technological limitations, temporal dispersion, and linguistic differences impact the inter-relation between communication, identification, and perceived proximity in GVTs?

The remaining part of the paper reads as follows. First, we present the conceptual framework used in the paper. Here we draw on the notions of communication, identification, and perceived proximity and existing studies of perceived boundaries GVTs. This is followed by the method section where the two Danish MNCs i.e. SWS and Grundfos are presented, and where the data gathering techniques used in the study are outlined. Subsequently, the empirical findings are presented in a thematic narrative format. Finally, we discuss the implications of the results for the management of global virtual teams.

**Literature review**

**Communication, Identification and Perceived Proximity**

Global virtual teams are geographically, culturally, and linguistically distributed diverse teams that rely on technology-mediated communication to solve organizational tasks (Baba, Gluesing, Ratner & Wagner, 2004; Lipnack & Stamps, 1997). Thus, global virtual teamwork allows
organizations to position specialists from different functional areas on the same team, regardless of the individual’s geographical location (Hinds & Keisler, 2002). The physical distribution of team members is, however, a two-sided coin. For while it may offer the organization many potential advantages, including increased flexibility and lowered cost, it also represent one of the most challenging aspects of virtual work. In consequence, the bulk of literature on virtual collaboration has been concerned with how the geographical distance impacts team effectiveness (Wilson et al., 2013). However, results show that geographical dispersion seems to have different consequences in different settings, challenging the relation between geographical dispersion and team effectiveness. Thus, the question of whether physical proximity and face-to-face meetings are essential to the success of team work some researchers have found that GVTs should meet as a minimum once a year (e.g. Nandhakumar & Baskerville, 2006) while others proposed that GVTs can be effective without any face-to-face meetings at all (e.g. McKinney & Whiteside, 2006). Recent literature suggest that these conflicting results are due to the static conceptualizations of objective boundaries, which doesn't take into account the dynamic and perceptual processes that occur around a boundary, which influences the potential effect of this boundary. For instance, the mainstream of studies on global virtual teams has conceptualized distance in mere objective terms as the number of kilometres or miles between individuals (Schweitzer & Duxbury, 2010). However, recent research suggests that distance or proximity is also a matter of perception (Wilson et al., 2013; Wilson et al., 2008). Hence studies have shown that people often perceive the same objective distances differently. Therefore, what is “far” to one person may be “close” to another (De Blij, Murphy & Fouberg, 2006), and is dependent on a range of factors that potentially come to influence individual’s perception of one another. Here the quantity and quality of communication as well as a shared identity between team members have proven to impact the extent to whether an individual feels an emotional proximiy to another individual despite them being geographically separated (Wilson et al., 2008).

Communication in global virtual teams is the exchange of information between two or more individuals primarily through information systems technology (Nobel & Birkinshaw, 1998). Studies have consistently shown the importance of communication for virtual team effectiveness (Jarvenpaa & Leidner, 1999; Zander et al., 2012). This is primarily due to the fact that communication allows team members to strengthen interpersonal bonds that in turn increases information flow between sites (Kraut, Rice, Cool & Fish, 1998). Simultaneously, communication allows team members to develop shared values and categories that strengthen the identification process between individuals (Fiol & O'Conner, 2005). When individuals communicate together
they start building shared identities related to for example profession, teams, etc. Thus, identification is a social process of self-categorization based on interaction with others (Hinds & Mortensen, 2005). As members start identifying with each other, they establish a common ground from which they can work (Sarker & Sahay, 2002). The more common ground individuals share, the more they communicate, and the closer they feel to each other. This means that both communication and identification is intrinsically linked to perceptions of proximity, i.e. the extent to which an individual feels near or distant to another individual (Wilson et al., 2008). Thus, it can be argued that even though a relation exists between geographical distance and performance, this is primarily a mediated one. The interrelation between communication, identity, and perceived proximity directly affects the relation between spatial distance and team outcomes. For example, empirical results from geographically distributed software development projects show how individuals were able to perform well when solving very complex tasks (Kogut & Metiu, 2001; Wilson et al., 2008). These virtual team members experienced, due to intense communication and a shared ‘Hacker-identity’, emotionally close to one another (Raymond, 1999). Such examples where team members are ‘far-but-close’ cannot be explained if we merely include an objective understanding of distance (Wilson et al. 2008). Instead, we must acknowledge the importance of individual perceptions of proximity and its dynamic relation with communication and identity (Wilson et al., 2008).

**Perceived boundaries in Global Virtual Collaboration**

When investigating global virtual collaboration, we must also recognize that other boundaries in global virtual environments influence communication, identification, and perceived proximity, and thereby potentially impact team performances. In this paper we therefore seek to explore how the perception of key boundaries characteristic for global virtual teams come to affect the dynamic interrelation outlined above. Boundaries can be important as they distinguish one situation from another making order in a given environment (Ashforth et a., 2000). Watson-Manheim et al. (2012) suggest that there are three different categories of boundaries, which vary in their degree of obviousness, namely: Physical boundaries, administrative boundaries and categorical boundaries. Physical boundaries represent the most obvious boundaries in the form of material differences (e.g. geography, time). Administrative boundaries for instance represent national rules, laws, policies, incentives etc. Finally, categorical boundaries represent distinctions made to classify people in for example religion, economic class, education, background etc. This kind of boundary
is the least obvious of the three. Often category boundaries are most visible to those within a boundary and least obvious to people outside.

As argued by Watson-Manheim et al. (2012) boundaries in GVTs may be perceived differently among distributed team members. Thus, they argue that it is necessary to divide the effects of the boundary from the boundary in itself, as some boundaries are perceived as a problem in one team but not in another or by one team member but not by another. They posit how researchers interested in understanding GVTs and managers trying to optimize their performance must investigate in more detail the perceptions of those boundaries by the individuals involved (Watson-Manheim et al., 2012). Instead of a static perception of global work with a fixed set of boundary effects, it is argued that the problems of virtual work is a dynamic challenge, where boundaries such as language, time etc. have an evolving nature depending on the specific circumstances. Following this perspective Watson-Manheim et al., (2012) conceptualize the discontinuities and continuities at a boundary, suggesting that "only when an individual perceives a discontinuity at a boundary is that boundary problematic and that developing continuities can mitigate problems associated with boundaries" (Watson-Manheim et al., 2012, p. 22).

In this paper we focus on technological limitations, temporal dispersion, and linguistic differences as significant key boundaries in GVTs. Here technological limitations refer to the challenges presented by using information and communication technologies relative to face-to-face collaboration. Thus, it can be a lack of richness in the media itself i.e. the fact that when using media you have fewer communicative cues to rely on compared to face-to-face interaction (Daft & Lengel, 1988). It can also be technological breakdowns and discontinuities in the video feeds. The notion of temporal difference captures that GVT members reside in different time zones (Chudoba, Wynn, Lu & Watson-Manheim, 2005), and language difference the fact that their GVT members most often speak a language different from their own. Technological limitations, temporal, and linguistic differences have traditionally been associated with either communication or identification challenges. For example, it has been established that lean media has a negative impact on communication, and that temporal differences influenced identification in virtual teams negatively (Lengel & Daft, 1988; Wilson et al., 2013). No studies have, however, related the perception of these three boundaries to the notion of perceived proximity, nor sought an understanding of how they come to influence the dynamic interaction between communication, identification, and perceived proximity, and potentially mediate the relation between geographical distance and team performance (see figure 1).
In the following we describe the qualitative data technique used in the study. We then move on to an empirical description of the results, describing the challenges related to virtual team performance arising from technological limitations, temporal dispersion, and linguistic differences.

Method
The findings from our study presented in this paper are based on data gathered in two Danish-owned MNCs. The first MNC, here called SWS, produces components for use in the sustainable energy sector, employs more than 20,000 individuals worldwide, and had at the time of the study recently split their R&D tasks between India and Denmark. The MNC had created several virtual teams to co-ordinate and oversee various tasks and projects in relation to new product development. The second MNC, Grundfos, is a leading engineering manufacturer that employs 18,000 individuals globally, and has about 80 subsidiaries spread over five continents. Over the years, the firm has to an increasing extent utilized GVTs to manage their decentralized and global activities. The MNCs were chosen since both rely heavily on communication and information technology in the day-to-day coordination of tasks between different units of the organization. The GVTs included in the study were all involved in knowledge-intensive tasks such as R&D, marketing, and logistics. The majority of teams also had Danish managers in key positions, which

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*Figure 0.1 – The impact of perceptions of central GVTs boundaries on communication, identification, and perceived proximity. Adapted from Wilson et. al 2008.*
made the teams particularly suitable for exploring how Danish managers perceive challenges related to virtual team work. The GVTs were selected in collaboration with their global HR managers according to the following criteria: 1) the team had to be split between at least two geographically and temporally dispersed sites, 2) the team would not meet face-to-face more than four times a year, 3) the tasks solved in the teams were knowledge intensive and thus necessitated a high degree of virtual interaction. Depending on the task, team-structure and phase, the amount of interdependence between team members varied, but as a general rule members would exchange emails, speak on the telephone, and participate in virtual meetings with each other several times a week. At the outset of the study our main focus was to get a broad understanding of global work conditions that could impact the interrelation between communication, identification, and perceived proximity as an effect of geographical distance. Rather than gaining an in-depth understanding of the social practice of a particular GVT, we decided to conduct multiple interviews with virtual team members and managers. Hence, the results presented in the paper are grounded in interviews rather than directly observed behaviour, providing us with information about individual thoughts, feelings, and experiences i.e. how team members perceive virtual interaction.

**Data Collection**

In the two MNCs a total of 84 semi-structured interviews were conducted. In SWS 43 employees located in India and Denmark were interviewed, and the study involved members from 14 GVTs. In Grundfos we interviewed 21 Danish employees and 20 of other nationalities including; Indians, Germans, Swedes, Chinese, Americans, and Hungarians encompassing a total of 16 virtual teams. The semi-structured interviews would take place in vacant meeting rooms or the offices, and were facilitated as a guided dialogue between the researcher and the informant. This technique ensured that we gained answers to the questions outlined in the interview protocol, while simultaneously allowing the informant to bring up novel topics related to virtual collaboration processes (Spradley, 1979). Interview questions included for example “What challenges do you encounter when communicating with other virtual team members”? Thus, during the interviews the participants were asked to identify critical incidents illustrating situations where virtual collaboration and leadership were particularly challenged or particularly well managed (Flanagan, 1954). All interviews were either noted down or audio-recorded and transcribed. The interviews lasted approximately one hour and to increase the accuracy of their responses, each interviewee was assured anonymity.
Data Analysis

The data was analyzed using the steps described by Spradley (1980). The researcher involved in the study of each MNC read through the data independently, seeking to identify challenges to the daily collaboration of virtual teams. For each dataset related to an MNC, 6-8 main codes, each containing 4-6 sub-codes, were developed. Subsequently, the themes arising from the coding were compared across the two MNCs and we identified the most frequently described examples on boundaries in virtual collaboration. Based on the participants’ own notions we generated an initial list of boundaries. During multiple meetings, we discussed our individual interpretations of the emerging themes in our coding scheme and how they challenged communication, identification, and perceived proximity. We moved back and forth between data analysis and the literature to gain a theoretical understanding of our findings, and to refine our coding. In this process, the link between global work conditions and communication, identification and perceived proximity started to emerge. At this stage we involved a third independent researcher with whom we discussed our findings. This added validity to the coding process, but also sharpened our interpretations of the empirical data (see table 1). The results of these analytical steps were three themes, which we have labelled technological limitations, temporal dispersion, and linguistic differences.

Findings

In the following sections we present our findings and show how the perception of three boundaries 1) technological limitations, 2) temporal dispersion and 2) language difficulties influence the dynamic relation between communication, identification and perceived proximity in GVTs. Table 1. provides a summarizing overview of findings describing the interrelations between technological limitations, temporal dispersion impacting communication, identification and perceived proximity.
There is a technical barrier which means that you do not talk confidentially in the same way. It might sound like a bad excuse, but the technology is such a problem, and often you are not able to have a qualified discussion when you are more than 3 or 5 participants attending a virtual meeting. Our web meetings are most commonly used for presenting material, there is less development and discussion going on there – sometimes we just have to give up or we have to turn off the microphones and cameras to get a better connection. These web meetings are not made for getting to know people. One or two face to face team building activity days (…) to get to know people would be more effective to get a more “us” feeling. I can say that I feel that I am not in the same project (…) you only have few virtual contacts with these colleagues. I think at virtual meetings some people have this mental block... They are afraid to speak up. (…) I think, the more we communicate, the closer we will feel, and the closer we feel the more we communicate. I am supposed to call my colleagues on the virtual project (…), but instead I ask the one next to me, since it is easier.

[[..]You easily lose a day or two […] this is really a frustrating barrier, when you just want to go on with your project. [...]When you are at a distance is not good enough to be able to schedule a meeting in 2 days, sometimes you just have to be able to sit down and talk to people here and now. Then you are struggling just to put up a video or telephone conference with a colleague or your boss … this is really a frustrating challenge.

- The time zone challenge is very important. Part of feeling as a team is being able to discuss things during the day. - When Americans feel excluded from meetings and information in general, we become like teenagers. We want to be heard, but at the same time we want to be independent. - You feel neglected! We had a really bad example with a workshop where 50 persons had been invited and here in the US we had to get up at 3.00 a.m.!

- With a time zone difference of 9 hours (…) we have difficulties finding each other at the time needed. - As a Dane you just don't think of how big this frustration can be... After I have been here I now experience that the time zone difference is a practical burden of being a part of this company.

The thing is the Chinese are not that well educated in English. Some engineers can reply to an email, but on the phone you have to repeat everything over and over again. It just delays everything so you just want to stop talking with them and send them a mail instead - A couple of times there has been total silence at web meetings - Still, Danish managers can’t even speak English, (..), so how can we communicate? A lot of those we work with in Denmark just don’t know English.

- When we are discussing important details in a project, you kind of get annoyed with them, when you don’t understand what they are trying to say, – and in the end you just give up. - It takes some time to understand each other because we have different pronunciation in English.

- When you experience things like this (language barriers) you don’t feel that the world is getting smaller. Actually quite the opposite. You feel very far apart". - (…) The only doubt was how to get closer to the other colleagues that I don’t know, for instance the ones that are located in Finland.

Table: Example of quotations from the dataset describing the interrelation between technological limitations, temporal dispersion and languages difficulties impacting communication, identification and perceived proximity
Technological limitations

In the course of our study it became clear that many of our informants were of the opinion that virtual collaboration was severely challenged due to technological limitations. According to the virtual team members, such limitations entailed technical reliability and ease of use as well as the effective mastering and use of media available in the organization. Many of the informants would express frustration with the quality of the available communication technology as technical problems would cause severe communication challenges in the teams. As noted by an informant: “You have to face many technical issues on a daily basis [...] this is really a challenge to virtual communication”. This viewpoint was supported by several informants who highlighted the impact the lack of reliable technology would have on virtual collaboration:

\[ \text{When we are facilitating a meeting, the worst thing is when technology messes up, it is frustrating not only for the facilitator, but for everybody […] I think many virtual meetings are postponed for this reason.} \]

The above quotation illustrates how technological limitations would impact communication frequency. In line with this, another respondent said that the technology would limit the number of individuals who could partake in telephonic and web-based synchronous communication:

\[ \text{It might sound like a bad excuse, but the technology is such a problem and often you are not able to have a qualified discussion when you are more than three or five participants attending a virtual meeting.} \]

Also, the technology would, according to the informants, limit the range of tasks that could be solved. Thus, synchronous media were pinpointed by several respondents as a challenge for communication leading to lack of performance in the teams:

\[ \text{Often our virtual communication is just a cascading of information. Some of the problems at virtual meetings is that you are pulled in different directions. There is so much going on. It is as if they try to squeeze more into the same time…the natural exchange of information is just not happening at our virtual meetings.} \]

In particular, the informants would argue that communication would be challenged when solving more complex tasks: “Our web meetings are most commonly used for presenting material to each other, there is less development and discussion going on there”.

Thereby, technological limitations would reduce the team member’s reciprocal communicative exchanges. This would in turn challenge identification processes in the GVTs. Informants
described how web communication would limit the possibility to deepen social bonds, and how virtual communication would be more formal and task-oriented compared to face-to-face interaction. In consequence, the majority of informants agreed that even though virtual communication was a necessity in international organizations, face-to-face interaction was preferable shaping social relationships and a shared identity in the team. Here, informants highlighted how their adoption of a more impersonal type of communication would decrease feelings of personal connection and engagement when interacting through technology. As an informant noted:

“I think at virtual meetings some people have this mental block... They are afraid to speak up. You’ll need to meet face to face in order to get to know people and what they stand for”.

This perception was pinpointed by a Danish employee: “These web meetings are not made for getting to know people”. The communication challenges related to technological limitations also diminished informants’ desire to engage with each other virtually:

_Sometimes there may even be 20 employees participating in our web meetings. This many participants also often makes a lot of technical problems and sometimes we just have to give up, or we have to turn off the microphones and cameras to get a better connection... this makes really bad meetings!_

Thus, due to the communication challenges team members would create an emotional distance to each other. Limitations of the technology ended up having a direct effect on how close team members would perceive each other. As stated by a Chinese virtual team member: “I think, the more we communicate, the closer we will feel and, the closer we feel the more we communicate”. The lack of perceived proximity would again affect communication, and thereby have a negative impact on team performance: “I am supposed to call my colleagues of the virtual project (...), but instead I ask the one sitting next to me, it is easier to ask the one closer to you”

In sum, technological limitations could hamper communication and be viewed as a barrier to creating a shared identity within the team. The lack of identification would again influence the perceived emotional proximity between individuals and have a negative effect on team performance.
Temporal Dispersion

The second factor we identified that would influence communication, identification and perceived distance was the temporal dispersion of team members. In particular, employees and managers would comment on challenges related to the use of synchronous real-time media such as telephones, web meetings and video-conferencing when located in different time zones. In particular members argued that they encountered difficulties in: “finding each other at the time needed”, and the higher the temporal dispersion, the greater the communication challenges:

*With a time zone difference of 9 hours between California and Denmark, the window of opportunity for contacting each other is very limited, and don’t underestimate this!*  
*There is practically no overlap in working hours.*

It would prove more difficult to find the time to communicate when members were located on different continents, and thus divided by big time differences: “Work time really shrinks as more time zones are crossed, and it is almost non-existing each time we have to include China”. This delayed communication, and caused great frustration, since the team would not be able to proceed with a given task:

*You easily lose a day or two [...] this is really a frustrating barrier when you just want to go on with your project. When you are at a distance is not good enough to be able to schedule a meeting in two days, sometimes you just have to be able to sit down and talk to people here and now.*

Even routine tasks, such as scheduling a meeting could become complex and fraught with interpersonal friction as noted by this virtual team member: “Then you are struggling just to put up a video or telephone conference with a colleague or your boss ... this is really a frustrating challenge”. The lack of communication due to time zone differences would also pose a barrier to identification. Thus, team members felt excluded from informal and ongoing dialogue. For example, a virtual team member stated the following: “[...] the time zone challenge is very important... a part of feeling as a team is being able to discuss things during the day...” Also, informants would feel excluded when meetings were scheduled at times and places where they had difficulties attending. One informant said: “You feel neglected!” and went on to tell how this happened from time to time: “We had a really bad example with a workshop where 50 persons had been invited and here in the US we had to get up at. 3.00 a.m.!”
While a global virtual manager from the US jokingly listed endurance as one of the most important traits due to conference calls at odd hours, it was not always possible to participate which severely impacted identification with the team:

> You see, when Americans feel excluded from meetings and information in general, we become like teenagers. We want to be heard, but at the same time we want to be independent. I think we all have our moments of anger and frustration because of this.

The lack of identification and emotions of isolation would in turn add to the perceived distance between team members. Thus members felt that they drifted apart from each other and the organization. As stated by this informant: “As a Dane you just don’t think of how big this frustration can be... After I have been here I now experience that the time zone difference is a [...] burden of being a part of this company”. Consequently, time-zone differences between virtual team members posed a severe challenge to communication, identification, and perceived proximity.

**Linguistic Differences**

During our study, several respondents pointed out how linguistic differences could be a challenge to the virtual collaborative process. Thus, team members stated how they would often be frustrated by differences in the common corporate language since it slowed down the communicative process in synchronous media. As noted by a Danish manager:

> The thing is that the Chinese are not well educated in English. Some engineers can sit and reply to an email, but on the phone you have to repeat everything over and over again. It just delays everything so you just want to stop talking with them and send them a mail instead.

As exemplified in the above quotation individuals were often frustrated with their foreign colleagues, when using telephonic and web based media. In particular, informants highlighted differences in accent to course communication challenges, her a Danish manager:

> It is not so much that we do not know the same words. It has more to do with the fact that they speak in this funny tone making it hard to understand. If we discuss something complex we have to ask again and again, and even then we still misunderstand each other.
This would, according to some informants, hinder that Danish managers could lead the GVT effectively: “Still Danish managers can’t even speak English [...] so how can we communicate? A lot of the persons we work with in Denmark just don’t know English”.

However, it was not only the accents in verbal conversation that had a negative impact on communication in the GVTs. Linguistic differences also created spells of silence in virtual interaction: “A couple of times when there has been a total silence at web meetings, I have tried to translate what I say in English into their native language, for example Hungarian. For this I have used Google-translate (Danish manager). Accordingly, language difficulties led to misunderstandings in communication in the daily virtual work. This in turn, would impact identification in the GVTs. As members would start to use negative categories when describing communication in the virtual team: “You look at the ones with language difficulties, they can be really smart, but you just don’t know, when you don’t understand what they are saying”, and another respondent noted:

When we are discussing important details in a project, you kind of get annoyed with them when you don’t understand what they are trying to say – and in the end you just give up.

Thus, identification processes between team members suffered at the hands of language difficulties as they evoked negative sentiments between team members. This, according to the informants, added to the perceived distance between the members. As pinpointed by this Danish manager: “When you experience things like this you don’t feel that the world is getting smaller. Actually quite the opposite. You feel very far apart“.

To conclude, language differences affected the dynamic interrelation between communication, identification, and perceived proximity. Hence, language differences functioned as a barrier to communication which had a negative impact on the shared identity between virtual team members. Consequently, language differences led team members to perceive each other as distant.

**Interrelations between technological limitations, time zone differences and language difficulties**

Because the boundaries of technology, time zones and language often were mentioned as interrelated in our interviews, it seemed difficult to distinguish these boundaries from each other. From quotes it was obvious how the three boundaries were dynamic phenomena that might have had different consequences if isolated from the other boundaries. For example to cope with time
zones, many team members found that they had to participate in meetings where the challenges of technology and language were also represented. As a team member said:

“Often we sit for a department web meeting for two hours, which means that we have to get up at 6.00 a.m. in the United States. We then participate in a web meeting where they speak poor English... It is damn boring... sometimes I just reject these meetings”.

While a single boundary in our study might not have been perceived as problematic it is clear from the above quotations that language difficulties interact with technological limitations that again interact with time zone differences and vice versa. And it was clear that the interaction between the three boundaries often resulted in severe frustrations among team members. Further, there seemed to be differences among team members as individuals in the subsidiaries clearly experienced higher levels of discontinuities related to the boundary of time zones than did the Danes located in the headquarter. The specific perceptions and responses to boundaries seemed also to vary over time. For a few collaborators their working conditions had changed and as a result, their interaction with for instance specific technologies had varied as well. In the following we will discuss the dynamic character and interrelations of boundaries and their effects on communication, identification and perceived proximity and further relate this to team performance.

**Discussion**

When summing up, our findings show that challenges related to technological limitations, temporal dispersion, and linguistic differences were perceived as discontinuities that impacted communication, identification, and perceived proximity in the global virtual teams. Technological limitations posed a barrier that affected member’s communication frequency and quality. This again impacted identification and the individuals’ sense of proximity. Time zone differences tended to reduce communication in general, and spontaneous communication in particular, this led to sentiments of isolations in the GVT as well as lack of perceived proximity. Linguistic differences were also important in the virtual collaborative process as team members reported how language differences slowed down communication and created negative categories with the effect of diminishing identification and increasing the member’s sense of emotional distance. Thus, our findings suggest that technology, time zone, and language boundaries were perceived discontinuities that severely impacted the dynamic relation between communication,
identification, and perceived proximity, and potentially had a negative impact on virtual team performance. Further, our findings also point to the dynamic interrelation among the three investigated boundaries. It seemed clear how the three boundaries were dynamic phenomena that might have had different consequences if isolated from each other. However, while the three boundaries of technology, time zones and language were highly visible, there might be other boundaries that posed challenges but that were less obvious for us as researchers as well as for the informants. Thus, relating the boundaries to the categorization of Watson-Manheim et al. (2012), technology, time zones and language all represent what is termed a physical boundary. However, there might be other significant boundaries that we missed due to their less obvious character. While the three boundaries of technology, time zones and language were highly visible physical boundaries (Watson-Manheim et al., 2012), a limitation in our interview-based study, could be that there might have been other boundaries that posed challenges but that were less obvious for us as researchers as well as for the informants. In line with this, Hinds et al. (2013) for example propose how less obvious boundaries were associated with physical boundaries that represented more visible boundaries. Specifically they showed how a boundary, formed along the dimensions of asymmetries in the degree of language fluency of team members, location, and nationality, was associated with subgrouping-boundaries in teams that also suffered from power contests. Thus, suggesting that power contests among subgroups activated otherwise dormant boundaries. They found that the boundary of language asymmetries acted as a lightning rod such that team members’ emotional responses to them were constant reminders of subgroup differences on these teams, which further activated negative emotions.

Managerial implications

The results of this study indicate that due to the technological limitations, temporal dispersion, and linguistic differences, globally distributed teams require an active and persistent managerial focus on building communication, identification, and perceived proximity. Potentially the obviousness of a boundary will have an impact on whether it triggers some managerial actions and development of continuities. However, managers should be aware of also the less visible perceived discontinuities in their respective teams. While addressing a discontinuity initially might take some effort, shifting from discontinuity to continuity might lead to synergy and collaboration on another level than was originally the case. When viewed from the perspective of learning (Wick, 1995), mismatches in expectations between individuals can be potential enablers of change, new ideas and new work practices, and thus potentially lead to enhanced performance.
Regarding the three boundaries of technology, time zones and language, it is important to identify the area where managers and team members actually have control. For example, the time zone differences are per se beyond a manager’s control, however the priorities on how often and regarding which tasks distributed team members should participate in synchronous meetings during night time, can be guided by managers. In general, managers have to encourage members to practice virtual communication in different forms and with different communication tools. Managers should actively support the appreciating and inquiring approach to communication. Further, they should support language training for team members who want to improve their ability to speak/write the common company language. In regard to language difficulties, examples from another study showed how employees held “English Fridays”, where they only spoke English as a way of gaining comfort with the language (Neeley, Hinds & Cramton, 2012). As both language and communication skills in general increase with practice sessions, these skills also reduce the necessity for frequent face-to-face meetings (Wilson et al., 2008). Managers can also enhance perceived proximity by encouraging conversations where people share and reveal daily work issues. Promoting personal sharing of experiences and emotions enables all parties to empathize with each other, and thus enhances perceived proximity.

In general, research shows that one of the greatest problems with global teams is that they do not share the same work context in their daily life. Team members therefore have no idea about the work environment, pace, scale, or scope of their distributed colleagues. The lack of shared context leads to misattributions and less identification, and amplifies the perceived distance among distributed members (Mortensen & Hinds, 2001). Thus, an important task for managers of GVTs is to work towards compatibility of work practices, processes, tools, models, and systems across sites. When team members have access to the same information and share the same tools, work processes, work concepts, and work cultures, the likelihood of misunderstandings and divergent approaches is reduced. A shared context across sites provides the grounding necessary to better understand and make sense of what is said, potentially mitigating harsh attributions and, in turn, reducing interpersonal conflicts. Alignment of context, systems, work concepts, and processes is, on the other hand, often a result of many years of effort, even though movement in this direction may strengthen the platform for collaboration in GVTs. Shared context relates to what Clark & Brennan (1991) define as “common ground”. For one person to understand another, there must be common ground between them. When people believe they share some common characteristic or experience they project traits or characteristics on others based on real or assumed category
membership (Cramton, 2001). Hence, shared work practices and common ground potentially leads to shared identity, and altogether enhances the perceptions of proximity between virtual team members.

**Limitations and Future Research**

Our findings are limited by choices made in the design of our study. We looked across a large number of members and managers of virtual teams in order to gather a variety of experiences. While our interview strategy allowed for a broad understanding of perception commonalities, it did limit our possibility for observing the interpersonal dynamics within specific teams. Future research could address this limitation by observing how virtual team members overcome discontinuities related to technological limitations, temporal dispersion, and linguistic differences. Second, our reliance on individual reports limits our ability to confirm team performance outcomes. Future research could address this limitation by obtaining objective measures of the impact of these factors on GVT performance. Further, we might have identified ways of managing the specific challenges if we had studied these factors on longitudinally basis. Studies of the process of the challenges posed to virtual teams could be an important topic in future research. Finally, the effects of perceived proximity warrant further investigation. In line with our findings we would expect perceived proximity to predict willingness to work together and beliefs about the effectiveness of collaborating at a distance.

**Conclusion**

This study investigated the impact of perceived boundaries in global virtual collaboration. Our findings show that virtual team members had difficulties according to technological limitations, temporal dispersion, and language difficulties, and that these factors were negatively impacting communication, identification, and perceived proximity. Our findings also show, that the more static and objective notions of boundaries do not capture the dynamic interrelations that impact perceptions of distance, and thereby potentially team performance. We believe, that the present analysis of virtual team boundaries offers great potential for making GVTs in Danish MNCs more effective in the future. In particular our study draws attention to the fact that Danish international employees actually can increase perceptions of proximity regardless of physical distance. Thus, instead of perceiving face-to-face meetings as the only solution to the challenge of being dispersed, managers that understand the underlying mechanisms in global virtual collaboration can develop continuities in GVTs by other means. For example, the variables, such as communication and identification processes among team members need to be managed thoughtfully. This could be
through building common ground, shared work practices and reinforcing communication structures, that support the teams' ongoing interactions and perceived proximity. In recognition of the dynamics of these issues, we assert that Danish companies can manage these challenges better and thereby enhance their effectiveness when collaborating globally.
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Webpages

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Paper 2.

Perceived boundaries in global collaboration: Exploring implicit theories and their impact on global collaborative behaviour
Abstract

Multinational corporations (MNCs) expect members of their distributed teams to engage in effective global collaboration. In this study, we focus on the challenges posed by their perceptions toward virtual meetings, which have received surprisingly little attention despite the important negative effects they can have on global collaboration. Using multi-sited ethnography across four sites in a Danish-owned MNC, we explore these perceptions, which we further identify as being guided by implicit theories. We find three implicit theories and illustrate how they affect distributed team members’ global collaborative behavior.

Keywords: collaborative behavior, perceptions, implicit theories, global collaboration, virtual meetings

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Introduction

Globalization has made multinational corporations increasingly reliant on global virtual teams to facilitate collaboration between dispersed units of the organization (Zander, Mockaitis, & Butler, 2012). Such teams consist of an interdependent group of individuals who reside in different time zones and countries and who rely primarily on communication technology to accomplish a common goal (Horwitz, Bravington, & Silvis, 2006; O'Leary & Cummings, 2007). Virtual teamwork allows experts from different areas to be in the same team wherever they are located, thus decreasing travel costs, stress and time (Orlikowski, 2002). Even though there are significant potential gains of virtual teams, existing research as well as practical experience shows that managing and rendering effective results often proves difficult in a global context compared to co-located work groups (Lipnack & Stamps, 1999; Olson & Olson, 2000; Connaughton & Shuffler, 2007; Steers et al., 2012). These results are highlighted in numerous papers that describe the challenges of virtual collaboration. For example, geographical dispersion, technology, time zones, language difficulties, national and organizational cultures are all identified as potential constraints to global virtual collaboration (Maznevski & Chudoba, 2000; Hinds & Kiesler, 2002; Gibson & Cohen; 2003; Cheshin et al., 2011; Klitmøller & Lauring, 2013; Lauring & Klitmøller, 2015; Gilson et al., 2015).

In our view, however, understanding and describing virtual team collaboration cannot rest solely on the acknowledgement of the inherent geographical and technological challenges of global work such as the ones mentioned above. There is a component that researchers in global virtual collaboration have explored little so far, a terrain that, as we argue here, has the potential to help us understand how and why people are challenged by this new way of collaborating. This unexplored terrain consists of what has been labeled as implicit theories, defined as core assumptions that form an individual’s reality and foster behavior that are consistent with these assumptions in a particular domain (Dweck et al., 1995a). Using a theoretical model, Dweck et al. (1995a) show how, especially in the face of negative events, individuals’ judgments and actions are influenced by their implicit theories of intelligence and morality. We argue that such implicit theories are omnipresent in organizations and virtual teams, as they are in everyday life. Hence, in global virtual teams, where traditional ways of working are no longer valid, virtual working conditions can easily compromise the basic assumptions which team members bring to their work and the extent to which they can effectively comply with the requirements of their work (Wong et al., 2007). Implicit theories on global virtual collaboration bring forward the importance of one’s own beliefs in
creating one’s perception of a certain technology or virtual collaboration, similar to the social information processing theory (Fulk, 1993), which argues that individuals are influenced by the attitudes and beliefs of their co-workers to the extent that it can influence their willingness to adopt a technology (Leonardi & Barley, 2010). In the next section, we present the concept of implicit theories and discuss the existing literature that focuses on implicit theories in organizations and team collaboration.

Understanding Implicit Theory

To understand team members’ approaches with respect to global virtual collaboration, we apply the concept of the implicit theory. This stream of research states that individuals’ perceptions of the environment are based on and guided by their implicit theories (Furnham & Henley, 1988; Dweck et al., 1995b; Dweck, 2000; Yzerbyt, Judd & Corneille, 2004). The proposition is that people’s implicit theories, even when unconscious or not clearly articulated, can play a crucial role in social interaction. Implicit theories are also known by different terms, such as “lay theory” or “folk theory” (Dweck et al., 1995a; Levy, Chiu & Hong, 2006). The meaning of implicit theories in organizations and the interpretation of information has gained increasing acceptance among both organizational theorists (Engle & Lord, 1997; Junker & van Dick, 2014) and social psychologists over the past two decades (Levy, Chiu & Hong, 2006; Job et al., 2015). In other organizational settings, similar research on implicit theory has been undertaken and found to influence behavior. An example is the case of individuals’ perceptions toward technology adoptions influenced by the beliefs of their colleagues (Fulk et al., 1987), as well as the type of information they receive about that technology, be it negative or positive (Griffith & Northcraft, 1996). It is thus proven that perceptions of technology influence the behavior of individuals as far as adopting or rejecting the technology (Leonardi & Barley, 2010). Another example of how implicit theories influence the behavior of individuals in organizational setting is in the leadership literature. Van Gils et al. (2010) show that implicit theories influence the ways in which the leader and followers makes sense of each other’s behavior as well as how they behave (Junker & van Duick, 2014). Similarly, we argue that implicit theories influence team members’ behavior on global virtual collaboration.

Implicit theories are defined as ontological assumptions that form the individual’s reality and give meaning to events in a particular domain. In other words, implicit theories are beliefs that influence people’s behavior, thinking and perceptions in regard to a certain area (Haslam et al., 2004).
Implicit theories as a research field are situated within an epistemology of constructive approach that explicitly recognizes the dynamic, co-constructive interactions between individuals and their social context. Implicit theories are comparable to the interpretive schemes (Daft & Weick, 1984; Weick, 1995) or the mental models (Senge, 1990) that are already known within the organizational literature. While implicit theories comprise the assumptions and beliefs people form about the world, mental models tend to be specific and include “knowledge and beliefs that are thought to be of doubtful validity” (Norman, 2014, p.8), such as superstitions that tend to engage individuals in cautious behavior. Implicit theories are also comparable to the concept of technological frames, which comprise the individual’s perceptions of technology (Orlikowski, 1992). While technological frames are concerned with the nature of technology, technology strategies and technologies in use, we use the concept of implicit theories more broadly and further to represent individual’s perceptions about individuals or situations, the existence and effects of which respondents may be unaware (Dweck et al., 1995b; Dweck, 2000; Yzerbyt et al., 2004).

According to existing research implicit theories can be broken down into three subgroups (Levy et al., 2006). As such, an implicit theory is (1) what people perceive to be true about an object, (2) certain characteristics of an object or (3) certain interrelationships between objects. As an example, the implicit theory “We live in a just world” individuals are worthy of what they receive and receive what they are worthy of e (Lerner, 1970; Montada & Lerner, 1998). Hence, this specific implicit theory concerns what the object/world is like (subgroup (1), see above) and simultaneously pertains to “how things work or should work” (Levy et al., 2006:6) (people get what they deserve) (subgroup (3), see above). Implicit theories are individually held and are constructed upon the individual's existence in various contexts such as work, family, and education. Existing research shows that implicit theories can differ in their range of application (Kelly, 1955). Some implicit theories are narrow and others are broader. As an example, implicit theories such as “White skinheads are racists ” can be specific to a domain and to a certain group, while a broader implicit theory such as “We live in a just world” tends be general and applies across many situations and across time (Lerner, 1970; Montada, 1998). Previous studies show that more particular implicit theories tend to have a narrower area of usage, but can still be strong predictors of behaviours within the area of application (Summers & Norton, 2006).
Implicit theories are generally described as “naïve,” suggesting that they are not thoroughly defined. The term “theory” is related to the fact that people’s beliefs derive from a goal of possessing an abstract understanding of the world. In general, people are not entirely aware of the decisive influence their implicit theories have on their social perspectives and behavior (Furnham & Henley, 1988; Hong et al, 2001); however, that depends on the level of explicitness of the implicit theory, with some being clearer than others. Implicit theories embodied by traditional sayings, such as: “What goes around comes around” (Lerner, 1970), tend to be more often voiced. The one factor that could be more or less explicit in these cases is the content of the implicit theory. That is, the person may or may not realize, or even have access to, the existence of this particular implicit theory. It can also be the case, however, that people are unaware of the effect of a particular implicit theory. For example, a person able to report the content of an implicit theory might be unaware of the effects of this theory on his/her behavior. Although implicit theories are theorized to be relatively stable across time, several studies illustrate how implicit theories’ meanings can change with experience (Levy et al., 2006).

In summary, implicit theories are defined as beliefs about some particular phenomenon. Implicit theories have several characteristics. They can relate to an object, the characteristics of an object, or to its relationships to other objects. Implicit theories typically vary in range of application, stability and their ability to predict a certain behavior. They are typically the result of a person’s past experience and may influence the way people behave or perform.

The purpose of this study is to identify the types of implicit theories team members have regarding global virtual collaboration and further explore how members of virtual teams behave as a result of these implicit theories. The research on implicit theory has contributed fundamentally to understanding various phenomena in domains such as morality and intelligence (Dweck et al. 1995a); however, it has not yet been applied to global virtual team collaboration. Because there are no specific theoretical propositions on global virtual collaboration in the literature discussed above, we take an open and exploratory approach to the study of implicit theories in virtual teams. Because people’s theories tend to be largely implicit or poorly articulated, a thorough analysis on the part of the researcher is necessary to identify them and to map out their implications (Hong et al, 2001). In this study, we seek to identify key implicit theories that we believe construct a framework for analysing and interpreting the distributed team members’ behavior. We view these theories as
alternative means of constructing realities, each with their pluses and minuses. Hence, the purpose of our research is not to evaluate the correctness of these different implicit theories, but to demonstrate that holding these different implicit theories can have potentially important implications for global virtual collaboration. Thus, our study uses qualitative methods to explore the implicit theories virtual team members hold and how these implicit theories result in specific behaviours in global virtual collaboration.

Method

Multi-sited Ethnography
This study builds on the approach of multi-sited ethnography. The roots of multi-sited ethnography come from a stream in anthropological studies claiming that research phenomena need to be captured from not only a local point of view but also from a global perspective (Clifford & Marcus, 1986; Taussig, 1993; Lauring & Klitmøller, 2015). Multi-sited ethnography is a data collection method that follows a topic through geographically different field sites and meets the conditions necessary for observing and analysing global interactions that cross several locations and social networks (Marcus, 1995; Falzon, 2009). Multi-sited ethnography differs from classical ethnographic data collection methods, by tracking a common research topic through several geographically dispersed field locations for shorter periods of time (Clifford & Marcus, 1986; Marcus, 1995). While traditional ethnography situates a researcher in one field site for a longer period of time, thereby allowing the researcher to get to know one setting extremely well, a main point in multi-sited ethnography is the “tracing process” it uses across several locations while illuminating research phenomena that are not easily observable, such as interconnections affecting social interaction across social entities (Marcus, 1995; Hannerz, 2003; Lauring & Klitmøller, 2015). In our study, we aim to advance our understanding of how perceptions of global virtual meetings may affect collaborative behavior among team members in globally dispersed MNC units. The character of these individual perspectives is often challenging to capture as these perceptions may not be visible at first and there are many sensitive factors when assessing peoples’ personal perceptions. We sought a more flexible and sensitive method that leads the researcher to identify new and unexplored paths while following the research topic across multiple geographical locations. In line with this, we think that multi-sited ethnography could be beneficial and flexible when exploring the challenges of global virtual meetings. This approach brings us the possibility of
capturing the internal dynamics of virtual meetings while acknowledging the nature of geographical distribution in MNCs.

Sites
The aim of the multi-sited ethnography was to explore the global virtual collaboration of employees with a particular focus on their collaborative behaviours during virtual meetings. Our fieldwork included the HQ and three subsidiaries in a Danish MNC. The MNC, here called ScanEngineering, is a leading engineering company that employs 18,000 individuals globally and has 80 subsidiaries spread all over the world. ScanEngineering has increasingly utilized global virtual teams to manage its decentralized and global activities, particularly in the development of new products in the R&D department. Employees in the R&D department collaborate through several forms of mediated communication including email, instant messaging, telephone, shared documents, and video conferencing. During our initial field study in the Danish HQ of ScanEngineering, we observed that members of globally distributed teams experienced challenges with respect to virtual meetings. We decided to trace this challenge, and when we were seeking to identify clear barriers of virtual meetings, we soon realized there is much more behind the observed reality of people’s behavior toward virtual meetings. The idea to study implicit theories came only after we had started exploring the collected data. The research second site was the American subsidiary and in our interviews here, we noticed an interesting recurring pattern of statements expressing perceptions and beliefs individuals held about participation in virtual meetings. It was here where we got the drive to explore the beliefs or implicit theories of global team members towards virtual meetings, and equally importantly, how these implicit theories influenced their behavior. The third site was the Hungarian subsidiary; here, while constantly exploring the emerging themes in HQ and at the American site, we found that the barriers to participating in virtual meetings related to the employees’ experience with virtual technology more than, for example, national culture. The tracing process continued in the Chinese subsidiary, until we obtained a validation for the presence of perceptions of global collaboration as barriers when conducting virtual meetings. The whole process took place from January 2012 to November 2013. During the process, we involved researchers and research assistants to support us in data collection and data analysis.
Web Meeting Technology

The virtual technologies referred to in this study are the two-videoconferencing systems, Scopia and Adobe Connect. Both systems allow locations to communicate by synchronous two-way video and audio transmissions. In addition to the visual and audio transmission of meeting activities, the media can be used to share documents. The team members in this study assessed Scopia and Adobe Connect through either stationary computers or laptops. Virtual meetings were located in either open office landscapes, meeting rooms or from home where broadband connections were provided. Scopia and Adobe Connect were used for similar purposes among team members, and the choice of which of the two technologies to use depended on the group’s system preferences. All of the individuals included in this study, comprising managers and employees, used both systems to collaborate at a distance; however, as mentioned above, the group majority decided which collaboration tool would be used in meetings. A more detailed description of the subjects will follow in our Data Collection section.

Data Collection and Analysis

We conducted participant observation in the R&D department of ScanEngineering’s Denmark HQ and three sites in the US, Hungary and China. Full-time participant observation was conducted at all four locations, for one week at three locations and for several months at the headquarters. The researchers were present at these sites during the entire workday, and were typically situated among the informants observing their daily work routines, participating in small talks, and team meetings, and joining them for lunch. The overt participant observer role Adler & Adler, 1994), as a member of the global virtual teams was applied, with the informants knowing they were being observed. Overall, during our research project we interacted with and observed developers, secretaries, project managers, and managers. Our role in the teams was to study the collaborative behavior of the team members. All observations on activities related to research aspects were written down in complete field notes during or at the end of the working hours (Czarniawska, 2007). We discussed our preliminary findings with the team members in both informal conversations and in formal presentations and workshops, at several points during the data collection process.

The interviews followed a semi-structured approach, and counted 29 managers and 21 employees in R&D including Danish, German, Chinese, American, and Hungarian individuals. The semi-structured interviews were conducted either face-to-face in vacant meeting rooms or as online
virtual meetings and were facilitated as a guided dialogue between the researcher and the informant. This technique ensured that we gained answers to the questions outlined in the interview protocol while simultaneously allowing the informant to bring up novel topics related to the global virtual collaboration processes (Spradley, 1979). The interviewees were asked open-ended questions to encourage them to describe challenges and suggestions for improving distributed team collaboration. Interview questions included: “What challenges do you encounter when working in a virtual team?” and “What conditions are essential to make virtual team work a success?” During the interviews, the informants were asked to identify critical incidents illustrating situations where global virtual collaboration and leadership were particularly challenging or particularly well managed (Flanagan, 1954). As shown in Table 1, all interviews lasted approximately one hour; notes were taken during the interview or the interview was audio-recorded and transcribed. Each interviewee was assured anonymity.

**Table 1 Data Sources Overview**

<table>
<thead>
<tr>
<th>Data sources</th>
<th>Count</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Virtual meetings</td>
<td>9</td>
<td>21 hours</td>
</tr>
<tr>
<td>Face-to-face meetings</td>
<td>4</td>
<td>104 hours</td>
</tr>
<tr>
<td>Site visits (China, Hungary, US)</td>
<td>3</td>
<td>150 hours</td>
</tr>
<tr>
<td>Interviews: Managers</td>
<td>29</td>
<td>29 hours</td>
</tr>
<tr>
<td>Interviews: Employees</td>
<td>21</td>
<td>21 hours</td>
</tr>
</tbody>
</table>

In this study, we refer to all informants as team members or employees, but we occasionally point out the managerial role. Table 1 shows an overview of our data sources with the corresponding interview time. Following the ethnographic methodology, we started the analysing the data soon after engaging in the data collection, and continued in this iterative manner until the end. We also discussed the observed data from each site, together with experiences relevant to our research topic. Our data analysis builds on the elementary strategies of grounded theory (Strauss & Corbin, 1998) and the use of data reduction methods (Miles & Huberman, 1994). We started the data analysis with a simple definition of implicit theory as perceptions influencing individuals’ views of the world and
governing their behavior in ways that are consistent with their constructed reality (Dweck, 2000). Each transcript was prudently reviewed independently by the two researchers with the definition of implicit theory in mind. At the end of this phase, each researcher had identified five and six initial implicit theories, respectively; however, further analysis showed strong similarities between some of the categories, after which they were then combined, leaving us with the final list of the following three implicit theories:

1. “You can’t build relationships through web meetings”
2. “I can be present in more than one place at a time”
3. “You can’t have in-depth discussions at a virtual meeting”

At this point, each transcript was coded in detail to locate every instance of the 3 implicit theories. A total of 125 examples of the three implicit theories were identified during this phase. The respondents’ statements were cut and pasted into a common document with a reference to the specific page number in the transcriptions to ensure the statements were locally secured and sufficiently contextualized. Our data provided relatively rich examples of how the individuals behaved according to the implicit theories. Little by little, a trend of how the different implicit theories were related to a pattern of specific collaboration behaviours was revealed. Inspired by the recommendation to gradually create a system of categories (Strauss & Corbin, 1998), the specific behaviours related to each implicit theory were grouped into more general categories based on their similarities. Hence, related to Implicit Theory (1), two individual behaviours were initially identified and later grouped in one category of behavior. In the Results section below, this category is described along with the explanation of each implicit theory.

To ensure the dependability of our data analysis, we documented the relationship between our data collection and our conclusions (Miles & Huberman, 1994). Hence, each text segment was connected with the implicit theory it represented, and also with the behavior associated with the specific implicit theory if possible. These schemes helped us identify and locate each text segment, as well as ensuring a systematic and structured approach in our data analysis.

**Results**

The presentation of the results is based around the three implicit theories derived from the analysed data. We first describe these implicit theories and then identify the corresponding behavior, which
individuals in our study described as being a consequence of their perceptions of global virtual collaboration. In Table 2, we present a summary of our results, which shows the frequency of respondents’ mentions of each implicit theory, along with a description of their related behavior.

**Table 2 Results**

<table>
<thead>
<tr>
<th>Implicit Theory (Frequency)</th>
<th>Description</th>
<th>Related collaborative behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT1: You just can’t develop relationships through web meetings. (25)</td>
<td>The belief that relationships cannot be built or nurtured through the use of web meetings. Face-to-face interaction is not only preferable for building social relationships, it is the only way.</td>
<td>1.1 Formal</td>
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<td></td>
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<tr>
<td>IT2: I can be present in more than one place at a time. (7)</td>
<td>Virtual meetings allow for flexibility and create the perfect escape to engage in other duties or just to think about other projects. Members of virtual teams are often in a situation where they are simultaneously attending a virtual meeting and talking on the messenger, or replying to emails and working on another project, or all of those activities at the same time.</td>
<td>2.1 Zooming out</td>
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<tr>
<td>IT3: You can’t have in-depth discussions in a virtual meeting. (13)</td>
<td>Virtual team meetings are seen as a waste of time because you cannot have real discussions, only the presentation of information.</td>
<td>3.1 Cascading Information</td>
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<td></td>
<td></td>
<td>3.2 Limited Discussions</td>
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</table>
Implicit Theory (1): “You can’t build relationships through web meetings”

The first implicit theory became apparent when people would tell us that good relationships were crucial in their work because they helped them to perform important functions. According to our data, however, relationships were rarely built or nurtured at the web-meetings. As a Danish project manager stated:

You just can’t build social relationships through web meetings, these meetings are totally impersonal.

(Danish Project Manager, Denmark)

In our interviews, the majority of informants said that for them, face-to-face interaction was not just preferable for building social relationships, it was the only way; in the words of one informant:

You’ll need to meet face-to-face in order to get to know people and what they stand for.

(Danish Manager, Denmark)

You can use the communication media for routine stuff, but for getting to know people it is almost impossible virtually.

(American Manager, USA)

In line with this, another informant stated:

The world would surely be easier if we sat face-to-face... we do not get to know each other at a distance. In the team we have discussed that we miss the non-business info about each other, but we don’t really meet that much.

(Danish Team Member, Denmark)

According to this team member, meeting face-to-face implicitly seems like the only way to build relationships. Our observations revealed how people seldom took the time for building relationships in the way that they interact in informal discussions. Implicit Theory (1) was the most prevalent view-point in our data. As Table 2 shows, the challenge of building relationships face-to-face in a virtual team was mentioned twenty-five times. In our data, we found evidence for the collaborative behavior “Formal and Task Oriented Behavior” associated with Implicit Theory (1).

Formal and Task Oriented Behavior

The majority of our respondents described virtual meetings as being very efficient in terms of task orientation. Hence, collaborative behavior in virtual meetings was often linked with an improved
task focus and a corresponding decrease of social interaction. On the one hand, this was described as a positive characteristic of the virtual meetings, but on the other hand, one that kept people from developing social relationships. Our observations also showed that people were pulled into the task orientation during the virtual meetings and that it often seemed as though they were in a hurry to get on with the task. There were often no or very few and short-term informal conversations and comments as a part of either the beginning or the end of the meeting. We noted that people seemed like they were wavering between continuing with the task and making time for informal talks. When asked about this, one team member described it as awkward to take the time to do the informal round and chat. Another project leader noted:

\[
\text{It is still very formal when we meet virtually, and there are so many ways people back away when we have these conference calls.}
\]

(American Manager, USA)

This primary task-oriented behavior hindered people from developing relational ties through nonverbal cues and informal talk, and for this reason, virtual meetings were described as being less personal. Although Implicit Theory (1) was the most prevalent among our informants, examples of opponents to this theory were also represented in our study. A manager reported that after some developmental team exercises, team members discovered how virtual meetings, when conducted in the right way, can allow for closeness and relationships to develop. The manager further reported:

\[
\text{Some of [the team members] also discovered that they could use their virtual colleagues for sparring much more than they do today. It was as if they discovered that their new global department had more resources than they had first thought.}
\]

(Danish Manager, Denmark)

According to this manager, this example shows the importance of finding new ways to communicate virtually to develop relationships through virtual meetings.

**Implicit Theory (2): “I can be present in more than one place at a time”**

The second implicit theory presents the assumption that while in a virtual meeting, members of virtual teams think they can be engaged in several activities at the same time. Virtual meetings allow for flexibility while simultaneously creating the opportunity to engage in other duties or projects. This became clear to us when one of the managers stated:
In the end, you kind of don’t care at all [during web meetings] and you kind of drift away and you are not present anymore.

(Danish Manager, Denmark)

Members of virtual teams were often in the situation where they were attending a virtual meeting while also talking on their in-hose messenger, replying to emails or working on another project. Some were even engaged in all of these activities at the same time. During one of the meetings, we observed one manager pose the following open question to his colleagues:

*How can you create more presence in your online interactions?*

(Danish Manager, Denmark)

His reflection made us aware of the existence of a behavior associated with the implicit theory of being present in more than one place at the same time, identified as “Zooming-out and Multitasking.”

**Zooming-out and Multitasking**

The first type of behavior, zooming-out, is characterized by individuals’ ability to gradually lose focus of the initial meeting discussion and shift their awareness to another activity. Muting the microphone and turning off the camera are two of the signals reinforcing this behavior. Our observations of the virtual meetings showed us how even shortly after the start of a meeting, individuals became absent. They would still be present as a name on the conference call, but would participate or interact minimally during the call. Individuals expressed their frustration with this type of behavior during our interviews, as in the statement of one manager:

*Sometimes you just observe that people check out and leave the meeting and you are left wondering what they are doing.*

(Danish Manager, Denmark)

In another case, talking about the experience with virtual meetings, another manager voiced the following reflection regarding his colleagues:

*I believe that it is all about the presence. [...] do your thoughts ever drift away from the topic or the person at the other end?*

(Danish Manager, Denmark)

The other related behavior we noted as being driven by Implicit Theory (2) is “Multitasking.” Multitasking represents the participants’ engagement in several other activities during a meeting.
that are not related to the meeting. This became apparent to us both during the interviews and the observations. Individuals revealed in their interviews their belief that virtual meetings were sometimes a tempting opportunity for them to get work done on other projects and to answer other inquiries not related to the meeting topic/s.

Implicit Theory (3): “You can’t have in-depth discussions in a virtual meeting”

Virtual team meetings are seen as a waste of time because it is difficult to have real, in-depth discussions. Members of virtual teams believe that it is easier to manage the information shared and make it meaningful for the participants during face-to-face meetings. This implicit theory became visible when the virtual teams’ members began complaining that meeting face-to-face was necessary to have in-depth and meaningful discussions. One of our interviewees stated:

*The best is to walk around, look at what people are doing and start discussing it with them.*

(Danish Team Member, Denmark)

Using this implicit theory, we identified two corresponding behaviours that are connected to each other: “Cascading Information and Limited Discussions.”

Cascading Information and Limited Discussions

Individuals are faced with a great deal of information to absorb, which they find difficult to cope with. A manager noted:

*There is a dilemma of course; on the one hand, they are facing a lot of cascading information all the time, but on the other hand, they are not including or forgetting to include people.*

(American Manager, USA)

Keeping meetings efficient in terms of the information shared becomes difficult and instead of focusing on the important things, employees end up simply reporting information. Due to the number of individuals attending the meetings, each person has very limited discussion time, as noted by one of our interviewees:

*It is very hard to share meaningful information when you have a meeting with thirty participants.*

(Danish Manager, HQ Denmark)
The participants’ willingness to engage in in-depth discussions is also limited by the lack of time and broad discussion topics. Another virtual team member recalled:

*We do have some bad experiences where we had three hours of video meetings and five to seven applications to discuss. There is no doubt face-to-face is easier.*

(Chinese Team Member, China)

Because the time frame for everyone to meet is limited by the time-zone differences, more topics are on meeting agendas than there is time to discuss. The result is having a very limited, informative talk about the topic rather than a more in-depth discussion.

We also found managerial support for our assumptions in our interviews. One manager acknowledged that what may be keeping people from successful collaboration is actually their own implicit theories on global virtual collaboration:

*Often distance is just as an excuse not to do anything about it... What I tell my employees is that I don’t want to hear this anymore because they have actually proven several times that some of the best collaboration they have been doing is across sites.*

(Danish Manager, China)

Further, they acknowledge that more can be done if people stop complaining and start collaborating:

*We proved that even complicated stuff can be handled virtually.*

(Danish Manager, Denmark)

**Discussion**

Our study attempts to answer two research questions concerned with implicit theories and their effects on the collaborative behavior of members in global virtual teams. The first research question aimed to identify the types of implicit theories team members have regarding global collaboration; our second research question seeks to explore how global virtual team members behave as a result of their implicit theories. More precisely, we wanted to examine whether team members’ implicit theories resulted in specific behavior patterns in global virtual collaboration. We will discuss our answers to both research questions below.

The first and the most present implicit theory in our data, “You can’t build relationships through
“virtual meetings,” reinforces the importance of relationships and social interaction facilitated by face-to-face encounters. Prior research stresses the difficulties of communicating virtually because to a certain extent, technology eliminates social cues that might result in communication breakdowns (Maznevski & Chudoba, 2000; Klitmøller & Lauring, 2013). While recognizing the challenges of mediated communication, other researchers show how the individual understanding of perceived familiarity and relatedness toward others is dependent not only on the characteristics of the media but also on how the individuals approach the communication (Waterworth & Waterworth, 2001). Thus, the question of establishing relationships and connectedness with others in mediated communication is affected by the beliefs, attention, and behavior of the engaged team members, as well as the specific technical solution. This finding is not only affirmed in our study, we have also demonstrated how the implicit theories can increase the formal and task related behavior.

In relation to implicit theory two, “I can be present in more than one place at a time,” existing research shows how the individual’s feeling of presence moves from the virtual environment to the actual setting, experiencing a break in presence that requires a certain level of effort in order to overcome it (Garau et al., 2008). Waterworth and Waterworth (2001) conceptualize presence in terms of attention, stating that due to their reduced cognitive capacity, individuals should aim for equilibrium between the actual world, the virtual world, and their internal world when dividing their attention. Thus, presence is dependent on the allocation of attention and presence in one world, for instance, the virtual world, requires that the individual be absent from the other worlds (Schultze, 2010). We know from our own study that team members with the implicit theory that one can be present in more than one place at the same time were often zooming out from the actual meeting or doing other things. In alignment with prior studies, this shows that if people have no motivation to direct their attention to the virtual environment, team members use the time during meetings to work on other tasks (Mark et al., 1999).

Implicit theory three, stating that “You can’t have in-depth discussions in a virtual meeting,” is strongly connected with the previous two theories and reinforces the formal view of individuals regarding the lack of usefulness of virtual meetings. Again, this implicit theory is related to existing research concerning how complex and ambiguous tasks are often challenged by technological limitations when they take place over mediated communication (Maznevski & Chudoba, 2000; Gerybadze, 2004). Furthermore, our findings provide nuance, showing that it is the combination of
technological limitations, the individuals’ approach, and implicit theory that contributes to the success of a discussion during a virtual meeting. As shown in the results section, the implicit theory can potentially contribute to more limited discussions and one-way communication, which again decreases the individuals’ engagement in a global virtual collaboration. In contrast, Bystrom et al. (1999) suggest that individuals tend to pay more attention to the virtual setting during a captivating task, thus forming the right conditions for being immersed in in-depth discussions.

As shown in Table 2 in our results section, there is a relatively large difference between the numbers of statements we found in support of our implicit theories. This finding leads us to think that some implicit theories are more implicit than others and that individuals are not necessarily aware they subscribe to them, which is also supported by the literature (Lerner, 1970; Dweck et al., 1995b; Job et al., 2015). According to our study, individuals’ implicit theories can have a crucial influence on both their motivation and their behavior with regard to how they approach virtual collaboration. We see a vicious cycle: team members’ implicit theories reinforce a behavior that is consistent with their beliefs, which in the end reinforces their implicit theories. As one of the manager interviewees stated, however, distance is often used as an excuse for not succeeding with their global virtual collaboration. It also appears, however, that there were several cases when members of globally distributed teams proved they could successfully accomplish complicated tasks virtually.

According to prior research, there is no doubt that managing communication in virtual teams is more challenging than in traditional co-located teams, which is due to inherent technological limitations and disruptions of conversation patterns, causing misunderstandings and frustrations among team members (Maznevski & Chudoba, 2000; Maznevski et al., 2006). Our findings, however, show how virtual collaboration is challenged not only by these inherent characteristics of computer-mediated communication but also by the beliefs of team members engaging in virtual collaboration.

Managerial Relevance
Our study of implicit theories has some practical implications. First, managers and organizations should not diminish the existence and influence of the implicit theories people bring to global virtual collaboration. Implicit theories can be analysed and discussed, thereby guiding people to challenge their beliefs and experiment with new collaborative behaviours. Hence, to develop
successful virtual collaboration, it is not only a question of adding new, more sophisticated technology and providing technological training but also a question of challenging the implicit theories people bring to collaborative efforts.

Second, to ensure successful global virtual collaboration, organizations must equip virtual team members with the appropriate technology to support their collaboration. In addition to more advanced technologies, qualitatively better and more creative uses of existing technologies should be developed. Regardless of the advanced level of the technology, team members should continuously experiment with the form and content of their virtual meetings to allow for more closeness and in-depth discussions. Organizations should also plan a careful migration of new communications technology, ensuring that these new tools are working to effectively support successful virtual collaboration.

**Limitations and Future Research**

The contributions of this paper are limited by the design of our study. Our design sought to more closely examine fifty distributed team members and managers in one multinational organization across four sites to explore a new field of research; however, our reliance upon individual reports and observations from only one organization limits our contribution. The results revealed in our study are perhaps limited due to the specific organizational context. Future research could address this limitation by obtaining objective measures of both implicit theories and related collaborative behaviours across several organizations and professional areas. Our strategies sought commonalities across the experiences of our informants, which also meant sacrificing a closer examination of a few specific teams and their dynamics. Future research could address this limitation by studying complete teams and their internal dynamics in greater depth. Future research could also investigate the conditions under which specific implicit theories occur and how they are influenced by, for instance, organizational context, profession, and private life. Further, we found no differences across team members’ locations (e.g., headquarter vs. subsidiaries), differences that may have been detected if we were to follow a handful of teams longitudinally.

Despite these limitations, the exploration of implicit theories and collaborative behavior offers great potential for making global virtual collaboration more successful in the future. Advocating for implicit theories as a lens for understanding the, yet unexplored, aspects of global virtual collaboration points to the value of addressing the beliefs that influence individuals’ reality and behavior.
Conclusion

Our study explored implicit theories in global virtual collaboration. Identifying implicit theories addresses an unexplored terrain, which, as we argue here, has potential to help us understand how and why people are challenged by global virtual collaboration. Through interviews and observations gathered from fifty team managers and members, we identified three implicit theories in global virtual collaboration. We also showed how informants behaved as a result of these implicit theories.
References


Paper 3.

Transforming Perceptions of Presence:

Reporting from an Action Research Project
Abstract

When working in globally distributed settings, the perception of presence in collaboration and the use of technology directly impact how people are able to act in daily work practices. In this paper, we want to identify new ways to transform the way people think about presence in global collaboration, with the aim of improving the collaborative possibility for working closely with remote colleagues. In particular, we want to experiment with new techniques and approaches for facilitating reflections among the globally distributed participants, directly improving their conditions for work. Based upon previous research on global collaboration, we conducted an action research study over a period of 21 months, where collaborative partners working within a global engineering company were invited to participate in workshops facilitating improved global collaboration. Through two action cycles we improved the approaches and techniques to make people reflect upon current practices with the aim of transforming their perceptions of presence when working remotely. In this paper, we present the results of this action research arguing that while discursive interventions challenging people’s perceptions are relevant and important, the embodied experience of the activities are essential to be able to transform people’s perceptions on presence and improve the global collaboration.

Keywords: Global collaboration, action research, interventions, embodied experience.

Authors: Rikke Lindekilde & Pernille Bjørn
Introduction

Global collaboration certainly suggests a host of new opportunities for individuals and companies alike. With the arrival of various collaborative technologies new opportunities for global collaboration continue to emerge, but with new technologies, new questions and challenges also materialize (Maznevski and Chudoba, 2000; Gibson and Cohen, 2003; Olson and Olson, 2013). These challenges include technological discontinuities, time zone differences, and cross-cultural communication (Bjørn and Christensen, 2011). One key challenge in global work is related to people’s perceptions of presence in global collaboration and the ways in which closely coupled interaction is possible across geographical distance. People’s perceptions of distributed collaboration directly impact the ways in which daily work practices emerges (Bradner and Mark, 2002; Orlikowski and Gash, 1994). The process of transforming perceptions and work practices in global collaboration is a topic, which deserves attention (Dubé and Robey, 2008).

In this paper, we want to identify new ways to transform people’s perceptions on presence in global collaboration, with the aim of improving the collaborative possibilities for working closely with remote colleagues. Thus, theoretically grounded within the literature on global collaboration, presence and transformation (e.g. Bjørn et al. 2014), we conducted an action research project (Rapoport, 1970), with the aim of transforming people’s perception of presence over two action cycles. The action research study was conducted within a research and development (R&D) department of a global engineering manufacturing company we refer to as “ScanEngineering”.

The practical goal of the action research project was to concretely facilitate participants in the R&D department, who were globally dispersed to improve their collaboration. During the last decades the organizational structure of the R&D department has changed from a primarily Danish department to a global division located in China, Hungary, and the US. This organization required a change in the ways management interact with each other and engage in technology-mediated activities. Particular ScanEngineering wanted to empower and increase the involvement of the subsidiaries in new products development in the R&D department. Thus, the action research interventions were designed with the dual goal of supporting the practical challenges of designing appropriate interventions while developing theoretical conceptualizations on the characteristics of such successful interventions. We found that while interventions based upon discursive characteristics can support reflective practices, embodied interventions turned out to be most effective. The embodied interventions were organized as activities where the participants were challenged in their
perceptions of presence in global collaboration through collective embodied experiences with global colleagues.

The paper is structured as follows. First we review previous literature on distributed work with an emphasis on presence and transformation in global collaboration. This is followed by an introduction to the action research project, including detailed account of the data sources. The result section is divided into two main sub-sections, each presenting the interventions as they were planned, executed, and reflected upon in the two action research cycles of the project. We then discuss the results of the empirical investigations with the aim of figuring out, why the interventions in the second cycle were much more effective than in the first action cycle. Finally, we present our conclusions.

**Working globally**

**Global collaboration**

Working globally is the new normal for many multinational companies within global software development, manufacturing, engineering (Majchrzak et al., 2000) and research in distributed collaboration has become core for IS research (Vlaar et al., 2008; Matthiesen et al., 2014) Predominately, collaboration across geographical distance has been investigated in terms of common ground, coupling of work, collaborative readiness, technological readiness, and management and decision making (Olson and Olson, 2014). Even with later revisions and newer results in distributed work research (Bjørn et al., 2014) it is confirmed that geographical distance still matters.

Traditionally the literature has conceptualized geographical distance and perceived distance as similar and overlapping notions. However, Bradner and Mark (2002) show how the potential impact that geographical distance has on distributed collaboration is not fixed, but rather dependent on factors such as the amount of interaction. Thus, although team members initially cooperate less with someone they perceive as far away, their willingness to interact increases quickly with interaction (Bradner and Mark, 2002). Bjørn et al. (2014) support this finding showing how geographical
distance matters less among closely-coupled workers due to continuous interaction compared to their loosely-coupled counterparts.

O'Leary et al. (2014) show how objective proximity has generally weak or mixed relationships with perceived proximity, communication and shared identification, and no effect on relationship quality. In contrast, the communication and identification processes generated perceived proximity in significant ways (O'Leary et al., 2014). Thus, global collaboration are dependent not only on geographical distance but on the perceived proximity to distributed colleagues building on factors such as the amount of interaction, shared identity and organizing of work. Understanding the perceptions people have in regard to their work can be particularly useful in order to understand the challenges with global collaboration. Social cognitive research has long shown that individuals act on the basis of their perceptions of the world, and in doing so enact particular social realities and endow them with meaning (Berger and Luckmann, 1967; Weick, 1979).

Orlikowski and Gash (1994) define "technological frames" as a useful analytic perspective to understanding team members’ perception of technology and their interaction with it. While technological frames are individually held, it is nonetheless useful to distinguish those cognitive elements that – through socialization, interaction, or negotiation – individuals have in common. Orlikowski and Gash (1994) use the term technological frame to identify that subset of members’ organizational frames that regards the assumptions, expectations, and knowledge they use to understand technology in organizations. Studies show how recognizing the central influences of the technological frames, is critical to developers, researchers and practitioners of global collaboration (Orlikowski et al., 1992; Bjørn et al., 2006).

**Presence in global work**

Global collaboration challenges previous perceptions of presence, because it enables team members to participate in different interactions at one time, and to be present in interactions at distant places. Presence is a complex phenomenon and its conceptualization has evolved in part because technology has become more social and used for various applications (Kim and Biocca, 1997; Schultze, 2010). Presence has developed from a single concept of telepresence to a multi-faceted concept of psychological states including spatial, social and time-related aspects (Schultze, 2010).
Thus, the original notion of telepresence referring to the overall sense of existing or “being there” in the virtual space (Ijsselsteijn et al., 2001), now further entails the sense of “being with” (e.g. social presence, Bente et al., 2008) and being connected all the time (e.g. eternal presence, Loy, 2007).

Given the interactional and social nature of global collaboration, the form of presence that is of primarily relevance here, is that which is termed “social presence” (Kim and Biocca, 1997; Schultze, 2010). Social presence was originally defined as the medium’s ability to increase others’ salience in an interaction (Short et al., 1976). However, in later research social presence became a term, which reflects the subjective experience of closeness to and connectedness with others in mediated communication (Schultze, 2010, p. 438).

There are different theories on how to influence the sense of presence in computer-mediated worlds. Waterworth and Waterworth (2001) posit how the technology user is simultaneously present in both the “real” and the “computer mediated” world. When the user’s sense of presence shifts from the computer mediated to the real world, this leads to a “break in presence” (Garau et al., 2008). However, the break in presence need not necessarily be caused by a shift to the real world but can also be a shift to a private, internal world of thoughts and dreams, and the user become absent (Waterworth and Waterworth, 2001). Presence is a question of where attention is allocated. The number of distractions from both the actual and the computer-mediated environment that influences the user determine his ability to attend to the virtual world. Presence is further dependent on the extent to which the user makes the event in the computer mediated communication meaningful by attaching significance to them, which in turn enhances presence (Bystrom, Barfield and Hendrix, 1999; Salinä, 2002). Existing research shows how presence has a strong positive effect on both memory and persuasion, which again enhance the transfer from the computer mediated world to the “real” world (Kim and Biocca, 1997). Kim and Biocca (1997) further show how the absence from the physical environment’s distractions is critical to enhance the participants’ memory and persuasion.

Transformation of global work
Understanding the perceptions team members have in regard to their work can be particularly useful in order to understand the challenges of global collaboration. Further, understanding the perceptions team members have in regard to their work also provides a means for influencing and transforming individual’s perceptions of computer-mediated collaboration. Thus, tracking team members’ perceptions provide both researchers and practitioners to design a number of interventions to clarify
or transforming people’s understanding and work practices. Existing research shows how transforming team members’ perception and the use of collaborative technology to more successful practices is influenced by both technological, social and psychological factors (Bjørn et al., 2006; Majchrzak et al., 2000). Bjørn et al. (2006) found that the alignment of individual technological frames required the articulation and re-evaluation of experience with collaborative practice and with the use of technology. Thus, the key finding was that the alignment that led to the successful use of groupware by a virtual team built on practical experience, and therefore could not take place at the outset of groupware adoption (Bjørn et al., 2006). Majchrzak et al., (2000) argue that global teams may experience misalignment between the pre-existing work practices and new technology. In their study, they initially tried to solve this misalignment by changing the team members’ work practices. However, as the team proceeded, a series of discrepant events unfolded and caused the team to re-evaluate and modify both the group practices and the technology structure (Majchrzak et al., 2000). Thus, based on existing research, the technology adaptation process is understood to be one that evolves over time, sometimes gradually, sometimes discontinuously as a response to interruptions (Tyre and Orlikowsky, 1994). As Majchrazak et al. (2000) conclude, new technology represents “occasions for restructuring” of both organizational, group and technology structures. Global collaboration are dependent not only on geographical distance but on the perceived proximity to distributed colleagues. Understanding the people’s perceptions of their work can be particularly useful in order to understand the challenges in global collaboration. Previous perceptions of presence, for instance, can be challenged by global collaboration, because technology enables team members to participate in different interactions at one time, and to be present in interactions at distant places. Existing research shows how transforming team members’ perception and the use of collaborative technology to more successful practices are influenced by technological, social and psychological factors.

Methodology

Empirical case
The research question for this paper is:

*How can we transform people’s perceptions on presence in global collaboration, with the aim of improving the collaborative possibility for working closely with remote colleagues?*
The aim of the research project is both to explore and improve the collaboration in the global setting of ScanEngineering, and further to contribute to the body of knowledge on how to design and conduct training sessions for global teams. Our research project is a 21-months (January 2012 to November 2013) collaborative study between a global engineering company, here named “ScanEngineering”, and researchers at Aarhus University, Department of Business Administration and University of Copenhagen. ScanEngineering was established in 1945 and is today a leading engineering company that employs 18,000 individuals globally. ScanEngineering is headquartered in Denmark and has 80 subsidiaries in more than 55 countries. During the last decade ScanEngineering has undergone continuous globalization and the aim is to empower and involve the subsidiaries more and more particularly in the development of new products in the R & D department. The R & D department has to an increasing extent utilized global virtual teams to manage their decentralized and global activities. Developing new products in ScanEngineering is knowledge-driven work, and executed by knowledge workers across various locations including America, China, Hungary and Denmark. In general the tasks are complex and planning and collaboration among virtual team members are critical. As distributed team members in the R & D department, mainly engineers, may spend time on developing, for instance the hydraulic components for a product, they often need to operate in real time to facilitate the exchange of rich and technical detailed information. The global team members collaborate through several forms of mediated communication including email, instant messaging, telephone, shared documents and video conferencing. Despite of the potential benefits of the globally distributed teams, rendering effective results is a challenge compared to the co-located teams in the R & D department.

The Action Research Approach

This research has two main interests, namely first to improve practice of global collaboration in ScanEngineering, and second to develop new theoretical understandings of how to create enabling conditions for globally distributed work. This dedicated dual goal made action research a useful approach as action research “aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science” (Rapoport, 1970, p. 499). Action research has received increased interest within IS research for the last decades and has been described as a post-positivist social scientific research method, ideally for studying technology in a human context (Baskerville and Wood-Harper, 1996; Bjørn and Boulos, 2011).
Action research is characterized by linking practice and research through different forms of cyclical and iterative processes (Baskerville and Wood-Harper, 1998; Avison et al., 1999; Coghian, 2001). There is a variation of action research approaches which generally all are organized by first a diagnostic of the practical circumstances and then the executions of interventions based upon theoretical considerations, collecting empirical data about the intervention, and finally reflecting upon the results (e.g. Baburoglu and Ravn, 1992; Baskerville and Wood-Harper, 1998). In this research we conducted an action research study, which consisted of two cycles with the following phases: diagnosing, action planning, action taking, evaluating and specifying learning (Susman and Evered, 1978). Given our objective of transforming people’s perceptions on presence in global work, we studied the R&D department in ScanEngineering, a company dedicated to the development of their global collaboration.

Data Sources
The empirical data from our action research project came from various sources over the 21 months in which the first author worked closely with ScanEngineering (see table 1). During this period the first author spent half of the daily working hours at ScanEngineering doing research while engaging with the organization and supporting them in identifying new strategies to improve their global collaboration. In this period the first author conducted 50 interviews and 3 workshops were conducted, each planned as intervention activities, and data was collected about these interventions. It is especially two of these workshops, which are the core focus in this paper. While the majority of the interviews provided us with valuable background knowledge on the case, 10 out of the 50 interviews were directly regarded the action research interventions. The interviews regarding the interventions were done immediately after the change sessions to get the first hand experience of the participants. Examples on questions asked in the interviews were: “What is your overall impression from the session?” This was supplemented by more specific questions regarding the actual exercises such as: “How did you experience the first exercise? (where you had to do the interviews while you were lying down with closed eyes)” The interviews were recorded and transcribed and supplemented with discussions and emails if necessary. A few weeks later, we revisited the participants on email to gain their feedback on the usefulness of the sessions. We compared the methods and the results of the two action research cycles to evaluate both the success of the interventions as problem solving methods as well as the applicability of the methods in other contexts.
### Data Sources

<table>
<thead>
<tr>
<th>Activities</th>
<th>No./hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participatory observations: First author had an office in the department and participated in daily routines, meetings, activities, travelling, informal breaks,</td>
<td>21 months, Jan 2012 – Oct 2013:</td>
</tr>
<tr>
<td>Workshops interventions, conducting intervention</td>
<td>1 x 2 days workshops with 29 participants</td>
</tr>
<tr>
<td></td>
<td>2 x 1 day workshops with 7 participants</td>
</tr>
<tr>
<td>Interviews, Semi-structured managers and employees</td>
<td>29 (managers) and 21 (employees) = 50 total</td>
</tr>
<tr>
<td>Site-visits &amp; observations: Hungary, The US and China</td>
<td>5 working days at each location</td>
</tr>
<tr>
<td>Observations of meetings held in two global management teams in R&amp;D</td>
<td>9 virtual meetings = total 21 hours</td>
</tr>
<tr>
<td></td>
<td>4 face to face meetings = total 13 days</td>
</tr>
<tr>
<td>Participant on Yammer: An internal knowledge sharing platform on global management for R&amp;D’s managers</td>
<td>6 months – where 29 managers were sharing their knowledge and concerns on global management</td>
</tr>
<tr>
<td>Development of an online tutorial on global collaboration for distributed teams</td>
<td>1 online tutorial was developed in cooperation with 1 internal consultant and 1 R&amp;D manager</td>
</tr>
<tr>
<td>Documents analysis of, internal and external information</td>
<td>14 documents &amp; 3 books</td>
</tr>
</tbody>
</table>

*Table 1: Data sources*

### Data Analysis

While data analysis was done during the whole period of interaction with the company, one specific aspect was particularly pertinent - namely the results of continuously re-designing and aligning the workshop activities. The data collection as well as the analysis is guided and informed by theories on global collaboration, presence and transformation in global work. In our continuous data analysis we compared the methods and the results of our planned workshop which in turn directly informed the following workshop. In our data analysis, we evaluated both the immediate success of the methods as problem solving methods and the practical improvement of the global collaboration. In this study, more than one year after the last workshop was held, we investigate this in more detail, and we re-examine the empirical data from the two workshops in order to understand if, why and how the intervention activities supported the transformation of the practice. The two action cycles are presented below in four main sections describing the problem diagnosing, the planning and activities of the two interventions as well as comparing and evaluating the outcomes from intervention 1 and 2.
Transforming the perception of distance

When we first set out to conduct workshops, with the aim of improving the global collaboration in ScanEngineering, it was important for us to design interventions, which helped the participant to reflect upon their own beliefs about working globally and to use this to further re-consider the collaboration. In addition, we wanted to make sure that the interventions were particularly designed for the audience in mind, taking into consideration the organizational culture of ScanEngineering as well as the particular global teams in the R&D department.

Problem diagnosis: Why is it difficult to work globally?

To ensure that interventions and activities were directed at the specific conditions in ScanEngineering, we began the study by exploring the challenges as experienced by the participants when engaging in global work. Two main data sources provided insights into the collaborative challenges, namely the interviews, and the participatory observations conducted during the time of study. During this period, several different ideas to why and how working globally was difficult emerged from practice. In this period the first author engaged in reflective interactions with participants repeatedly presented in-progress findings from the data ensuring feedback loops and confirming interpretations. The findings of this diagnostic process were in-depth characterization of challenges experienced by the organizational members. Participants expressed that working globally was difficult, because the lack of proximity and use of technology impacted the conditions for work in negative ways. The participants insisted on the frequent need for meeting face-to-face and they experienced that working at a distance kept them from fulfilling the work expectations. Many of our informants had different perceptions of what it meant to work in remote settings, however some perceptions were shared between participants and fundamentally impacted their experiences of global work. One key perception, which emerged during the diagnostic process, concerned the importance of being able to see each other in for instance videoconferences in order to build relationships. The perception was: *In order to develop a relationship with remote colleagues, it is critical to see each other.* This key perception became the centre for the way we organized the interventions, since this was one of the perceptions that kept the participants constrained within traditional work habits making it difficult for them to expand their horizon and fully engage in global collaboration. In addition, it also became clear for us, that the strategy for transforming their work practices, through interventions forcing participants to reflection upon their
core assumptions about global work, was aligned with the ideas and interests of the participants. As a manager stated:

"I would like to challenge the assumption that you only can develop a trustful relationship face to face (...) I believe it is all about presence – also in the virtual media world. Do your thoughts ever drift away from the topic or the person at the other end? The question is, how can you create more presence in your online interactions?"

(Manager, March, 2013)

Interestingly, the manager in this quote expresses, how he experiences that team members’ perceptions about global collaboration hinder the relationship building among them. Also he points to how the core question is about how to create the experience of ‘presence’ in global work. Based upon these insights we planned interventions dedicated to investigate: How can we transform peoples’ perceptions on presence in global collaboration through action interventions, with the aim of improving their conditions for work. Investigating this question, various activities were developed and executed with the global team members – however in this paper we will focus on the interventions related to the experiences of presence in global work.

**Intervention 1: The Discursive Intervention**

So, how do we transform peoples’ perceptions on presence in global work? We wanted to design an intervention encouraging reflections as the main method for learning. The discursive intervention here is a conversation, where the collocated participants, on the basis of a video, reflect and tell about their own opinions and experiences and listen to the opinions and experiences of others. The aim of the discursive intervention, was to lead to new reflections and insights. Immediate and general positive feedback gave us confidence that participants valued the intervention and the workshop as a whole. One of the responses after the workshop was:

"I would also like to thank all for a couple of very inspiring days! (...) I have been thinking that the task ahead is not just to become better virtual leaders, but for our teams in general to be better virtual teams. We must raise the awareness of our new “virtual reality” in the minds of all members of our departments (and in the organization as a whole)!
"

(Manager, April, 2013)
The above quote demonstrates that the results of the discursive intervention were positive and that the participants felt inspired with an increased awareness on the remote work and global collaboration. However, investigating the remote work, which followed the reflective intervention, it became clear that it was difficult for the participants to bring the insights they developed during the workshop into their practices. These results made us wonder whether and how we could improve our intervention not only as a discursive and reflective experiment, but also anchoring the results into the practices afterwards. These insights became the basis for the design of our second intervention activity.

**Intervention 2: The Embodied Intervention**

Moving from reflection to anchoring the experience to practice we needed a new approach for the intervention. While reflection in the first intervention was designed as a discursive engagement, we wanted the participants to experience a more embodied reflection. The embodied reflection is here understood as the process of reflecting on direct experience, when the body engages in concrete activities, instead of only discussing the issues of concern. Intervention 2 also took place during a collocated workshop and started with a new group of participants watching a tutorial. The tutorial was created by the first author and based upon the results from the problem diagnosis. The tutorial included a short-form video (approx. 5 minutes), with a similar content to the video in intervention 1 and with an overall radical questioning of basic assumptions in global work. The video-presentation included four assumptions to challenge as well as four new assumptions to experiment with. An example of one of these four assumptions presented in the video is: 1) “One actually needs to see the person in order to develop a personal relationship with him or her”. This assumption was challenged with a research-based description of an alternative assumption, which stated: “By listening differently one can connect with somebody at a deep and very personal level” (see figure 1). The instruction after the video was in summary as follows: “In pairs of two, spend 15 minutes on a phone conversation. The topic should be of importance to you and could well be a challenge you would like to have solved. Share your topic with your partner. Lie down and close your eyes during the conversation”. Thus, instead of simply having the participants discuss the content of the video afterwards (as in intervention 1), the participants were placed in experimental collaborative set up situations which clashed with some of their perceptions on global work. Concretely, participants were placed within different rooms and asked to lie down on the floor with their eyes closed, and
asked to engage in a phone conversation through their cell phone with a person they barely knew. Throughout the phone call the two people on shift were sharing a topic of importance for them for instance a work challenge they would like to have resolved. The intervention was designed as an embodied experience confronting participants’ perceptions of conditions for meetings. Where expectations to ordinary meetings were that participants sit on chairs with tables, they were in the intervention placed on the floor. Where expectations to ordinary meetings were that participants is that all can see each other directly in the eye; they were asked to close their eyes in the intervention. Where expectations to ordinary meetings were that participants needs high resolution media, they were asked to only use audio on their traditional cell phone. So what happened during this intervention was, that participants were invited to reflect upon their own perceptions about the constraints in global work, by participating in the embodied intervention activity, which potentially could transform their perceptions on global work. The aim of the exercise was to demonstrate that the simple act of lying down with the eyes closed, with no outer distractions, while listening to the voice of another person, enhance presence and can be a crucial way to connect with this person.

Figure 1. Slides from video in both intervention 1 and 2.

The immediate feedback on the intervention was that as soon as the participants got used to the new position, (lying down with their eyes closed), they experienced how their own perceptions could play a crucial role to the quality of collaboration. One of the participants explained:

“The session was a good way of actively work with your perception of virtual collaboration and the constraints that we often believe in (...) it really opened your eyes (ha ha) towards having a deeper discussion than you would normally do with your eyes open. For me it was clear that I do definitely not need a video meeting to get very close to my colleagues.”

(Manager, September, 2013)
As indicated by this manager, results from the embodied intervention caused participants to carefully reflect on their own perceptions on global work, and as it turned out it also affected their future collaboration. Further some of the participants experienced how their teams had a double-looped learning related to global collaboration and the potential for building relations online. One manager stated:

*When my team did this exercise, not only did they discover (or were reminded) that it is important to remove distractions during virtual meetings/telephone meetings to allow for the closeness to develop. Some of them also discovered that they could use their virtual colleagues for sparring much more than they do today. It was as if they discovered that their new global department had more resources than they first thought. So you could say that there was a double learning in this exercise for my team.* (Manager, September, 2013)

### Comparing intervention 1 and intervention 2

While both interventions were designed with the same aim, the results of the two interventions were different. Comparing the two interventions it was clear that while discussing the video started out with fairly high engagement and awareness during the discursive intervention, the anchoring of the reflections to practice afterwards were minor. According to one of the participants the discursive intervention presented an opportunity to discuss interesting insights, but the insights were difficult to absorb and put into practice. By investigating their collaboration, the participants were offered an opportunity to become aware of their perceptions and work practices, but the implications of these weren’t as evident as in the embodied intervention. In the embodied intervention, it took time initially for the participants to engage, due to the unfamiliar conditions for the participants. This cautious from the participants however quickly changed during the exercise, and their engagement steadily increased during the workshop and represented for the majority an experience of practical inspiration. Thus, posited by one of the participants:

*The session was very useful and pinpoints that some of the perceptions that you have in regards to being a virtual team can actually be proven not to be true. I am convinced that in the future I will conduct several of my one-on-one meetings by phone instead of video.*

(Team member, September, 2013)
This quote demonstrates the general change in the perception on global collaboration of the participants during the embodied intervention. Besides becoming a reflective tool, the embodied experience transformed participants’ perceptions on global collaboration in general, and further made them develop ideas on how to improve their practical considerations about collaboration across distance in the future. Half a year after the intervention a manager explains how the intervention inspired him to change his management team meetings:

*It gave us the concrete outcome to change our weekly meetings to now be conducted by each of us instead just me and also to vary the way the meetings is held. (not just Scopia meetings).*

*(Manager, September, 2013)*

It was evident that both interventions impacted participations perceptions on global collaboration. Remember, that the majority of the participants in both interventions had significant objections in regard to the constraints of global collaboration, and basically had their doubt about whether it was possible to have successful global teams. Therefore, the execution of both interventions showed important results in terms of transforming people’s perceptions on presence in global work. Furthermore our results also showed that the embodied intervention transformed the participants’ perceptions on global work in much more engaged ways, compared to the discursive intervention, making it possible for the participants to anchor their reflections to their practices. Below is a table summarizing and comparing the results from both interventions.

<table>
<thead>
<tr>
<th></th>
<th>1: Discursive Intervention</th>
<th>2: Embodied Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aim/purpose</strong></td>
<td>Challenging perceptions and changing work practices</td>
<td>Challenging perceptions and changing work practices</td>
</tr>
<tr>
<td><strong>Main approach</strong></td>
<td>Discursive &amp; reflective approach</td>
<td>Embodied &amp; reflective approach</td>
</tr>
<tr>
<td><strong>Activities</strong></td>
<td>Video-Information, reflection and discussion, agreements</td>
<td>Video-Information, embodied experience, discussion, agreements</td>
</tr>
<tr>
<td><strong>Participants</strong></td>
<td>29</td>
<td>7</td>
</tr>
<tr>
<td><strong>Participant outcome</strong></td>
<td>Some transformed perceptions in global collaboration</td>
<td>Transformed perceptions, agreements and implementation of on new work practices</td>
</tr>
</tbody>
</table>

*Table 2 Comparing 1st intervention and 2nd Intervention*
Discussion

Our study seeks to answer the research question: How can we transform people’s perceptions on presence in global collaboration, with the aim of improving the collaborative possibility for working closely with remote colleagues? Building on various data sources such as interviews and participatory observations over 21 months in the R&D department in ScanEngineering, two workshops were conducted and planned as intervention activities, and data was collected about these interventions. In this action research project we experimented with two different types of interventions and found that while interventions based upon discursive characteristics can support reflective practices, embodied interventions turned out to be most effective. The embodied interventions were organized as activities where the participants from a global R&D department were challenged in their perceptions of presence through collective embodied experiences with global colleagues. Let’s unpack this in more details.

Previous research investigating global collaboration and particular how such work organizations are transformed and changed over time have point to the role of discrepant events as the driving factor (Majchrzak et al., 2000). In this work, the discrepant event served as driving force for reflecting upon the practices, and thus using this opportunity to transform the work. Understanding our findings in this perspective, we can talk about the interventions as discrepant events, providing the opportunity for the management teams to reflect upon their practices and thus change these. However, it does not explain the differences in the effect of the two types of interventions.

Clearly, changing the way people think about global work impact the way they interact in global work (Orlikowski and Gash, 1994). However, while the participants were reflecting and thus changing their perspective on global work in both interventions it clearly provided different results. We might speculate that the effect of the change was due to whether the management team had a ‘window of opportunity’ (Tyre and Orlikowski, 1994) and thus was able to take benefit of the intervention in different ways comparing the two sets of interventions. It is difficult to change patterns of technology use and that participants often get stuck in unproductive work practices (Bjørn et al., 2006; Orlikowski, 2002), and it might be that the discrepant events provide global management team members with the ability to revise, modify and adjust work practices, including their technology use (Orlikowski et al., 1992).
However, more importantly, we found that it was the embodied intervention, which provided a particular new window of opportunity for the global collaboration. This new window was created not only as a reflective event, but as an embodied experience and was exploited immediately by the new perceptions and work agreements among participants. In line with the results of Tyre and Orlikowski (1994) the new perceptions among the participants emerged discontinuously (rather than continuously) as a result of the specific workshop intervention.

Our findings suggest the importance of embodied experiences in global work and confirm existing cognitive science indicating the crucial role of the body and embodied experiences for learning and knowing to take place (Biocca, 1997). The use of the body in the second intervention served as locally negotiated yet distributed organized context with border bracketing out the local practices not relevant to the current interaction (the participants were lying down with their eyes closed). This structure of the intervention had a fundamental role in making the collaborative actors currently present enhancing a sense of presence (Kim and Biocca, 1997). By reducing local stimuli from physical local environment, it made the collaborative partners able to bring his or her full attention to the remote partner. The presence experienced by our participants in the embodied exercise further served as an effective way to develop closeness and connectedness to the other person (Schultze, 2010).

Finally, our results highlighted how the activity of telling a personal but still work-related story allowed for bringing the participants closer together and experience a relation. By shutting down the physical local presence (closing eyes), distractions from the interaction was deleted and the participants were able to focus elsewhere – namely on the remote collaborator.

Our study has two main practical implications. First, organizations should not underestimate the challenges of people’s perceptions on global collaboration and should intentionally challenge team members’ and managers’ perceptions and existing work practices (Dubé and Robey, 2008). When an organization engages in global collaboration with the intent to make substantial changes in their business processes, people’s perceptions on collaboration will likely also require a transformation. In reality, one, often-used strategy, is to implement the new organizational structure of virtual teams widely in the belief that through experiences and with time, successful global collaboration will
flourish (Orlikowski, 2002). However, our results show how an intervention can help people transform these perceptions, and we offer a short introduction to both problem diagnosing and workshop interventions, thereby guiding for similar interventions. By acknowledging the perceptions on global collaboration and through the challenge of these, global workers will be better prepared, and thus be able to develop routine (Esbensen and Bjørn, 2014), engaging communication patterns (Jensen and Bjørn, 2012), and solve task dependencies (Matthiesen, Bjørn and Petersen, 2014).

Second, in addition to the continuous development of more sophisticated technology, this study shows how creative uses of existing communicative technology should be considered. In our study, as well as existing research (Dubé and Robey, 2008), many global team members seemed anchored in a perception, which limits creative generation of more efficient alternatives. Workers might for instance engage in rapid and simple online exchanges or in formal writing in emails, where they end up perceiving the quality of collaboration as inferior compared to face-to-face interaction. Therefore, workers in global teams need to be informed and modelled to engage in more embodied ways of communicating, this could be to engage in communication which ensure presence and awareness among participants of the global technology-mediated communication. Consequently, to gain value from global collaboration organizations should prioritize careful migration of people’s perception, technological frames and work practices with the concrete communication technology (Orlikowski and Gash, 1994; Bjørn et al., 2006).

Like all research, our contributions are limited by choices made in the design of our study. Thus, Mathiassen (1998) posits how it is difficult - if not impossible - to generalize findings from action research. With respect to the improvement of global collaboration among the participants, our reliance upon individual reports limits our ability to confirm the outcomes associated with the interventions. Quite possibly, individual statements on outcomes could have been clouded by both enthusiasm and retrospective rationality among participants. Future research could address this limitation by obtaining measures of presence in global collaboration.

Future research could also investigate the conditions under which successful transformation of perceptions occurs. The transformation process, in our study, may be dependent on the influence of the first author and her long relationship into the organization. Quite possibly, the transferability of
the intervention process revealed in our study may be limited due to reduced representativeness of both participants and researchers in the study. New research is required to complete the conceptualization of embodied transformation in global collaboration. Additionally research is required to refine and test the conceptualization. Regarding the transferability of the key perception on presence in global work that emerged from our empirical case, this perception is similar to the results of previous research (Caulat, 2010). This point to that our results are of a more general nature, and thus the interventions might be useful in supporting the transformation of peoples perceptions in working globally in other organizations.

Conclusion

We set out to study interventions, which will enable team members’ and managers’ participation in global work, and through our research we found, that the role of the embodied activities was essential. Our action research study suggests that in the transformation of perceptions on presence in global work, the embodiment played an important role in facilitating the process by which participants’ reflections are brought into practice. While reflective interventions are critical for transforming global work, we found that the embodied experience was central and served to transforming the perceptions of participants. For participants with a background in technical environments and engineering applications (like in our case), the discursive reflections turned out to be difficult to grasp and put into practice.

However, we believe our finding is of a more general matter. Often when participating in global work, participants tend to direct their attention towards their immediate local colleagues, rather than their remote colleagues. This is often also related to the amount of distractions, which often exist within a local workspace. Meetings, disruptions, local politics all serve as disruptive element during the day, making it difficult to focus and pay attention elsewhere. In global work, attention and concentration is even more important, since it does not automatically exist within the work environment. This mean that global teams have to spend extra effort in zooming in and paying attention required to engage in relevant and important global work. We argue, that our findings, on the importance of embodiment, are not only about embodied experience making it easier for participants to transform reflections into changed actions. Instead, it is the presence and concentration we created through the activity, which was essential. We created a space by which the
participants could concentrate and participate in engaged and relevant interaction without interruptions, and this is the key to the success.

Our research, presented in this paper, thus make an important point for managing global work – namely that rather than spending resources of high fidelity surroundings for video conference meeting, improvement of the global work might rather be accomplished by creating situations where presence, concentration and focus are directed at remote colleagues. By creating collaborative patterns and enabling rhythms for global work, we might be able to improve global work in a much more fruitful manner. The process of learning new work practices in global teams, is one of potentially many issues that deserve attention in future research as well as in distributed organizational settings.

What existing perceptions might arise in the future to challenge global collaboration? Some challenges may become obsolete because they rest on contemporary perceptions about global work. We cannot assume to transfer experiences between work settings of fundamentally new structures. The next generation digital natives might have different perceptions and conventions for collaborating. Long-term research on the perceptions and transformations of global work is needed to further investigate changing perceptions of technology, work, and distance.
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Paper 4

Detecting long-term impact of action research interventions: Relational Excavations of Presence in global collaboration
Abstract

Reporting from an action research study, we wanted to examine the ways in which we are able to determine the long-term impact. In doing so, we closely examined interventions of an action research project particular directed at creating successful conditions for collaborative presence in global work. Researchers agree, that experiencing presence in geographically distributed collaboration is difficult, thus there is a need to identify new strategies and technologies supporting presences in global work. Our action research was designed to improve the conditions for the experiencing of presence in global work supported by information systems technologies. Returning to the organization six months after the interventions, we found that our interventions dedicated to support the experience of presence had created long-term impact on the organization’s capability to work in globally distributed teams. In particular we identified one main strategy (Mental Attention) derived directly from the action research interventions to enhance presence. We suggest and demonstrate our analytical approach, which we used to make the long-term impact evaluation: Relational Excavation. Relational excavation is characterized by following associations and relations from current practices to past interventions with the aim to determine the nature and basis of the detected organizational changes. We argue that the Relational Excavation approach provides the possibility to detect long-term impact of action research interventions, even in highly dynamic organizations with frequent organizational changes. Our paper has two main contributions to Information Systems research: 1) Identification of a key strategy to enhance presence in global work supported by information systems technologies and, 2) Relational Excavation as an approach to assess long term impact of action research.

Keywords: Evaluation, action research, long-term, social presence, information systems technologies

Authors: Rikke Lindekiilde & Pernille Bjørn
Introduction

Over the past three decades, Information Systems (IS) researchers have increasingly engaged in action research projects (Baskerville and Woodharper, 1998; Narayanaswamy and Grover, 2007, Mathiassen, 2002; Braa and Vidgen, 2000; Donnellan, 2003). The IS action research is committed to explore and solve a particular problem situation in real life, while attempting to simultaneous achieve practical value to the involved organization as well as contributing to the development of theoretical knowledge (Galliers, 1992; Rapoport, 1970). The reason for the increased interests in action research is to make academic researchers climbing down the fence and getting their hands dirty by getting involved with the real challenges, issues, and needs experienced by people outside the academic walls of the universities (Greenwood and Levin, 2000). Action research has the potential to foster social impact and change for real people solving real problems. While impact and interventions is at the core of action research, few have considered how we might be able to evaluate the long-term impact of our interventions (Braa et al., 2004). Clearly there are many accounts of interventions and impact of IS action research (Bjorn et al. 2009, Mathiassen & Nielsen, 2008; Braa et al., 2004; Sarker & Sahay, 2004), but what if we are to take a step back and explore how we might evaluate the possible long-term impact, which our research hopefully has in the world. In this paper, we investigate how to evaluate the long-term impact of action research interventions in large global enterprises faced with continuously organizational changes. Global organizations today are dependent upon IS technologies to be able to execute and take advantage of their global appearance (Majchrzak et al., 2000). Thus, finding new ways to support global work in large organization is vital for the growth and success of these organizations (Malhotra et al., 2001; Nicholson & Sahay, 2001; Olson & Olson, 2014; Watson-Manheim et al., 2002; Dubé & Robey, 2008). Still, organizational change is the ‘normal natural trouble’ of working in global organizations (Bjorn et al., 2014; Jensen & Nardi, 2014; Matthiasen et al., 2014). New technological opportunities as well as new business opportunities constant require organizations to accommodate and thus re-organize. This state of organizational flux complicates our capabilities to plan, design, and execute action research interventions supporting their daily work, since people, locations, technologies constantly changes (Matthiasen & Bjørn, 2015).

Starting January 2012 the first author conducted an action research project identifying new strategies for supporting ‘presence’ in global work. The action research project took place in the Research & Development (R&D) department in the Danish headquartered global company:
Grundfos. Grundfos has long been a world-leading manufacturer of engineering instruments in the water-supply industry. During the last decades the organizational structure of the R&D department has changed from a primarily Danish department to a global division located in China, Hungary, and the US. This transformation of the organization required a change in the way management interacted and engaged in technology-mediated collaborative activities. Thus, the action research interventions were designed with the dual goal of supporting the practical challenges of designing appropriate interventions while at the same time to develop theoretical conceptualizations on the characteristics of such successful interventions. At the time after the action research interventions in May 2013, the impact and the action researcher were clearly visible in the organization; however we wondered how long the impact would last as well as whether it would be possible to detect the impact of these inventions six months later. To explore the question, we planned to revisit the organization in which the interventions had taken place and closely explore techniques which could help us to detect the long-term impact of the past action research interventions.

We found that the key challenge when evaluating long-term impact of action research interventions is to identify which organizational changes are founded in the action research interventions and which are simply part of the frequent organizational change, which forms the every-changing status of many large global organizations. Global organizations are constantly changing and re-organizing, which makes it difficult to determine the nature of the changes. Therefore, we developed an analytical approach, which were able to follow associations of current practices back to the past interventions, and through this work determine whether the organizational changes were based within the past action interventions, or simply part of the natural development of the organization. We refer to this analytical approach as Relational Excavation. Relational Excavation is an approach where the action researcher explores and follows the associations and relations of past interventions to current practices. It stipulates that the relation between past interventions and current practices is not a simple casual relationship, but instead must be detected as ripples in water. Such analytical work requires carefully following associations as excavation work, where layers are being carefully removed to unpack the relations underneath.

The structure of the paper is as follows. First we set the scene on IS action research impact while reviewing previous literature on global work with an emphasis on presence in global collaboration. This distinction in literature is needed, since we first want to make it clear the action research literature on impact, which we seek to add our contribution, and secondly since we want to make it
clear the theoretical framing by which our action research interventions were designed. We then present our methodology including detailed account of the data sources as well as a short introduction to the action research project. The result section explore how we managed to identify the long-term impact of one action research interventions; namely the strategy to create Mental Attention, which was identified in the future ripples of past interventions. Finally, we discuss how the strategy of Mental Attention as a long-term impact relates to former research on presence and global work, and argue how Relational Excavation is a fruitful approach to distinguish normal natural organizational change from long-term impact of interventions.

Action Research & IS

Action Research Impact

“Action research simultaneously assists in practical problem-solving and expands scientific knowledge, as well as enhances the competencies of the respective actors, being performed collaboratively in an immediate situation using data feedback in a cyclical process aiming at an increased understanding of a given social situation, primarily applicable for the understanding of change processes in social systems and undertaken within a mutually acceptable ethical framework.” (Hult & Lennung, 1980, p. 247)

As demonstrated in the above definition, action research aims to solve current practical problems while expanding scientific knowledge and links theory and practice in cyclic and iterative processes (e.g. Baskerville and Wood-Harper, 1996). Attention to the two goals and their interaction helps researchers produce knowledge by applying a theoretical framework in response to the practical problems at hand and by using practical insights from real world setting and the interventions taken to discover new theoretical knowledge to inform future research (Chiasson et al., 2009). Different action research approaches define different cyclic processes (e.g. Susman and Evered, 1978; Checkland and Holwell, 1998; Baskerville and Wood-Harper, 1996), however basic elements remain the same. Inspired by Checkland (1991), Hult & Lennung (1980) and Rapoport (1970) our action research project unified practice and theory in an iterative and collaborative process with problem diagnosis, interventions and reflections as core activities.

Today, we find a relatively well-established tradition of conducting action research projects within IS that dates back to the 1970s (Baskerville, & Wood-Harper, 1998). When doing action research in
IS, reflexive analysis of the challenges encountered when handling action researcher’s dual agenda of combining academic and practical contribution is needed. Thus, existing IS research focuses on how more adequate methodological perspectives are needed in order to develop IS action research. While action research together with other forms of Engaged Scholarship have had a privileged status in Scandinavia so far, Mathiassen & Nielsen (2008) argue how there appear to be counter forces through which researchers might be seriously weakening the engaged scholarship approach. They provide an analysis of existing Scandinavian IS research while drawing on the principles of Engaged Scholarship when they discuss the past and future role of Engaged Scholarship in shaping Scandinavian IS research. Their argument is that Scandinavian IS researchers must further develop their strengths and further establish their ability to describe why and how they employ engaged scholarship such as action research. Boulus-Rødje (2014) proposes replacing the normative frameworks found in some IS action research literature with a reflexive framework that encourages researchers to investigate critically how their methods are enacted and practiced in the field. Boulus-Rødje (2014) draw upon her interventions and fieldwork experiences from an action research project in a healthcare setting and use these experiences as a basis for appraising the normative criteria for rigor and relevance that are enacted in existing IS action research. In line with the purpose of advancing the approach of action research, we in this present paper argue how adequate methodological perspectives are important because they have implications not only on how we conduct action research, but also on how we share research experiences, document and evaluate research processes. By generalizing from a rather unsuccessful large scale attempt with action research within the health care sector in a number of developing countries, Braa et al. (2004) address why so many action research efforts fail in the long term. Building on Scandinavian-based action research’s recognition of the value of performing action as part of a network, rather than a local event, they argue that the two major challenges in the development of such interventions are the interrelated factors of sustainability and scalability. While Braa et al. (2004) concerns are more biased towards the interventions themselves more than their perceived impact and the techniques to evaluate this, our paper will take the methodological perspective on the central role of methods for evaluating long-term impact.

Action research is often criticized as an inductive and responsive adaptive method for studying the changes of human social behavior in their naturally occurring circumstances. Given these characteristics, many evaluators have come to think that inquiry of this type is exclusively oriented by or based in the data that emerge as on-site investigation proceeds. Even though action research
evaluators often do not begin inquiry with formal hypotheses, or explicit conceptual models of the activity to be studied, they do shape and reshape the specific themes, issues and questions of their inquiry in a recurrent cycle of on-site data gathering, data analysis and reflection. While acknowledging the necessity of adequate methodological perspectives, we here focus on the practical contribution action research aims for: Namely the impact of our interventions in practice. Building on the articulation of a lack of a long-term perspective on action research impact (Braa, et al., 2004; Greenwood & Levin, 2000), we assess that approaches as for how to reveal the practical impact in the action research problem setting is under-developed in IS literature - particular when it comes to identifying and evaluating long-term impact. Former research talks about organizational change and impact as what distinguishes action research from other research areas (Baskerville & Myers, 2004). Thus, unlike other research methods, where the researcher seeks to study organizational phenomena but not to change them, the action researcher is concerned to create organizational change while studying the process (Baskerville & Myers, 2004). Baskerville & Myers (2004) suggest the underlying philosophy shared by most forms of action research is pragmatism. As a philosophy, pragmatism provides a method to help explain why something works or why it doesn’t work. A central premise that arises from pragmatic philosophy is that truth is embodied in the practical outcome, put in other words – embodied in the practical impact when for instance doing action research. While change is important for IS action research, and assessing impact is critical – we still lack approaches to unpack the ways in which we are able to assess long-term impact. We build this paper on the empirical basis of a two-year action research project within a Danish MNC and we develop principles for exploring long-term impact of action research. In particular we are interested in figuring out how to examine impact in concrete ways such as where to pay attention, and how to analytically structure the examination in order to identify and create data unpacking the relationship between past intervention and currently impact.

**Presence in Global Work**

"Giant strides in information technology at the turn of the century may have unleashed unreachable goals. With the invention of groupware, people expect to communicate easily with each other and accomplish difficult work even though they are remotely located or rarely overlap in time."

(Olson and Olson, 2000, p.139)

The challenge of globally distributed teamwork is central to many large global companies
Global teams are defined as an interdependent and geographically distributed group of people working towards a common goal (O’Leary & Cummings, 2007). Global teams allow companies to position experts from different geographical and functional areas on the same team (Lipnack & Stamps, 2000; Olson & Olson, 2014). Potentially global teams are optimized as they draw on the best talents, wherever they are located and reduce the travel expenses, time and stress (Orlikowski, 2002). However, global teams today face challenges that are created by certain factors such as cultural diversity, time-zone differences, and diverse organizational practices (Bjørn, & Ngwenyama, 2009). Because of these challenges, researchers propose that it is difficult for global teams to be as successful as co-located teams (Olson and Olson, 2000, 2014). Although information technology is often highlighted as the key enabler of global collaboration, information systems can also create barriers to effective collaboration. Thus, reliance on technology can increase conflict (Hinds and Mortensen, 2005), create difficulties in development of group cohesion (Jarvenpaa et al., 2004) and reduce interaction and knowledge sharing (Fiholt et al., 2002). Thus, prior research shows how global team members are dependent on gaining satisfying access to others for a wide range of activities including exchanging information, decision making, generating ideas, problem solving, getting to know someone, and resolving conflicts etc. Recent research has further shown that successful global teams are organized in closely-coupled work arrangements forcing distributed team members to interact frequently due to the dependencies created in the work definition (Bjørn et al., 2014). With the help of successful enactment of communication technology, closely-coupled global team members are able to create a strong collaborative presence despite the possible challenges. Thus, research exploring the distributed team members’ experience of presence is critical when we investigate global collaborative work.

The overall definition of ‘presence’ in technology-mediated IS systems refers to the sense of “being there” in the external environment independent of place and physical location. It has been defined as a psychological state in which the virtuality of the experience is unnoticed (Lee, 2004; Riva, 2009). Researchers have used the term presence to describe the mental state of the user in response to being immersed in technology-mediated interaction as well as the physical world (Sanchez-Vives and Slater, 2005). While presence in its origin form (telepresence) refers to the sense of being there in the virtual environment, the concept of presence was soon developed to also referring to the sense of being with others (social presence). A great deal of global collaboration is about using a medium to be with and work with distant others. As social beings a common purpose is to increase
the sense of being with others in mediated communication either to accomplish a given task or as an end in itself (Biocca et al., 2003).

It has been argued that presence overall can be seen as a matter of where and how attention is allocated. Global team members while engaging in technological mediated communication are simultaneously present in both the real and the technology-mediated world (Waterworth & Waterworth, 2001). The shifts between the technology-mediated and the physical environment imply a break in presence (Garau et al., 2008). In remote technology-mediated communication we can be deluged by messages from different platforms and sources, that presence on any of them becomes very difficult and arbitrary. Team members are said to have strategies to enhance presence. By strategies we refer to initiatives aiming to cope with the challenges of presence by confronting them rather than denying their existence (Monat & Lazarus, 1991). The question is, given all the possible initiatives they might take toward their global colleagues, what do team members do to enhance presence? And even more importantly, how can we through action research intervention improve the conditions for presence in collaboration. The question directing the design of interventions was therefore; which action research interventions can facilitate the accomplishment of presence in global work?

To make informed intervention strategies supporting presence, we originally began by exploring prior theoretical frameworks investigating presence. We found that presence as a theoretical concept has evolved during the last decades as virtual environments have become more social and used for various applications (Schultze, 2010). Existing research on presence in computer-mediated interaction shows that there are new definitions and different forms of presence arising. Thus, researchers in computer-mediated interaction use the term ‘presence’ in increasingly diverse ways and in combination with different adjectives (Schultze 2010). Presence takes forms such as telepresence (Minsky, 1980), social presence (Lombard & Ditton, 1997; Biocca, 1997), co-presence (Ijsselsteijn et al., 2001; Durlach & Slater, 2000), self-presence (Lee, 2004) and hyper-presence (Biocca et al. 2003). The many different adjectives is an indication that the term ‘presence’ is found to be equivocal, and also that researchers are aware that the term is being used in significantly different ways. However, when we were to design and execute the action research interventions, our aim was to identify intervention strategies, which could facilitate the accomplishment of presence as “being there with others” in geographically distributed teams taking into account both the bodies and minds. Thus, social presence was the concept on which we built
our interventions. Social presence was originally defined as the technology’s ability to increase the salience of others in the communication (Short et al., 1976). Social presence later became a psychological construct that reflects the subjective experience of closeness to others during mediated communication (Biocca, 1997; Schultze, 2010). The mediated experience of closeness to others reveals a paradoxical and complex relationship between technology and the physical realities of our mind and body. Thus, technology has on one hand been a way to mask the constraints of our body by engaging in simultaneous mediated interactions, and thereby making us present remotely at different geographical locations at the same time. In technology-mediated interaction we might at first sight think that our bodies move to the background while our mental interaction becomes foregrounded. However, in closer investigations we will find that our physical bodies matter and we cannot easily make this distinction. Our bodies and minds are not distinctly divided in practice, but must be understood as one whole entity in a given time and context (Anderson, 2000). It is through our bodily senses that we experience the physical world and other human beings. Our bodies are also the primary carriers of identity with markers such as gender, race, age, culture, and social-economic status. Thus, computer-mediated interaction offers us an opportunity to become aware of and explore the role of the physical body when communicating and collaborating with others (Schulze 2010; Ihde, 2002; Dreyfus, 2009).

**Methodology: How to explore Long-term Impact?**

The action research project, which forms the empirical basis for this paper, takes its starting point in the theoretical framing of presence in globally distributed work introduced above and used this framing in the design and execution of the different interventions in Grundfos. However, in order to study the long-term impact of these action research interventions, we planned to revisit Grundfos six months after the first intervention had been executed.

The methodology of this long-term research is distinct from that employed with a traditional single entry because it is more easily able to detect changes in contextual factors and subjective perceptions. Doing long-term impact research enables researchers to explore chronological timelines of events or changes over time. In existing research, long-term qualitative methodology has been used for studying organizational processes such as organizational change management (Van de Ven & Huber, 1990), and the influence of technology on organizational change (Heracleous & Barrett, 2001; Orlikowski 1992). This type of research is generally conducted over a time period sufficient to allow for the collection of data on specific conditions of change. Based
on our practical experiences and knowledge of Grundfos, we estimated that six months was needed to pass before assessing the long-term impact. Organizations such as Grundfos are constantly being re-organized and working in such a place means working under ever-changing and dynamic conditions. This means that if we are to wait longer than six months, we risk that all the people who originally took part in the action interventions no longer work in the same roles or might even have left the organization entirely. These changes in staff make it very difficult to detect impact, since the assessment of impact requires revisiting the people originally part of the interventions. So we decided on six months as a time where the organization had sufficient time between the past interventions and current practices allowing for the interventions to manifest in daily life and practices, while still having some similarity in the organization making it possible to revisit the practitioners who were part of the original interventions.

An aim of long-term impact evaluation research is to enable the identification and meaning of changes and the exploration of how such change impacts organizational members. Here, focus can be on organizations, groups, and individuals (Hermanowicz, 2013). In our case we tried to understand how the strategies to enhance presence were developed on a work practice level looking at collaborators’ individual behavior. The purpose was to evaluate the different strategies used by the team members in the global teams to enhance presence in their global collaboration and see how these could be traced back to the action research interventions done six months earlier. We found one strategy, which was directly linked back to the previous action research intervention. Clearly, the strategy linked to the action research interventions had positive impact on the organizational members’ ability to collaborate globally. Our results demonstrate the value of using action research interventions as a vehicle for change in an organization, and also how interventions potentially have long-term impact, despite other organizational changes.

Below we describe and critically evaluate our research practice and methods, with emphasis on advancing the pragmatically workable techniques and approaches, we applied in the evaluation of the long-term impact. Our action research evaluation methodology is building the foundational ideas contained in the research on organizational change processes in longitudinal studies by Pettigrew (1985, 1990) and Ngwenyama (1998) as well as on the inspiration of multi-sited ethnography (Marcus, 1995) and virtual ethnography (Hine, 2000; Hine, 2008; Ruhleder, 2000). One of the major differences between these fields of research and action research is that the former have more focus on the systematic data collection and analysis in longitudinal studies. Inspired by
these fields of literature we are led to rethink how to make long term relational links in the data material while adapting traditional field methods to include online settings, and using these same techniques to open up new possibilities for data collection and analysis. We label our approach Relational Excavation and even though what we present is partial, our hope is that it can guide future attempts to evaluate the long-term impact of action research and take us a step ahead in understanding the change processes in action research.

Organizational setting: Grundfos
Grundfos was founded in 1945 and has for a long time been a world-leading manufacturer of engineering instruments in the water-supply industry. Grundfos has about 18,000 employees and is headquartered in Denmark and has 80 subsidiaries in more than 55 countries. Grundfos has gone through continuous organizational changes in particular related to expanding the core of the company globally during the last decades. The goal of these changes is to increasingly empower the subsidiaries while involving experts here in the development of new products. Thus, Grundfos is expanding their R&D department globally. So while R&D originally only was a Danish entity, and thus the whole organizational structures circled around the Danish headquarter decisions and research – the new organizational strategy strive for a global organization of management. To increase effectiveness within the global R&D department one of the key strategic focus areas has been to utilize global R&D teams to take full benefit of the global organization. Organizational change from being a national company towards becoming a global company is difficult and often prone to different failures. This mean that organizations must consider how to organize global work practices and prepare the challenging organizational changes that occur in situations where colocated and national companies becomes global (Matthiesen et al., 2014). In January 2012, Grundfos decided to prepare for the organizational changes and further to engage in an action research project together with the first author to help smooth this process. The role of first author was to collaborate with Grundfos particular on establishing globally distributed team collaboration by supporting the global management in finding new ways to organize their work in becoming a new global R&D department.

The Grundfos action research project
In order to build a solid action research project, the project began by exploring the current global collaborative practices in the R&D department, while developing a theoretical framework based upon the previous research on presence in global work (see also section 2.2.). In this early stage of
the problem diagnosing, the data collection included semi-structured interviews, observations, shadowing participants, observing work practices, and document analysis. During the next 21 months the first author spent her days at Grundfos, both in the headquarter as well as in the 3 subsidiaries. In this initial period, the first author conducted in total 40 interviews and worked closely with two management teams through shadowing, interventions, and participatory observations. In addition, an internal online platform established to support the global work was analysed.

During this process the first author reflected together with the practitioners on how to support them in engaging in global work, while executed action research interventions directed at identifying new strategies to improve their global collaboration and bringing these into concrete new practices. Considerable work went into supporting managers to succeed with global collaboration, and the action research interventions included an online learning-tutorial and 3 workshops designed specifically for Grundfos to engage with their experienced problems for global work emerging from the problem diagnosis. Over the project, the first author experimented with different types of workshop setups and scenarios. The first of the workshops was developed particular for 29 global managers in the R&D department, while the other two workshops were designed for specific global management teams. Each workshop was planned as intervention activities, and data was collected about these interventions and later analysed. All interventions were designed upon the empirical experienced problems of the practitioners and with the aim of supporting Grundfos in improving their global collaboration in real life. In addition an internal confidential online platform Yammer supporting knowledge exchange across the 29 global managers in Grundfos were created. The platform was a collaborative technology designed to support the globally distributed R&D managers in sharing knowledge, experiences, and concerns about global management. In Grundfos Yammer was generally used for collaboration between collaborators and departments that are spaced far apart. The specific setup was established as a space for knowledge exchange across participants from the workshops. We experienced that Yammer was used a lot by the participants from the workshop to share ideas and concerns on global management and collaboration. Participants posted questions and answers related to their personal experiences on leading and collaborating globally. Data from Yammer was collected and included documentation of the complete set of activities on the “Virtual Leadership” Yammer group, as anonymized transcriptions of all the online communication between primo May 2013 (workshop 1) until November 2013
In our data analysis the transcriptions from this portal is treated and coded in the same manner as the other qualitative data in our study. All the involved 29 managers were as registered users on the platform, and over the period of the action research study, many of the managers became active users posting questions and answers related to their personal experiences on managing globally distributed teams. Several different problems in global work e.g. presence were discussed and shared in this online group.

To evaluate the impact of the action research interventions, we conducted semi-structured interviews with 10 out of the 29 managers immediately after the workshop intervention and then again six months later. We choose to interview respondents instead of sending a questionnaire to them because we sought rich information of their experiences of both the process and impact of the action research changes. Using a detailed guide, we asked questions about the experiences working in the team, how the work practices had changed and how they managed to stay present in their global teams. The interviews lasted about 60 minutes. These interviews were then explored to trace the impact of the interventions in daily work life in Grundfos. Our exploratory approach meant that we were able to develop themes proposed by the interviewees and thereby to combine their view with systematized data generation (Alvesson, 2003). As the interview guide took shape, a number of themes started to emerge such as for example how to be present at a distance. The interviews were either recorded or documented through extensive notes, and all were transcribed immediately (cf. Eisenhardt, 1989). To increase the accuracy of their responses, each interviewee was assured anonymity.

The interviews conducted six months after the first workshop were inspired by Hermanowicz (2013). We asked novel questions on the same themes from the former interviews, as well as explored new topics in order to explore changes in themes and topics. We also asked interviewees to describe the long-term development of the strategies and perceptions of presence in global collaboration. In particular one topic derived from the action research interventions became apparent; namely the employed strategies of creating mental attention in remote meetings. By following the association and relations from these strategies in the current work, back to the interventions done earlier, we were able to detect how these were direct long-term impacts successfully embedded in the work practices in Grundfos. This way of following the associations and links back were done by excavating and analysing the traces of interactions which was already
documented in the online platform Yammer setup by the first authors during the interventions. By exploring how the practitioners collaborated through knowledge exchange on this platform, we were able to detect the links back to the intervention activities. In this way the online collaborative portal served as an opportunity for an alternate mode of data collection that to both supplement and verify the interview data. The overlaps in empirical data types provided opportunities for triangulation of the online and the experienced understanding among the participants. Thus, using the platform not only allows for a check of consistency between the online community and interviews, but the collective group voice of the portal helped to minimize the potential effects of interviewer-interviewee interactions. Thus, while the content of the interview schedule focus was directed towards a description of the individual strategies, the participants had substantial flexibility in directing the conversation on the platform.

**Result: Mental attention as a strategy to mitigate challenges in remote meetings**

Investigating the long-term impact of action research in Grundfos, we identified several strategies, which could be linked directly back to the action research interventions, however here we will focus on just one key strategy, namely Mental Attention. In this section we will demonstrate how we identified the strategy and its relation to our interventions, and through this present our approach of Relational Excavation.

One of the main long-term impact, we encountered as embedded within the work practices of Grundfos, we label the employment of Mental Attention as a strategy to mitigate the challenges of global work. Mental Attention is the concern by participants to stay focused on their remote colleagues and the task at hand during collaborative encounters in synchronous interaction mediated by technology. In Grundfos, one of the main challenges in making global collaboration successful was that to pay attention towards remote partner, and explaining the issue by referring to the need to be face to face in collaboration. The Mental Attention strategy was thus developed through the action research project to unpack and question the challenge, while finding new ways to enhance attention across remote partners. It was directed at excluding disruptions and ‘noise’, which tended to drive the attention of people in other directions than the people and task at hand. When remote partners were successful in creating mental attention supported by technologies, the managers in Grundfos experienced more successful interactions and improved collaboration across distributed team members. While the strategy of Mental Attention clearly improved the global work – even
more interesting is that we found that the strategy had clear links to the interventions in our action research. We will unpack this in more details.

Initially, before we began our action research project, data from Grundfos show that almost 75% of the employees experienced huge challenges when conducting synchronous web meetings with remote colleagues. We began unpacking these difficulties to diagnose the problem and found that several employees reported how in-depth discussions of critical topics were not feasible and even impossible in geographically distributed settings. Their reason for these problems was articulated as technical limitations of their videoconferencing-system and the difficulties in creating relational connections between people without collocation. The employees found it problematic to informally exchange ideas and discussions, and they repeatedly experienced that remote colleagues were mentally absent during remote meetings. As one Danish team member express:

"Sometimes there is this question: 'Any comments?' and it is as if, it is a radar... Often nobody is saying anything and you wonder how many is actually doing something else. People get frustrated both by this and by the way the meetings are conducted. In the end you kind of don’t care at all... and you drift away and you are just not present."

(Team member, US, March 2013)

Grundfos employee experienced remote colleagues as mentally absent during remote meeting, because of limited and lack of engagement in the discussions of topics. Interestingly, we found that the employees often described their experienced difficulties in paradoxical manners. While the employees experienced remote meetings as more efficient, task-oriented, and fast compared to collocated meetings; they also described the remote meetings as less personal and more ‘distant’ and how their remote colleagues were not being immersed or mentally present at the meetings. Participants in these meetings did not feel inclined to share knowledge or personal experiences relevant in strategic discussions of the company. When asked directly about sharing personal knowledge and experience driving strategic discussions, an American team member said: “It is still very formal when we meet virtually, and there are so many ways people back away when we have these conference calls”. (Manager, Denmark, March 2013). Frustration regarding the absent colleagues during remote meetings increased in Grundfos and was a huge problem particularly for the global management team. Often participants in remote meetings ‘checked-out’, or as one team
member phrased it the remote meetings became a “small break” in the else hectic everyday working day. The monthly remote meetings in a management team were experienced as a waste of time. Monthly remote meetings typically lasted three hours and had an average of 7 participants from Denmark, China, Hungary and the US and was experienced as ‘unbearable’ – as one participant explained: “During these meetings I always mute myself, and then I go and get some coffee... otherwise it will be too unbearable...“ (Manager, April, Denmark, 2013). Muting the microphone and turning off the camera makes it impossible to demonstrate attention towards the topics discussed for remote partners. It was deemed vital for successful meetings that remote partners demonstrate presence and attention through engagement in the discussions, mediated by technology.

The general perception among team members was that remote colleagues often engaged in other duties, tasks, and activities during remote meetings. These activities included chatting with colleagues outside the meeting using MSN messenger, replying to emails not connected to the project, or simply working on another project tasks – or in some situation all of the above simultaneously. Thus, being absent at remote meetings either involved multitasking behavior or behavior where people were loosing focus by being occupied by other matters. While a few of our respondents found this behavior acceptable, the majority expressed how they found this behavior problematic and unproductive. For example, one manager expressed during a discussion with his colleagues on these issues that: “I believe that it is all about the presence. [...] do your thoughts ever drift away from the topic or the person at the other end?” (Manager, Denmark, March 2013). This statement from the manager underscored how he and many of his colleagues perceived the importance of creating new ways to communicate across geographical distance supported by technology in order to develop mental presence at the remote meetings.

Circulating around these issues of presence and attention, we designed action research interventions aimed in particular at helping participants to find new ways and experiment with new approaches to conduct successful remote meetings. These action research interventions were executed as part of the workshops and were directed at challenging the perceptions of the employees on how to work in global collaborative situations. While our intention here is not to unpack all the details on the action research interventions during the workshop, we interestingly identified how one particular activity,
which turned out to have a long-term impact in Grundfos; namely the activity designed to confront the participants’ taken-for-granted assumptions about global work.

The activity, confronting taken-for-granted assumptions about global work, was executed by placing the participants in experimental collaborative set-up situations, which disputed and contested with their perceptions on global work. The interventions were designed as an embodied experiences and reflective interaction to ensure that the participants not only talked about their issues, but actually got to feel on their own body why this their assumptions on global work might be unproductive. Participants’ basic taken-for-granted assumption about global meeting was that it was to be executed in the physical setup of ordinary remote meetings comprise participants siting on chairs around tables mediated by video-conferencing technology. Now to challenge this assumption, we designed the intervention as a situation, where participants were laying on madrasas on the floor with their eyes closed talking to remote participants in a cell phone. This setup challenged the assumption that successful meetings require that all participants are able to see each other directly in the eye, thus how high resolution video technology is important for remote meetings. By restricting their interaction to only the use of audio on their traditional cell phones, we were able to experiment with their fundamentals assumptions about remote meetings. As part of the interventions participants were invited to reflect upon their own experience of presence and attention in the experimental setup of the remote meeting. By participating in this embodied intervention activity and reflecting upon their practice we created conditions, which questioned participants’ perceptions on global work, making it possible to develop new strategies to mitigate the challenges. The aim of the workshop interventions were thus to demonstrate that the simple act of lying down with the eyes closed, with no outer distractions, while listening to the voice of another person, and can be a crucial way to enhance presence and attention – even in geographically distributed situations.

Interestingly, this intervention had huge impact on the ways in which the employees conducted meetings immediately after. Thus, agreements and new arrangements were made on how to conduct team meetings, as well as one on one meetings and also to vary the way the meetings is held. However even more excited was it when we found that our intervention also had a long-term affect on the global work in the organization. When we revisited Grundfos six months after our interventions, we had initially expected that our interventions would have been forgotten due to the
never-ending organizational changes and normal natural circumstances which modern global organizations always embrace. Instead, to our amazement we detected several examples and a continues interest in experimenting with and finding new ways to enhance presence and attention in remote meeting supporting information system interactions. As expressed by one of the managers:

“Presence in a virtual meeting takes much more courage as a facilitator to make sure that people are mentally present and engaged. What I have used a lot when I feel they are distracted, is that I ask them what they are thinking of... I imagine myself, what would I do. If they are bored, I can say, “I noticed that you are not paying attention””.

(Manager, US, October 2013)

It turned out that the manager had been and was still constantly experimenting with creating enabling conditions for preserving attention of participants in remote meetings. He was dedicated to constantly find ways to ensure more focused attendants during the remote meetings. He explored ways to do this by interpreting the signals or in some cases ‘lack of signals’ he got during remote meetings and being direct and explicit about his interpretations of the attendants’ behavior in the concrete situation. This explicit strategy demonstrated that it is possible to do something to change the sense of presence and attention behavior in remote meetings, thus not accepting the restrictions provided by the dislocation and information technology and the detached behavior demonstrated by some attendants. According to this manager’s experiences this confronting facilitator strategy initially took extraordinary courage as well as a learning curve in figuring out how to interpret the available signals during remote meetings. Another manager applying the same strategy also explained about the importance of interpreting available signals through the technology by saying:

"It requires that global managers while talking on the phone are able to sense if there is more to be inquired... all the signals you receive, you can use them for anything...” (Manager, Denmark, November 2013). Thus, the changed behavior in the organization long-term was the attention which signals can revealed about remote partners in information systems supported interaction, and how these provided important opportunity to confront and communicate with the team members about the quality of presence and attention during remote meetings.

Some managers not only experimented themselves with new strategies in remote meetings, but also encouraged and instructed the teams to experiment and provide input into how they collaboratively
could create enabling conditions for presence and attention in information system interactions. Following the experiences from the action research intervention done six months earlier, a manager told his employees: “You only get some new results if you try to do communicate in new ways... so take the risk of doing something new...” (Manager, Denmark, November 2013).

Combining the interview data, with the data from the collaborative portal Yammer we also saw how many of the managers were sharing their experiences on how they tried to have this engaging and encouragingly this strategy of mental attention, while acknowledging how global collaboration took all team members to improve their ability to engage in focused and present online interactions. These interactions on the portal were very open and reflective, e.g. how individual managers had experimented with discussions of “real things” at the remote technology-mediated meetings, and what he had done in concrete details, e.g. by stating utterances such as: “There is no hiding... I am quite directly... and encourage my team to be like that...” (Manager, US, October 2013).

Besides strategies of confronting directly and engaging during the remote meetings the strategy to enhance presence through mental attention also involved other examples of behavior among the global managers. Thus, managers shared on the portal how they for instance delegated tasks and the facilitator-role to the global team members as another strategy to enhance the sense of presence. They also discussed how to introduce additional technologies in meetings in order to create enabling conditions for the experience of presence in global collaboration. These strategies included ways in which to engage team members in global collaboration outside the remote meetings with individual frequent phone-calls. By articulating the importance of before and after the meeting, he was able to improve the meetings in a more general matter. As a manager expressed it: “There is also a process before and after the meeting. I always call them right after the meeting, there I make sure that every message is understood.” (Manager, Denmark, November 2013). On the portal managers also discussed what topics to discuss during remote meetings in comparison with topics, which needed to wait until the few collocated meetings.

Revisiting the organization six months later, it was clear that the strategy of mental attention introduced by our action research interventions directed at improving conditions for meetings had been embraced by the organizational members and continuously have help them to further develop their organization as ripples in the water. Several managers had posted on the online portal how
they either implemented weekly meetings or new ways of facilitating these with the purpose of engaging their global team members in productive engagements. Experiments were shared across the organizational members supporting a shared global leadership education directly relevant for the participants to implement in their everyday work, and it was clear how the process and outcome of the education had exceeded their expectations due to creative ways of keeping participants present and engaged in online interactions.

Linking back to our action research interventions, we detected a growing capability among the organizational members to ensure and accomplish presence in global interactions through mental attention. Acknowledging the complexity in modern organizations not only the action research interventions but also other organizational events and trends impacted the success of this strategy to create enabling conditions for mental presence and attention in remote meeting. While our action research project was helping to ensure the managers curiosity and capability to create conditions for mental presence, a manager told how it: “kind of have become a hype to do stuff virtually”. (Manager, China, September 2013). Thus, trends of the society and the organization of Grundfos, together with the action research interventions all seemed to pull the collaborators towards the strategy to enhance the quality of presence in their meetings. An important aspect in our study was that people initially and continuously criticized the technology available, making technology responsible for people being mentally absent. However, our action research interventions as well as the described new experiences gave respondents a renewed focus on how presence was dependent on other things than more advanced technology. This realization brought the majority of the participants to experiment with the strategy to enhance presence at their remote meetings not solo blaming the technologies for possible failures.

Discussion

When planning a follow up on the action research interventions in Grundfos, we found that action research did not provide insight into how to approach such analytic work. We were unable to retract principles or guidelines as to how we could assess and explore whether the interventions conducted earlier, actually had a long-term impact in the organization. Thus our curiosity as to how we could analytically approach our investigation of the long-term impact began. Our first challenge was related to our role as action researchers. When conducting action research, close engagement with the organization is crucial however also risks blinding you in the process. Often you are not aware
of all the extra and often invisible activities you automatically do in your work with the organization, which has huge impact but remains outside your attention. So while the action research project followed certain guidelines for diagnosing the problems, planning, and collecting data about the intervention, and then reflecting the results back to the theoretical framing, this does not automatically make it possible to see the link from these activities to the current long-term practices. Therefore, we decided to intentionally address our own blind spot and direct our attention towards all the various types of engagements and activities we have done. This work had the opportunity to guide our attention towards what we label as ‘changing events’, which were activities (small or large; intentionally or unintentionally), which we identified as having clear impact in the organization. Using these changing events as a starting point we began following the associations and relations within certain changing events, which we experienced had been crucial for the organization in the short-term, with the aim of exploring how these might also have had long-term impacts.

**Mental Attention strategy as long-term impact**

The most pertinent changing event for exploring the long-term impact turned out to be how team members developed a collaborative practice supporting mental attention in global work. Thus, we through our analytical work identified the ways in which “Mental Attention” was performed as a strategy on how presence was enhanced among the geographically dispersed managers. However, what makes this strategy particular supportive of the global collaboration? Unpacking the strategy of mental attention through the lens of existing research on global work, we find that by questioning the participants basic assumption about global work, making them aware that successful collaboration is not simply about high-resolution video-feed and bandwidth, but instead is dependent upon focused and attentive participation. Former research has also hinted at this, e.g. in the restructuring of their online meetings, the organizational structure of allowing to tap-in or out mentally in meetings, allowed participants to be constructive and useful when needing special expertise, while letting the expert continue work outside the meeting, when agenda items was not relevant for them (Malhotra & Majchrzak, 2004). While the proposed best practices on global work in far-flung teams (Ibid) do not explicitly refer to the strategy of mental attention, it is certain that their recommendations supports the strategy of mental attention. We found that managers explicitly after the action research interventions (both short-term and long-term) explained how they...
enhanced presence by reducing local stimuli from physical local environment, by being a direct, confrontational and explicit facilitator of web meetings, or by encouraging team members to experiment with new creative ways of facilitating activities online for instance strategy workshops. Part of these initiatives included experimenting with different use of technologies during regularly and individual follow-ups on web meetings or by an extraordinary focus on sensing and using the signals about remote colleagues. Prior research have pointed out how closely-coupled work (Bjørn et al 2014, Jensen 2014), creates good conditions for frequent interaction supporting global work (Hinds & Bailey, 2003). These results point to how developing rhythms in work as a way to handle dependencies across sites is crucial for handling tasks of high complexities (Esbensen and Bjørn 2014). Technology clearly plays an important role in supporting frequent interaction, coordinative rhythms, supporting collaboration across participants in high-complex tasks, while former suggest that it is the capability of the information technology to create an immersive contact between the users which makes it useful (Sanchez-Vives and Slater, 2005), our findings are more in line with the research that stresses the individual’s cognitive attentiveness in computer-mediated communication is the key (Waterworth & Waterworth, 2003; Garau et al., 2008). Thus, our data suggest that the more attention collaborative partners allocate towards remote colleagues, the greater their collective sense of presence even in global work. Studies show how consequences of the enhanced attention are enforcing persuasion and memory as well as knowledge exchange in the remote collaborative situation (Kim & Biocca, 1997). While we saw similar aspects in our case, we also found that by successfully enacting mental attention in the global work included initiatives among the managers towards more involving and engaging web meetings, where not only the attention but also the actions of the participants were changed. This included improved delegation of tasks and responsibility during web meetings, which necessitated specific actions and task engagement among the participants. Thus, the presence performed also enhanced the ability and imperative of not only “being there” but also “doing there”. Presence as a result of the ability to and requirement for action are shown to be dependent on the individuals’ intention for action as well as the requirement of the context (Sanchez-Vives and Slater, 2005; Riva, 2009). Moreover, participants have been found to be more present in a perceptual poorly online context if the ability and requirement for action and attention exist compared to more advanced rich online context without the ability to act (Riva, 2009). Our findings stress how creative and engaging usage of existing information technology should be considered in order to enhance presence in global work. In our study, as well as previous research (Dubé and Robey, 2008), many global team members
seemed anchored in work practices, which limited creative generation of more novel alternatives. Clearly it is difficult to change patterns of technology use and that participants’ risk getting stuck in unproductive work practices (Bjørn et al., 2006; Orlikowski, 1992). However, we found that through our action research interventions, the organization was able to initiate (short-term) and continue to develop (long-term) to create new novel ways to support presence through mental attention strategies supporting the global work. However it is clear that without our interventions, these organizational changing events would not have happened. We might say that our action research interventions served as a window of opportunity (Tyre and Orlikowski, 1994).

**Relational Excavation as an approach to evaluate long-term impact**

Now having discussed our findings concerning global work, we will now change our focus to the methodological concerns of how to identify long-term impact of action research. Exploring long-term impacts, we argue that it is impossible simply to assess the actual impacts as positive or negative, primary or secondary long-term effects produced by an action research intervention. Instead long-term impacts are complex multiplicities, where significant interactional events spur change within the organization as ripples in water producing a relational nature. The relational approach take away the idea of evaluation results in terms of dichotomies, and instead stipulate that we need to follow the relations and see where these take us during our investigation. In our case, we study the strategies and perceptions among individuals in different global teams to determine the impact of the interventions by following the associations across sites, activities, and current practices to determine the basis for the organizational changes as they emerged in new interviews as well as in traces captured by social digital platforms. Following associations from these new data and then back to the past interventions, it became clear that we were not able to capture long-term impact as simply casual relationships – instead it turned out that few small events, which had been part of interventions had left traces of many kinds into the current practices. In this way, the systematic approach is analytical rather than instrumental – and requires careful excavating of the practices unpacking links and relations. This is why we label the practice of detecting long-term impact of action research Relational Excavation. Lets take a closer look.
Relational Excavation as dedicated inquiry on significant events

Relational Excavation is a systematic data construction and analysis rethinking how to conduct long-term evaluation of action research impact. A central research challenge at hand in action research evaluation is to identify practices and events that are, not merely from a researchers’ perspective, but from participants’ points of view, related in some way to the interventions to be evaluated; and to understand and describe these practices in terms of participants notions of reality and meaning. If the evaluation of the long-term impact does not accurately portray reality as participants know and experience it, the results are not valid and participants and stakeholders can easily reject the evaluation as a useful basis for decision and future action. Put in other words, if the outlined change is to have important impact the participants must be able to recognize and define the impact in their practices.

Evaluating the long-term impact the inquiry must take its outset in what the participants experience as significant events, and then the question become are these events also changing events? While the short-term inquiry have a more general focus in identifying changes, the long-term perspective allows for a more focused and selective approach where the researcher decides to explore how specific activities or categories of interest unfolds in the context of significant events. In our case the participants readily and reliable directed our attention to the events that they found to be central in our action research interventions. Key parts of their global collaborative practices, such as remote team meetings, online strategy sessions, and kick off meetings, were especially salient for the participants. They related these particular activities to the core of their global work, thus the participants guided us to explore long-term impact as they unfolded in these types of activities. Our analytical work then became the work of carefully unpack the possible relations of these current practices back to past interventions. We found that participants referred to the connections between our interventions and activities in their daily life, which we might otherwise had neglected. Examples includes how participants explained to us that new practices included ‘pit stops’ where global teams renegotiated their global collaboration and web meetings where managers experimented with new strategies to enhance the sense of presence among team members. Thus, Relational Excavation is an analytical approach assessing long-term impact, where action researchers, guided by participants, identify significant changing events, and follow the associations back to the interventions by zooming in on relevant features as they are displayed in significant events.
Relational Excavation as unpacking continuous Digital tracing

While the data material guiding our relational excavation took its starting point in the participants point of view as expressed in interviews, we needed additional data sources to be able to follow associations and links from current practices to past interventions. While we did have much data from multiple data sources during the actual interventions, we also wanted to identify material, which could help us to shed light on the practices in Grundfos in the period in between. For this purpose documents and other permanent results of interaction might be useful sources. However, we found that getting access to the electronic traces of the collaboration in the organization was a very important source to detect long-term impact. We label the process by which we analytically explored the digital content captured by the different collaborative technologies used by the participants as digital tracing of long-term impact. Analyzing the continuous digital tracing, which were captured by the online portal interactions gave us unique insights guiding while contrasting both our observations and results from the interviews. In this process, we identified new managerial initiatives, such as the initiation of an asynchronous technology-mediated workshop designed to discuss strategies for global collaboration in Grundfos, which had been shared on the online portal. We used these new insights to shape the follow-up interviews with participants. These experiences explicate the strength of analysing the continuous digital tracing created by the use the collaborative technologies since it enables the researcher to both follow-up, contrast, as well as guide future data triangulation. Digital tracing also identified and nuanced the differences among the experiences of the participants, as some participants were more reluctant to share their experiences while others were debating and discussing these more openly. As researchers we were able to observe the ongoing online interactions, and to write extensive notes as strategies and discussions unfolded before us. This allowed us not only to trace and focus our observations during our second organizational entry. Additionally, the online interactions helped us to question our own perception of what were important, challenging, or common strategies among the participants.

Furthermore an important part of digital tracing is to achieve sensitivity to the ways in which the continuous dialogue and sharing among managers take form. Thus, while the online portal can be thought of as a mirror of team members’ global collaborative strategies, and as such is a fruitful field site, being visible in an online forum by adding to conversations and answering questions can also be a way to accomplish organizational recognition and thereby impact the priorities of what to
share online. When doing relational excavation, an important part in our digital tracing has therefore been to triangulate and supplement online and offline observations. Or as Hine (2008) puts it: “…we need to move around and beyond online observations if we are to find out what kind of mirror it is for its users: whether it is a fairground distortion, a true reflection, or a flattering artefact in a fairy-tale” (Hine, 2008(b), pp. 55). The digital tracing approach in relational excavation is about pursuing relations that seem to make sense in terms of understanding the impact of a particular intervention, while being sensitive to portraying social life and culture as lived and unfolded both online and offline in a particular disciplinary context (Hine 2000; Hine 2008(b)). Digital tracing should not be understood alone when exploring long-term impact of action research interventions, instead it is critical to combine these sources with other types of data sources. Thus, it is in its reliance on other data sources we see digital tracing as an inherently partial technique to guide and trace information on long-term impact in other settings.

**Relational Excavation as Relations of associations**

A systematic approach towards identifying long-term impact of action research interventions must identify strong relationships within the data in order to establish the strength and consistency of the findings. The objective of what we term as the *associated relations* is to find items that imply the presence and positive relation between the past intervention and the impact in current practice. Since impact must be understood as the ways in which changes in practices can be detected back through associations to one or multiple intervention past events, and emerges in terms of iterations rather than casual relations, it means that we need to explore long-term impact as continuity and patterns of change.

But what does it mean to explore long-term impact as continuity and patterns of change? Lets look more closely at the empirical example we presented in the result section. Here our analysis began with a basic definition of strategies to enhance presence as positive means for coping with the challenges of not being geographically present by confronting them rather than denying their existence (see also section 2.2). We independently reviewed all transcripts systematically with this definition in mind, and notes were taken on all references to the identified strategies. Several initial strategies on how people tried to enhance presence were identified, however we revealed strong similarities between three strategies, which were then merged into one, leaving us with mental
attention as the most prevalent and significant strategy. Due to it’s prevalence and dominance we chose to focus on analysing only this one strategy.

As the next step, before extracted from their full transcription, text segments with instances of reference to the category “mental attention” were sufficiently contextualized in order to explore the relations to other similar instances or to the previous action research interventions. For example, the online portal revealed how conversations on how to enhance peoples’ sense of presence through experimental settings (as the ones demonstrated on the workshop), spawned conversations about new strategies on more confrontational and direct facilitation-style. This further evolved to strategies on more engaging tasks at web meetings and later to strategies on delegating facilitation of web meetings as well as to strategies on how to implement personal follow-up procedures after team meetings etc. As managers were sharing their ideas and experiences, the excavation of association relations showed that other managers again were referring how they adopted these ideas and strategies in specific managerial situations. The text segments of associations and sharing of ideas were all cut and pasted into a table. In this way of documenting the chain of associations and evidence linking data collection to conclusions, the aim is the establish credibility and traceability of the findings (Miles & Huberman, 1994). In addition, we associated each text segment with the intervention it represented and in this way multiple relations with the same starting point: Significant event began to emerge. In this work it was important to identify quotations with a number representing its association sequence. This not only facilitated identification and location of text segments, but also supported our systematic approach to the data analysis. In this way, we relied on some basic premises from the fundamentals of content analysis (Weber, 1985), grounded theory (Strauss & Corbin, 1998), and the use of data reduction methods (Miles & Huberman, 1994).

**Relational Excavation**

While our intention is not to develop new specific guidelines for how to evaluate long-term impact of action research interventions, we believe that by tentatively articulating our findings in forms of principles might be a useful way to communicate and thus make it possible for others to continue the work of evaluating long-term impact of action research.

6. Relational excavation begins by identifying significant changing events from the participants’ point of view, since participants and the context define impact - not by external parameters.
7. Relational excavation is the analytical practice of identifying continuity and patterns of change, by tracing the past interventions and related iterations revealing and unpacking their characteristics through multiple types of qualitative data sources.

8. Relational excavation stipulates that impact and change in organizational reality is a mixture of multifaceted practices where contexts, content, and process of change together with their interconnections; and is not a rational, linear process where actions are perceived as means to achieve rationally declared ends.

Relational excavation is our attempt to specify and unfold an approach to evaluate the interconnected changes in order to discuss and guide some of the practical choices we encounter in conducting action research impact evaluation.

**Conclusion**

Our intention with this paper is two-folded. Firstly, we wanted to find out whether our action research intervention conducted in Grundfos had long-term impact on global work practices in the organization; and secondly, we wanted to explore and develop analytical ways to detect long-term impact of action research. If we begin with our first intention, namely to figure out whether our action research interventions on global work had any long-term impact, we clearly found traces of long-term impact on the strategies to enhance presence among participants. We found that while it did not make sense to think about the impact in casual terms, we saw how the perception of engaging in global collaboration had changed. It was not one single significant event which could be detected as the only source for change, instead we detected ripple of changes from various significant events; e.g. embodied experienced workshop, video challenging basic assumptions, and online forum supporting knowledge exchange. Clearly the practices of working in globally distributed managing teams had change in the period, and continued to evolve through the ongoing practices. Now turning to the second intention, as in how to detect long-term impacts of action research, we propose Relational excavation as an approach to identify and evaluate long-term impact based upon certain analytical proportions.

Drawing on our experiences from identifying the long-term impact of our interventions in Grundfos, we propose that Relational excavation 1) is an analytical approach dedicated inquiry exploring significant events from the members point of view; 2) seeks to identify continuity and
patterns of change, by tracing the past interventions and related iterations revealing and unpacking their characteristics through multiple types of qualitative data sources; 3) perceive impact and change in organizational reality is multiplicities to be explored by associations. While we do not claim this list of inquiry to be complete, we do propose that further investigations following these propositions can provide long-term action research evaluations access to the social realities it purports to seek. To date, such principles have not been part of action research evaluation and using the principles provided here brings long-term evaluation closer to scientific validity. There are, however also good practical reasons to follow the principles laid out here, reasons that go beyond validity to assuring acceptance and usability. A point in regard to the above outlined principles is that this kind of evaluation outlined here is more time consuming and expensive than alternative strategies such as questionnaires, quick interviews, and site visits, which are the predominating activities in this kind of work which have come to be labeled qualitative evaluation. Our approach, however, is completely compatible with such efforts, however it adds to the analytical considerations of such work, and in particular have the ability to fundamentally change the depth of the analysis. We stipulate that we need to go deeper into the practices and carefully identify relations, which risk being neglected at first sight. Further, if the focus in the evaluation is on significant events and digital tracing, this approach can be important even in quite modest evaluation processes, as these techniques are less time consuming than more traditional ethnographic methods for assessing long-term changes.


Weick, K. E. (1979) *The social psychology of organizing*. Addison-Wesley.
PART 3

APPENDIXES
Appendix 1

Interview Guide 2012

Presentation of PhD Project

My name is Rikke Lindekilde and in January 2012 I began my PhD project on virtual collaboration here in Grundfos

The purpose of this project is to gain knowledge on the challenges, the advantages and the areas of improvement regarding global virtual collaboration

The project design will continue as follows:

- Interviews with the leaders and team members on a one-to-one basis to explore the research aspects.
- (Observation on their virtual meetings and communication with their team (e.g. teleconferences, videoconferences))

Hence, in this interview I’m interested in your personal experiences on being part of a virtual team

Date:
Name:
Function:
Department:
Nationality:
Language:
Years in Grundfos:

Before we start I would like to hear a little about your function and your department….
Tell me about your role as a part of a virtual team…

What are the challenges…
What are the advantages…
What are the areas of improvement…
What conditions are essential to make global collaboration a success?”
What kind of expectations do you have in regard to your virtual collaboration with your distributed colleagues

I also know that you are in the middle of a change process.

What expectations do you have for the new organization?

What are your wishes for this new organization?

What were/are you most excited over the new organization with multiple virtual leaders in Grundfos?
Why?
Ex.
Why?
## Preliminary Findings: Example

**TABLE 1: Qualitative Data: From codes to themes**

(Adapted *Thematic Network Analysis* to analyse my qualitative data (Attride-Sterling, J. (2001))

<table>
<thead>
<tr>
<th>Codes (Step 1) Examples...</th>
<th>Issues discussed</th>
<th>Themes identified (Step 2)</th>
<th>Global Themes identified (Step 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Organizational Change</td>
<td>- Frustrations</td>
<td>- We need to know the</td>
<td>Blurry boundaries in GVTs</td>
</tr>
<tr>
<td></td>
<td>- Roles and procedures</td>
<td>direction, procedures and our roles</td>
<td></td>
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<tr>
<td></td>
<td>- Denmark vs subsidiaries</td>
<td>- Host and virtual manager undefined</td>
<td></td>
</tr>
<tr>
<td>• Virtualization</td>
<td>- Meeting behavior</td>
<td>roles meets difficulties</td>
<td>Perceived distance vs geographical</td>
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<tr>
<td></td>
<td>- Artificial communication</td>
<td></td>
<td>distance</td>
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<td></td>
<td>- Order and laws</td>
<td>- PEF are intrinsic and</td>
<td></td>
</tr>
<tr>
<td>• Collaboration</td>
<td>- Expectations/</td>
<td>universal to human beings</td>
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<tr>
<td></td>
<td>Obligations</td>
<td>- Inherent limitations in virtual relations</td>
<td>Assumptions on collaboration possibilities at a distance</td>
</tr>
<tr>
<td></td>
<td>- Building up relations</td>
<td>- How to behave trustworthy virtually</td>
<td></td>
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</tbody>
</table>