Augmented Sociality

How the Digital and Physical Worlds Merge in the Social Use of ICT

Sanna Tiilikainen
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Abstract

In the digitalized society of today, individuals are leading increasingly ICT infused social lives, both at work and during leisure. This development entails individuals repeatedly combining their digital- and physical-world social behaviors with and around information and communication technology (ICT) use in various work and leisure situations. With ICT impacting their ongoing sociality, this combining gives rise to complex social phenomena that come with both opportunities and risks for individuals' productivity and well-being. As a result, individuals can be left struggling in their efforts to keep their combining behaviors benign. These struggles, associated with the positive and negative effects of ICT use on individuals, are deemed an important, nascent topic in Information Systems (IS). This thesis focuses on how these struggles unfold, affect individuals' sociality and lead to the positive and negative effects on their productivity and well-being, by examining the social tensions arising and becoming resolved in the combining processes. Video-recorded empirical data from real interactions with and around ICT are used, supplemented with interviews. The videos are analyzed using multimodal interaction analysis and the interviews using content analysis, applying a theoretical background of symbolic interactionism.

Based on the findings, the thesis introduces a novel theoretical device, the concept of Augmented Sociality, for understanding how the combining of the digital and physical worlds can be obtained in the social use of ICT in a way that is benign to the ongoing sociality. The thesis positions Augmented Sociality as a state in social behavior, an interational co-achievement of humans and ICT, where the digital and physical worlds merge into one hybrid environment for social behavior. Augmented Sociality is made possible by individuals negotiating their interactions with each other and ICT in a socially acceptable way, staying within their social tolerance toward ICT use. Within this social tolerance, the combining behaviors are deemed socially acceptable ICT use, and as a result, the state of Augmented Sociality emerges. Maintaining Augmented Sociality requires heightened social sensitivity toward the social demands of all participants, whether human or ICT. Each incident of achieving this social acceptability reinforces Augmented Sociality. Over repeated achievements, individuals tend to adapt their social tolerances toward ICT use and help ICT to adjust itself accordingly, to comprise humans and ICT as one social group, across the digital and physical worlds as one hybrid social environment. These adaptations, in turn, impact the ways in which individuals work and spend time together during leisure and respond to ICT in interaction. The thesis proposes that Augmented Sociality can help in addressing the effects of ICT use on users' sociality, productivity and well-being. The thesis contributes to the knowledge on the effects of the increasing use of ICT and social use of ICT. Further, it provides real-life, empirical insights into the ways in which individuals keep up their social life with and around ICT.

Keywords Increasing use of ICT, Social use of ICT, Dark Side of ICT use, User behaviour, Sociality, Work, Leisure, Video-based research, Interaction

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Viitelmä


Laajennetun sosiaalisen lievittämisen ja ylläpitämisen vaatii hienotunteisuutta ja monipuolisia sosiaalisia taitoja, sillä onnistuakseen ICT:n käyttäjien on huomioitava vähä aikaa sekä ihmisten että ICT:n sosiaaliset vaatimukset fyysisessä ja digitaalisessa maailmassa. Onnistumisten seurauksena he kokevat toimivansa hybriditympäristöissä uudenlaisten käyttäytymissääntöjen ja odotusten ohjaamina. Laajennetun sosiaalisuuden ymmärtäminen auttaa löytämään siihen liittyviä liiketoimintamahdollisuuksia, suunnittelemaan käyttäjien tuottavuutta ja hyvinvointia tukevia palveluja, sekä jäsentämään teoreettisesti digitalisaion ja teknologian käytön mukanaan tuomaa muutosta sosiaalisissa suhteissamme.

Avainsanat
Digitalisaatio, ICT:n sosiaalinen käyttö, teknologian käytön haittavaikutukset, työ, vapaa-aika, sosiaalisuus, videopohjainen tutkimus, vuorovaikutus


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By the time I received my Master’s in sociology a few years back, I knew I just had to continue to examine the social use of ICT. I had just visited several families to observe how they lived with and around ICT at home. Seeing families living together with and around ICT left me wondering. They seemed to coexist in social harmony, in mutual agreement about what to do and how to do it, with everyone content with the choices made, everybody knowing their place in the group, including ICT. How did they agree about all this? What was the role of ICT in these agreements? Although there were some theories addressing life with ICT, I could not find any explanation for these questions. With news about the dark side of ICT popping up at an alarming rate in the media, I was convinced that this process of successfully combining the digital and physical worlds with and around ICT was something to focus on, as social harmony seemed to arise as its by-product. Acting on a hunch that the answer to this question lay somewhere between humans and technology, I applied to the doctoral program of Aalto University Information Systems. Little did I know about the wonders of social life with and around ICT that awaited me there. Pursuing a PhD has been a true exploratory expedition during which I found the answer I now present in this thesis. However, I could not have found the answer alone. Now it is time to thank those who helped me along the way.

First, I express my gratitude to the preliminary examiners of this thesis, Professor Iris Junglas and Professor Netta Iivari, for their thorough reviews and encouraging feedback. I am also honored to have Professor Junglas as my opponent. Next, I wish to thank my supervisors, Professor Virpi Tuunainen and Professor Suprateek Sarker, for their rock-solid support, delivered with tough but constructive critique, eye-opening insights and helpful advice during these years. Coauthoring with you, the grand masters of the art and craft of Information Systems Science, has been the ultimate learning experience, for which I will remain grateful forever! Further, Professor Virpi Tuunainen and Professor Matti Rossi receive my thanks for organizing all the courses and Inforte seminars at Aalto, with their visiting professors. Seeing, hearing and getting to know all these international scholars has been most helpful! Next, I wish to thank Professor Kalle Lyytinen for his insightful feedback on my work. Further, I am grateful to senior lecturer Johanna Bragge, for giving me several teaching opportunities, as well as opportunities to try out and develop new teaching methods.

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sion group, as well as all the participants of that group who took part in validating my analyses. I have learned so much from you all!

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Helsinki, 4 November 2018

Sanna Tiilikainen
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List of Key Concepts

Augmented Sociality

A state in social behavior taking place with and around ICT in a hybrid environment merging the digital and physical worlds. In Augmented Sociality, the ongoing ICT use behaviors have the social acceptability of the participants, stemming from them staying within participants’ social tolerance toward ICT use.

Dark side of ICT

Unintended, negative outcomes of ICT use, such as social offense and strain on social relationships (D’Arcy et al. 2014; Tarafdar et al. 2013, 2015a).

Digital world interaction

Social behavior within the digital environment (Oestreicher-Singer and Zalmanson 2013).

Hybrid world interaction

Social behavior merging digital and physical world interaction into one social environment.

ICT (information and communication technology)

Hardware, devices, such as tablet computers, computers and smartphones and also software, such as applications and operating systems.

ICT interaction

A contingent process between human(s) and ICT, where each party aims at giving an appropriate response to the prior interactions of the other party, based on both the intent of the initiating participant and the interpretive work of the other determining its significance based on the responses given to the interaction (Suchman 1987), i.e. a form of social behavior.

ICT interruptions

Events of ICT initiating interaction between human(s) and ICT, originating from either the needs of ICT or humans in the digital world (see also Chen and Karahanna 2014; Coraggio 1990; Jenkins et al. 2016).

ICT use

An asymmetrical process of interaction, where a human ICT user initiates action and ICT responds accordingly (Suchman 2007).
Participants

Those contributing to social behavior through interaction (see Goffman 1959; Lamb and Kling 2003; Suchman 1987; Suchman 2007)

Physical world (face-to-face, f2f) interaction

Social behavior within a collocated environment (Goffman 1959)

Social acceptability of ICT use

A participants’ collective agreement that it is appropriate to use ICT in the manner it is being used in a social situation (see also Otway and Von Winterfeld 1982; Terrade et al. 2009)

Social behavior

Engaging in interaction by initiating interactions and responding to the interactions of others (Goffman 1959; Lamb and Kling 2003; Mead 1962; Suchman 2007), i.e. oriented action, reacting to and taking into account the behavior of others (Weber 1968)

Social tolerance toward ICT use

A collectively agreed leeway between the lowest threshold of socially acceptable ICT use behavior and its perceived optimum, where the social behaviors taking place are perceived as less than ideal but still satisfactory by the participants (see also Goffman 1959; Kettinger and Lee 2005; Tan et al. 2016)

Social use of ICT

A form of ICT use for collaboration or sociability (Junglas et al. 2013; Lamb and Kling 2003), i.e. a form of social behavior of individuals, taking place through and around ICT

Sociality

Human innate trait, a tendency to participate in interaction with others for collaboration and sociability (the enjoyment of socializing) (Junglas et al. 2013; Levinson 2006; Simmel 1910, 1949)

Symbolic interaction

Social behavior conducted by using and constructing symbols (meaningful representations) (Aakhus et al. 2014; Mead 1962)
List of Original Research Papers

This doctoral dissertation consists of a summary and of the following original research papers which are referred to in the text by their numerals


**Author’s Contribution**

**Paper 1:** Reinforcing Family Values with Web Design - Case Yle “P2” Children’s Website

Sanna Tiilikainen was the lead author of this paper. She took the main responsibility for the research idea, theoretical framework and literature review. She was responsible for data collection, analysis, design principles, as well as authoring the discussion of results. Virpi Kristiina Tuunainen, the second author, took part in developing and revising the theoretical framing and developing the design principles. She contributed to the positioning of the results within the existing research and provided her insights into the research quality and narrative.

**Paper 2:** The Hidden Curriculum of ICT and the Social Behavior of Young Children

Sanna Tiilikainen was the sole author of this paper.

**Paper 3:** Constructing Shared Context for Temporary Teams in Virtual Worlds with Informal Interaction

This paper is based on Laura Kohonen-Aho’s research idea. Both authors contributed equally. The authors planned the paper structure, scope, and contribution together. Kohonen-Aho collected and prepared the transcripts. Both authors conducted the literature review and analysis. All the paper sections are jointly written. Kohonen-Aho took the main responsibility for the sections Virtual worlds and embodiment, Research setting and data collection, and linking the findings to data and data examples in Findings. Tiilikainen took the main responsibility for the sections Shared context, Informal interaction, and Theoretical perspective. The paper is iteratively written, edited and revised by both authors.

**Paper 4:** Do ICT Interruptions Really Distract from Performance of Knowledge Work: The Critical Role of Civil Inattention

Sanna Tiilikainen was the lead author of this paper. She took the main responsibility for the research idea, theoretical framework and literature review. She was responsible for data collection, analysis, models, as well as authoring the discussion. Virpi Kristiina Tuunainen took part in developing and revising the theoretical framing and developing the models, positioning the results within the existing research. She provided her insights into the research quality and narrative. Suprateek Sarker took part in developing and revising the theoretical framing and developing the models and positioning of the results within the existing research. In addition, he provided his insights into the research quality and narrative. Ilkka Arminen brought his expertise regarding the multimodal interaction analysis and sociological literature into the author-team. He contributed to the analysis as the second coder, organized the data session meetings for validating the analyses and contributed to the quality of the presentation of findings regarding the multimodal interaction analysis.
Part 1: Summary
1. Introduction

In this section, I give an overview of the thesis. I start by introducing the research background and motivation, after which I present the research questions. I close this section with a description of the structure of the thesis.

1.1 Background and motivation

Information and communications technology (ICT) has become enmeshed with the social life of individuals at work (Dery et al. 2014; Scheepers and Middleton 2013) and during leisure (Hess et al. 2014). Part of social behavior has moved online, with the rise of the social media and virtual worlds (Oestreicher-Singer and Zalmanson 2013). A generation of digital natives has grown up with digital technology as an integral part of their life (Wang et al. 2013). However, digital immigrants, referring to those who learned to interact with ICT as adults, are also adapting their relationship with ICT, growing into digital fluency, a state of technology adeptness, where they view ICT as intrinsic to their everyday activities (Voorveld and van der Goot 2013; Wang et al. 2013).

As individuals of all ages are increasingly involved in the digital social worlds, using their (multiple) ICT while simultaneously interacting in the physical world, both of these have become a recurrent part of their interaction in face-to-face (f2f) social situations (Chen and Karahanna 2014; Junglas et al. 2013; Middleton et al. 2014). As a result, the distinction between digital- and physical-world social behavior is disappearing (Chen et al. 2014; Goes 2014). At the center of this development are the digital individuals who are no longer setting their digital and physical social world behaviors apart (Brenner et al. 2014; Hess et al. 2014). In other words, combining the digital and physical worlds in the social use of ICT has become the widespread option for conducting social behavior, even the new normal (Hess et al. 2014; Middleton et al. 2014). However, at present, research on these combining processes and their effects on social life remain both nascent and ambiguous.

On one hand, it has been suggested that combining the digital and physical worlds with and around ICT provides several social opportunities for individuals. These include keeping in touch with the distant colleagues, friends and relatives (Andrade 2014; McClure et al. 2015; O’Leary et al. 2014), working wherever their team mates are, whether in digital or physical collaboration environments (Crisp and Jarvenpaa 2013; Sarker 2003) and reaching out for new acquaintances and collaborations around the globe (Faraj et al. 2011; Oestreicher-Singer and Zalmanson 2013). Combining the digital and physical worlds in the social use of ICT can also enrich family time at home (Tiilikainen and Arminen 2017) and facilitate constructive relationships between parents and children (Golsteijn and den Hoven 2011).
Unfortunately, combining the digital and physical worlds in the social use of ICT also involves social risks. This is because it can lead to situations where the social demands of the two worlds collide, stemming from the contextual differences between them (Bjørn and Ngwenyama 2009; Koppman and Gupta 2014; Sergeeva et al. 2017). Here, the digital world may demand the attention of an individual at inopportune times, such as a text message arriving while having an f2f discussion with colleagues or family. The other way round, becoming interrupted by a colleague stopping by while writing an email or preparing to plug in a smartphone for charging, can lead to social ill effects in the digital world. These include forgetting to send that email, potentially offending its intended recipient, or failing to plug in the smartphone in time before its shutdown, potentially being cut off from the company chat for a while, or losing any unsaved work.

There is an increasing body of evidence speaking for disturbing and negative social outcomes arising from combining the digital and physical worlds in the social use of ICT, such as increasing arguments between individuals (Chen and Karahanna 2014; D’Arcy et al. 2014; Zwanenburg 2013). Whether at work or during leisure, this salience of ICT in everyday life in both the digital and physical world can increase social conflicts and create tensions. At work, it can affect relationships with colleagues (González and Mark 2004). During leisure, it can strain intimate relationships such as those between children and parents at home (Chen and Karahanna 2014; Cho and Lee 2017). It can even increase strain on the relationship between individuals and ICT (Jenkins et al. 2016). Taken together, all these social issues may lead to social offense and conflicts within and across the digital and physical worlds, risking individuals’ work performance (see Ren et al. 2008) and well-being (Mazmanian et al. 2006; Roberts and David 2016) by putting strain on their social relationships (Cho and Lee 2017; Jenkins et al. 2016; Sergeeva et al. 2017; Zhan and Chan 2012).

The above discussion demonstrates how, despite the potential for positive social outcomes, efforts toward combining the digital and physical social worlds with and around ICT can also lead to individuals struggling. As a result, during these combining processes, individuals often have to make emergent compromises and tradeoffs, trying to get the best of both worlds, without neglecting the demands of either humans or ICT (Bjørn and Ngwenyama 2009; Jenkins et al. 2016).

Although the abovementioned social opportunities and risks have already been noticed in the IS literature, the processes by which individuals negotiate them and cope with combining the digital and physical worlds in the social use of ICT, have not yet been thoroughly explained or theorized. Taken together, the previous research on this area, discussed above, shows how combining the physical and digital social worlds with and around ICT has potential for both positive and negative outcomes for the individuals and ICT taking part. In any case, because this combining includes several participants (whether humans or ICT), it is not only about an individual’s decision to use or not to use ICT. Instead, this combining is a complex social process where the simultaneous social demands of humans and ICT, as well as those of the digital and physical social worlds, have to be all taken into account simultaneously and juggled accordingly, in real time. However, at the moment, there is limited understanding about the social processes, mechanisms, thresholds and boundaries by which the digital and physical worlds can or cannot be combined in the social use of ICT in a way that is mutually acceptable to all the participants involved (Addas and Pinsonneault 2015; Chen and Karahanna 2014; Jenkins et al. 2016).
Because social issues with tangible outcomes can arise as part of these combining processes, there is a need for new knowledge about ways of combining digital- and physical-world social behavior, as well as theory and methods for approaching it, to mitigate potential problems and make the most of the opportunities (Goes 2014; Middleton et al. 2014). To this end, it is important to understand the actual, real-life social combining processes involved in the lives of digital individuals with and around ICT, to understand also the accompanying social, work-related, ethical and theoretical questions and the boundary conditions by which ill effects arise or are avoided (Addas and Pinsonneault 2015; Chen and Karahanna 2014).

The existing research on these social combining behaviors with and around ICT tends to focus mostly on one facet at a time, either the physical or the digital world one. In particular, the social behavioral processes of combining the physical and digital social worlds have not received much attention in research, other than acknowledging that with current ICT, this behavior can yield opportunities and risks for ongoing sociality (Lundgren et al. 2015; Oestreicher-Singer and Zalmanson 2013). In the e-commerce literature, the combining of digital and physical interactions into a seamless whole is acknowledged as an important topic, but is approached from a different viewpoint: here, “interaction” refers to interactions between an individual customer and a company (Nüesch et al. 2015), not taking into account all the other social engagements or the demands of ICT taking place in the combining processes. Further, the emerging research on virtual reality, augmented reality and social robots suggests these issues are a salient and still unresolved issue around the very latest ICT, too (Clark and Clark 2016; Jokinen and Wilcock 2017; Steffen et al. 2017). Hence, my dissertation addresses this knowledge gap by focusing on the social processes of combining the physical and digital social worlds with and around ICT.

1.2 Objective and research questions

The objective of this thesis is to provide new knowledge for understanding how individuals negotiate their interactions with and around ICT to stay within mutually acceptable ways of combining the physical and digital social worlds. My research examines the processes, mechanisms, thresholds, boundaries and outcomes of achieving and maintaining the state of this socially acceptable behavior in the resulting hybrid social environment, where the digital and physical worlds merge in the social use of ICT. The overall research question of the dissertation is:

RQ: How do individuals manage merging their digital and physical world social behaviors into a hybrid social environment with and around ICT in a mutually acceptable way?

To answer this question, I investigate the unfolding of actual, real-life, micro-level social behavioral processes where individuals are combining their digital- and physical-world social behavior with and around ICT. I examine these processes within and across multiple leisure and work contexts, with video data from real-life social situations, collected over several years. I chose to focus on these micro-level social behaviors because social behavioral issues with and around ICT are a recurring, increasingly salient concern in the current literature (see Cho and Lee 2017; Gupta et al. 2013; Mazmanian et al. 2006; Roberts and David 2016). However, although these potentially problematic social behaviors are recognized and deemed important in current research, the ways in which individuals actually succeed or fail in com-
bining the digital and physical worlds in their real-life interactions is not yet fully understood. In particular, breaching the social demands of the other participants present in a social environment is recognized as a salient risk for individual productivity and well-being (Roberts and David 2016; Sergeeva et al. 2017; Steffen et al. 2017).

As a summary, the current literature suggests that the ways in which individuals achieve and keep up their sociality in the hybrid social environment merging the digital and physical worlds, juggling the boundaries of acceptable and non-acceptable social combining behaviors, are not sufficiently addressed. However, understanding them is important, as the current research hints that the ill effects of this combining behavior start arising when individuals fail in their combining efforts: in other words, when they fail to achieve and keep up the hybrid environment for their sociality. Therefore, understanding how the hybrid social environment is achieved and kept up by the participants involved in this combining process can help in avoiding its ill effects and facilitating its positives.

To understand this combining and its boundaries as a social behavioral process, I further divide my overall research question into three sub-questions. This is to focus on the different facets of my multifaceted research problem addressing a real-life behavioral process, as recommended by Langley (1999), Aakhus et al. (2014) and Schegloff (1996). My sub-questions focus on how the need to engage in these managing processes arises in the social use of ICT (sub-question 1), how ICT enables, constrains and guides individual behaviors in these processes (sub-question 2) and how individuals cope with these behaviors and what kinds of boundaries and consequences these combining processes have (sub-question 3).

To start with, to understand the ways in which individuals manage the combining of their digital and physical worlds, it is important to first understand its antecedent condition, i.e. how the need to engage in this combining process arises in the social use of ICT (see Langley 1999; Schegloff 1996). The current literature suggests ICT use in a social environment including both the digital and physical worlds simultaneously can introduce tensions into the social situation. This is because these situations include several social contexts and these can have contrasting social demands such that individuals have to manage the various social demands at the same time (Bjørn and Ngwenyama 2009; Faraj et al. 2011; Mazmanian et al. 2006). However, the ways in which these tensions arise in actual social behavior has not yet been adequately addressed. To focus on this facet of my overall research question, I ask sub-research question 1 as follows:

**SubRQ1: How do the tensions between the digital and physical world social behaviors emerge with and around the social use of ICT?**

In this thesis, I address this question in papers 1 and 4. In paper 1, I focus on the ways in which young children’s and their parents’ interaction with and around ICT recurrently introduces tensions into their family relationships and well-being. In paper 4, I address the ways in which various work-related social demands contrast with each other across the digital and physical worlds and introduce tensions related to work performance.

In addition to introducing tensions to social relationships, the ICT participating in these combining processes, can favor some behaviors and constrain others, thus guiding individuals toward changing their behavior. Understanding this process by which ICT favors and constrains social behavior during combining processes is important, because through repeatedly exposing individuals to them, ICT can ignite individuals to come up with novel social behav-
iors and associate novel meanings with ICT, which in turn, impacts the overall ways in which they expect to manage these situations (Aakhus et al. 2014). Therefore, to focus on this facet of my research problem, I ask sub-research question 2 as follows:

**SubRQ2: How does ICT interaction influence the social behaviors of individuals?**

In this thesis, I address this question in two different contexts in papers 2 and 3. With paper 2, I focus on the leisure context. I examine how interaction with ICT influences the social behaviors of young children by affecting their turn-taking, which in turn, affects the ways in which these young children approach social behavior not only with ICT, but also with their family. To also address the work context, paper 3 examines the ways in which shared contexts for teamwork are constructed in virtual worlds. In virtual worlds, ICT influences social behavior, because in this setting, the participants can conduct social behavior only with and through ICT.

Thirdly, in addition to the above, it is also important to research how individuals actually cope with the simultaneous and constant demands of the digital and physical social environments in their lives, when attempting to combine them with and around ICT. This is critical for managing the two as a hybrid environment, because these social demands come with potential opportunities and unfavorable outcomes, and failing to satisfy social demands can lead to negative outcomes (see Faraj et al. 2011). Further, the participating individuals take note of and evaluate the unfolding of these coping processes, as well as their actual outcomes, and these can influence individuals' behavioral preferences and expectations, but these processes are not yet thoroughly understood (Aakhus et al. 2014). In this way, the coping processes can alter what the participants view as acceptable or non-acceptable social behavior with and around ICT. To address this facet of my research interest, I ask sub-research question 3:

**SubRQ3: How do individuals negotiate the combining of the digital and physical worlds with and around ICT?**

In this thesis, I address SubRQ3 in papers 1 and 4. In paper 1, focusing on the leisure context, I address the ways in which young children’s interactions with and around ICT at home inflicts adaptations in family dynamics and relationships. To cover the work context, in paper 4, I focus on the ways in which knowledge workers process ICT interruptions in teamwork. In paper 4, data from knowledge workers coping with ICT interruptions in various work contexts and team formations over several years is analyzed, to inquire about the ways in which recurrent ICT interruptions are processed and affect sociality with and around ICT.

### 1.3 Thesis structure

This thesis is divided into two parts. In the first part, I start by giving a summary of the literature relevant to the topic area and the research framework with accompanying data, method and analysis. Then I present my findings, contributions and conclusions, with limitations and suggestions for future research. The second part is a compilation of the original research papers opening up the details of the empirical work I have done for this thesis.
The definitions of the concepts salient to this thesis can be found in the list of key concepts. In this introduction, I have given an overview of the background and motivation for my work and introduced the overall research question and its sub-questions. In the next chapter, I will position my work with regard to the relevant literature. After this, a chapter on the methodology follows. Next, I will open up my data collection and analysis, including an overview of the ethical considerations related to using video methods for collecting and analyzing data. In the chapter following these, I present my findings. Next, I discuss my findings, sum up the contributions of this thesis and conclude with suggestions for further research.
2. Positioning the research

In this section, I position my work in relation to the existing literature. My research interest in this thesis revolves around the effects of recurrent ICT use in the hybrid environment combining the digital and physical worlds on the sociality of individuals. In this chapter, I introduce the literature streams closely related to my research interest, the increasing use of ICT and the social use of ICT. I focus on literature from IS research and its closely related disciplines of computer science and management science, as recommended by Levy and Ellis (2006) and Webster and Watson (2002). In addition, to establish a theoretical foundation for my research and to conceptualize my contribution, as recommended by Webster and Watson (2002) and Rowe (2014) in case of a novel and emerging topic, I complement the above with interdisciplinary literature, drawing from sociological research addressing human sociality and interaction.

In sociology, sociality refers to the human innate trait manifesting in a tendency of individuals to engage in interaction for collaboration or sociability, the pure enjoyment of socializing (Levinson 2006; Simmel 1910, 1949). In IS, sociality has been approached in relation to ICT use at work and during leisure, under the research stream referred to as the social use of ICT, both as collaborative interactions between users, as well as those arising from sociability (Junglas et al. 2013; Lamb and Kling 2003). The research stream about the social use of ICT, in turn, originates from the research on the increasing use of ICT (Davis 2002; Olson 1983).

Within the social use of ICT, there is research focusing on both the bright (positive) sides of the increasing use of ICT, as well as its dark (negative) sides (Davis 2002; Lee and Fedorowicz 2018; Tarafdar et al. 2013). The latter stream also considers the social tensions and conflicts that can arise during the social use of ICT, contributing to the ICT-originating dark side effects (Bjørn and Ngwenyama 2009). Here, ICT interruptions are acknowledged as one potential source for these tensions and conflicts (Addas and Pinsonneault 2015).

Tensions and conflicts in a social situation can arise from the participants having diverse social expectations about the appropriate social behavior. When the unfolding of the actual interaction with and around ICT does not conform to these expectations, social tensions and conflicts tend to arise whenever participants’ social expectations are compromised too much (Bjørn and Ngwenyama 2009; Mazmanian et al. 2006). In IS research, it has been acknowledged that the others present in a ICT use situation do influence an individual’s ways of using ICT, and the individual’s ICT use behavior can be viewed negatively by these others (Roberts and David 2016; Sergeeva et al. 2017). Taken together, the above studies suggest that the extent, severity and implications of these tensions and conflicts in the social situation could be related to ways in which participants mutually receive ICT influencing their social behavior across the digital and physical worlds. In sociology, it has been acknowledged that in a social situation, the participants do not accept and tolerate their social demands and expectations being influenced or compromised too much (Goffman 1959). However, to the best of my
knowledge, the linkages between these social tensions and conflicts in the interactions with and around ICT across the digital and physical worlds have not received detailed attention in IS research in relation to social tolerance toward ICT use and the social acceptance of ICT use.

In sociology and computer science, there is nascent research about the social acceptability of ICT use, with an assumption that it may be linked with the perceived social ill effects of ICT use in social situations, stemming from the fact that ICT use in a social situation can be seen as undesired social behavior by the others in that social situation (Efthymiou and Halvey 2016; Terrade et al. 2009). According to sociological research, in a social context, the acceptability of the social behaviors of the participants is dependent on the participants collectively tolerating each other’s occasional mishaps which take place during interaction (Goffman 1959, 1963, 1967, 1983). It has been acknowledged that in an individual ICT use context, an individual using ICT usually shows some tolerance toward the mishaps taking place in their interactions with it before they become annoyed and terminate use (Kettinger and Lee 2005; Tan et al. 2016). In the chapters below, I introduce the abovementioned research streams in more detail.

2.1 Increasing use of ICT

When the first commercially produced computers entered work and education from the 1950s, they were used for dedicated tasks (such as storing sales data), interleaved with non-computerized tasks. This was because only one or a few computers were available for the whole personnel to share, and one individual at a time could work with them on their discrete, individual tasks, using a limited number of functionalities (Bryan 1970). With the invention of cheaper and more versatile PCs in the 1970s, the number of computers began increasing rapidly, also increasing their usage (McFarlane and Latorella 2002).

The improving connections of PCs to remote servers enabled the onset of telework (working from home) in the 1980s (Olson 1983; Venkatesh and Vitalari 1992). With telework, computers could be used at both the workplace and home, increasing their use (Olson 1983). Telework also introduced a second line of uses in addition to doing individual tasks, that of keeping in touch with remote colleagues (Olson 1983). This emphasized the communicative functions of computers in addition to doing tasks individually, and gave rise to the term ICT (information and communication technology), to foreground the social aspects of using computers (Davis 2002; Leonardi et al. 2010).

The improving connectivity of ICT, with its accompanying flexibility regarding work arrangements, soon gave rise to knowledge work, where the work revolves around producing new knowledge, utilizing previous knowledge, with the help of ICT (Davis 2002). Knowledge work is fundamentally different from the previous mode of working individually on isolated, structured, standardized, and measurable tasks that had dominated office work for a century (Davenport et al. 1996). Not only is knowledge work dependent on ICT, but it is also social and unstructured in nature (Davis 2002). This means that in knowledge work, the workers are free to organize their work as they see fit and as a result, their productivity is dependent on individual time and resource management but also sociality (Davis 2002; Jemielniak 2009; Perlow 1999). In practice, knowledge work requires periods of intense individual concentration (Perlow 1999), while its value is also produced in interactions between workers (Bhatt 2001; Orlikowski 2002; Small and Sage 2006), often in interdependent teams that can
be distributed over various locations (Addas 2010; Castells et al. 2007; Davis 2002). Further, knowledge work tends to comprise several interleaving tasks with both short- and long-term elements (Addas and Pinsonneault 2015).

Starting from the 1980s, with the increasing connectivity and new functionalities fit for leisure, such as gaming, ICT use spread from the workplace into private life and the leisure context (Ashton 2011; van der Heijden 2004; Hess et al. 2014; Lowry et al. 2013; Penttinen et al. 2010; Venkatesh et al. 2012; Wu and Lu 2013). As a consequence, not only did ICT use increase, but also the difference between work ICT use and leisure ICT use started becoming blurred, as users began utilizing ICT interchangeably for both work and leisure, across the digital and physical worlds (Ashton 2011; French et al. 2014; Hess et al. 2014). The increasing use of ICT was further accelerated by the adoption of the Internet (Hoffman et al. 2004) and mobile devices from the 1990s onwards (Middleton et al. 2014), as well as social media in the 2000s (Oestreicher-Singer and Zalmanson 2013). Together, these developments increased ICT use within and across all uses, contexts and environments (Beck et al. 2014; Benjamin et al. 2014; Carroll 2010; Isaacs et al. 2012; Koch et al. 2012; Middleton et al. 2014; Oestreicher-Singer and Zalmanson 2013).

As in the work context, in the leisure context as well, the ways in which individuals actually behave with and around ICT started transforming the ways in which they perceive their relationships with each other (Andrade 2014). This, in turn, started transforming the ways in which users approach their decisions to either use or not to use ICT, making the social side of ICT use more salient (Junglas et al. 2013). In this way, the increasing use of ICT and its accompanying developments have made it relevant for IS scholars to focus on the social side of ICT use as a specific line of research (Lamb and Kling 2003), as discussed next.

### 2.2 Social use of ICT

With the developments discussed in the previous section, ICT use started to become more and more intertwined with the overall social behaviors of users (Junglas et al. 2013; Lamb and Kling 2003). While IS research has a well-established history of studying individual ICT users (Lamb and Kling 2003), with the increasing importance of understanding the social use of ICT, Lamb and Kling (2003) reconceptualized ICT users as social actors, whose environment and its social context impacts their use of ICT.

In knowledge work, the above developments gave rise to distributed teamwork, where workers are located in several, geographically dispersed work sites and also working from home (Vlaar et al. 2008). As a consequence, workers also started to increasingly stay in contact with each other when out of the office (Belanger and Allport 2008; Leonardi et al. 2010). These new work arrangements and their accompanying use of ICT for social interactions between the workers, in turn, started to transform the ways in which individuals perceive their relationships with colleagues not in their immediate presence, such as feeling close to them from a distance, based on their online collaboration (O’Leary et al. 2014). As another part of this development, ICT became indispensable for working (Leenders et al. 2003). Workers, acknowledging this, started viewing the ICT originating calls for action, such as incoming emails, as part of their overall work portfolio, where several tasks were tended to in an interleaved manner (Addas and Pinsonneault 2015). Today, it is widely acknowledged that the social context of ICT use and the social dynamics and processes involved are important and
have an impact on user behavior (Junglas et al. 2013; Oestreicher-Singer and Zalmanson 2013).

In current IS research, the social use of ICT has been approached by focusing on users as small groups or teams, in either the f2f environment, digital environment or a combination of both (Goggins et al. 2011), whether at work (Zellmer-Bruhn 2003), during leisure (Isaacs et al. 2012) or a combination (Chen and Karahanna 2014). At work, small groups have been researched as distributed teams that have partially shared work locations, those occasionally meeting in a f2f environment and as fully virtual teams, never meeting f2f (Dubé and Robey 2008; Fiol and O'Connor 2005; Vlaar et al. 2008). During leisure, small groups of users can be approached as a group of friends (Mäntymäki and Islam 2016) or a family comprising parents and children (Eynon and Helsper 2014). Further, the children and young people in these groups have been studied as young children (Cho and Lee 2017), as minors (Ferguson and Olson 2013) or as young adults (Cho and Hung 2015; Roberts and David 2016).

Further, social ICT users have been studied as digital natives who have grown up with ICT and digital immigrants who learned to use ICT as adults (Vodanovich et al. 2010; Wang et al. 2013). It has been proposed that digital natives would have a more accepting and well-adjusted relationship to the adoption and use of ICT than digital immigrants, as well as better skills for coping with potential ICT-related issues (Wang et al. 2013). Other studies have suggested that differences in behaviors may be more related to individual psychological characteristics than belonging to a certain age group (Jones et al. 2010; Jones and Czerniewicz 2010).

2.3 Bright and dark sides of ICT use

Inspecting the effects of ICT on social ICT use, users, and their relationships is important, as these have implications for their well-being and performance through the bright and dark sides of ICT, defined as the unintended and unexpected positive and negative outcomes of ICT use (Chatterjee, Sutirtha, Sarker 2013; Lee and Fedorowicz 2018; Lee 2015; Purao, Sandeep, Wu 2013; Tarafdar et al. 2015b). Some scholars suggest that the dark side of ICT could be mitigated with ICT design and policies on ICT use (Chae et al. 2005; Chatterjee, Sutirtha, Sarker 2013; Chatterjee and Fuller 2009; Watts and Wyner 2011). However, as the dark and bright sides of ICT are not fully understood yet, questions about the right kind of design and the beneficial policies for mitigating the dark side effects and advancing the bright side ones also need more attention (Tarafdar et al. 2015b).

There is a lot of evidence for the bright side of ICT use. Examples include the positive effects of the increasing social use of ICT at work, such as enhanced flexibility of work arrangements including distributed and temporary teamwork arrangements that enable more efficient knowledge sharing and the use of resources within and across organizations (Bélanger and Allport 2008; Faraj et al. 2011; Leonardi 2011; Merminod and Rowe 2012). In addition, the social use of ICT can facilitate relationships between workers both while working (Crisp and Jarvenpaa 2013; Goggins et al. 2011; O'Leary et al. 2014) and also during their time off (Koch et al. 2012).

During leisure, the social use of ICT can contribute to the well-being of users in many ways. These include feeling close to friends that are not in immediate proximity (Andrade 2014), having a sense of belonging to communities and having friends based on pure online relationships (Bishop 2007; Ludwig et al. 2014), as well as finding others who share similar in-
terests and being able to engage in shared activities from a distance (Nov et al. 2010). Within families, the social use of ICT can facilitate positive relationships between family members by giving things to talk about and focus on during family time together (Golsteijn and den Hoven 2011; Tiilikainen and Arminen 2017).

However, with the increasing use of ICT, the evidence for its darker social effects has also been increasing (D’Arcy et al. 2014; Lee 2015; Mäntymäki and Islam 2016; Tarafdar et al. 2013, 2015a; Walsham 2012). At work, these include a worsening work-life balance, because workers feel the others expect them answering emails and doing work-related tasks also during their time off (Chen and Karahanna 2014). This, in turn, can stress social relationships within the family, when family members feel they are being neglected because of ICT use (Chen and Karahanna 2014; Mazmanian et al. 2006). Parents are also worried about the ill effects of ICT use on the social behavior of their children, such as isolation, aggression and objecting to parental authority (Cho and Lee 2017; Pujol et al. 2016). Further, romantic social relationships can suffer if one half of the couple feels s/he is being neglected because of his/her partners’ ICT use (Roberts and David 2016).

2.4 ICT interruptions

ICT interruptions are one example of the phenomena classified under the dark side of ICT (Tarafdar et al. 2013). In this context, ICT interruptions are often defined drawing on Corraddock (1990), who defines them as random and discrete, ICT-originating events that break the focus of an individual on a primary task. With the increasing use of ICT, the number of ICT interruptions has also been rising rapidly (González and Mark 2004; Jenkins et al. 2016). There is extensive evidence for the dark side effects of ICT interruptions both at work (Adler and Benbunan-Fich 2012; Cameron and Webster 2013; González and Mark 2004; Heninger et al. 2006; Jenkins et al. 2016; Wickens et al. 2015) and during leisure (Chen and Karahanna 2014; Mazmanian et al. 2006; Roberts and David 2016).

However, there are also some studies suggesting that ICT interruptions can have both dark and bright side effects, depending on the situation where they arise and the ways in which individuals cope with them (Addas and Pinsonneault 2015; Jett and George 2003; Ou and Davison 2011). There is even some evidence of their positive effects at work (Tyre and Orlikowski 1994; Zellmer-Bruhn 2003) and during leisure (Tiilikainen and Arminen 2017). Another negative implication of ICT interruptions is that they can make further dark side phenomena emerge in their wake. These include multitasking, defined as doing several things at once (Voorveld and van der Goot 2013), task-switching and attention allocation, which are about switching between tasks and allocating attention between several tasks (Wickens et al. 2015), and constant connectivity and multicommunicating, perceiving that one has to keep up all one’s connections and discussions at all times (Cameron and Webster 2011, 2013; Reinsch et al. 2008; Wajcman and Rose 2011). In some cases, it has been suggested that the ill effects from dark side phenomena such as constant connectivity might even negate the productivity enhancements brought about by the social use of ICT (Leonardi et al. 2010), while worsening the well-being of users, such as by creating technostress (Ayyagari, Rama-krishna, Grover and Purvis 2011; Maier et al. 2015; Tarafdar et al. 2013).
2.5 Social acceptability of ICT use

To summarize the literature discussed above, when individuals are using ICT in a social situation where there are other individuals present, ICT use tends to affect their interactions and relationships. This is because ICT can compete for the time and attention individuals can give to each other (Mazmanian et al. 2006). Some negative outcomes include perceived incivility (appearing rude to others) and social offense (others feeling insulted and becoming angry because of the inappropriate behavior of someone in a social situation) (Cameron and Webster 2011; D'Arcy et al. 2014; Roberts and David 2016).

Social offense in the social use of ICT arises when people taking part in a social ICT use situation come to the conclusion that an individual is behaving in a socially inappropriate, unacceptable way, and become insulted and angry as a result (Chen and Karahanna 2014; Mazmanian et al. 2006; Roberts and David 2016). In other words, social offense is an outcome of failing in the process of combining the digital and physical worlds in a mutually acceptable way. Social offense is an escalation of perceived incivility, which is defined as a mild form of social mistreatment, irritating but yet not intolerable to the individuals at the receiving end (see Cameron and Webster 2011; Goffman 1959, 1983). In this way, ICT use originating social conflicts and tensions and the accompanying positive and negative impacts introduced above also relate to the social acceptability of ICT use and tolerance toward potential deviations from user expectations (see Kettinger and Lee 2005; Oestreicher-Singer and Zalmanson 2013; Terrade et al. 2009).

The social acceptability of ICT use refers to the collective mutual agreement of the individuals present in a social situation about if and how it is appropriate to use ICT in that situation (Efthymiou and Halvey 2016; Montero et al. 2010; Suen and Eghtebas 2017; Terrade et al. 2009). Various factors in the social context of ICT use, such as the perceived situational behavioral expectations, contribute to the social acceptability of ICT use in a given situation (Terrade et al. 2009). A situational factor can be, for example the group interaction situation in the f2f environment requiring the immediate attention of an individual. In other words, the social acceptability of ICT use comprises both the individual user’s view of what it is possible to do with ICT in a certain situation where there are also others present, as well as the view of those who are present but not necessarily using ICT themselves at the moment (Terrade et al. 2009). All the participants involved in a given social situation have to collectively view the ICT use behavior as socially acceptable for the social acceptability of that ICT use to become possible (Montero et al. 2010).

The concept of the social acceptability of ICT use is distinct from the concepts of acceptable IS use and the user acceptance of IS. The social acceptability of ICT use is based on individuals evaluating their current social situation by for example observing their interpersonal social dynamics with the others present in their environment, not only considering their pre-existing normative perceptions about the appropriate ways of using ICT (Terrade et al. 2009). Acceptable IS use, in turn, refers to the individual’s subjective, ethically and normatively grounded general perception about the correct way of using IS (Goel et al. 2016). User acceptance of ICT, in turn, refers to the individual’s general intention to use or not to use ICT, based on considering for example its perceived usefulness and ease of use, or whether others whose opinions the individual values think they should use it or not (Davis 1989; Venkatesh et al. 2003, 2012).

When evaluating whether to use ICT in a given social situation, users consider the potential social risks involved (Otway and Von Winterfeld 1982). A social risk in this context means
fearing that the others will view the individual as breaching the social expectations of behaving in the situation. This breaching of social expectations can lead from perceived incivility to social offense and risk the individual giving a bad impression about themselves, or even terminating the social situation and risking future collaborations (Goffman 1959). As humans are social by nature (Junglas et al. 2013; Simmel 1910) and their endeavors often require sociality and collaboration, they tend to perceive the abovementioned outcomes as unpleasant and try to avoid them to maintain sociality (Goffman 1959). However, human social expectations are often malleable and flexible, with some leeway for breaching them, before unfavorable outcomes start arising (Goffman 1959).

2.6 Social tolerance toward ICT use

The discussion above demonstrates how in a social situation, it is important that the process of using ICT is not only enjoyable to the user from his/her individual point of view but also meets the situational social expectations of the user and those of his/her social environment. This is important, because meeting these expectations creates social value for the user, while failing to meet them can lead to the user becoming disappointed and even discontinuing ICT use (Bruns and Jacob 2014). Regarding the expectations of an individual user, satisfying these is not a one-off, either-or state. Instead, it is a range of states called the zone of tolerance, ranging from the desired state through an adequate state to the minimum level that the user is willing to tolerate (Kettinger and Lee 2005). It is important that the individual’s experience using ICT stays within this zone of tolerance, as an experience below the minimum level can lead to the user abandoning ICT (Kettinger and Lee 2005; Tan et al. 2016).

Today, user experience is also affected by the social environment and context of ICT use and the social processes involved (Oestreicher-Singer and Zalmason 2013). However, to the best of my knowledge, tolerance toward ICT use as a social-level concept has not yet been researched. In addition, the IS literature emphasizes that breaching situational social expectations because of ICT use can lead to ill effects on the social situation and it is important to find ways of avoiding this (Chen and Karahanna 2014; D’Arcy et al. 2014; Mazmanian et al. 2006; Roberts and David 2016). Further, to the best of my knowledge, in the current literature, no measure exists for defining the boundaries by which this breaching of the social expectations while using ICT in a social situation either does or does not take place. In addition, it is not yet known in detail, how social offense either arises or does not arise in those processes where ICT is used in social situations combining the digital and physical worlds.

In this thesis, I name the above-discussed collectively agreed leeway for breaching the social expectations of a given social situation with and around ICT use “social tolerance toward ICT use.” In this thesis, I show how the boundaries of this social tolerance toward ICT use unfold as a micro-level social behavioral, empirically observable phenomenon and how it is connected with the social acceptability of ICT use, adaptations in sociality and also the social ill effects of ICT use. I believe addressing these questions is important, as a fundamental question around IS is how ICT can be used for mutual benefit in human social endeavors, avoiding any social ill effects (Grover and Lyytinen 2015; Lee and Fedorowicz 2018).
3. Methodology

The empirical part of my thesis comprises four separate but interlinked research papers that all address the changing relationships between individuals and ICT stemming from digitalization and the increasing and social use of ICT. Although the details of these papers vary, they also have some shared qualities. All the papers use a qualitative methodology, with an interpretive approach, informed by theories from the social constructionist tradition. In addition, all the papers are empirical and involved inspecting real-life social behavioral processes using video-based micro-ethnographic research. In this section, I open up my assumptions about the nature of the reality I am studying (ontology), my relationship with the knowledge I am producing (epistemology) and the techniques I use for producing the knowledge (methodology), as recommended by Orlikowski and Baroudi (1991) and Sarker et al. (2013).

3.1 Philosophical assumptions

All the papers in this thesis are part of the interpretive research paradigm. Interpretive research focuses on individuals' interpretations of their social reality, with the subjective and intersubjective meanings they associate with it (Orlikowski and Baroudi 1991; Walsham 1995, 2006). In this thesis, my ontological assumption about the nature of reality is that no single, external reality exists, but multiple realities are possible within my domain of interest, social behavior combining the digital and physical worlds with and around ICT (see Orlikowski and Baroudi 1991). From this ontological assumption follows my epistemological assumption about the knowledge I am producing. In interpretivism, research aims at understanding the phenomenon of interest, based on researcher’s interpretations and explanations (Orlikowski and Baroudi 1991). Therefore, the knowledge produced this way is relative, bound to the social context studied (Walsham 1995). However, I also assume that some abstraction and generalization of this knowledge is possible, by discussing my findings in relation to previous theories and concepts addressing related research interests (see Klein and Myers 1999).

Within interpretivism, my ontological position is moderate, based on internal realism. This means I acknowledge both the subjective, socially constructed realities of the individuals I study and those potential realities that exist independent of the individuals being aware of them (see Walsham 1995). In practice, this means that on one hand, I see the social reality of individuals as socially constructed in interaction and as intersubjective, arising from the understandings and meanings individuals give to the things in their life as they experience and interpret them in social situations (see De Jaegher et al. 2016; Orlikowski and Baroudi 1991). On the other hand, I also acknowledge that in addition to these, some objective facts can exist, too (see Walsham 1995).
I made the choice to adhere to moderate interpretivism to complement my interest in human social behavior with and around ICT as subjective, situational and negotiable, but nevertheless influenced and constrained by some realities independent of the perceptions of these individuals. In this thesis, I see sociality as a behavioral phenomenon based on interaction that both is situational and also has some structural properties. Examples of my assumptions about independent realities include assuming that humans are social by nature and have an innate tendency to engage in interaction, and that they are geared toward understanding others (Junglas et al. 2013; see Levingson 2006; Simmel 1910, 1949). I also assume that some universal principles and enduring structures in social behavior can exist without the individuals being fully aware of them, such as the human turn-taking system in interaction (Levingson 2006; Sacks et al. 1974; Stivers et al. 2009). Further, I assume that some social expectations exist and that they are formed based on individuals’ previous experience (see Goffman 1959, 1963, 1970, 1983). However, I acknowledge lived social reality can contradict with these social expectations and as a result, during the course of their actual real-life behaviors, individuals can find themselves behaving in ways that do not align with their prior assumptions (Festinger 1953). Further, over time and cumulative experience, these real-life behaviors, if successful enough, can shape the social reality of the participants, aligning their expectations about social behavior to match their actual behaviors (Festinger 1953; Mead 1962). Therefore, I assume that socially constructed structures such as norms, values and practices can situationally influence, constrain and guide, but not rule, the lived reality of social behavior (see Giddens 1984). Taken together, in my research, I emphasize the unfolding of real-life everyday social behavior and the meanings constructed in it as forming the social reality of individuals and guiding their future behavior, over their perception of the pre-existing rules and norms.

Along with the interpretive methodology (Orlikowski and Baroudi 1991; Sarker et al. 2013), I assume that the socially constructed reality of individuals can be accessed by inspecting the tensions between actual social behavior and social constructions, including objects such as ICT, the ways in which these objects are used and the shared meanings individuals associate with them (Myers 2013). By obtaining information about what kinds of struggles individuals face in their lives as a by-product of these tensions and how and with what kinds of outcomes they cope with them in interaction with their surroundings as an ongoing process, research can reveal these meanings (Myers 2013). To reveal these struggles, interaction processes and accompanying meanings, I chose a qualitative research approach, relying on observing the interactions between individuals and ICT through video recordings. With this choice, my aim was to allow individuals to express their interpretations of their social behaviors in interviews (see Orlikowski and Baroudi 1991).

These assumptions and choices are important, because in this thesis, I am interested in the struggles individuals face in their everyday lives and the ways in which they resolve them in their daily social behavior. Because the unfolding of the conduct of everyday behavior can change individuals’ perceptions about that behavior (Festinger 1953), I assume that those struggles and their resolutions I address in this thesis are the very foundations of changing social behavior. Today, the behavioral situations where these kinds of social dilemmas are present, increasingly include negotiating over the inclusion of both the digital and physical worlds and ICT (Roberts and David 2016). In this way the ways in which ICT are used can also change social order; that is, the basic premises by which individuals understand and approach each other and collaborate (see Kling 1991).
To be able to focus on the processes and mechanisms related to the above, I chose moderate interpretivism, assuming that individuals have some expectations that guide, but do not rule, their behavior and that these expectations can be challenged and changed with their lived experiences. In my thesis, I focus on the ways in which these conflicts and tensions arise and are resolved and the kinds of symbolic meanings and courses of action they facilitate for these individuals.

3.2 Theoretical background

3.2.1 Social constructionism and symbolic interactionism

In this thesis, the informing theories I use all belong to the social constructionist tradition. I chose this theoretical background to emphasize the role of interactions with and around ICT in shaping social behavior. According to social constructionism, individuals construct a meaning for the things they encounter in interactions with other individuals (Berger and Luckmann 1967; Miranda and Saunders 2003). In this viewpoint, the social reality of individuals is based on their experience and social surroundings and is therefore both subjective and situated, evolving over time (Berger and Luckman 1967).

Paper 1 uses constructionism as an underlying assumption, while paper 3 adheres to it explicitly. In papers 2 and 4, in turn, I use symbolic interactionism, a sub-division of social constructionism, focused on addressing the real-life, situational social behavior being conducted with symbolic meanings (meaningful representations) and their construction in everyday interaction (Aakhus et al. 2014; Blumer 1969; Charon 2007; Mead 1962).

Symbolic meanings refer to mutually shared understandings about things in the world, such as a tablet computer or ICT interruptions (Aakhus et al. 2014). Based on symbolic meanings, social interaction and collaborative efforts, such as teamwork, become possible (Aakhus et al. 2014; Blumer 1969; Charon 2007; Goffman 1959; Mead 1962; Miranda and Saunders 2003). Symbolic meanings guide and affect interaction, but they do not rule it (Aakhus et al. 2014).

Symbolic meanings are evolving and malleable and ongoing interaction with things in the world is meaningful and consequential to them (Charon 2007). Consequentiality means that the process of interacting with things gives rise to the symbolic meanings associated with them, when interpreted socially with other individuals in micro-level interaction (Charon 2007; Blumer 1969). In symbolic interactionism, these other individuals can be present either in a f2f environment (Goffman 1959), a digital environment (Aakhus et al. 2014), both environments, mediated by ICT (Brenner et al. 2014; Middleton et al. 2014), or as a “generalized other,” referring to an internalized, mental image of the social demands of other people, enduring even when an individual is seemingly alone (Mead 1962).

Symbolic meanings are constructed daily and situationally in everyday social encounters, but they can also endure: when individuals repeatedly construct certain symbolic meanings in relation to something, they come to expect these in the future, too (Mead 1962). These recurrent, routinized interpretations guide the ways in which individuals approach these in the future and perceive the social demands (the mutually expected ways of interacting in a given situation) around them (Charon 2007; Goffman 1959; Mead 1962). Today, individuals routinely combine their physical and digital-world social activities with ICT use (Hess et al. 2014; Nüesch et al. 2015). In this way, ICT takes part in the individuals' meaning-making
practices, both enabling and constraining interaction (Faraj et al. 2011; Majchrzak et al. 2013), also through ICT interruptions (Addas and Pinsonneault 2015).

### 3.2.2 Informing theories

In this section, I give an overview of the use of theories informing the papers included in my thesis. In interpretive research, it is possible to use theory in three ways: 1) as an initial framework for data collection, 2) as part of data collection and analysis and 3) as the final product of the research (Walsham 1995). I clarify my use of theory in Table 1, below.

**Table 1. Use of theory (After Walsham 1995).**

<table>
<thead>
<tr>
<th>Use</th>
<th>Paper 1</th>
<th>Paper 2</th>
<th>Paper 3</th>
<th>Paper 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial framework</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Data collection and analysis</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Final product of research</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

In Table 2, below, I provide a summary of the informing theories I use in each paper and the main theoretical ideas that I draw on.

**Table 2. Informing theories and their main points.**

<table>
<thead>
<tr>
<th>Paper</th>
<th>Informing theory</th>
<th>Summary of the main theoretical ideas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Social values and family values, individualization (see Beck and Beck-Gernsheim 2008; Giddens 1984)</td>
<td>Social and family values guide family behavior. However, they are challenged by individualization. This development can result in tensions and conflicts within families when the family values collide with the individualized wishes of each family member.</td>
</tr>
<tr>
<td>2</td>
<td>Symbolic interactionist view (Mead 1962), Literature on turn-taking in interaction (Mead 1962; Sacks et al. 1974; Stivers et al. 2009)</td>
<td>Individuals attach symbolic meanings to the things (such as ICT) they encounter in their lives based on the ways in which these function as part of their everyday. Turn-taking is a structural system keeping social behavior orderly and helping individuals to understand each other. While humans are born with readiness for turn-taking, its details have to be learned in interaction with others.</td>
</tr>
<tr>
<td>3</td>
<td>The social construction of meaning (Berger and Luckmann 1967). Literature on informal interaction (Coupland 2000)</td>
<td>Individuals construct a symbolic meaning for the things they encounter in interactions with other individuals and also objects, such as ICT. Informal interaction helps in this process by providing background information for the symbolic meaning-making.</td>
</tr>
<tr>
<td>4</td>
<td>Symbolic interactionist view (Blumer 1969; Goffman 1959; Mead 1962), together with theory on collaboration as a social performance (Goffman, 1959)</td>
<td>Individuals attach meanings to the things they encounter in their lives (such as ICT), based on the ways in which these function as part of their everyday. Collaboration at work can be seen as a social performance that the participants give to each other. Keeping up a performance requires that the participants collectively commit to it.</td>
</tr>
</tbody>
</table>

### 3.3 Research approach

#### 3.3.1 Qualitative research

In this thesis, I use a qualitative approach, to complement the novel nature of my research problem, comprising questions about how individuals do things with and around ICT and how ICT contributes to their behaviors, as recommended by the literature (see Myers 2013;
Sarker et al. 2013; Van de Ven 2013). Qualitative research methods include fieldwork approaches such as ethnography, action research approaches, case studies and grounded theory (Myers 2013). In qualitative research, data can be obtained with interviews, questionnaires and observation techniques, such as video-recording and making notes (Myers 2013).

Table 3, below, summarizes the qualitative methods I have used in the papers included in this thesis, with their accompanying data collection and analysis techniques. Over the next sections, I explain the details of each and devote the next chapter to the ways in which I obtained data for my research.

Table 3. Summary of methods.

<table>
<thead>
<tr>
<th>Paper</th>
<th>Qualitative method</th>
<th>Data collection method (analysis method)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Micro-ethnography, Action design research</td>
<td>Video recordings (multimodal interaction analysis), interviews (content analysis)</td>
</tr>
<tr>
<td>2</td>
<td>Micro-ethnography</td>
<td>Video recordings (multimodal interaction analysis), interviews (content analysis)</td>
</tr>
<tr>
<td>3</td>
<td>Micro-ethnography</td>
<td>Video recordings (multimodal interaction analysis)</td>
</tr>
<tr>
<td>4</td>
<td>Micro-ethnography</td>
<td>Video recordings (multimodal interaction analysis)</td>
</tr>
</tbody>
</table>

3.3.2 Micro-ethnography

Ethnography comprises a set of qualitative approaches, where the researcher acquires in-depth knowledge about a phenomenon of interest by observing what the individuals are doing and how they go about their daily lives, either unobtrusively (without taking part in the observed activities), or through participant observation (by actively taking part in the action observed) (Myers 1999). Interviews and asking questions about the ongoing actions can be included as supplementary data, if desired (Jarrett and Liu 2016). With ethnographic approaches, it is possible to gain an in-depth understanding of the research interest, because an ethnographer aims at understanding all aspects of the phenomenon, including the individuals, their ways of organizing their lives and the context in which they are embedded (Myers 1999). The overall aim of ethnography is to capture as much evidence about real, naturally occurring behavior as possible, instead of relying on the perceptions of the subjects (Myers 1999). Within the ethnographic tradition, there are several different possibilities for approaching the research interest, such as confessional and critical ethnography, netnography (digital ethnography) and micro-ethnography (Babbie 2010; Jarrett and Liu 2016; LeBaron 2005; Schultze 2000; Van de Ven 2013).

All the papers in this thesis are using the micro-ethnographic approach. The distinct feature of micro-ethnography is its interest in uncovering how individuals do things in their real life by focusing on the minute details of interaction in a high level of detail (LeBaron 2005). Because of this attention to detail, micro-ethnographers tend to focus on short but significant episodes in interaction, such as those moments when decisions are made in a team or the interaction dynamics become salient (such as participants getting angry, losing focus, or becoming very engaged in interaction) (Jarrett and Liu 2016). These significant episodes can be very brief, lasting from a few seconds to a couple of minutes, but they can be also be longer, as the aim is to include the initiation, conduct and termination of the significant action (Jarrett and Liu 2016). Within the significant episodes, called “cases,” micro-ethnographers aim at recognizing and classifying the minute details of interaction over time, assuming that by
uncovering the structure and temporal organization of this specific social behavior within the case, it is possible to understand and explain that behavior (Jarrett and Liu 2016; LeBaron 2005; LeBaron et al. 2017; Streeck et al. 2011). The number of cases included in a micro-ethnographic study varies from a few to several dozens, depending on whether the research aim is to understand the structure of a social phenomenon in a specific context, or to generalize the findings to a wider context (Jarrett and Liu 2016).

In micro-ethnographic research, minute details of both the verbal and nonverbal interactions between individuals and individuals and objects are examined in relation to the context where they unfold (LeBaron 2005). This requires the micro-ethnographer to immerse themselves in the specific research phenomenon in its context, by spending lengthy periods repeatedly observing that specific phenomenon (LeBaron 2005). Because micro-ethnography requires examining the minute details of interaction, micro-ethnographies are often conducted based on video-recorded observations, either as such, or supplemented by participant observation, making notes and sometimes interviewing subjects (Jarrett and Liu 2016; LeBaron et al. 2017). Although it is possible to do micro-ethnography without video-recording the observations, in practice, micro-ethnographies are often conducted based on observing the phenomena of interest from video recordings, because of the various benefits associated with this approach (LeBaron 2005). I will discuss the details of video recording-based observation next.

### 3.3.3 Video-recording based observation

The advantage of using video recordings for micro-ethnography compared with the method of observing behaviors without video-recording them is that video-recording observations is a permanent way of storing all the ongoing action (Mondada 2008). Because of this, social situations can be revisited over and over again, just as they took place in real life (LeBaron 2005; LeBaron et al. 2017; Mondada 2008).

Using video recordings in micro-ethnography enables both verbal and nonverbal social behaviors to be captured in all their richness and flow, compared with making notes, drawing and taking pictures in the situation, as the latter approach produces snapshots of the social processes (Mondada 2008). This is important, as in ethnographies, the researcher does not know in advance which behaviors are significant to the research interest, which is why the aim of ethnographic observations is to gather as much detail as possible (Babbie 2010).

It has been suggested that a significant part of human social behavior is nonverbal and that nonverbal behavior is an important driver behind human social processes (Levinson 2006). The importance of also addressing nonverbal behavior in analysis has been acknowledged in IS for a long time (Jenkins and Johnson 1977). However, analyzing nonverbal behavior in IS has been sparse, due to the dearth of methods for addressing it (Andrade et al. 2015). It has been suggested that using video-recordings could be a way forward in addressing the nonverbal behavior (Andrade et al. 2015).

In video-based ethnographies, the researcher does not have to be physically present in the research environment during the data collection although s/he can be (Knoblauch 2006). In this way, video-recording can make capturing real social behavior attainable, because the researcher can be absent from the situation, thereby not affecting the ongoing action (Andrade et al. 2015). In addition, with video recordings, the subjects can sometimes forget they are being researched, especially if the cameras are positioned out of their view, compared with the researcher being in the situation with them, observing, or even taking part in the
action (Mondada 2008). The options for video recording include the researcher recording the ongoing action with a handheld camera, the informants documenting their life themselves and using either one or several stationary cameras that can be either visible to the subjects or hidden from their view. Each of these approaches has its strengths and drawbacks that I open up below.

When the researcher is collecting data with a handheld camera, s/he can focus the camera on what is interesting and even ask questions about the ongoing action, where relevant (Knoblauch 2006). However, with this approach, there is a risk of ignoring something else going on in the research context and the researcher affecting the behavior of the informants. In addition, when the camera is visible, informants can become camera-shy and modify their behavior (Babbie 2010). In my study, I used a combination of a handheld camera and a stationary one in papers 1 and 2. In addition, the method of the researcher using a handheld camera is time-consuming, as ethnography is in general (see Myers 1999).

When informants capture their lives themselves, they can provide deep and fresh insights that the researcher would not have thought of. However, with this approach, there is also the risk of posing for the camera and staging the behavior to match the assumed expectations of the researcher (Babbie 2010).

The third approach of collecting video data is using one or multiple stationary cameras to capture an overall view of the ongoing action. At its best, this results in capturing all the fine details of interaction, without any prior evaluation about what is important and what is not (Knoblauch 2006). Provided that the cameras are positioned correctly (see LeBaron et al. 2017 for details), especially when multiple cameras are used, this approach can provide very rich data (Knoblauch 2006).

In addition, informants can more easily forget stationary cameras, compared with being followed by the researcher with a handheld camera or using the camera themselves (Babbie 2010). This is even more likely when the cameras are hidden so that the participants cannot see them, and therefore capturing natural behavior with this approach is more likely than with the other camera choices (LeBaron et al. 2017).

The risks of the stationary camera approach are that, once positioned, the camera angles cannot be adjusted: if the relevant action takes place outside the camera placement, it will not be seen and sometimes not even heard (LeBaron 2005). In addition, the stationary camera approach often results in a huge mass of data that can be difficult to store and analyze, as it can comprise periods of non-action alternating with periods of highly relevant action in a random way (Knoblauch 2006).

The advantage of all the video-recording approaches is that they capture the behavior exactly as it occurred, allowing the researcher to revisit the real-life social situations captured over and over again, up to the finest detail (Mondada 2008). With the resulting data, the researcher can zoom into the interesting interaction and play the videos in slow-motion, in loops and even backward, as desired (LeBaron et al. 2017; Mondada 2008).

Table 4, below, provides a summary of the video-recording techniques used in each of my papers.
Table 4. Summary of video-recording techniques.

<table>
<thead>
<tr>
<th>Paper</th>
<th>Single/multiple cameras (number of cameras used):</th>
<th>Positioning of cameras: Stationary/handheld</th>
<th>Salience of cameras in context: Visible/hidden</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Multiple (2)</td>
<td>One stationary and one handheld by a research assistant</td>
<td>Visible</td>
</tr>
<tr>
<td>2</td>
<td>Multiple (2)</td>
<td>One stationary and one handheld by a research assistant</td>
<td>Visible</td>
</tr>
<tr>
<td>3</td>
<td>Multiple (2)</td>
<td>Stationary</td>
<td>Hidden</td>
</tr>
<tr>
<td>4</td>
<td>Both single and multiple (1 to 4 per research site)</td>
<td>Stationary</td>
<td>Both visible and hidden</td>
</tr>
</tbody>
</table>

A limitation often associated with ethnography is that if only one context is studied, the generalizability of findings can be compromised, but this can be overcome by including several data sources (Myers 1999), as I have done in my research. In addition to including several data sources, my research is focused on the ethnography of interactional micro-level social behavioral processes, where the research interest is the fine details of human embodied action, lasting from a few seconds to a couple of minutes each. These are present in abundance in even the short video recordings of real-life action (LeBaron 2005; Streeck et al. 2011).

I chose to use video recording-based micro-ethnography as a method because I wanted to understand how social outcomes unfold as sequences of interactions in real social life. Video recording can capture this sequentiality and temporal organization of social behavior in detail (see LeBaron et al. 2017). Researching the sequentiality and temporal organization of real social behavior highlights the importance of everyday actions in producing social outcomes, an important viewpoint currently underused in IS (Aakhus et al. 2014). In addition, video recordings capture the ongoing social action in its full richness and make it possible to investigate all its facets (Mondada 2008).

These choices are important for my knowledge claims coming up in the findings, as well as for the generalizability of my results. This is because even though qualitative research is context-bound, inspecting the micro-foundations of structural social phenomena can help in understanding and explaining how higher-level social phenomena emerge from the series of events and event cycles between individuals and ICT, compared across several individuals and teams (Klein et al. 1999; Sarker and Valacich 2010).

3.3.4 Action design research

In addition to video ethnography, paper 1 also uses action design research (Sein et al. 2011) as a method. In action design research, the goal of the research is to build and evaluate an IT artifact and produce generalized knowledge based on a background theory and a practical problem that is solved together with the company (Sein et al. 2011). In action design research, the IT artifact is built over several cycles of building, intervention and evaluation together with the case company (Sein et al. 2011). Frequent visits to the organization of interest are conducted over an extended period of time, to gain in-depth knowledge about the organization.

In my paper 1, the research aim was both to discover how ICT use can introduce tensions into family life and how to design to mitigate these in the case context, public service broadcasting. To this end, the case company, Yleisradio, was visited repeatedly during the study.
Video recordings of the families with young children were obtained using the video ethnography method, visiting each family once.

3.4 Data collection and analysis

This section gives an overview of the datasets I used in this thesis, the ways in which I analyzed the data and a summary of the analysis methods and theories used in each individual paper.

3.4.1 Data collection

I addressed naturally occurring social behavior using video recordings obtained from both work and leisure social situations, supplemented with interviews in some cases, as specified below. To boost the generalizability of my research, a suggested limitation of ethnography (see Myers 1999), I collected data from both leisure and work contexts. I chose this approach because the ways of using ICT are different in these contexts and this impacts social expectations toward ICT and around using it: work ICT use is often mandated by the work setting, while ICT use during leisure is voluntary (Chen and Karahanna 2014; Hess et al. 2014; Mazmanian et al. 2006). I also included different organizations, with participants of various ages, educational and cultural backgrounds, in various kinds of work situations, because these can affect the ways in which individuals approach social behavior with and around ICT (see Wang et al. 2013).

I obtained data from eight different sources. I collected two datasets myself (those used in papers 1, 2 and 4). I then gained access to six additional datasets based on multidisciplinary research collaborations with various universities and companies. My data covers video-recorded real-life interaction with and around ICT from 2011 to 2017. During the data collection period, none of the researchers collecting data neither the participants knew the recordings would be used for analyzing the ways in which individuals combine the digital and physical worlds with and around ICT use. Because of this, the videos are free of the participants anticipating socially appropriate ways of behaving when combining the digital and physical worlds with ICT, as can sometimes be the case when video-recording individuals (see Babbie 2010; Goodwin 1993). Taken together, the video recordings open up a unique window to the real social life of individuals with and around ICT, both at work and during leisure. Below, I give an overview of each dataset.

**Dataset 1 (used in papers 1 and 2)**

This dataset addresses the leisure context. It comprises videos of real-life interactions between ICT and young children (3 to 6 year olds) in their social surroundings, including parents, siblings and me or an YLE representative as the visiting researcher, together with parental interviews. I collected this data in 2013, in Finland, in collaboration with Yleisradio (YLE). YLE is a public service organization with which I did a joint research and development project with an objective to redesign its website comprising gamified mobile apps for young children. I collected data with a YLE researcher, by visiting the homes of ten families with at least one young child. Five of the families were volunteers recruited by Yleisradio and five were recruited by a commercial consumer research agency.

As it has been suggested that children younger than two should have limited contact with ICT, due to concerns about its effects on their development (Brown 2011), the young children
included in this study were three to six-year-old at the time of recording. Five of these young children are between three and four years and five are between five and six, both age groups including both boys and girls. The family visits lasted around two to three hours each. They were video-recorded from the beginning to the end using two camera angles: a camera hand held by a research assistant was used for ICT screen capture and to zoom into the details of child-computer interaction, while a stationary one recorded an overall view of the family context.

During the visits, each young child was first given his/her favorite ICT and allowed to use it as desired, to record the real interaction between them and ICT. The children were not interviewed, but were given a chance to express their views in a form of a play session, as recommended by literature (see Druin 2002; Fails et al. 2013). Here, I asked the young child to explain what s/he was doing with the ICT at the moment and why. I also asked if I could try using the ICT, but pretended to be hesitant, constantly asking the young child for assistance. With this approach, I could also observe how the young children behave around ICT, in other words, how their interaction with ICT impacts their interaction with the others in their social context. In addition to me interacting with the young child, the videos also include an occasional parent or sibling stopping by during the visits.

Parents were interviewed separately from their young children using ICT, with a semi-structured interview guide. To avoid priming them to see ICT as impacting on the social behavior of their young children (see Babbie 2010), especially as individuals tend to view non-compliance with their preferred social conduct as negative by default (Stivers et al. 2009), the parents were asked to describe their life at home with and around ICT. The questions included their young children’s most and least favorite ICT, typical ways and times of using them, positive and negative experiences with ICT, potential preferences, restrictions and trouble related to ICT use and learning, and also details of their family life and relationships between young children, parents and siblings, with and around ICT, in general.

**Dataset 2 (used in papers 3 and 4)**

This data addresses the work context, by simulating virtual teamwork in a temporary team working in a virtual world (SecondLife). Data were collected in 2012 in Finland, by my co-author for paper 3, PhD Kohonen-Aho from Aalto University School of Science. I gained access to this data through our research collaboration for paper 3.

In this data, virtual teamwork in temporary teams was simulated with student volunteers, with time constraints (see Dabbish and Kraut 2008; Li et al. 2011; Schiller et al. 2014). A total of 36 students were included as participants, with a mean age of 23.8 years. In the videos, the participants can be seen collaborating as avatars in 12 randomly assigned teams in SecondLife, with no interaction across the 12 teams. In addition, they can also be seen using their smartphones for extracurricular tasks. Each team session lasted 2.5 hours. These data comprise video recordings of the 12 team sessions, totaling 30 hours. Data include both a video-recording of the collaboration environment in SecondLife where the three team members are situated together as avatars, and individual video recordings of each participant in their real-life location, with verbal and nonverbal transcripts of the team interactions. In addition to the videos and transcripts, each team’s collaboration outcomes, the written answers to the routine and creative tasks, are included in the data.
**Dataset 3 (used in paper 4)**

This dataset addresses the leisure context. It includes videos of families spending time together at home with and around ICT, with children playing video games both alone and with friends and parents doing work-related tasks either alone or while spending time with their family. Data were collected in 2011 and 2012 in Finland, with 24 participating families, recorded by using four stationary video cameras in each family. These data were collected by the researchers of Tampere University Center for the Research on Children, Youth and Families (PERLA) and I gained access to the dataset through a joint research collaboration for paper 4, a book project (see Tiilikainen and Arminen 2017, not included in this thesis) and further collaborations not included in this thesis.

To collect these data, a research assistant from PERLA visited each of the 24 families twice. First, she asked about the family’s everyday routines and media use to decide the most suitable day for the video recording and the best locations for the cameras. During the second visit, the research assistant installed the video cameras to record fixed locations (living room couch, TV screen capture, kitchen table and an additional environment where the family said they spent time using ICT). The assistant turned the cameras on before leaving and the parents turned the cameras off in the evening. The next day, the research assistant came to collect the cameras. The resulting videos total about 665 hours, with each recording lasting from three to 11 hours. To help in navigating the data, another research assistant described and documented the events in each video at ten-minute intervals.

**Dataset 4 (used in paper 4)**

This dataset addresses the work context. It comprises videos of five teams of four knowledge workers each, testing a prototype for a new digital service called Beamer. Data were collected by PhD and Researcher Sean Rintell in the Human Experience and Design group at Microsoft Research, Cambridge UK, in 2014. Data includes knowledge workers of several nationalities. I gained access to this dataset through ongoing research collaboration for paper 4 and additional collaborations not included in this thesis.

The participants included in this data are employee volunteers within one company. Their average age is 29 years with a SD of 4.10. Each prototype testing session lasted about 20 minutes. The team was divided into two locations, with one participant in one room and three in another. They were instructed to jointly design a t-shirt. They were given a mobile phone each, with an application called Beamer (the prototype being tested), Internet Explorer, Office, camera, photo gallery, and calendar. The sessions were video-recorded with a video camera capturing both the collocated participants and the single participant from a shared screen. The resulting videos total three hours.

**Dataset 5 (used in paper 4)**

This data addresses work in a municipality context, where distributed teams collaborated on a joint objective. Data were collected in 2013 and 2014 in Finland, by my coauthor for paper 3, PhD Kohonen-Aho from Aalto University School of Science, and I gained access to it through our research collaboration for joint projects not included in this thesis.

Data were collected from two workshops, where a total of 11 teams were taking part over several locations. In the first workshop, with four participating teams, the joint objective was developing a new school campus. In the second workshop, with seven participating teams, the joint objective was developing collaboration and business case possibilities for an emerging network of entrepreneurs in creative industries. In both workshops, some of the teams
were located with a master facilitator keeping track of the workshop schedule, while the rest were in further locations with assisting facilitators. The participants could interact freely within their own team and with their local facilitator. They heard the master facilitator’s voice through Skype, but could not talk to them or to the other teams attending the meeting. Instead, the teams were instructed to interact over Presemo, an experimental text-based collaboration application enabling asking questions, discussion, ideating and voting. This data comprises video and audio recordings of interactions in the participating teams, together with the content logs of their interactions in Presemo. In addition to using Presemo, the participants periodically used their personal ICT for extracurricular tasks. The video recordings in this dataset total 21 hours.

Dataset 6 (used in paper 4)
This dataset addresses the work context. It includes teams comprising Masters’ students and academic knowledge workers, collaborating on various research projects. Data were collected between 2013 and 2015 in Finland, by my coauthor for paper 3, PhD Kohonen-Aho from Aalto University School of Science. I gained access to this data through a research collaboration not included in this thesis. In this dataset, a total of three teams can be observed having meetings in an f2f setting while also using their personal ICT, discussing how to proceed with their research projects. These video recordings total 54 hours.

Dataset 7 (used in paper 4)
This dataset addresses the work context. It comprises video recordings of knowledge workers (company representatives) and Masters’ students, working together on ICT research and development projects for the participating companies, in global, multicultural, and distributed teams. PhD Antero Hirvensalo from the Aalto University School of Science, collected this data in 2016, in Finland. I gained access to it through our research collaboration not included in this thesis. In these videos, a total of four teams, comprising participants from several countries, nationalities and ages, can be seen in two different teamwork contexts.

In some of the videos, the participants are having distributed meetings, where part of the team is in a joint f2f environment and further teams are taking part over Skype. In these recordings, the cameras are positioned to capture both the participants in the f2f environment and those in Skype. Some videos, in turn, include the individual teams having f2f meetings about their next steps regarding their project. In all the videos, the participants can also be observed using their personal ICT. These videos total 25 hours.

Dataset 8 (used in paper 4)
This data addresses the work context. In these data, one group of academics is having an f2f meeting, discussing and making decisions on teaching-related administrative issues. I collected this data in 2017, in Finland. The participants represent various nationalities and ages. This video totals 48 minutes. In the recording, the participants are also using their personal ICT during the meeting.

3.4.2 Data analysis
My unit of analysis in all the papers included in this thesis is a small group of individuals, where each individual impacts and is impacted by both the ICT use environment and the social context of use (Eynon and Helsper 2014; Junglas et al. 2013; Lamb and Kling 2003; Miranda and Saunders 2003). To answer my overall research question and the accompanying
sub-questions, I conducted four independent but interrelated examinations of my data. Based on their results, each paper included in this thesis, focuses on the social interactions, processes and mechanisms between individuals for combining physical and digital-world social activities with and around ICT during leisure (papers 1 and 2), at work (paper 3), or a combination (paper 4).

In my analysis, I inspected the tensions, negotiations and adaptations in social behavior that arise when sociality across the digital and physical worlds is being combined with and around ICT use. In this analysis, I identified and mapped the boundaries and thresholds of socially acceptable and non-acceptable behavior and took note of whether and how the participants succeeded or failed in their efforts to combine the digital and physical worlds into a hybrid social environment. To answer my overall research question, I inquired about the social acceptability of ICT in the combining behaviors and the social tolerance toward ICT in them by interviewing the participants and observing interaction between the users and ICT (papers 1 and 2), or focusing on observing the real social behavioral processes between the participants (papers 3 and 4).

**Analyzing video data**

To analyze the videos, I used Elan video annotation software (Brugman and Russel 2004). I used Elan to synchronize videos obtained from those datasets comprising several camera views (such as the datasets used for papers 3 and 4), as well as making annotations on the data.

With video data, I could observe the minute details of social behavior over and over again, as they took place in real life (see Mondada 2008). This kind of micro-level ethnographic approach reveals how social situations unfold, with and around objects, and how the sequences of the tiny details included are consequential to the interaction, which means that they result in tangible outcomes for the sociality (LeBaron 2005). The synchronizing of several simultaneously recorded video captures in papers 3 and 4 gave me a multi-window view on the parallel social processes simultaneously taking place across several locations.

To code and analyze all the video data, I used multimodal interaction analysis (Andrade et al. 2015; Jewitt 2014), adapting techniques multimodal conversation and interaction analysis (Sidnell 2007; Stivers and Sidnell 2005). With this approach, I inspected the speech and gestural acts of individuals in relation to their social surroundings, examining what and how is being said (see Goodwin 2000, 2007; Heath et al. 2010; Jordan and Henderson 1995; Streeck et al. 2011). In the following sections, I open up the detailed processes of managing and analyzing video data I used for this thesis.

**Storing and managing video data**

The video data I analyzed for this thesis comprises hundreds of hours in total. Video data takes a lot of storage space and for this reason it is most practical to store the vast datasets in cloud servers. Smaller datasets can also be stored in portable hard drives and selected video clips can be stored in a laptop. Some of the datasets used in this research (those from datasets 2 to 7), originate from research collaborations. These data were stored in the servers (dataset 2 and datasets 4 to 7), or hard drives (dataset 3) of the universities who own them. In the case of datasets stored in servers, I was given guest access to them. Regarding dataset 3, I visited the university storing the data in person for each round of analysis. As datasets 1 and 8 were of manageable size and collected by me, I stored them in a portable hard drive kept in a locked cupboard to ensure confidentiality, as recommended by LeBaron et al. (2017).
Initial explorations and content logs
I conducted the analysis of the video data over several rounds. First, I observed all the video material related to each study, to gain a working understanding about the social processes involved, as organized into sequences of action unfolding in time and space. I chose this approach because sequentiality, referring to the unfolding of actions in time and space, is a fundamental human way of experiencing and structuring social action (Levinson 2006). The sequentiality of social action is notably difficult to capture and analyze, as its details are rich and fine-tuned (Langley 1999), but with video-recorded data, it becomes attainable (LeBaron et al. 2017).

After the initial explorations, I proceeded to more detailed analysis, writing content logs about the social action observable in the data. This included describing the social actions going on in the data, time-stamping the processes and also making annotations about potentially meaningful moments related to the combining of the digital and physical worlds with and around ICT use, such as an individual noticing a pop up screen on his/her laptop, as recommended by (LeBaron 2005).

As dataset 3 was the first I gained access to, I began analyzing data from there. Dataset 3 comprises 665 hours of videos. Here, I started with reading the 280 pages of content logs produced by the PERLA research assistants, describing the events in data as time-stamped every 10 minutes. Based on reading these transcripts, I focused my sampling within this dataset on those time slots that included more than one participant and ICT, as relevant to my research questions. Next, I gained access to dataset 1, then datasets 2 and 4 to 8, analyzing them in this order. In practice, I analyzed all the material included in the shorter datasets 1, 2, 4 and 8. Regarding the vast ones, numbers 3, 5 and 6, I randomly sampled within each of them, until saturation of the phenomenon addressed.

Overall, this phase in the analysis resulted in content logs of data that described the ongoing social actions in detail, with time-stamps that helped me navigate the data.

Identifying and analyzing cases in the video data
After writing the content logs, I started identifying the variations in the processes and outcomes regarding the combining of the digital physical worlds with and around social ICT use in more detail. During this phase, my aim was to reveal the visible and audible sequential organization of my phenomena of interest, as recommended by literature on video methods (see LeBaron et al. 2017). The rationale behind this kind of analysis is that a sequence is the fundamental way for individuals to experience and make sense of their everyday life and as social behaviors unfold through time and space, these activities gain a meaning in relation to their position within these sequences (LeBaron et al. 2017; Levinson 2006).

In practice, I conducted this part of the analysis by watching the processes identified in the previous phase repeatedly. During this part, my goal was to identify the beginnings and ends of each combining process and the events unfolding in between in detail. Whenever I discovered any of these, I tagged them with time-stamps and described what was taking place in data in relation to each time-stamp. This phase resulted in select data excerpts called “cases.” In multimodal interaction analysis, cases refer to examples of complete social processes demonstrating the unfolding of the phenomenon of interest in its different forms (LeBaron 2005). Each of the cases I captured lasts from about thirty seconds to a few minutes.
Next, with a series of screenshots, I revisited the cases and formulated visual sequences to represent the social processes within them. With these screenshots, I documented the actual processes as a series of “transitional moments” unfolding sequentially from the beginning of a case until to the end. A transitional moment refers to a point in interaction when the flow of interaction changes and documenting them in their temporal order can reveal how the outcome of the process unfolds (Langley 1999; Schegloff 1996, 2007). In these series of screenshots, I included the antecedent condition of the phenomenon of interest (such as the ongoing teamwork just before an ICT interruption arose), and the events following it, such as one or more individuals noticing the ICT interruption, reacting to it, the individuals commenting on the ICT interruption or the actions of each other, signs of social offense appearing and disappearing and as the last screenshot the outcome of the process, such as the teamwork being resumed or the individuals exiting the situation because of being offended by each other’s actions with and around ICT.

In addition to the screenshots, I also took short video clips of these cases, lasting from one to three minutes, on average, about the social processes representative of those phenomena I wanted to address in each study. These video clips are a little longer than the actual cases, to enable demonstrating how each case begins with the initial transitional moment, becoming salient amidst the overall social action, and dissolving with the final transitional moment (see Mondada 2008; Schegloff 1996, 2007).

I analyzed every dataset in this way, continuing tagging the social processes, until the data saturated and no more cases that contributed to the phenomenon with new information could be found with further sampling within that dataset, as recommended by Langley (1999). Table 5, below, summarizes the cases I analyzed in each dataset. Table 5 lists the datasets in the order I analyzed them, to show the saturation of my research phenomenon across the datasets.

**Table 5. Number of cases analysed in each dataset.**

<table>
<thead>
<tr>
<th>Dataset number</th>
<th>3</th>
<th>1</th>
<th>2</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of cases</strong></td>
<td>120</td>
<td>74</td>
<td>70</td>
<td>58</td>
<td>35</td>
<td>15</td>
<td>10</td>
<td>9</td>
</tr>
</tbody>
</table>

These two types of cumulative evidence about the cases, the case descriptions and their accompanying series of screenshots and video clips, enabled me to discover the recurrent and repetitive micro-level social patterns, processes and outcomes across the datasets. Next, I revisited the cases and made notes about their similarities and differences. During this phase, I paid attention to the various facets of the phenomenon such as the context (work, leisure or a combination), the urgency and origin of the social demands in each case (human or ICT, digital or physical world) and the ways in which the case was negotiated, together with their outcomes. The case descriptions, screenshots and video clips also serve as documentation of the phenomena and processes of interest, comprising a lasting body of evidence for the claims made based on the empirical material (LeBaron 2005).

Based on identifying repetitive and recurrent patterns, processes and outcomes across cases, I chose examples representative of these for the micro-level multimodal analysis and validating my analysis with peer evaluation. I explain these next.
Transcribing
After identifying the representative cases to cover the different facets of my research phenomenon, I analyzed these cases using micro-level multimodal interaction analysis. During this process, I first transcribed the cases. In multimodal interaction analysis, transcribing data means using a standardized notation for annotating cases to transform the gestural and tonal details of video data into a written format (Bezemer 2014). For transcription, I used the notation standard from Atkinson and Heritage (1989).

This micro-level transcription makes the minute details of interaction explicit and helps the analyst in identifying the structural details of interaction (LeBaron 2005). Further, transcripts are the basis for the peer validation of analysis and therefore using a standardized notation is important, as it makes the interpretations explicit and possible to evaluate in the peer validation process (Knoblauch 2006, see chapter “validation”).

My transcription of data entailed first observing the cases over several rounds and then playing videos in small chunks to focus on the micro-level details and writing them down in transcripts. Here, I transcribed data up to a resolution of 0.1 seconds, including all the tonal, gestural and temporal aspects in the transcription (Heath et al. 2010; Mondada 2008). To this end, I investigated the speech and gestural acts of the individuals in relation to their working teams, examining what and how was being said, together with the accompanying bodily orientations, such as the gestures the individuals used with and around objects and toward each other, together with the accompanying signs of social acceptance, offense or disapproval, such as nods, frowns or spoken statements, and transcribed them using the notation system (Goodwin 2000, 2007; Jordan and Henderson 1995; Streeck et al. 2011). I also used these transcripts in validating my analysis.

Combining the screenshots and transcriptions into process maps
In this phase, I combined the series of screenshots and their accompanying transcriptions within each case. With this combining, I formulated visual process maps about the social processes with and around ICT in data. The cumulating evidence from these process maps provided me with an understanding about the real-life interactional processes between individuals and ICT. I analyzed these micro-level processes until no more information about the events within the phenomenon of interest could be obtained from further inspections (Langley 1999; Van de Ven 2013).

Validating the analyses
To validate the analyses, I used the standard peer validation procedure from the conversation analysis tradition (Knoblauch 2006). Here, the cases were either transcribed by me (in papers 1 and 2), or separately by me and a coauthor (in papers 3 and 4). In papers 3 and 4, we compared our transcriptions and notes, resolving any differences by discussing them, until 100% agreement over the interpretation was reached.

Next, the transcripts with their accompanying video clips representative of the variation in the social processes of interest were presented to groups of external experts who specialize in analyzing both f2f and ICT-mediated interaction, over a total of nine video data session meetings. In each data session, I presented two cases. During the data sessions, the cases and their interpretations were discussed with the expert panel, resolving any difference by negotiating to 100% agreement, as recommended by Jordan and Henderson (1995) and Have (2007).
Analyzing interview data

To analyze parental interview data for papers 1 and 2, I used content analysis, (Krippendorff 1980). In the content analysis for paper 1, I focused on parental views about ICT use by young children and its effects on family life. Here, I started by classifying parental accounts into emergent categories, addressing parental concerns, hopes and suggestions for improvement related to their young children’s ICT use and the reasoning they gave for these.

After the initial categorizing, I revisited these initial categories to discover an overarching theme. Here, I discovered that when parents were talking about their concerns, hopes and suggestions for improvement, they were also talking about the ways in which their young children’s ICT use was either aligned or misaligned with their family values. These family values of the parents, in turn, guided parental thinking about the young children’s desirable and undesirable ways of behaving with and around ICT at home. After this discovery, I undertook a second round of coding to focus on these family values. In this phase, I classified the interview data into categories based on the family values brought up by the parents, together with the ways in which the young children’s ICT use either supported or challenged them and their outcomes for family life.

For paper 2, I also did the analysis in several rounds. First, I classified the parental interview data into initial categories based on the ways in which parents described ICT affecting the social behavior of their young children, both when the young children were interacting with ICT and when they were interacting around it with their parents, sibling and peers. Secondly, I matched these initial categories with the turn-taking patterns between young children and ICT I had observed in analysis of the video data of young children interacting with ICT. I summarized the parental views about the different ways of taking turns between the young children and ICT in each category. Next, I classified these as taking place in young children’s interaction with ICT, their interaction around ICT, or a combination. Last, according to the ways in which parents talked about the specific turn-takings, I classified these descriptions as positive, neutral or negative, including the reasoning the parents gave for them.

3.4.3 Ethical considerations

For this research, ethical considerations have been necessary, as the data are based on video recording participants in their real-life interaction situations with and around ICT (LeBaron et al. 2017). Table 6, below, illustrates the contexts of the videos used in each paper and the ages of the participants.

Table 6. Addressing the sub-research questions in the individual papers.

<table>
<thead>
<tr>
<th>Paper</th>
<th>Context of the recordings</th>
<th>Participant age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Home</td>
<td>Work</td>
</tr>
<tr>
<td>1</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>2</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>3</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>4</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

While planning and conducting this research, I adhered to the RESPECT code of conduct (CORDIS 2004) and the specific ethical guidelines of video research (Heath et al. 2010; Jordan and Henderson 1995) to ensure the ethical treatment of the participants. In addition, special guidelines giving guidance about researching children, were considered in that con-
text (Druin 2002). All the adult participants signed informed consent forms declaring their rights during the research and requesting the use of their data in publications. In addition the parents signed informed consent forms on behalf of their children. When collecting data for papers 1 and 2, the children were also indirectly asked for their consent for participating, by providing them with the study materials and allowing them to use or not to use those as they wished. Further, during the visits, I monitored the young children for any signs of getting tired, frustrated or losing interest in ICT interaction and allowed them start, stop and resume their interactions with ICT as they desired.

To ensure the privacy and anonymity of the participants (LeBaron et al. 2017), the video and interview data were stored in secure places. Data of manageable size collected by me were stored on portable hard drives in a locked cupboard. I stored the data for paper 1 and 2 and some of the data used for paper 4 in this way. The vast datasets I accessed through research collaborations were stored in various, secure university servers. The data I used for paper 3 and some of the data used for paper 4 were stored this way. In addition, the screenshots, transcripts and video clips were stored in hard drives kept in locked cupboards. The transcripts used in data session groups were collected from the participating experts after each data session and destroyed. The data sessions themselves took place behind closed doors, where the videos could be seen and heard only by the researchers participating in the session.

Some of the papers included in this thesis contain data excerpts. When choosing the data excerpts for publication, I started by checking the informed consent forms signed by the participants, to see if they had given permission to use screenshots from their material in publications. To illustrate my points in publications, I chose excerpts from those videos where the participants had given their permission to do so. Even in these cases, the excerpts were anonymized by using pseudonyms for the participant names and blurring their faces and relevant details to prevent identification. With the data excerpts including young children video-recorded at home, a stricter procedure was used: in paper 1, only excerpts from parental interviews were used. In paper 2, the figures of young children are cropped to show only their hands and to cut off their surroundings to prevent recognition of their homes from the screenshots, as recommended by LeBaron et al. (2017). In addition, each screen view of the ICT including screenshots was checked to prevent the child’s face being reflected.
4. Findings

In this section, I present my findings, based on the relevant results of my individual papers. I start by summarizing the findings. Next, I proceed to answering the sub-questions and the overall research question in detail. Table 7, below, shows how the individual papers contribute to the sub-questions of this thesis.

Table 7. Addressing the sub-research questions in the individual papers.

<table>
<thead>
<tr>
<th>Sub-research question</th>
<th>Paper 1</th>
<th>Paper 2</th>
<th>Paper 3</th>
<th>Paper 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>SubRQ1: How do the tensions between the digital and physical worlds emerge with and around the social use of ICT?</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>SubRQ2: How does ICT interaction influence the social behaviors of individuals?</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>SubRQ3: How do individuals negotiate the combining of the digital and physical worlds with and around ICT?</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

4.1 Overview: social use of ICT featuring digital and physical worlds

Overall, in each of my papers, I found that the social expectations of both the physical and the digital worlds, as well as those of both individuals and ICT, feature saliently in social situations with and around ICT. Acknowledging this, individuals appear oriented toward keeping up their interactions both in the digital and physical worlds simultaneously, as a single hybrid social environment, without the contextual expectations of the digital and physical worlds colliding with each other. When doing this, they collectively monitor, consider and respond to the social demands of both humans and ICT as participants across the social environments (digital and physical), prioritizing, timing and adjusting their interactions accordingly.

In practice, individuals tend to respond to some of the social demands coming their way more swiftly while delaying their responses to others. This prioritizing is done by considering what kind of response each participant expects. In this prioritizing, individuals are trying not to exceed the tolerance of any participant, whether human or ICT. This means that they do not automatically give priority to human social demands over those of ICT, but may prioritize ICT over humans if they consider its demands more urgent than those of humans. This collective monitoring, considering and adjusting means that individuals give each other and ICT some leeway related to their expected ways of social behavior and adjust their social behaviors accordingly, acknowledging that the leeway is finite. They also acknowledge ICT giving them some leeway, too, as well as room for negotiation for their responses.

The social behavior of individuals appears to be adapted toward taking into account the social expectations of humans in the physical and digital environments as well as those of ICT.
as part of their everyday lives. However, tensions between the social demands of the participants, whether human or ICT, can and frequently do arise, as part of individuals combining the digital and physical worlds in their social use of ICT. These tensions stem from the diverse and not always explicitly compatible social expectations of the humans in the physical and/or digital world and those of ICT. Individuals acknowledge these tensions as an expected and prevalent part of their daily lives, as a driver for change in their social behavior and as impacting on their perceptions about appropriate ways of behaving. In their daily social behavior, individuals engage in resolving these emergent social tensions by engaging in complex negotiations with each other and ICT. These negotiations aim at achieving and maintaining a digital-physical hybrid environment for sociality without neglecting any party, whether human or ICT, beyond its tolerance.

Individuals, especially adults, appear skilled in their combining behaviors, both at work and during leisure. However, young children, who are still learning about social behavior with and around ICT, tend to proceed with recurrent social mishaps in theirs. Even though these social mishaps of young children frequently push the boundaries of what the other participants are willing to tolerate and accept, they still tend to be resolved by negotiation within the collective social tolerance of the participants, or by swift corrective action, if the social tolerance toward ICT use is exceeded. This is because the adult individuals and also the ICT used by young children allow the young children ample leeway in relation to meeting their social demands. In addition, whenever the young children do push the boundaries of the socially acceptable ICT use, the adult individuals tend to reconsider their social behavioral expectations and help the young children, their siblings and ICT, to adjust theirs accordingly. Overall, in the data, participants exceeding social tolerance toward ICT use in their combining behaviors is a rare occurrence, while achieving and maintaining the digital-physical hybrid environment for sociality is the prevalent outcome. Once achieved, this hybrid social environment is kept up by the subsequent interactions of all participants staying within their social tolerance toward ICT use as a collective phenomenon.

4.2 ICT and the emergent tensions between the digital and physical worlds

In this chapter, I answer the sub-question 1, by presenting the relevant findings of papers 1 and 4. These results reveal how the tensions between the digital and physical worlds arise in the social use of ICT.

Overall, combining the digital and physical worlds in the social use of ICT is not a straightforward individual decision. Rather, it appears a process, initiated by a suggestion from one participant for several participants to jointly take part in a social situation, without them all necessarily having any shared interests. In contrast, the participants joining can and often do introduce competing social demands to the situation. This is because all the participants present in this kind of situation expect their social demands to be met by one or more of the participants in a timely manner. As a result, tensions between the social demands associated with the digital and physical worlds can and frequently do arise. These tensions stem from the plurality and diversity of the social contexts and their demands present and the fact that the individual receiving them has to prioritize the demands, making the those deemed less important either wait for a response or be ignored altogether.

In the current, digitized leisure and work environments, where ICT is increasingly part of all activities, the distinction between the contrasting social demands can be related to work
tasks, pre-existing behavioral expectations, or individual wishes. To demonstrate how the tensions between the two worlds constantly arise in real-life social behavior in both the work and leisure contexts, I address them by presenting the relevant findings of papers 1 and 4.

4.2.1 ICT challenging the pre-existing social expectations at home

Paper 1 addresses the emerging tensions in a home context. Although the main focus of this paper is on producing new design knowledge in the public service broadcasting context, its findings also reveal how the digital-world social behavior of young children with and around ICT affects the physical-world social reality of the families and vice versa. This brings up recurrent tensions between the two worlds in the social use of ICT. In paper 1, theory on social values and family values is used as a lens to approach the findings (see Beck and Beck-Gernsheim 2008; Giddens 1984).

According to the findings of paper 1, the parents view that the ICT use of their young children tends to conflict with the family values held by the parents, introducing tensions into family life with and around ICT. This is because the parents acknowledge their family values guiding the ways in which they would prefer their young children to use ICT in social situations at home. However, social ICT use by young children at home rarely matches these preferences. For example, parents value harmony at home, but find young children’s social ICT use tends to increase conflicts among family members.

In addition, the social expectations related to the timing of the interactions across the digital and physical worlds do not always match easily. Here, for example, the parents say their young children tend to become too absorbed in the digital worlds, to the point of this harming their sociality and empathy toward other family members. However, the social demands of the physical worlds at home often also contrast with those of the digital worlds the young children are engaged in. Here, for example, siblings tend to influence the ways in which parents can give their young children guidance and monitoring during their engagement with the digital worlds, should they need any.

In addition to the negatives, the parents also find ICT repeatedly challenges their pre-established social expectations in positive ways. For example, they find their young children can stay surprisingly safely and harmoniously engaged with ICT without constant, full-time parental monitoring at home. The families can also enjoy prolonged visits to restaurants together with ICT keeping young children entertained as needed. Further, ICT prompts elder siblings to spontaneously take care of and help their younger siblings in using ICT, increasing empathy between them, instead of sibling rivalry. Last, the young children tend to learn about ICT use quickly and can teach their parents about interacting with ICT. One example is young children learning to use ICT by constant trial and error without being afraid of making mistakes in the process, encouraging adults to try the same approach.

The contribution of this paper to my thesis lies in revealing how the recurrent efforts of young children and their parents toward merging the digital and physical worlds in their social use of ICT routinely lead to emergent, unexpected tensions within families. The findings of this paper show how these tensions emerge from ICT challenging pre-established family values and conduct of social behavior the parents would prefer or expect their young children to adhere to and internalize. However, despite these recurrent tensions, young children’s social use of ICT also contributes positively to family life. In addition, ICT appears too important for family life to be removed from the lives of young children, or even severely re-
stricted. This dilemma between the young children’s need to learn to use ICT in social situations but avoid undesired, unexpected social learning, with its recurrent mismatches between the situational social demands of ICT and those of the parents gives rise to constant, emergent tensions between the digital and physical worlds in the social use of ICT.

Study 1 also proposes that ICT design could be used as a solution to these tensions between the digital and physical worlds in the social use of ICT. To this end, it presents design principles for mitigating parental concerns and emphasizing the positives of young children’s interaction with and around ICT. The overarching design principle, “Lifeification,” refers to the designing of website content for young children by conforming to their real life. This is to ensure that as part of their interaction with ICT, young children are also learning skills that benefit them in combining the digital and physical worlds, such as empathy. The findings of this paper highlight the importance of designing ICT to take into account the social context of use and the family values present in use situations and to tailor the content to the joint interests of young children, their siblings and parents, to foster sociality at home.

4.2.2 ICT taking part in knowledge work

Paper 4 addresses the constantly emerging tensions between the digital and physical worlds in various contemporary knowledge work contexts where the digital and physical worlds are simultaneously present. This paper reveals how ICT takes part in knowledge work through its social demands, appearing as constant ICT interruptions, relentlessly shuttling across the digital and physical worlds. As a theoretical lens, this paper uses the symbolic interactionist view (Blumer 1969; Goffman 1959; Mead 1962), together with theory on work tasks as a collaborative performance jointly given by the participants (Goffman, 1959).

According to the findings of paper 4, the recurrent tensions between the digital and physical worlds emerge in contemporary knowledge work from several sources. To start with, they arise from those of the individuals in the physical (face-to-face) work environment, those from the individuals in the digital environment and those of ICT. All these tend to be simultaneously present in knowledge work, in various combinations.

Another source of tensions arises from individuals regarding all these social demands, whether originating from humans or ICT, as potentially equal in importance. This is because in contemporary knowledge work, individuals in physical (collocated) and digital (remote) environments and ICT both tend to be critical for the knowledge work performance. Acknowledging this, knowledge workers have no inherent prioritization between the social demands from any of these, but have to set one up by negotiating each time the need arises.

Thirdly, the social demands of the individuals and ICT in knowledge work are diverse and not always compatible. In addition, the social demands tend to be somewhat malleable and negotiable regarding their expectations about the synchronicity and asynchronicity of responses. However, the leeway regarding response times is still finite and exceeding it results in ill effects on the knowledge work performance, as the other participants get annoyed, offended and distracted when they are neglected too much.

The contribution of this paper to the thesis in relation to sub-question 1 is in revealing how the tensions between the digital and physical worlds in the social use of ICT in knowledge work arise emergently and simultaneously from many different sources. These are potentially of equal importance and include several potential ways of resolving them with negotiation.
4.3 ICT-originating adaptations in social behaviors

In this chapter, I answer the sub-research question 2, by presenting the relevant findings of papers 2 and 3. These results reveal how ICT interaction influences the social behaviors of individuals.

As the previous chapter demonstrates, attempting to combine the digital and physical worlds in the social use of ICT relentlessly spawns emergent tensions between the social demands of these two worlds. The relevant findings of my papers 2 and 3 demonstrate that, more than creating tensions, ICT also influences the actual social behavior of individuals in the situations where tensions arise. This is because in response to the emergent tensions, individuals situationally adapt their social behaviors, in order to mitigate the tensions. Like the tensions, these adaptations also arise spontaneously during the combining processes. The following sections open up these adaptations in detail in both the home and work contexts.

4.3.1 Families accommodating ICT at home

Paper 2 addresses the ways in which ICT influences the social behavior of individuals, by inspecting the ICT-originating adaptations in social behaviors in the home context. It uses the same data as paper 1, but focusing on a different angle: the real social behavioral dynamics and accompanying social behavioral adaptations by young children interacting with ICT, as well as the ways in which these are perceived and responded to by their parents.

In this paper, I use literature on human interactional turn-taking (Mead 1962; Sacks et al. 1974; Stivers et al. 2009). I examined the ways in which interaction between young children and ICT promotes adaptations in the turn-taking system of young children and how their parents perceive these adaptations, carried over to the social behavior of their young children when they are interacting with them and other children. The paper addresses the synergies and tensions between the conduct of interactional turn-taking of these young children, as preferred by their parents, and the turn-taking promoted by their interactions with ICT.

To address the ICT-originating social behavioral adaptations in this paper, I chose to focus on turn-taking, because turn-taking is the fundamental human system of conducting interaction and understanding others (Sacks et al. 1974). The turn-taking system is so critical for social harmony and mutual understanding between individuals that even the slightest deviations from the expected ways of taking turns in interaction can lead to social offense, conflicts and misunderstandings (Sacks et al. 1974). These, in turn, can strain the relationships between individuals (Mead 1962).

Studying the social behavioral lessons related to turn-taking with and around ICT in the context of young children is especially important, because young children are in a critical development period (Mead 1962). Before the age of seven, they are learning the lifelong conduct for interacting with their social surroundings, which today includes both humans and ICT (Mead 1962; Druin 2002). Therefore, any social behavioral lessons learned by young children during this period have the potential to influence their social behavior for life. (Mead 1962). Stemming from the special developmental period of young children, it has been suggested that their social behavior can be especially prone to the impacts of ICT (Turkle 2015).

Another special developmental point regarding young children is their viewing of objects, especially ICT, as “a little bit alive” (Mead 1962; Turkle 1984). It is suggested that in interaction, with recurrent feedback and guidance from other individuals, such as parents, young children learn to tell the difference between humans and non-live objects over time (Mead
Today, however, young children are recurrently interacting with ICT, up to several hours a day, often without parental mediation (Repo and Valkonen 2017). In addition, it has been discovered that children much older than seven, such as 15-year-olds, can also spontaneously respond to ICT by not setting it apart from a human (Bowman et al. 2012; Kahn et al. 2012). This phenomenon has raised concern about the potential changes in the social relationships of children, both with and around and ICT, and its implications for the social life of children remain unclear (see Rosenstein and Sheehan 2018).

The findings of paper 2 reveal that as young children are interacting with ICT, the social behavioral demands and expectations coming from ICT are putting relentless pressure on their developing conduct of turn-taking. This is because, seen through the eyes of young children, interaction with ICT is carried out by taking turns with it, in ways that resemble but do not fully conform to the ways turns are taken between humans. This constant pressure encourages the turn-taking of young children to develop in ways that do not fully conform to the turn-taking expectations of humans. In particular, to advance their objectives in ICT interactions (such as to get the game moving forward when getting stuck), young children situationally and recurrently adapt their turn-taking in several ways. Here, ICT puts pressure on the turn-taking of young children to adapt to the preferred interactional conducts of ICT, by rewarding them for these adaptations.

In addition, these adaptations, merging the social conducts of humans and ICT in the eyes of young children, blur their emerging distinction between humans and ICT as participants in social behavior. As a result, young children tend to repeatedly give the social demands of ICT priority over those of humans in their social use of ICT, if they deem the demands of ICT more urgent than those of humans. Examples of these situational social behavioral adaptations include young children adapting their social interactional response times from the synchronicity associated with human f2f interaction toward the asynchronicity previously associated with ICT interaction. In practice, this means them viewing it as socially acceptable to delay interactional responses to their parents until their ICT interaction has finished. Another example is them viewing terminal overlaps (starting their interactional input before the previous speaker has finished), as socially acceptable, because these are routinely tolerated and even rewarded by ICT.

These social behavioral adaptations of young children with and around ICT do not go unnoticed by their parents. The parents find most of these adaptations undesirable but acknowledge some of them are beneficial for the social behavior of their young children. Further, the parents find these social behavior adaptations take place when their young children are interacting with ICT, but they also find the influence of their interaction with ICT carries over to their social behavior around ICT, when they are interacting with their parents, siblings and peers.

In paper 2, I summarize these ICT-originating pressures to adapt turn-taking as “the hidden curriculum of ICT.” I define this as a set of latent learning objectives the young child infers as a basis for getting ahead in the overt learning objective of ICT (such as scoring high points in a game they are playing). According to my findings, over the hidden curriculum of ICT, young children’s interaction with ICT can have both negative and positive impacts on their social behavior around ICT. On the negative side, the disregard of turn-taking encouraged by the hidden curriculum of ICT can be perceived as rude, alienating and offensive by parents, risking increasing conflicts at home and when playing with other children. On the positive side, the decreasing sensitivity to social mishaps in interaction and the endless potential of ICT to
resume interaction after mistakes and breaks, also promoted by the hidden curriculum of ICT, encourages young children to be increasingly persistent, tolerant and resilient in their social behavior.

To summarize the findings of paper 2, when interacting with ICT, young children are not only learning how to interact with ICT, but about the social use of ICT; that is, how to interact both with and around ICT. Their parents, although not content with most of these adaptations, admit they feel incapable of correcting them all and often let them pass undiscussed, instead.

Taken together, recurrently adapting social behaviors to match the preferences of ICT in ICT interaction, together with getting away with it in the social behavior around ICT interaction, can have profound implications for the future social behavior of young children. This is because young children are in a special developmental phase, learning the lifelong basics of their social behavior (Mead 1962). In this way, over their daily and repeated interaction with ICT, young children can be growing up, internalizing these adapted social conducts as a “natural” way of behaving (see Mead 1962). This means that the social behavioral adaptations encouraged by the hidden curriculum of ICT may be quietly challenging not only young children’s turn-taking system, but also their fundamentals of social behavior, as the unintended by-product of them growing up with and around ICT. The hidden curriculum of ICT unfolds as a micro-interactional phenomenon, unfolding within a timeframe from a few seconds to minutes in each interactional sequence. However, its power to shape social behavior comes from the persistent repetitions between young children and ICT, together with parents tolerating the modified turn-taking. With these recurrent daily repetitions, the hidden curriculum of ICT gains its potential to alter the social behavior of young children in a tangible way.

The contribution of this paper to the thesis is in demonstrating how the micro-level interaction dynamics unique to ICT interaction relentlessly challenge the emerging social behavioral patterns of young children, suggesting it develops in ways that do not fully conform to the human innate system of turn-taking and the ways it is applied in the current forms of interacting. In addition, in this process, young children are also learning to perceive ICT as participants in social action.

Together, these developments put pressure on their emerging perception of sociality, preferred ways of interacting and taking others into account. These, in turn, pave the way for the altered social behavior to be viewed as socially tolerable and acceptable by these young children and also their parents, who acknowledge the constant presence of ICT at home as a fact they have to put up with.

4.3.2 Knowledge workers interacting with and around ICT

To cover the ways in which ICT influences social behavior at work, I report the relevant findings of paper 3. This paper simulates a work situation, where a group of knowledge workers who do not know each other in advance have to swiftly organize themselves as a team to work on assigned tasks in virtual worlds. In this quasi-experimental setting, they are sharing only the virtual world view, not seeing each other’s actions as the actual individuals behind the avatars.

The research objective of this paper is to understand the utilizing and consequences of embodied informal interaction for the construction of a shared context for teamwork in virtual worlds, where all the interaction between the team members is dependent on ICT. As part of
this research objective, the results also reveal how knowledge workers adapt to interaction with and around ICT in this kind of setting.

In this paper, the social construction of meaning (Berger and Luckmann 1967) is used as a theoretical background. The findings of this paper demonstrate how team members engage in interaction not only with each other, but also with ICT, adapting their social behaviors to accommodate both. The teams use verbal and nonverbal informal interaction to collect information about each other, maintaining copresence and transgression. These interactions help team members to construct a shared context for their teamwork. The shared context constructed with informal interaction can either facilitate or disrupt team performance. In all the interactions with and around ICT, the social demands of ICT feature saliently and with transformative impacts on the sociality of the team members.

Paper 3 demonstrates how the ways in which team members engage in informal interaction swiftly become modified and transformed by ICT. With the teams accepting this, as a result, the ways in which the team members approach social behavior adapt to accommodate the social behavioral preferences of ICT. For example, because the avatars used in the quasi-experiment were designed to hold a position (such as pointing with a finger) for some time even though the corresponding individual had already stopped doing that activity, the individual behind the avatar could actually be doing something other than attending to the virtual world. As a consequence, the team members quickly figured out that an avatar pointing at something does not necessarily mean the individual behind it focusing on the corresponding object, unlike in a face-to-face environment, where pointing at something does mostly correspond with the individual’s focus (Mondada 2011). As another example of behavior that contrasts with the conducts of the face-to-face environment (see Mondada 2011), the avatars were designed to adopt a hunched position but stay visible in the virtual worlds, whenever they had not moved for some time, even though the corresponding individual could be either attending actively to the virtual world, or not. Because of this, the individual behind an avatar could also be attending to other things, such as checking their personal ICT, despite their avatar looking like it was engaged in the virtual world. As a result, the teams quickly adapted to not automatically connect the active or hunched position of an avatar to having the attention of the individual behind the avatar, but to see it as a cursory one, to be routinely inquired about as required.

The findings of this paper reveal that working on their addressed tasks in the virtual worlds, the team members often socially tolerate and come to accept these changes, either leaving them unaddressed or actively using them for informal interaction. By doing this, they construct the shared context for their teamwork with these adapted social behaviors put forth by ICT. It is only on those rare occasions when the team members’ social demands are stretched too much that they confront each other about these ICT-originating social behavioral adaptations. As a result, when collaborating in virtual worlds, the team members are not only constructing a shared context for their teamwork with informal interaction, but simultaneously also adapting to an altered social reality where their sociality is dependent on the preferred social conducts of the ICT they use for interacting with each other. In this way, focusing on their task and getting along with the other team members through ICT, the team members come to accept the preferred social conducts and the sociality put forward by ICT as their own as a by-product of interacting in the virtual worlds.

The contribution of paper 3 to the thesis is in inspecting how the sociality of the team members is transformed by the social behavioral adaptations encouraged by ICT. Further, it re-
veals how the team members socially tolerate and accept these changes as part of their social behaviors, as long as they perceive they do not disrupt their sociality “too much.” Also these social behavioral adaptations of the knowledge workers, like those of the young children addressed in paper 2, take place as micro-interactional phenomenon. In virtual worlds, ICT places pressure for the sociality of the team members to recurrently adapt to the demands of ICT.

On the surface level, these micro-level social behavioral adaptations of the team members may appear minute and subtle. However, in this setting, the tangible impacts of ICT on the social behaviors of the individuals in this context arise from the swift and relentless repetitions of these adaptations. In addition, in virtual worlds, in order to advance social objectives, one has no choice but to collaborate not only with humans, but also with ICT.

Paper 3 makes explicit how even the social behavior of adults can swiftly adapt to accommodate the social conducts of ICT: although the team members taking part in this study had no prior experience of virtual worlds, they promptly found ways of constructing the shared context within their novel surroundings, swiftly adapting to an altered conduct of social behavior and to the social demands of ICT as a by-product.

Unlike the young children discussed in paper 2, who are in a special development phase for internalizing their lifelong conduct of social behavior, the adults examined in paper 3 have already internalized theirs as part of growing up (see Mead 1962). However, with the cumulating and repetitive experience, the social conduct of adults can also evolve over time, too (Mead 1962). This paper shows how even adult individuals can start adapting their ways of interacting with others, immediately, willingly and unnoticed, when starting to use a novel ICT for social interaction.

4.4 Negotiating with and around ICT as part of social life

The answers to sub-questions 1 and 2 presented above demonstrate how individuals’ combining of the digital and physical worlds in the social use of ICT spawns tensions between the social demands of the participants. The findings also reveal how in response, individuals adapt their social behaviors to mitigate these tensions and to advance their social objectives by meeting the social demands of the other participants. In responding to these tensions with their social behavioral adaptations, the individuals take care not to let these tensions, or the social behavioral adaptations that follow, stretch the social demands of the other participants too far. This brings up questions such as how do the individuals know what is too much for the others to bear and how do they avoid getting too far in their combining behaviors.

The findings discussed in the above sections suggest that individuals engaging in combining behaviors are willing to make compromises in their combining behaviors to keep everybody satisfied. On the other hand, the answers also suggest that these others are orienting toward these situations in the same way, too. Therefore, by answering sub-question 3 in this section, I open up how individuals negotiate the combining of the digital and physical worlds with and around ICT. I address this sub-question in both the leisure and work contexts, based on the findings of papers 1 and 4 in the following sections.

4.4.1 ICT as indispensable for family life

As discussed in relation to sub-question 1, the parents of young children are quite often unhappy about the ways in which ICT challenges their family values about appropriate social
behavior at home. In particular, they are not content with the ways in which ICT overrides their family values. In addition, parents worry about the clashes between their preferred and actualized conducts of family life and the potential educational and cultural learning brought to their young children by ICT. Parents are also worried about the undesired effects of ICT interaction on the development of their young children, including their social behavior in general. Overall, parents say they would prefer their young children’s ICT use to conform to their family values supporting family life and learning useful life skills as a part of growing up with and around ICT, but real life rarely matches these ideals.

However, even though parents acknowledge the potential undesired influence of ICT on their family life, they do not want to ban ICT at home, or even severely restrict their young children’s time with it. This is because they say ICT also influences their young children in a positive way. For example, they say with recurrent ICT interaction, young children grow into a natural and trusting relationship with ICT. Parents regard these ICT interaction skills as essential for inclusion in the digitalized society. As a result, they engage in constant negotiations with their young children with and around their ICT use, to find ways of living with ICT that do not stretch their family values and social behaviors too much.

In practice, this means the parents put up with the ICT originating tensions in their family life and those ICT-originating adaptations in the social behavior of their young children that they find socially acceptable. When these become too much for the parents to bear, however, they take action to mitigate them. Accordingly, they 1) restrict their young children’s time with ICT whenever too much social behavioral trouble arises, 2) choose benevolent and age-appropriate content for their young children, and 3) try to keep an eye on their young children’s interactions with ICT. Still, parents find these efforts ineffective, because they find that ICT influences the social behavior of their young children relentlessly, whenever they interact with it, and ICT cannot be removed from home altogether because it is indispensable for family life.

As an outcome, the parents find themselves increasingly negotiating with ICT or just adapting their family values and social behaviors to accommodate ICT in social situations. They view they have no choice but to accept the ICT-originating changes in their family life and to adapt their family values and perceptions of good parenting accordingly. As an outcome, the view their family life is no longer negotiated between the parents and children at home, but it also accommodates ICT as a participant in these negotiations, too.

The contribution of this paper to my thesis, in relation to sub-question 3, is in revealing how the parents and young children negotiate sociality at home not only with each, but also with ICT. Because ICT appears indispensable to the family life, both young children and parents are adapting their sociality to accommodate it, whenever they find the demands of ICT socially tolerable and the accompanying social behaviors socially acceptable. In addition, in these negotiations taking place in the family life, ICT tends to relentlessly stretch the boundaries of the socially tolerable and acceptable ICT use behavior.

4.4.2 Juggling knowledge work as a joint effort of humans and ICT

The answers to sub-questions 1 and 2 reveal that the tensions and behavioral adaptations when combining the digital and physical worlds also take place in the work context. Moreover, here, those engaging in the combining are trying to advance their social objectives, while it is important that neither the tensions nor the social behavioral adaptations stretch the social demands and the tolerance of the other participants too much.
To address how knowledge workers negotiate this combining without stretching the tolerance of other participants too much, I report the relevant findings of paper 4. This paper addresses knowledge work as a collaborative performance (Goffman 1959) that is kept up by all the participating collaborators contributing to it well enough for everyone to stay content. Keeping up a collaborative performance requires negotiation between the collaborators (Goffman 1959) and the findings of this paper reveal how in knowledge work, these negotiations unfold in the real-life social processes between humans and ICT collaborating in various combinations. In their efforts combining the digital and physical worlds into a hybrid environment in the social use of ICT, knowledge workers are facing a situation where social demands from humans (whether in the digital or physical worlds) and ICT are simultaneously present. Because knowledge workers acknowledge these all as potentially critically important for their work performance, they have no inherent prioritization for them, but have to set one up by negotiating within the situation. Further, the social demands are diverse and not always compatible. However, they tend to be often somewhat malleable and negotiable in relation to their synchronicity and asynchronicity. Therefore, knowledge workers are faced with an emergent and complex web of social demands from the humans and ICT taking part in their work performance, with no preset or fixed answers regarding how to cope with all of them simultaneously.

According to the findings of paper 4, in these kinds of situations, knowledge workers engage in complex negotiations across the digital and physical worlds to find a socially satisfying and sustainable way of prioritizing the demands without offending any participant. In these negotiations, they tend to react to ICT interruptions (regardless of its originating from the demands of humans or ICT itself) in a similar way to how they respond to human calls for interaction, i.e. as social demands. Accordingly, they orient toward negotiating all these demands across the digital and physical worlds as one hybrid environment in relation to their overall work performance with an emergent social behavioral adaptations that merge the f2f and digital social conducts.

In this negotiation process, they end up responding to the social demands of both humans and ICT as potentially equal in importance, to be prioritized according to the urgency of their social demands, instead of automatically prioritizing humans over ICT. The results of this paper reveal how by doing this, knowledge workers are augmenting their perception of sociality in two ways: first they are augmenting it from responding to the f2f and digital worlds as separate domains for sociality, to interacting in a one hybrid environment, comprising the perceived synchronicity and asynchronicity of f2f sociality, digital sociality and interaction with ICT as one set of social demands. In addition, in their real-life interactions, their lived-in experiences of sociality also recurrently augments to accommodate not only humans but also ICT as participants.

According to the results of paper 4, only those ICT interruptions that violate the social demands of these knowledge workers or ICT to the point of the breakdown of their performance can lead to ill effects in knowledge work, especially if left unrepaired. However, these breakdowns rarely occur, as knowledge workers appear skilled in processing ICT interruptions within each other’s social tolerance, and even in repairing their performances, if the rare event of a performance breakdown takes place. When processing ICT interruptions within social tolerance, knowledge workers respond to them as they do to interactions with individuals in their physical world environment, regardless of the origin of these ICT interruptions (human or ICT). Therefore, their lived social reality contains interactions originating from
humans and ICT both in the form of interactions, instead of referring to the latter as ICT interruptions. This way, knowledge workers end up repeatedly socially accepting also ICT interruptions as an inherent part of their work.

This paper reveals how individuals take into account both each other and ICT, in real time, to reinforce their sociality with and around ICT in the transformed social behavioral setting. Study 4 reveals how as a result of these negotiations, the performance of knowledge work is no longer an end result of human social effort, but one co-constructed as a joint effort of humans and ICT. With the team members working with and around ICT, their sociality becomes interpreted by ICT in ways that require them to collaborate with ICT to advance their social objectives within the team. As a result, when interacting, the team members take both each other and ICT into account, without neglecting either party to the point of performance breakdown.

The contribution of paper 4 to my thesis is in providing a more nuanced understanding of the digital and physical worlds coming together in a hybrid environment in the negotiations in the social use of ICT and the roles and consequences of ICT in it. Although this paper focuses on knowledge work, it also includes data on where the knowledge workers are in a leisure context, working from home. According to the findings of paper 4, there are no discernible differences in the ICT interruption processing of these knowledge workers, based on their work context. Therefore, the findings of this paper about the ways in which the reinforcing, neutral or breakdown effects of ICT interruptions on teamwork unfold apply to the work and leisure contexts alike.

This paper also includes theorizing on the consequences of processing ICT interruptions in a team context, revealing how the symbolic meanings of the work task, performance, ICT and sociality all become altered as a by-product of these micro-level negotiating and combining behaviors. This paper reveals how individuals are proficient processors of ICT interruptions. Across the different work and leisure contexts, ICT and team formations, they keep an eye on the social tolerance of humans in the digital or physical world toward their ICT use and also that of ICT, to avoid exceeding it. When staying within this social tolerance toward ICT use, the combining efforts gain social acceptability toward ICT use from all participants. With these efforts, individuals keep up a hybrid environment for their work together with and around ICT, merging the digital and physical worlds. Within this hybrid digital-physical environment, ICT interruptions appear initiations of interaction to them, whether originating from the social demands of humans in the digital or physical worlds, or those of ICT.

4.5 Summary: digital and physical worlds merging in the social use of ICT

In this section, I summarize the findings of my sub-questions to answer my overall research question about the ways in which individuals manage merging their digital- and physical-world social behaviors into a digital-physical hybrid environment with and around ICT in a mutually acceptable way. Taken together, my findings show how individuals are recurrently combining their digital and physical worlds in their social use of ICT, often successfully merging them into one hybrid environment for sociality. This merging of the two worlds is not a straightforward incident, however, but a complex negotiation process between humans and ICT that may lead to both benefits and ill effects for the ongoing sociality. These effects are dependent on whether all the participants collectively socially tolerate and accept the ICT use behaviors, with the ICT-originating originating tensions present in these situations and the
each other’s accompanying social behavioral adaptations. Acknowledging that the leeway of bending the expected ways of social behavior is finite, the participants try to keep their combining behaviors benign to the ongoing sociality. To this end, they engage in complex negotiations to mitigate the tensions with situational behavioral adaptations, trying not to exceed the tolerance of any participant. In other words, when combining the digital and physical worlds in the social use of ICT, they try to stay within the collective social tolerance toward ICT use of all the participants to gain their collective social acceptance for their ICT use behaviors.

According to my findings, although the individuals overwhelmingly tend to succeed in these negotiations, merging the two worlds and avoiding ill effects for their sociality, the negotiation process involved requires skill and effort because of its complexity. To begin with, achieving a benign outcome for the ongoing sociality in this process requires sensitivity to the diverse social demands present and compromises from individuals across the digital and physical social spheres, as well as from ICT. This is because each participant enters the social situation with social demands and expectations of his/her/its own.

The social demands and expectations present in these negotiations can be related to the participants’ previous experience about those situations, or a lack thereof. The previous experience can be about the demands of the digital or physical worlds, individuals or ICT, in the same kinds of situations, such as the demands of a specific application used. It can also be related to the context of the f2f, or digital world interaction, such as being in routine versus time-pressurized meetings, with ICT asking for updates that can be postponed or ICT having immediate demands, such as the battery running out. When all these become simultaneously present within one social situation in various combinations, tensions and pressures between them can emerge, from the conflicts between the social demands and expectations that include contrasting social objectives. An example of this kind of situation can be ICT warning of its battery running out just as an important topic is being discussed in an f2f or distributed meeting. In social situations like these, the objectives of both the digital and the physical social worlds, as well as those of the human participants and ICT, are all simultaneously relevant. However, it is possible that each of these social demands expects a different course of action from an individual, such as ICT expecting an individual to leave his/her seat in the f2f meeting to plug in the power cord versus taking part in the ongoing discussion, or members of the distributed meeting pausing their decision-making process while the ICT needing attention is being tended to. However, simultaneously, the human participants of the f2f or distributed meeting may also be waiting for a response to their social demands.

These kinds of contrasting and simultaneous social demands within one social situation described above can leave the individual faced with a dilemma: neglecting any social demands or expectations, whether originating from humans or ICT, can yield unfavorable social outcomes to him/her and to the ongoing sociality immediately, or in the long term. For example, if the individual disregards his/her laptop in the situation described above, the laptop may shut down when its battery runs out, making further distributed interactions impossible and maybe even destroying any unsaved work in the process. On the other hand, leaving the ongoing f2f or distributed discussion unattended can result in giving a bad impression of oneself to colleagues regarding one’s commitment to work, or losing the possibility to contribute to the decision-making underway. In the leisure context, the same kinds of social tensions with and around the negotiations when combining the digital and physical worlds and ICT feature saliently, too.
For the individuals facing these dilemmas, there is no easy or predefined solution to resolving the situational tensions involved, as the social demands of all the participants (whether human or ICT) are relevant to them. Therefore, disregarding any of these can come with social risks the individuals prefer to avoid, such as the risk of offending somebody. Therefore, in these situations, the careful negotiation and balancing of these diverse social demands are needed for achieving a benign outcome for the ongoing sociality. This negotiation and balancing of the diverse social demands unfolds as a complex process. To start with, to come to an understanding about the social demands present, individuals have to constantly pay attention to all the incoming social initiations in their social context across the digital and physical worlds and evaluate them for their urgency and flexibility as they arise. Next, individuals have to balance these, by negotiating them with all the participants involved, whether they are humans or ICT, or located in physical or digital social surroundings. With this negotiation, it becomes possible for them to decide how to satisfy all the social requirements well enough, without offending any participant.

Luckily for the individuals facing these simultaneous and diverse social demands, it is rare for all of them to be equally immediate and pressing, at least at the same time. Most often, at least some of them contain leeway for breaching their social expectations, such as an individual or ICT tolerating waiting for a social response to his/her/its social demands, putting up with an individual doing things in a different way than she/he/it initially expected. In social situations combining the digital and physical worlds in the social use of ICT, a benign outcome for sociality becomes possible only when these combining behaviors stay within the leeway of each and every participant at the same time. Therefore, in social situations combining the digital and physical worlds in the social use of ICT, there is collective leeway for breaching the social demands expectations of the ongoing social situation when using ICT.

Within the collective leeway, the combining of the digital and physical worlds is received as the socially tolerable ICT use by the participants: it appears benign to the ongoing sociality, as none of the participating individuals shows any signs of social offense or distress, neither are any signs of sociality breakdowns apparent. Therefore, based on their interactions, it appears that all those taking part in this kind of situation collectively accept the combining behaviors taking place. As a by-product, this kind of ICT use gains their social acceptance. In these kinds of situations where the use of ICT for combining the digital and physical worlds has the social acceptance of the participants, individuals appear not to set the digital and physical world environments apart or automatically prioritize one environments over the other, but to interact within them as a single hybrid environments for sociality. Further, in this kind of situation, the individuals appear not to set human participants and ICT apart when negotiating meeting their social demands, but respond to them all as participants whose demands are responded to based on their perceived urgency only. Stemming from this, in this kind of situation, individuals do not set ICT interruptions apart from the interactional openings of humans either, but appear to respond to both as initiations of interaction. To summarize, the combining of the digital and physical worlds in the social use of ICT becomes manageable when the combining behaviors stay within the participants' social tolerance toward ICT use as a collective phenomenon. This way, the participants come to socially accept this kind of ICT use combining the digital and physical worlds as a part of their ongoing social work and leisure situations. In the next chapter, I will discuss my findings, proceeding from describing to theorizing.
5. Discussion

In this thesis, I set out to examine the social tensions that arise and are resolved when individuals are combing their digital- and physical-world social activities with and around ICT, in work and leisure contexts. My focus has been on inspecting how and with which kinds of consequences interactions between humans and ICT across the digital and physical worlds either give rise to, maintain or break down a digital-physical hybrid environment for sociality. In this thesis, I have approached this objective through four empirical research papers focusing on the different facets of my research questions, in both leisure and work contexts.

In this chapter, I discuss my contributions, proceeding from describing to theorizing. First, I present my descriptive knowledge contribution, followed by my theoretical and practical contributions. Last, I provide my conclusions, consider the limitations of my study and formulate avenues for future research.

5.1 Descriptive contribution: combining two social worlds in ICT use

Today, in their daily social endeavors, individuals attempt to combine their digital and physical worlds with and around the social use of ICT, both at work and during leisure. As a result, they end up in a situation where there are several participants taking part in a single social situation with many diverse and not always compatible social demands. This brings up tensions between the digital and physical worlds. The individuals acknowledge these as potentially detrimental to the ongoing sociality and, to mitigate these, adapt their social behaviors to avoid the ill effects. However, they also acknowledge these behavioral adaptations as potentially detrimental to their ongoing sociality, because when adapting their behavior to accommodate the social demands of one participant, the social behavior can shift further from the expectations of another. Because of this, individuals engaging in simultaneous digital- and physical-world social behaviors are faced with a dilemma, where mitigating social tensions in relation to one participant can spawn further tensions in relation to another. As a result, individuals engaging in these simultaneous digital- and physical-world social behaviors have to balance all the social demands simultaneously. In these efforts, individuals are using complex social negotiation mechanisms and processes to balance the diverse social demands of all the participants involved.

As a by-product of these efforts, the relentlessly ongoing combining processes have consequences for the social behaviors of these individuals, as well as for the symbolic meanings they associate with socially acceptable and tolerable ICT use, how they perceive individuals and ICT as participants in interaction and how they approach sociality in general. On one hand, these consequences are situational, arising from the emergent and ongoing microinteractional dynamics between individuals, as well as individuals and ICT. However, as ICT is an inseparable part of their lives, these combining processes and negotiations are taking
place relentlessly and repeatedly, on a daily basis. Therefore, these negotiations and combining processes are also putting pressure on the social behaviors and symbolic meanings of these individuals to adapt in the long term (see Mead 1962).

The combining processes and negotiations with and around ICT, across the digital and physical worlds, are present in both the leisure and work contexts for individuals today. For example, during leisure, stemming from the emergent tensions between the digital and physical worlds, family life and leisure practices are put under pressure to accommodate ICT. As a result, these are co-constructed with ICT, and change accordingly, as I demonstrated in paper 1. In addition, these combining processes and negotiations are present from the very beginning of the lives of digitalized individuals. When young children of the digital age are growing up digital natives, with and around ICT, the results of paper 2 reveals how the social tensions and covert learning objectives stemming from ICT put pressure on their very fundamentals of conducting social behavior, the turn-taking system, to adapt to accommodate the social expectations of ICT. This affects their social behavior not only with ICT, but also around ICT. As these micro-level social behavioral adaptations are present from their early childhood, they may be impacting the social behavior of these young children for the long term.

The combining processes and negotiations with and around ICT going on in the social use of ICT affect not only children, but adults, too. At work, the social behavior of adults also manifests tendencies to swiftly adapt to accommodate ICT, as demonstrated in paper 3. In a technology-mediated collaboration setting of virtual worlds, the shared context for teamwork is co-constructed with and around ICT. The ICT used in this process, virtual worlds, impacts both the processes and outcomes of constructing this shared context. Maintaining the resulting sociality with and around ICT is a complex process of real-time negotiation, where sensitivity to the diverse participants, making compromises and adapting to the various simultaneous social demands is required to maintain sociality, as identified in paper 4. Today, knowledge workers have to cope with ubiquitous ICT interruptions at work and during leisure. These ICT interruptions come from their private life and multiple work projects, all maintained with the use of ICT (Addas and Pinsonneault 2015). As knowledge workers are processing ICT interruptions in a team context and balancing the associated diverse social demands, they are augmenting sociality to include not only humans in one social environment or ICT, but humans in the digital and physical environments and ICT to be all interacted with within one, hybrid environment for sociality. In this process, knowledge workers are monitoring their social environments, their social contexts and demands for their urgency and flexibility and choosing their actions accordingly.

Taken together, the results of this thesis demonstrate how in their real-life social behaviors, individuals appear fluent and nimble in combining their digital and physical social world behaviors with and around ICT. They are doing this both at work and during leisure and generally coping with these combining behaviors, managing to keep this combining benign to their ongoing sociality. However, careful negotiation is required to achieve this outcome. Taken together, the four papers included in this theses, show how individuals negotiate the emergent social tensions arising from this combining behavior and respond to them with social behavioral adaptations that aim at achieving and maintaining a hybrid environment for their sociality.
5.2 Theoretical contribution: ICT use and sociality in a hybrid environment

As a summary, all the papers included in this thesis demonstrate how combining the digital and physical worlds in the social use of ICT comes with pressures to reconsider and adapt those social conducts, expectations, demands and the accompanying symbolic meanings that guide the ways in which individuals behave in social situations. The outcome of this combining behavior is a modified form of social behavior which, when unfolding successfully, gives rise to an adapted social state where the social domain comprises the physical and digital worlds as one hybrid environment for interaction and both individuals and ICT as participants. In this section, I proceed from describing to conceptualizing this adapted social state and considering its theoretical implications.

Compared with the current literature about the digital and physical worlds as separate domains for sociality, my results draw a markedly different picture of the social behavior of individuals: that of combining their digital and physical worlds with and around ICT into a single hybrid environment for sociality. The current literature about social life in the digitalized society of today acknowledges ICT as being present in the daily social activities of individuals, both at work and during leisure (Hess et al. 2014; Junglas et al. 2013). It also acknowledges that the social activities of individuals can be going on either in the physical, f2f social world (Lundgren et al. 2015), the digital social world (Oestreicher-Singer and Zalmanson 2013), or a combination (Middleton et al. 2014). It is also known that this combining of the digital and physical social worlds with and around ICT can provide opportunities but also be problematic, because of the simultaneous, contrasting social demands that can leave individuals struggling and risk ill effects on their sociality (Bjørn and Ngwenyama 2009; Chen and Karahanna 2014). The current literature also suggests that combining the two worlds is laborious, to the point where these efforts negate the benefits of the combining attempts (Leonardi et al. 2010), or overload the individuals, if they do manage to keep up this constant combining (Wajcman and Rose 2011). The current literature names ICT with its accompanying ICT interruptions as a prominent stressor for sociality in these situations, suggesting that to reduce the risks and ill effects, it is best to keep the two worlds separate and control for the ways in which demands from ICT can arise (Grandhi and Jones 2015; Jenkins et al. 2016).

My results, in turn, suggest that instead of approaching the combining the digital and physical worlds in the social use of ICT as two worlds interfering with each other, it is better understood as participants striving for a hybrid environment for sociality by trying to keep their efforts benign to the ongoing sociality. However, this striving does not guarantee a benign outcome. Rather, to achieve the benign outcome, the participants have to keep their efforts within all participants’ social tolerance toward ICT use, to gain a collective social acceptability of the ICT use for their combining behaviors. Below, I first elaborate on the relationships between hybrid environments, social tolerance toward ICT use and social acceptability of ICT use in the social use of ICT. After that, based on the relationships between the three, I proceed to conceptualizing this modified state of social behavior as a state of Augmented Sociality, where the combining of the digital and physical worlds in the social use of ICT is benign to the ongoing sociality, merging the two into a hybrid environment.

5.2.1 Social tolerance toward ICT use and hybrid environment

My findings reveal how the collective leeway for breaching the social demands of the participants combining the digital and physical worlds, appears as a boundary condition for achiev-
ing and maintaining the hybrid environment for sociality. This is because in their combining efforts, individuals are trying to avoid exceeding the threshold of what is deemed collectively tolerable and acceptable by the other participants (whether human or ICT), to avoid ill effects on the ongoing sociality. Although this process is complex, individuals appear well-adapted to balancing accompanying diverse social demands, processes and negotiations, most often mastering them unannounced in both leisure and work contexts.

I name the above-discussed collective leeway social tolerance toward ICT use. I define social tolerance toward ICT use, drawing on Kettinger and Lee (2005) and Goffman (1959), as the collectively agreed leeway between the lowest threshold of socially acceptable ICT use behavior and its perceived optimum, where the social behaviors taking place are perceived as less than ideal but still satisfactory by the participants. In other words, it is the zone between the preferred satisfying of social demands and the most severe breaching of the social demands the participants (human or ICT) collectively put up with before manifesting social offense. In this definition, “breaching” can refer either to time taken to respond, or deviations from the expected interactional conducts. Each individual and ICT has a tolerance of their own, and any social behavior aiming at combining the digital and physical worlds with and around ICT has to stay within all of these at the same time, for the behavior to stay within social tolerance toward ICT use.

Within social tolerance toward ICT use, an individual or ICT facing simultaneous and contrasting social demands can simply postpone those interactions that come with a wider zone of individual tolerance and prioritize those with a narrower one, taking care not to exceed any of them, to stay within social tolerance toward ICT use. However, in any case, social tolerance toward ICT use is not infinite, but it includes boundaries of how much delay or many mistakes each of the individual participants is willing to put up with. Exceeding any of these leads to the undesired social outcomes described above, thus preventing the participants from achieving a hybrid environment for sociality, or breaking up an existing one. The combining behaviors staying within social tolerance toward ICT use, in turn, are benign to the ongoing sociality and lead to the participants achieving a hybrid environment for their sociality or enable them keeping one up.

5.2.2 Social tolerance toward ICT use and social acceptability of ICT use

My findings reveal how within social tolerance toward ICT use, combining the digital and physical worlds in the social use of ICT is collectively acceptable to the participants in the social situation they are in, based on their real social behaviors. Therefore, staying within the social tolerance toward ICT use gives social acceptability to the ICT use taking place in these combining behaviors as a situational, micro-level social behavioral phenomenon. According to my results, this social acceptability of ICT use is critical for achieving a benign outcome for sociality when combining the digital and physical worlds. I elaborate on the social acceptability of ICT use and its implications for sociality when combining the digital and physical worlds below.

With their combining behaviors taking place within the social acceptability of ICT use, individuals tend not to set humans and ICT apart as participants, but to respond to social demands originating with either in a uniform way, prioritizing their responses according to the urgency and malleability of their social demands. In this way, they are treating ICT not as external to their sociality, the nuisance causing ICT interruptions, but as a participant in the social group that comprises ICT and humans in the digital and physical worlds. In these ne-
negotiations, the social behaviors taking place, do not have to unfold perfectly or be a perfect match for all the social demands and expectations of all the participants, to avoid straining their relationships, creating a scene or causing social offense. However, to achieve this benign outcome for sociality, the social behaviors during this combining must be good enough. Therefore, in these negotiations, it is absolutely critical for individuals and ICT to keep their ICT use behaviors socially tolerable, regarding the tolerance of all the participants as a collective, for them to become socially acceptable ICT use. In other words, the social behaviors have to first stay within the social tolerance toward ICT use of all the participants, whether human or ICT, for them to be benign to the ongoing sociality. It is only within social tolerance toward ICT use that the combining behaviors can be received as socially acceptable ICT use by all the participants, humans and ICT. This is because within the social tolerance toward ICT use the social demands of the participants are met well enough for them to be content with, or at least put up with, the ongoing ICT use behaviors.

The social acceptability of ICT use manifests in the micro-level social behaviors of the participants in an observable way. Within social acceptability of ICT use, the participants do not show signs of strain, stress or overload when combining the digital and physical worlds. Instead, they appear content and fluid in their interactions, managing these as one hybrid environment for sociality, instead of combining two separate domains for social behavior, the digital and the physical, both of which are threatened by ICT interruptions. Exceeding the social tolerance toward ICT use, however, tears down the social acceptability of ICT use and leads to observable ill effects on sociality. Here, the participants no longer find the combining behaviors as socially acceptable ICT use. As a result, signs of strain, stress and overload appear. Further, individuals and ICT can create a scene. Here, individuals can blame each other and ICT, turn their backs on each other and ICT can freeze, slow down or shut down, wiping out the ongoing sociality with it. As a result of this process, the hybrid environment for sociality is in endangered and may break apart. Luckily, according to my results, these breakdowns of the hybrid environment appear rare, as individuals and also ICT try their best to avoid them. If one does take place, participants tend to be swift and deliberate in their repairing actions, trying to wipe out or negate any harm done and restore their sociality, often successfully.

My view of the social acceptability of ICT use is in line with, but also distinct from the current view in the literature. Both the existing literature and my view conceptualize the social acceptability of ICT use based on the collective view of the individuals about if and how it is appropriate to use ICT in a social situation (see Efthymiou and Halvey 2016; Montero et al. 2010; Suen and Eghtebas 2017; Terrade et al. 2009). To the best of my knowledge, however, the current studies on the social acceptability of ICT use, conceptualize it based on the pre-existing perceptions of the human ICT users, using interviews and surveys. My results and conceptualization, in turn, show how the social acceptability of ICT use unfolds in real-life social behavior, as a micro-level interactional phenomenon including both individuals and ICT as participants. In my view, the unfolding of the real-life social behavior with and around ICT, gives social acceptability to the ICT use in the very social situation the users and ICT are in. Here, there are two differences that set my view apart from the others: the existing view on the social acceptability of ICT, focusing on user perceptions, states that individuals have decided in advance what kind of ICT use they are willing to accept in social situations, becoming offended if real-life behavior does not conform to their perceptions (see Efthymiou and Halvey 2016; Montero et al. 2010; Suen and Eghtebas 2017; Terrade et al. 2009). Ac-
cording to my view on the social acceptability of ICT use, it unfolds dominantly as a situa-
tional, micro-level behavioral phenomenon. My findings reveal how real-life social behavior recurrently tends to override pre-existing user perceptions of what is socially acceptable ICT use, without the individuals necessarily getting offended as a result. Even when asked about their perceptions, as I have done in papers 1 and 2, individuals acknowledge that their lived-in social behavior with and around ICT may not be ideal when compared with their perceptions, but within their social tolerance toward ICT use they still accept it. Secondly, in current literature, the social acceptability of ICT use is seen as a human centered phenomenon (see Efthymiou and Halvey 2016; Montero et al. 2010; Suen and Eghtebas 2017; Terrade et al. 2009). My empirical results, in turn, reveal how the social acceptability of ICT use unfolds as situational achievement that is dependent on the social tolerance toward ICT use of all the participants. Here the tolerance of the participating ICT itself can be as important as that of that of humans. According to my results, the participating individuals acknowledge this in their real-life interactional responses, but the current literature, focusing on individual pre-existing perceptions, does not.

These differences are important because the perceptions and real-life behavior of individu-
als can differ and in these situations, individuals tend to regard this difference as unpleasant, especially if there are contrasts or tensions between the two (Festinger 1953). My findings show how, even when reaching the social acceptability for ICT use, there can still be social tensions present in the combining of the digital and physical worlds in the social use of ICT. This is because the courses of action taken are not necessarily deemed ideal by all the participants. However, within social tolerance toward ICT use, the deviations from these ideals are inconsequential to the sociality. This means that although the participants notice the deviations from their social demands and expectations, within social tolerance toward ICT use, they put up with them, accepting them without manifesting any social offense or breakdowns of sociality.

As a result, the tensions in combining the digital and physical worlds with the social use of ICT taking place within social tolerance toward ICT use are benign to the participants, which means that they do not explicitly harm their ongoing sociality. Further, the participants tend to mitigate these tensions by negotiation. If the social tolerance of the participants toward ICT use is approaching its limits, it can often be prolonged with further negotiations, such as explaining oneself, or turning ICT to the battery-saving mode. Staying within social tolerance toward ICT use during these combining behaviors is critically important, as it provides this combining behavior with social acceptability of the accompanying ICT use in the given social situation, as none of the social expectations of the participants is being violated so much that social offense arises.

The relationship between social tolerance toward ICT use and the social acceptability of ICT use is important. Repeatedly staying within social tolerance toward ICT use in combining the digital and physical worlds in the social use of ICT has implications for the social acceptability of ICT use, both in the situation they are in and also beyond: when individuals find themselves repeatedly behaving in certain situations in ways that contrast with their perceptions about acceptable behavior in that situation, they have a tendency to adapt their perceptions to match their actual, real-life behavior rather than the other way around (Festinger 1953; Mead 1962). In this way, recurrently staying within social tolerance toward ICT use and reaching social acceptability for ICT use when combining the digital and physical worlds in
the social use of ICT can also alter individuals’ long term perceptions about the social acceptability of ICT use in these situations.

To summarize, combining the digital and physical social worlds in the social use of ICT in a benign way requires all the participants (whether human or ICT) to be alert, vigilant and sensitive to the demands of the various social spheres and participants at all times. When simultaneous social demands arise during these combining processes, as they recurrently do, the participants have to situationally negotiate their ways of balancing them in real time. In this negotiation, the participants attempt to balance these social demands of the different social spheres as one group, prioritizing any party (human or ICT) or any environment (digital or physical world) based on evaluating the social tolerance toward ICT use as a collective phenomenon.

Succeeding in this negotiation requires that these combining processes stay within the boundaries of social tolerance of ICT use; in other words, the individual tolerance of each and every participant at the same time. In this case, the ICT use behaviors taking place when combining the digital and physical worlds in the social use of ICT reach social acceptability of ICT use, the situational, mutual agreement that this kind of ICT use behavior is acceptable, by all the participants. However, even within social tolerance toward ICT use, there can still be tensions present, as having to wait for a response to one’s social demands or having them compromised in some other way (such as somebody doing something other than initially expected), may not be the optimal solution for the participant who has to compromise. However, if the social demands and expectations of the participants are not compromised too much, the ICT use is socially tolerable. In this case, the various social demands are tended to as interactions within one social group situation and the ongoing ICT use has social acceptability. Exceeding social tolerance toward ICT use, however, leads to conflicts over participants getting offended about others breaching their social expectations, making the combining behavior lose its social acceptability of ICT use. With the exceeding of the social tolerance toward ICT use of the participants, the digital-physical hybrid environments breaks apart. Accordingly, the group interaction within it breaks apart, too, leaving the individuals dealing with ICT interruptions, distractions, disruptions and multitasking, instead of smoothly juggling the simultaneous social demands as a single form of group interaction, comprising human and ICT as participants, within one digital-physical hybrid environment.

5.2.3 Conceptualizing Augmented Sociality

According to my results, the outcomes of combining behaviors when combining the digital and physical worlds in the social use of ICT are dominantly benign or positive, with the social behaviors taking place in a hybrid environment. Here, both humans and ICT are responded to as participants and ICT interruptions are also being responded to as an interactional input, without them stressing, straining, overloading or offending the participants in any observable way.

To the best of my knowledge, this kind of view of real-life interactional view of sociality taking place in a hybrid environment, where the social outcomes are dependent on the unfolding of the negotiation process between humans and ICT all as participants, is missing in the current literature. Especially, I suggest the current understanding could benefit from my view of sociality across the digital and physical worlds taking place in a hybrid environment as a situational and negotiated co-achievement of both humans and ICT, based on their real interactions. Here, the social tolerance of participants toward ICT use can be used as a boundary
condition for the successful combining behaviors and effects on sociality, whereas achieving the social acceptance of ICT use can be used as its threshold.

Staying within social tolerance toward ICT use during the combining processes and the combining behaviors gaining social acceptability of ICT use as a result, has four implications for the ways in which individuals behave in these combining situations. 1) Within social tolerance, individuals respond to ICT interruptions not as interruptions but as interactions. 2) In addition, within social tolerance toward ICT use, individuals respond to ICT interactions as they do to human interactions and do not inherently prioritize either party, but prioritize based on their situational evaluation of the social demands of the participants. 3) Further, within social tolerance toward ICT use, individuals treat humans in the face-to-face environment and those in the digital environments interchangeably, with situated assumptions of the synchronicity and asynchronicity regarding the appropriate response times. 4) Last, within social tolerance toward ICT use, individuals do not approach this combining behavior as multitasking or task switching, but as group interaction.

My findings suggest that successful combining of the digital and physical worlds is better understood as taking place within a hybrid environment merging the two, as an adapted social state. This adapted social state either emerges or not, dependent on the unfolding of the accompanying negotiations of the participants, when they attempt this combining in their real-life social behaviors. In these negotiations, the boundaries of social tolerance toward ICT use and the threshold of social acceptance of ICT use must be adhered to.

Therefore, to understand the processes, boundaries, thresholds and outcomes of combining the digital and physical social worlds with and around ICT in more detail, I introduce a novel theoretical device, the concept of Augmented Sociality. I define Augmented Sociality as a state in social behavior taking place with and around ICT in a hybrid environment merging the digital and physical worlds, where the ongoing ICT use behaviors have the social acceptability of the participants, stemming from them staying within participants’ social tolerance toward ICT use. In other words, Augmented Sociality is a situational and interactional co-achievement of humans and ICT that emerges when the threshold of the social acceptability of ICT use is achieved when combining the digital and physical worlds in the social use of ICT. Augmented Sociality can then be sustained with the subsequent social ICT use behaviors staying within the social tolerance toward ICT use of the participants. The concept of Augmented Sociality helps in understanding the social processes, thresholds and boundaries by which the digital and physical worlds can be combined in a benign way, merging the two into a hybrid environment for sociality. Below, I elaborate on Augmented Sociality.

The antecedent of Augmented Sociality is increasing and social ICT use, both in the physical and digital worlds. However, in addition to engaging in all these separately, individuals are also combining their digital- and physical-world social ICT use with and around ICT, using various social mechanisms and processes in their attempts to balance the diverse demands of these present. These relentlessly ongoing combining processes have consequences for the social demands and expectations of individuals and the symbolic meanings they associate with these. These consequences apply both to their leisure (as discussed in papers 1 and 2) and work (papers 3 and 4). As an example, during leisure, family life and leisure practices are co-constructed with ICT, and change accordingly (paper 1). Further, human turn-taking becomes adapted to accommodate ICT from early childhood, modifying social behavior (paper 2). At work, social team collaboration behavior adapts to accommodate ICT: in a technology-mediated collaboration setting, the shared context for teamwork is co-constructed with ICT.
Today, workers have to cope with ubiquitous ICT interruptions, coming from their multiple work projects, kept up with the use of ICT (Addas and Pinsonneault 2015). As workers process ICT interruptions in a team context and balance the diverse associated social demands, they are augmenting sociality to include both humans (in the digital and physical environments) and ICT (paper 4). In this process, they are monitoring their social environments and its social demands for their urgency and flexibility and choosing their actions accordingly. In these processes, they are trying to avoid exceeding the threshold of what is deemed socially acceptable ICT use by the other participants (whether human or ICT), to avoid ill effects on the ongoing sociality. All the papers demonstrate how the combining behavior comes with changes in social demands and expectations and the accompanying symbolic meanings that guide the ways in which individuals behave in social situations. The outcome of this combining ICT use behavior, if staying within the social tolerance of the participants and therefore reaching social acceptability in the situation is an adapted state of social behavior that I conceptualize as Augmented Sociality. In Augmented Sociality, the social domain comprises humans in the physical and digital worlds, as well as ICT as participants, all as one hybrid environment. The state of Augmented Sociality is an interactional achievement, made possible by both individuals and ICT constantly negotiating their interactions across the digital and physical worlds as one social group. Achieving and maintaining Augmented Sociality requires that these behaviors stay within the boundaries of the situation-specific social tolerance toward ICT use originating from both individuals and ICT having boundaries and thresholds for breaching their expectations of socially acceptable behavior in the given situation. Within this social tolerance toward ICT use, the ICT use combining of the digital and physical social worlds with and around ICT reaches a threshold of the mutual social acceptability of all participants, and as a result, the state of Augmented Sociality can emerge and sustain.

Augmented Sociality is related to but distinct from human sociality as a genetically driven phenomenon. In sociology, human sociality is viewed as an innate tendency to engage in interaction in groups (see Levinson 2006; Simmel 1910, 1949). Drawing on this view of human sociality as an innate tendency, and based on my findings, I suggest that the state of Augmented Sociality is an ICT-originating adaptation of human sociality, a modified social state, achieved with ICT originating interactional adaptations of social behaviors taking place with and around ICT. This view of Augmented Sociality as an interactional achievement that is partly dependent on ICT, sets it apart from human sociality as a genetically driven f2f phenomenon (see Goffman 1967; Levinson 2006). Augmented Sociality also regards ICT as a participant in interaction, whereas the abovementioned literature on human sociality does not. In addition, the interactions within Augmented Sociality have a wider temporal and spatial scope than f2f interaction (see Goffman 1959), stemming from the asynchronicity and connectivity of ICT.

Maintaining Augmented Sociality requires heightened social sensitivity, politeness and respect from both humans and ICT toward the simultaneous social demands and expectations coming from the digital and physical worlds. In Augmented Sociality, all the participants have to apply complex temporal and spatial negotiation techniques to stay within the adjacent social tolerance. Each achievement of reaching situational social acceptability for this combining behavior reinforces the symbolic meaning (see Mead 1962) of Augmented Sociality as a viable social state for the participants.
Because Augmented Sociality is a state in social behavior, comprising social interaction across the digital and physical worlds as one group, within one digital-physical hybrid environment, it entails the merging of the digital and physical worlds in the social use of ICT with each interactional achievement. Here, the threshold of social acceptability of ICT use is an important breaking point regarding the symbolic meanings being constructed: above this threshold, the combining behavior gains the symbolic meaning of Augmented Sociality, where the behavior is benign to the ongoing sociality and the digital and physical worlds merge into one hybrid environment.

As a social behavioral phenomenon, the fundamental difference between the state of Augmented Sociality and the phenomena of ICT interruptions (Addas and Pinsonneault 2015), multitasking (Voorveld and van der Goot 2013), task-switching and attention allocation (Wickens et al. 2015), constant connectivity and multicommunicating (Cameron and Webster 2011, 2013; Reinsch et al. 2008; Wajcman and Rose 2011), lies in how the participants approach and receive the combining behavior in their micro-level interactions in the given situation. This difference can be observed in the actual interaction situations by paying attention to how the participants treat the various environments and participants. To specify, if the participants are treating these as belonging to separate social phenomena that can interfere with each other, with their predefined boundaries, thresholds and ways of prioritizing them, their behavior is about multitasking, task-switching, attention allocation, or constant connectivity and ICT interruptions. In Augmented Sociality, however, the individuals are approaching their interactions with and around ICT, across the digital and physical worlds as one social group where all the ICT use behaviors are socially tolerated and accepted and ICT and individuals as the participants can coexist together without individuals setting them apart.

Achieving the social acceptability of the ICT use for these combining behaviors is critical for Augmented Sociality. For Augmented Sociality, it is not enough for any of the participants to go about their combining behavior without respecting the individual tolerances of the other participants and the accompanying collective social tolerance toward ICT use. Stemming from this, for Augmented Sociality to emerge, it is not sufficient that in a social situation, an individual acts based on their preconception that a certain kind of ICT use is acceptable. Instead, these ICT use behaviors have to be collectively tolerated in the real-life interactions by the others in the social situation and be received with social acceptability by them for Augmented Sociality to become possible. In other words, Augmented Sociality emerges and is sustained as a co-achievement in the interactional give and take of the participants across the digital and physical worlds, in those social situations where the participants signal with their interactions that they collectively tolerate this ICT use behavior and find it socially acceptable.

5.2.4 Theoretical implications of Augmented Sociality

I suggest that Augmented Sociality has implications on the literature on the social use of ICT and its subdivisions, such as the dark and bright sides of ICT. I elaborate below.

There is an observable behavioral difference between the participants orienting toward the other participants as separate individuals and ICT versus interacting with them as one social group in a hybrid social environment, as in Augmented Sociality. This difference is what sets Augmented Sociality apart from the current literature. This distinction also has implications for the literature on the dark and bright sides of ICT. As discussed above, this difference is dependent on the combining behaviors staying within social tolerance toward ICT use and
thus the ICT use gaining social acceptability, versus not. Further, within social tolerance toward ICT use, there are no observable ill effects on sociality stemming from this combining behavior, while outside it, ill effects start to arise. Accordingly, outside the social acceptability of ICT use, the social behavior of an individual toward combining the digital and physical worlds in the social use of ICT remains as an attempt, incompletely combining several, unrelated courses of interaction, within two separate domains of social behavior (the digital and the physical world), instead of merging them all into one, as in Augmented Sociality. In this way, Augmented Sociality is distinct from multitasking, task-switching, attention allocation or constant connectivity, which are all about doing several unrelated tasks either simultaneously (multitasking) or by switching and allocating attention between them (task-switching and attention allocation) (Adler and Benbunan-Fich 2012; Wickens et al. 2015), or carrying out several unrelated streams of communication in parallel (Wajcman and Rose 2011).

This difference between orienting to interaction as taking place within one social group and between several separate lines of action is important. This is because although humans have limited capabilities for doing several, unrelated things at once, such as in multitasking, they are well-adapted to social situations in f2f groups, with several participants suggesting and rejecting the topics being discussed, or even suggesting competing lines of action, with the participants finding this natural and enjoyable instead of taxing or stressful (Goffman 1967; Levinson 2006). The fundamental socio-behavioral requirement to emerge and sustain these social group situations is that none of the participants can request the attention of the other participants “too much,” or the whole group falls apart into smaller groups (Goffman 1967). In addition, social offense can arise in these group breakdowns, because some of the participants feel neglected or left out (Goffman 1967). In other words, group interactions can and often do include diverse social initiations, as does Augmented Sociality. Nevertheless, the participating individuals tend to perceive them all as belonging to the same social interaction, if these social behaviors stay within certain limits (Goffman 1959). In Augmented Sociality, these limits are staying within the social tolerance toward ICT use and the ICT use behaviors being socially acceptable. However, Augmented Sociality is also distinct from the literature about group interaction with humans as participants (Goffman 1959, 1963), because in Augmented Sociality, also ICT is included as a participant, in addition to humans.

Augmented Sociality can also be viewed partly distinct from the social use of ICT (see Suchman 1987). The close attachments of Augmented Sociality to human sociality are what make Augmented Sociality partly different from the literature on ICT use, including the social use of ICT. To start with, in Augmented Sociality, no apparent asymmetry can be observed between the individuals receiving the demands of humans or ICT, as in the literature about ICT use, defining “ICT use” as humans initiating interaction and ICT responding accordingly (see Suchman 1987). Rather, in Augmented Sociality, both humans and ICT appear to manifest their social demands, interactional preferences and individual tolerances that are all important for the social tolerance toward ICT use as a collective phenomenon. In Augmented Sociality, exceeding social tolerance toward ICT use, leads to a social outcome akin to social offense, defined as ill effects on, or the termination of, sociality (see Goffman, 1959), regardless of whether the party that appears to take this offense is human or ICT.

In addition, in Augmented Sociality, individuals acknowledge the approach of the threshold of these tolerances, whether of humans or ICT, and respond by prioritizing either party, depending on the urgency of their social demands. Therefore, the real-life social behavior with and around ICT in Augmented Sociality does not appear akin to “ICT use,” with its asymmet-
tical approach to sociality, but rather akin to “interaction,” a reciprocal process between the participants, whether humans of ICT (see Suchman 1987; 2007). This means that from the observable, interactional point of view, in Augmented Sociality, individuals respond to both humans and ICT as participants.

However, in this thesis, the social tolerance toward ICT use and social acceptance of ICT use that are critical for Augmented Sociality, are defined in relation to ICT use, which is a human-centric point of view. To start with, I made this decision to explicitly answer the main research question of this thesis, as all the sub-questions, all formulated from individuals’ point of view. Besides, taking a stance of defining ICT as an active social interactant by default is a philosophical question (see Suchman 1987; 2007) that is beyond the scope of this thesis, especially taking into account the ways in which I use my theoretical background, symbolic interactionism (Blumer 1969; Mead 1962), in my research: I use symbolic interactionism focusing mostly on individuals’ social behavior on a micro level, as it takes place in real life and I regard the social reality for individuals to be as it appears in their ongoing actual interactions with the things in the world (see Mead 1962). In addition, I use these ICT use-based definitions partly because my results show that the participatory stance of ICT appears conditional in data, dependent on its participation staying within the social tolerance toward ICT use and social acceptance of ICT use of humans. Primarily, when approaching the limits of the social tolerance toward ICT use, especially in the case of ICT malfunctioning, individuals tend to respond with repairing actions, care and empathy, often successfully. However, on falling out of these, the participation of ICT can sometimes also come to resemble “use” in my data, with individuals initiating, even forcing, interaction and ICT just responding accordingly (see Suchman 1987). However, this is rare. Besides, this kind of ICT use behavior is outside the scope of Augmented Sociality. Still, these results indicate that at present, even though individuals are overwhelmingly responding to ICT as participant in interaction, ICT can sometimes move out of the participant status when the individuals’ social tolerance toward ICT use is exceeded. The individuals in my data, in turn, always keep their participant status in relation to each other, even when facing social conflicts and offense with each other. Taken together, based on these observations and philosophical choices, in this thesis, I define the social tolerance toward ICT use and social acceptance of ICT use with “use” in it.

However, the findings of this thesis show that the real life combining behaviors tend to dominantly stay within the social tolerance toward ICT use and therefore be a manifestation of Augmented Sociality. Here, individuals do respond to the social demands of ICT in the same way as they respond to human participants in interaction. Therefore, drawing on symbolic interactionism (Mead 1962), I conclude that in the lived-in social reality of these individuals combining the digital and physical worlds inside Augmented Sociality, ICT appears as a participant for them. Further, it is significant that these combining processes appear not only mostly successful but also substantially uniform across the data from different contexts, recorded several years apart. This can be viewed as revealing the generalized symbolic meanings individuals have for their social behavior with and around ICT when combining the digital and physical worlds (see Mead 1962): according to symbolic interactionism, repeated achievements in a given social processes reinforce its symbolic meaning as a viable option for behaving in that situation and, as a result, social demands, expectations and codes of conduct tend to emerge over time (Mead 1962; Goffman 1959). With Augmented Sociality, each situational achievement of staying within social tolerance mutually confirms the social acceptability of this ICT use combining behavior as a collective agreement of the participants. Thereby,
each situational achievement reinforces Augmented Sociality as a viable way of behaving in those social situations with and around ICT where the digital and physical worlds are being combined. The routinized processes of negotiating this combining the digital and physical worlds and the repeated achievements of staying within social tolerance toward ICT observable in the data analyzed for this thesis suggest that Augmented Sociality appears to be the expected social reality for the individuals, even though they may occasionally fail to achieve it. In addition, these negotiations appear also to frequently push the boundaries of what the participants deem as socially acceptable ICT use and as a result, their social tolerance toward ICT use tends to get stretched in these negotiations. It appears that in these repeated achievements of staying within the social tolerance toward ICT use, individuals end up adapting their expectations of socially tolerable ICT use behavior and help ICT to adjust theirs accordingly, to comprise the social demands of both humans and ICT as one social group, across the digital and physical worlds as one social environment. In this way, over the repeated achievements, Augmented Sociality can also potentially impact individuals’ generalized symbolic meanings about sociality (see Mead 1962) with and around ICT and user perceptions about what is acceptable IS use in general (see Goel et al. 2016) in the context of the social use of ICT.

5.3 Practical contribution: how to use Augmented Sociality in ICT design

In today’s digitalized society, individuals work and spend their time together during leisure in small groups that can be located either in the f2f or digital worlds, or increasingly, a combination of both (Hess et al. 2014; Hinds and Mortensen 2005; Isaacs et al. 2012; Oestreicher-Singer and Zalmanson 2013). However, these combinatory social world environments in particular can pose a challenge to ICT design for small group interaction, because of the unexpected, negative social outcomes, such as decreased productivity, arising from the processes of combining the digital and physical worlds in the social use of ICT (Tarafdar et al. 2015b). In addition, individuals can also refuse to use or stop using ICT they find standing stressful to use, or standing in between them and their work goals, especially if they can go about their lives without it (Maier et al. 2015; Tarafdar et al. 2011)

My thesis shows how individuals cope with these social situations in their real-life interactions with and around ICT across the digital and physical worlds, keeping on using ICT without ill effects on their productivity and well being. Observing their successes and failures in real-life social behavior gives implications about how to approach this combining behavior in ICT strategy and design. The first implication of my findings is that in practice, this combining behavior, despite the occasional struggles involved, is the preferred and expected way of behaving in social situations for individuals. Second, in this combining behavior, humans and ICT are both approached as participants, whose social demands tend to be based on evaluating their urgency, not automatically giving humans priority over ICT. Third, the outcomes of this combining behavior (positive, negative or neutral) are dependent on the situational social acceptability of this ICT use combining behavior that arises from the social tolerance toward ICT use, collectively defined by the participants as a leeway for breaching their social demands and expectations in the given situation. These breachings can refer to the time it takes for one participant to respond to the social demands of the other(s), or to the number and severity of mistakes in the expected ways of behaving they make as a by-product of this combining process. Therefore, instead of ICT design focusing on separating the digital and
physical worlds, design efforts should focus on making these combining processes benign to ongoing sociality by aiming at designing socially acceptable ways of combining the digital and physical worlds in the social use of ICT. My findings suggest that to this end, focusing on social tolerance toward ICT use, comprising the tolerances of each participant, whether human or ICT, is critical. My findings show how in everyday life, it is rare for the social demands to be stringent and pressing, unless a critical moment in a given social process is taking place. Instead, the social demands of the participants tend to include at least some leeway that allows for negotiations and alternative courses of action within the social situations.

The individuals constantly evaluate their social surroundings for the adequate satisfying of their social demands and manifest the outcome of their evaluation as social tolerance toward ICT use, regarding the extracurricular activities as they see fit. Within social tolerance toward ICT use, the participants perceive no harm to be done because of the combining behavior and as a result, they accept it, even though they are aware of the situation being less than ideal. It is worth noticing that even within this social acceptability of ICT use, tensions and minor setbacks in the social processes and outcomes can take place. However, these tensions and setbacks within the social tolerance toward ICT use, are regarded as nonsignificant by the participants and therefore, they let them slip and pass unannounced.

According to my findings, the individuals are well-adjusted to evaluating each other’s social demands in their combining processes and as a result, it is rare to exceed the tolerance of any party. In addition, it is rare for a combining behavior to continue beyond the point of it turning detrimental to the sociality. However social schism does arise whenever the combining behaviors touch or even approach the threshold of the social acceptability of ICT use. Therefore, these results suggest ICT design for combining the digital and physical worlds in the social use of ICT would benefit from focusing on monitoring and defining the individual tolerances of the participants and keeping any negotiations and social behavioral adjustments within their social tolerance toward ICT use as a collective phenomenon, to keep the combining behaviors benign.

My findings show how individuals can expertly self-adapt their social behaviors and help ICT to adapt theirs accordingly, without ill effects on the ongoing sociality, within the limits of the situation which they are in. However, with current ICT, these behaviors require constant and repetitive adjustments from humans, as today, ICT has limited capabilities for social context awareness, learning from its social experience and adapting its social behaviors accordingly. Because of this, at the time of writing, achieving Augmented Sociality with and around current ICT remains dominantly a human responsibility, with individuals evaluating the social demands present and helping ICT to adjust itself accordingly. With their well-adjusted social behaviors, individuals can dominantly cope with this responsibility, but it is still not ideal for them. Therefore, distributing these efforts more evenly between the individuals and ICT with design would yield even more time and resources for individuals to focus on their tasks or just socializing with each other through and around ICT.

As a summary, I suggest that in ICT design for Augmented Sociality, more attention should be paid to discovering, monitoring and modeling the social tolerance toward ICT use in this combining behavior, to come up with ICT designs that can facilitate the combining of the digital and physical worlds in a benign way. Further, to innovate novel digital services and ICT designs for Augmented Social situations, future research and design could benefit from paying more attention to the thresholds and boundaries of social acceptability of ICT use in relation to Augmented Social situations where ICT is being used and to the processes that
drive social tolerance toward ICT use either toward a breakdown or toward the desired state. Therefore, the functionalities of ICT need to be designed so that the social demands of all parties, whether human or ICT, can be met without exceeding the social tolerance toward ICT use in these Augmented Social situations. In this way, the individuals engaged with ICT do not have to multitask, task-switch, allocate their attention between tasks, or stress about expectations for constant connectivity, all of which can be stressful and detrimental to individual well-being and productivity (see D’Arcy et al. 2014). I suggest that one way forward in this would be to focus on the multimodal ways in which individuals evaluate social demands addressing both verbal and nonverbal behavior (such as prosodic means, tone of voice, gestures, body positions and facial expressions) and find ways of teaching ICT to respond to these, too (see Jokinen and Wilcock 2014, 2017). This would help to distribute the social responsibility for this monitoring and adjusting more evenly between humans and ICT.

With design for the Augmented Sociality as the expected social state for conducting social behavior across the digital and physical worlds, it can become possible to increase the well-being and boost the performance of individuals using ICT (see Lee 2015). In addition to ICT design, these results can be used for formulating digital strategies and ICT design principles for business. These results can also be used for formulating policy guidelines for municipalities, educational purposes and parental guidance.

5.4 Conclusion: living with Augmented Sociality

My results in this thesis have shown how individuals do not inherently set humans and ICT apart in their processes of combining the digital and physical worlds with and around ICT. Instead, they evaluate every social situation as it arises and evaluate the social demands and expectations of each participant for their urgency and flexibility. Then, they proceed to balance the various social demands accordingly. In this process, the individuals consider both humans and ICT as participants, each with a tolerance of their own. The resulting collective social tolerance toward ICT use refers to the extent of possible simultaneous breaching of the social expectations of each participant for socially acceptable behavior in the given situation to arise. The balancing process aims at not exceeding social tolerance toward ICT use. Succeeding in this results in social acceptability of the ICT use combining behavior, as none of the individual tolerances of the participants has been exceeded and therefore, no ill effects can be observed in relation to the ongoing sociality. However, even within this social acceptability of ICT use, tensions and compromises can be present, but within social tolerance toward ICT use, they are inconsequential to the social situation. In this thesis, I have named this achievement of considering and balancing the simultaneous social demands of humans and ICT the state of Augmented Sociality merging the digital and physical worlds into a hybrid environment.

My results reveal that despite the struggle individuals can and often do face when combining their digital and physical social worlds with and around ICT, they routinely attempt this in their social behaviors, often successfully. With their careful negotiations, showing respect and sensitivity to the social situations they are in, more often than not, they succeed in achieving and maintaining Augmented Sociality in their interactions. In my data, Augmented Sociality appears to be the expected mode and dominant state of social behavior arising from the combining of the digital and physical worlds in the social use of ICT. In Augmented Soci-
ality, individuals approach both humans and ICT as one group of social participants, within one hybrid social environment comprising both the digital and physical social worlds.

5.5 Avenues for future research on Augmented Sociality

In this thesis, I have introduced the concept of Augmented Sociality based on the findings of four separate but interlinked papers that all use video-recorded data from real-life interactions with and around ICT. The data behind my findings are longitudinal, collected over several years and comprising many hundreds of hours of video recordings, obtained from both leisure and work contexts. In these videos, individuals of all ages and from all kinds of social, cultural and work backgrounds can be observed in various combinations of small groups, interacting across the digital and physical worlds. As the processes, boundaries and thresholds behind my proposed concept of Augmented Sociality appear repetitive and uniform across my data, I suggest the concept of Augmented Sociality as a social micro-level behavioral phenomenon has generalizability to a range of social situations and that it represents the expected social reality for individuals as it appears in their everyday lives with and around ICT today. I have also included some implications of Augmented Sociality for theory and design. In this thesis, I have also defined the boundaries and thresholds of Augmented Sociality with the concepts of social tolerance and social acceptability, as well as their interrelations.

Although ICT is dominantly responded to as a participant by the individuals in Augmented Sociality, this thesis emphasizes the human point of view over that of ICT for two reasons: firstly, according to my findings, although both humans and ICT are responded to as participants in Augmented Sociality, the responsibility for monitoring and adjusting the social behaviors dominantly lies in the human hands, as current ICT has limited capabilities for context awareness and automatic social behavioral adaptations (see Jokinen and Wilcock 2014, 2017). However, I hope that my findings will help in underlining the importance of this social context awareness and automatic social adaptability of ICT as important topics for future research.

Secondly, my results show how within social tolerance toward ICT use and social acceptability of ICT use, individuals respond to both humans and ICT as participants, without setting them apart in their interactional responses. These social behavior observations do not conform to the current notion of ICT use as an asymmetrical process, where the human user initiates action and ICT just responds accordingly (see Suchman 1987, 2007). Rather, the observed behaviors appear as ICT interaction (see Suchman 1987, 2007), or even more simply, as social behavior between two participants engaging in interaction by initiating interactions and responding to the interactions of others (Goffman 1959; Lamb and Kling 2003; Mead 1962; Suchman 2007), i.e. oriented action, reacting to and taking into account the behavior of others (Weber 1968). Still, in my current conceptualization, I have decided to conceptualize the social tolerance toward ICT use and social acceptability of ICT use with the “use” in it.

One of my findings in this thesis, however, is that current social life with and around ICT is overwhelmingly about Augmented Sociality merging the digital and physical worlds in the social use of ICT. This process appears to be stretching participants’ social tolerance toward ICT use and the social acceptability of ICT use. Further, the process appears to be encouraging Augmented Sociality as the mainstream state for sociality. It is within these processes that ICT appears to be gaining its ground as a participant. Therefore, an interesting question for the future could be what will happen to the relationship between humans and ICT in the
future if these processes persist? Will ICT gain a permanent position as a participant, or even as an interactant, in the Augmented Social future? What will happen to the “use” in ICT use? Will it still be viewed as a socially acceptable behavior? How will we conceptualize the relationship between humans and ICT in the Augmented Sociality of the future? These questions are clearly outside the scope of this thesis. However, I suggest they are relevant to future research, as already in my data, the individuals do not set humans and ICT apart within Augmented Sociality, but the ever-increasing interactivity of ICT is likely to blur the distinction between humans and ICT as interactants even more (see Clark and Clark 2016; Jokinen and Wilcock 2017; Steffen et al. 2017). Interestingly, in sociology, those social relationships where one participant “uses” the other are conceptualized as “abuse,” a form of violence, making it distinct from interaction (see Giddens 1984, 1992, 2009). The distinction between ICT use, abuse and interaction, with its implications and ethical considerations, could be one topic for future research.

Thirdly, the guiding principle behind my work has been to work with data that are as close to the natural behavior of the participants as possible. To this end, I have used data from various sources, some of which have been collected by other researchers for other purposes, to ensure that the participants could not have anticipated the appropriate behavior for combining their digital and physical worlds in their social use of ICT. I made this decision in order to avoid the participants modifying their behavior to match their perceived expectations of socially appropriate ways of behaving, as can sometimes be a problem when researching human behavior (see Babbie 2010; Goodwin 1993). As a by-product of this decision, some but not all of my data contains detailed and explicit recordings of the interactional inputs of ICT, such as content logs or screen captures. However, as the videos used in my research total hundreds of hours, there are also ample opportunities to analyze the interactional inputs of ICT with microethnography. This is because even in those recordings that do not contain the ICT screen capture of content logs, as often at least some of the screen action is captured in these recordings. For further research, I suggest that combining the video recordings of participants in the physical and digital worlds with content logging and screen captures can help in making the interactions of ICT an even more salient part of the research design.

Last, the concept of Augmented Sociality is based on an interactional achievement of satisfying the diverse social demands of the participants, staying within social tolerance toward ICT use and reaching social acceptability of ICT use for combining the digital and physical worlds in the social use of ICT. In my data, these achievements outnumber the failures in attempting Augmented Sociality. However, tensions, compromises and near-misses are also present in these negotiation processes. I suggest that future research should pay more attention to the social processes that drive these negotiations toward the lower threshold of social tolerance toward ICT use on the one hand and toward the ideal state, on the other, to increase understanding about social tolerance toward ICT use, social acceptability of ICT use and the processes and dynamics behind them.
References


