



During the last 30 years portable devices have gone from being exotic luxuries to domestic artifacts. The multi-featured contemporary laptop computer has its roots in early ideas about personal computing, as expressed by Vannevar Bush in 1945. Today, mobile technology is tightly integrated into our lives. This thesis is about the use of a specific portable and personal technology – the laptop – and its use characteristics in different situations. The thesis explores this tight integration between humans, technology and digital services in a university setting and asks the question: What characterizes the use of laptops in everyday life?

The contribution shows that when mobile technology is present the situations become networked; highly dynamic, with interaction in different layers and with an unpredictable set of participants. The networked situation is also a multi-situated one; the situation is shared and mixed with other situations through social media such as status updates, pictures and chat messages.

The contribution also shows how the user becomes a laptop, a hybrid actor, a combination of the human body, technology and digital services that acts together as one. A laptop is characterized by actions such as socket search, screensaver fear, screen peeking as well as online tics. These actions change the prerequisites for ones well known situations such as lectures within higher education.



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Being Multisituated – Characterizing Laptops in Networked Situations



UNIVERSITY OF GOTHENBURG

## Being Multisituated – Characterizing Laptops in Networked Situations

*Tomas Lindroth*

**Ph.D. thesis**



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# **Being Multisituated**

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## **Abstract**

During the last 30 years mobile IT has gone from being an exotic ingredient to an everyday artifact. This thesis presents an ethnographic study of laptop use in a university setting. The thesis concludes that it is no longer enough to describe the use of portable IT as an activity in its own right, i.e. using a laptop computer as an activity similar to reading a book or writing an essay. Additionally, describing a person as merely a user of digital technology fails to capture the interwovenness between the technology, situation, person and other actors. In order to find more nuanced answers about laptop use the thesis discuss what characterize the use of laptops in everyday life. With support from Actor-Network Theory, the Interaction Order and Experiential computing the thesis explores the hybrid combination of a person-laptop. The contribution is a framework of the driving forces behind the laptop user's everyday activities. Additionally a model of the networked situation is presented, that uncovers the effects of the laptop user over time, that is, the laptoping process. The contribution is a framework with key characteristics and typified interactions where the multisituated and network dimensions are understood as fundamental elements of hybrid interaction.

Keywords: laptoping, laptop user, interaction order, actor-network theory, networked situation, multisituationism.

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## *It takes an entire village to raise a fool*

På samma sätt behövs det en institution och ett forskarlag (eller två) för att akademiskt fostra en doktorand. Jag har haft förmånen att vara på två institutioner, en i Göteborg och en i Trollhättan. Det har varit en tillgång att vara en del av och ta del av två världar på nära håll.

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Tomas Lindroth, Sävedalen, april 2015





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# 1 INTRODUCTION

This thesis is about the use of a specific portable and personal technology—the laptop—and its specific characteristics in different situations. In our offices, at home in front of the TV and at school, during the last 30 years these portable devices have gone from being exotic luxuries to domestic artifacts. Thus, the presence of portable information and communication technologies (ICTs) in our everyday lives has become the norm rather than the exception. In line with Lyytinen & Yoo (2002) and Yoo (2010), this thesis argues that it is no longer enough to describe the use of a portable ICT as “use,” that is, as an activity in its own right. Using a computer is not equivalent to an activity such as reading a book or writing an essay, since a portable ICT is a common part of many activities, and is as such a prerequisite for these activities. In addition, describing a person as merely a user of digital technology fails to capture the interwovenness of the technology, the situation, the person and other actors. Such a description fails to capture the plasticity of the device, its effect on the situation and the various purposes it supports. Or, as expressed in the research commentary titled “Desperately Seeking the ‘IT’ in IT Research:”

...we must theorize about the meaning, capabilities, and uses of IT artifacts, their multiple, emergent, and dynamic properties, as well as the recursive transformations occurring in the various social worlds in which they are embedded. (Orlikowski and Iacono, 2001. p. 133)

Consequently, separating “computer use” from other everyday activities becomes counterproductive. For the informants of this thesis, everyday life is enmeshed with information technologies to the point where everyday life is best described and understood as a socio-computational mashup, or according to Yoo (2010), as experiential computing. That is, the subjects of this study experience everyday life as they do as a result of a tight technology integration. This thesis explores this tight integration in detail, and considers what effects such a tight integration might have in everyday situations.

In order to address these questions, I conducted a part-time ethnographical study of students equipped with laptops over a period of more than four years. In the educational setting where the study took place, more than 200 students used laptops on a daily basis to conduct their studies. This setting offered a stable and authentic environment

where the laptop as part of a practice was observable over a continuous period. The educational setting was a university department where IT-related educational programs and courses were offered. In this department, all the students possessed laptops, and a Wireless LAN was available. In such an environment, there were good opportunities for observation and multiple possibilities to follow the laptop-equipped students at close range.

The sophisticated and multi-featured laptop computer of today has its roots in early ideas about personal computing, as expressed by Vannevar Bush in 1945 in his foundational article on personal information processing (Bush, 1945). Similar ideas were later nurtured by Douglas Engelbart and, later still, formed the basis for the first prototype of what is commonly referred to as the birth of the laptop, Alan Kay's Dynabook concept (Engelbart, 1995; Chen, 2008; Kay, 1968). When GRiD Systems Corporation launched the first clamshell laptop design in 1982, the GRiD Compass designed by Bill Moggridge, they unknowingly set the standard for how personal and portable computers with a screen and keyboard would be designed for decades to come (McCracken, 2012).

Thirty years later, personal and portable computers, as well as online services, have become trendy. In figures, the popularity of portable devices was evident in 2008, when more laptops were sold worldwide than stationary computers (iSupply, 2008). The trend towards mobile rather than stationary devices is continuously strong, with increasing sales of and Internet surfing occurring via mobile rather than stationary computers (Bishop, 2014).

Mobile devices are not commonly used in a single place. For example, if you visit Gothenburg central station, numerous people carry mobile phones, and people with laptops are common. In the offices at Lindholmen Science Park, next door to the setting of this empirical study, the laptop is a necessity, and is omnipresent. These devices are thus not associated with work, leisure, a specific place or a specific activity, but are part of our everyday life practice.

Thus, society has an interest in personal IT for various reasons, and media coverage hints of a broad international interest that goes well beyond the stereotypical "techie" and "nerds." While the laptop, mobile phone and World Wide Web existed 15 years ago, at the birth of the new millennium, *they were not an integrated part of our everyday life as they are today*. The question is, how can society and the informatics research community understand this integration into everyday situations?

## **1.1 Research Motivations**

The changes described above—the switch from stationary to portable technologies, the integration of these technologies into everyday life and the rising popularity of online services—have both empirical and theoretical implications, which motivate this thesis. Additional motives, as expressed above, include these four concepts: how the notion of “user” evolves; how the notion of “use” evolves; and how everyday situations are affected by mobile technology integration.

### **1.1.1 The evolving user**

When mobile IT is an expected part of almost every situation, it is meaningless to state that a person is “using” a laptop or a mobile phone. Is the person reading a book, playing a game, flirting, working or just hanging out with friends? The notion of “user” has previously been discussed as unsatisfying by Lamb and Kling (2003) and Yoo (2010), since it does not capture the “user’s” embeddedness in his or her socio-technical environment, but rather suggests a focus on task-performing atomic individuals. This discussion pinpoints the continuous evolution of the user subject. Accordingly, Section 3.6 explores new ways of representing and analyzing the user, not as an atomic individual but as part of a situation, and as part of a larger network of actors—that is, the “laptop” (the user with his or her tightly integrated laptop), and his or her network entourage.

### **1.1.2 Redefining the situation**

To enter a university lecture without digital technology is to enter a situation that is limited by the four walls of the lecture hall. The reach of human interaction is limited by the physical constraints of the room. You are more or less bound to the room and to its related activities and norms. With an Internet-connected laptop, however, the walls are but a thin curtain that the outside world slips through. Interaction is not limited to the locals present; on the contrary, it lacks limits. The lecture that used to be secluded is now part of a networked society.

Within sociology, an emerging area revolves around the notion of networked society, including and going beyond Castells and his work, *The Rise of the Networked Society* (1996). Castells’ writings focus on the larger societal effects of digitalization, and suggest a shift towards a “culture of real virtuality,” thus replacing stable formations of place, identity and nation with “flows” across different types of barriers. Also within

sociology, the work of Rainie and Wellman departs from the individual perspective. Instead of the networked society, these scholars focus on networked individualism, and how networked individuals live their lives (Rainie and Wellman, 2012).

This thesis focuses on mobile technology and its effect on the everyday situation, taking a perspective that departs from the person and goes between the atomic individual and the societal perspective to focus on the *networked situation*. Section 3.2 develops this perspective.

### **1.1.3 On doing mobility**

Mobile technology enables people to perform different types of activities in different situations. With desktop computers, emails were dealt with at the desk. With friends without mobile phones, meet-ups were arranged in advance. With connected and mobile technology, however, emails, meetings and even shopping lists are managed almost regardless of the type of situation.

People move portable technologies from one situation to another. The reciprocal shaping between the technology, different situations and different actors is a result of mobility (Techatassanasoontorn, Diaz Andrade, and Wanchai, 2013; Fallman, 2005). However, a major part of mobility studies has primarily focused on temporal and spatial aspects of mobility. The effects of mobility within a situation and on the situated interaction as such have gained much less attention. In the studies presented in this thesis, the laptop-equipped student is co-creating a mobile and wireless practice; a practice in which mobility is not the exception, but part of the expected activity (Weilenmann, 2003), a perspective developed in Section 3.1.

### **1.1.4 The laptop**

The idea of a portable computing medium is over 40 years old, even though the current clamshell design was created in the early eighties (Kay, 1972; Maxwell, 2006). The actual design of the laptop, accompanying software and peripherals is important to this thesis because it affects the studied situations. A range of studies on mobile phones exist, but studies of laptop or notebook computers are not as common. Maxwell (2006) and his article “Tracing the Dynabook: A Study of Technocultural Transformations” is an exception. Studies of laptops as part of educational and pedagogical practices are common, however (Barak, Lipson and Lerman, 2006; Fisher et al., 2004; Fried, 2008; Kotz and Essien, 2002;

Thomas and Nishida, 1998). Still, the point of departure of these studies is the pedagogical practice, rather than the technology in use. Chapter 2 develops this perspective.

## **1.2 Research Aim and Question**

What happens when mobile technology and online services become actors in our daily situations? What happens when we move a personal Internet-connected technology between different situations? What if we treat the human+laptop as a subject, a laptop-hybrid and as part of a specific practice? How can we describe the character of the laptop-hybrid? What type of answers might these questions yield? To characterize is to describe the aggregate features, qualities and traits that form the character of a person, thing or phenomenon (Dictionary.com, 2014; Merriam-Webster, 2014). Hence, I will answer the following research question:

*What characterizes the use of laptops in everyday life?*

Basically, this thesis investigates new ways of characterizing the “portable technology use and user” by considering the close integration between different actors as well as its effects on everyday situations.

## **1.3 Structure of the Thesis**

Section 2 embeds the story in a larger context, tracing the story of personal computing back to some of its founding ideas. Actor-Network Theory and the Interaction Order are the most prominent theories I use to analyze and develop contributions. Section 3 describes these theories in depth, and discusses how they contribute to a better understanding of the topic of this thesis. That section is quite extensive, as it sums up the theoretical development of the five articles that make up this thesis, and presents it in a unified structure.

Writing a thesis and, in this case, a thesis consisting of five individual papers and this cover paper, is a journey with an unknown destination. The empirical setting, the theories, each paper, each journal and conference—all affect the conclusions. In Section 4, I will elaborate on my reasons for choosing ethnography, the effects of doing research in an educational setting and other methodological issues.

Section 5 presents each article and its contribution. Each description also includes how that article fits into the overall process of reaching the



conclusions of this thesis. Section 6 discusses each individual contribution, and presents the overall contribution. Section 7 offers the concluding remarks of the thesis. Then follows the collection of the five papers. In the thesis, these five papers are referred to as follows:

- Paper 1 Lindroth, T. (2012). The laptop as an alibi: Use patterns of unfocused interaction. *Nordic Journal of Digital Literacy*, 2012(2), 132-144.
- Paper 2 Lindroth, T., & Bergquist, M. (2008). Breadcrumbs of interaction: Situating personal information management. In *Proceedings of the 5th Nordic conference on Human-Computer interaction*. NordiCHI '08, Lund, Sweden.
- Paper 3 Lindroth, T., & Bergquist, M. (2010). Laptops in an educational practice: Promoting the personal learning situation. *Computer & Education*, 54(2), 311-320.
- Paper 4 Lindroth, T., Lundin, J., & Svensson, L. (2014). Laptops in classroom interaction: Deconstructing the networked situation. Accepted for publication: in *International Journal of Continuing Engineering Education and Lifelong Learning*.
- Paper 5 Lindroth, T., Bergquist, M., & Lundh Snis, U. (under review). Characterizing the Laptop: The sustainability struggle of onlineness, content curation and visibility. Submitted to an international IS journal. Second round of reviews.

## 2 Envisioning a portable and personal medium

Even though the portable computer became more common during the 1990s, its history and the vision behind it dates back to 1945. In the following text, a brief historical discussion will assist in establishing the roots of and concept behind personal and portable computing. My aim is to emphasize that technology itself possesses no inherent value; rather, its value lies in the enabling of conversation, interaction and learning around great ideas.

In 1945, during the last months of the World War II, Vannevar Bush wrote the article “As We May Think” for the *Atlantic Monthly*, summarizing a set of ideas developed over several years. Like many researchers at that time, he wanted to apply the technology that won the war to further the cause of peace, and to augment human memory and intellect (Bush, 1945; Packer and Jordan, 2001). Bush departed from the available non-digital technology of that time, and developed in his article a concept he named the “Memex.” The Memex, visually similar to a traditional wooden desktop, had the purpose of storing and organizing information according to an individual’s own *personal* associations. The top of the desk was a projection surface on which microfilms and photos could be projected and read. These microfilms could not only be read and edited in real time; they could, by mechanical levers, be changed and associated with each other. In this way, the reader created associations or relationships between related microfilms. According to Bush, the Memex would hold a personal library, records and documents as well as communication with others; it could also be maneuvered from a distance. The associations on one Memex could then be shared between different Memexes, with notes describing their relationship. Consequently, the concept of the Memex extended beyond a technology that could enhance the work of one individual. Its capability to associate, annotate and share both documents and personal trails suggests a technology that would interlink individual webs of documents with others into a common repository, or as Vannevar expressed it, “There is a new profession of trail blazers, those who find delight in the task of establishing useful trails through the enormous mass of the common record.” (Bush, para 8).

Even though Bush did not use the word in his article, he invented the notion of the hyperlink, an idea that would later have a profound influence on the inventors of the personal computer and the Internet (Packer and Jordan, 2001; Wikipedia). “As We May Think” and the Memex were 35 years ahead of their time, and are seen as the first step in

the development towards a personal medium not very different from the laptop of today.

Others were to follow. Inspired by Bush's Memex, Ted Nelson coined the terms "hypertext" and "hypermedia" while developing his own ideas in the project Xanadu, regarded as the first hypertext project, which was founded in 1960. In 1968, Douglas Engelbart presented the first system to put hypertext links into practice: the NLS or oN-Line System. The first demo of the NLS in December 1968 showcased the computer mouse, precursors to the graphical user interface, teleconferencing, and a form of email that was an early version of what later was named groupware.

Bush, Engelbart, Nelson and others were an inspiration for many computer scientists in the late 1960s. One of these was Alan Kay, who besides possessing technological expertise had the pedagogical interest and competency to envision a personal and portable computer designed for innovation, prototyped in 1968 as a *personal dynamic media* for children (Kay, 1972; Maxwell, 2006). The Dynabook, as it was called, introduced both the modern graphical user interface and object-oriented programming, both famous and still in use. Today, the Dynabook is considered as the archetype both for laptops and for recent pads of various brands (Chen, 2008; Gruener, 2010). However, Kay's vision of creativity and learning, based on theorists like Jerome Bruner, Seymour Papert and Jean Piaget, has been largely forgotten (Maxwell, 2006).

Thus, behind the portable and personal computer was an educational vision of a dynamic hypermedia for creative thought, a media that would include all other media, and that would be something other than so-called static media such as newspapers, paintings, TV and film. The Dynabook was in part an interpretation of Bush's Memex, Engelbart's NLS and Nelson's concept of hypermedia. Kay referred to it as a meta-medium, containing all other media, and stated that to use it purposefully would require what he called a new literacy (Maxwell, 2006). Hence, his goal was not technological per se, but envisioned a future in which schoolchildren, not just computer scientists, could interact meaningfully with digital technology (Maxwell, 2006). Maxwell describes Kay's vision and literacy as a literacy about understanding and being part of a system that converses about and renders ideas in dynamic form; that is, a literacy that is a form of competency. It is not a computer or digital literacy, since as Kay puts it, "The music is not in the piano" (1996b); rather, it is about taking part in the generation of new big ideas. Reading and writing are essential skills for participating in idea development, but they are not sufficient. Kay's concept for the Dynabook and a new literacy was to

design a new medium that would leverage and help to spread conversations of great ideas to a large percentage of students. Consequently, he did not consider a personal and portable meta-medium to be an end in itself, but an essential actor; part of an assemblage intended to nurture conversation and creativity around great ideas. In agreement with Kay, this thesis focuses on the use of this meta-medium and its effect on everyday situations. Such studies have historically been published within Informatics, HCI and CSCW under the term Mobility.

### **3 Theorizing Hybrid Interaction**

This chapter describes the theories used in this thesis, their relevance for the topic of laptoping, and how they relate to my contribution on this topic. Section 3.1 introduces the notion of mobility. Sections 3.2 and 3.3 introduce Goffman's interaction order and its associated relevant concepts. I use the interaction order framework to analyze the interaction between actors within a situation.

In Section 3.4 I discuss Orlikowski and Scott's umbrella notion of sociomateriality (2008) and its relevance for my thesis. In Section 3.5, I focus on the various parts of Actor-Network Theory (ANT) that I will later use to explore the empirical material. Finally, in Section 3.6, I introduce Michaels (2001) and his contribution to ANT and the hybrid perspective. Michael's work on road rage and couch potatoes was an important inspirational source for the direction of this thesis. Section 3.7 concludes the chapter.

The purpose of this chapter is to position the thesis and its conclusions within a relevant theoretical stream of research, and to be clear and obvious about its theoretical underpinnings.

#### **3.1 The origin of mobility**

A laptop is a portable device, made for people to take it with them. Thus, mobility is important to understanding laptop use. This chapter is also important in order to understand why this thesis was written in the first place. It provides a short historical overview of the field of mobility within Informatics and also a point of departure for this research. In the following sections I will describe how the field of mobility progressed, matured over the years and how I saw a gap in the research agenda. Thus, this description also shows a need for another type of focus within the field of mobility. Not only a focus on the effect of time and space, work patterns or access to information, but also effects on how mobile technology affects how users perceive a situation and how the mobile technology change the notion of user, in it self.

Studies of people moving around and away from their desks started to appear in the mid-1990s in the fields of human-computer interaction (HCI), computer-supported collaborative work (CSCW), and information systems (IS) and informatics. This work built on Suchman's work about situated action (1987) and was inspired by Orr's contemporary research on "modern work" (1996) as well as on Heath's case studies of work experiences (1996). The common denominator is not only the uprise of

mobility in particular, but the digitalization of the workplace in general. Three technology tracks—the mobile phone, the personal computer and the world wide web—further pushed the transformation from a 9-to-5 office schedule towards a post-industrial work practice, often referred to as anytime/anyplace computing (Kleinrock, 1996; Kopomaa, 2000; Davis, 2002).

Early studies focused on videoconferencing, mobile phones, laptops and other technologies. At that time, these technologies were new and trendy. However, it was not the technology per se that was in focus, but rather the different types of mobility these technologies were part of: micro mobility, remote mobility and local mobility (Luff and Heath, 1998); or visiting, travelling and wandering as described by Kristoffersen and Ljungberg (1998). In the following subsections, I present mobility studies as three waves. One wave does not indicate the termination of another; rather, they coexist as parallel fields of inquiry.

### **3.1.1 First wave: Experimental office studies**

While searching for the origin of mobility studies within the above-stated areas, I noted several authors (Belotti and Bly, 1996; Luff and Heath, 1998; Perry et al., 2001) referring to two sources: Whittaker et al. (1994) and Belotti and Bly (1996). These two articles represent two ways into the problem domain, the former with the goal of decreasing mobility, and the latter with the goal of supporting mobility.

Whittaker et al. represent the numerous articles about teleconferencing systems, and how we may use video conferencing to bridge distance and to open up technology-mediated communication; that is, how we can connect people who are dislocated in space, in order to engage in informal discussions and planned meetings (Fish et al., 1990; Heath and Luff, 1992; Webster, 1998; Tollmar, 2001). These articles represent a view of technology as a means to bridge distance, with the goal of decreasing the mobility of people (Belotti and Bly, 1996, p. 209). It is significant that these articles are solutions related to video conferencing in three different settings: the meeting room, the personal office or open areas such as the lunchroom. A focus on teleconferencing may seem contradictory in this context, since teleconferencing is the opposite of a mobile system, especially at that time. But teleconferencing and mobile technology share the ability to bridge distance and connect situations. The time period of these articles, from 1992 (Heath and Luff) to 1996 (Belotti and Bly), coincides in Sweden with the introduction of GSM mobile telephony and that of the personal computer, as well as with an increase in

the uptake of dial-up household Internet connections. Hence, they were written during the birth period of what we know today as the digitalization of society and the mobile Internet (Karlsson, 2011).

Belotti and Bly (1996) conducted a study of designers located at two different offices. These designers were separated in space, and relied on technologies such as telephones to interact. This separation became a problem, since the workers in the head office were often locally mobile in order to interact with other colleagues. The researchers observed that local mobility within the office affected the designers' collaboration with their remote colleagues. They concluded that collaboration with remote team members while being locally mobile is a key advantage in need of IT support. This article represents a view of technology being used to support remote collaboration through mobile technologies. Other articles following this line of thought include Luff and Heath (1998), Kristoffersen and Ljungberg (1998), Bergqvist et al. (1999) and Perry et al. (2001). Luff and Heath (1998) develop a taxonomy of mobility and highlight three forms: micro, local and remote mobility. This taxonomy has been widely referred to in order to design IT supporting, for example, local mobility. I see these frameworks as a first attempt to conceptualize theories about mobility from a very practical perspective, as they mainly deal with human mobility and collaboration.

These articles represent the first wave of mobility research, which mainly deals with human mobility, mobility within the office (including how workers may communicate with distant colleagues), and how one may support this mobility with different types of IT. These studies are often based on short ethnographically-inspired field studies of office work, in order to come up with design implications in support of mobile meeting and collaboration. These articles are primarily published within CSCW and HCI rather than IS.

### **3.1.2 Second wave: Experimental outdoor studies**

The second wave is characterized by studies in which researchers developed and studied their own novel applications in classical field experiments (Sachs, 1995; Cheverst et. al, 1998; Fagrell, 2000; Nielsen and Söndergaard, 2000; Wiberg, 2001). These studies focused on journalists, tele-technicians and wastewater operators, and on applications supporting their mobile work. This type of study looks at one profession, one work task and their specific needs. Major contributions from these studies are often about prototypes delivering time-critical information or context-aware mobile applications. Field data were collected with

ethnographically-inspired methods, and were used to come up with design implications, which were then used to build and evaluate a prototype. These devices became a part of the actual work task. For example, Fagrell (2000) presented a mobile knowledge management system called NewsMate. This system was designed to provide timely information in a mobile work setting for radio journalists.

In these cases, researchers have moved out of the office and, with the same purpose and methods as in the first wave, studied remote work situations. These first two waves are also characterized by their experimental field study approach. In both waves, researchers study a situation, design an application and then test the application in a field experiment. These relatively short studies (40-50 hours of observation) of work practices allow for rapid data input into prototyping. The focus of this work is not so much on person-to-person communication as on knowledge management systems: the ability to bring information and decision support systems from the desk (e.g., the control room) to the situation where the actual work is done (e.g., the tunnels of the London underground). In line with this focus, Churchill and Munro (2001) challenge the traditional understanding of the workplace:

Conceptions of the work place have always been mutable and are always changing. People have been working in 'unusual' locations all the while, but these issues are now becoming more visible. As well as the mobility coming to fore, it becomes clearer that we need to consider the ways in which stable infrastructures underpin mobile ones. (p. 8)

*What* the workplace is and *where* the workplace is are constantly changing concepts, and are dependent on the technologies that we use in our work. Another technology characteristic for this wave is the PDA, the personal digital assistant that, for a few years, lived in parallel with the mobile phone before it was merged into the so-called smartphones. One reason for the interest in the PDA rather than the mobile phone was the PDA's software development kit (SDK), which accepted third-party apps, a feature lacking in mobile phones at that time. This second wave represents the prototyping and delivery of online services in the field, and the early days of the app era.

### **3.1.3 Third wave: Everyday studies of mobility**

In the third wave, the non-experimental use of mobile IT began to attract interest, and focus moved from experiments to field studies of naturally-



occurring activities. There was also a shift in focus from work towards everyday life. Teenagers, mobile phone use and everyday situations such as waiting attracted attention (Weilenmann, 2002; Brown and Chalmers, 2003; Haddon, 2003). In a study of teenagers' use of mobile phones, Berg, Taylor and Harper (2003) drew conclusions on how to design phone functions, based on cultural use and cultural meaning-making involving the mobile phone. The focus of this study was on teenagers' everyday non-professional use of their phones.

Cafés, train stations, museums and amusement parks are areas of interest; that is, areas where the action is. This is a development one might expect from a rather new area, where the technology of interest has to reach a certain level of domestication before it is possible to study use in any larger scale (Brown, 2002; Palen et al., 2001). In this third wave, researchers take another step towards theorization, although studies are still grounded in very practical problems such as tourists using maps or knowledge-workers' extensive travelling (Pica and Kakihara, 2003). Studies initiate discussions of mobility in terms of place and space, and while temporal aspects have been central to the field from the beginning, these now become more theoretically saturated. For example, the consequences of "anytime" become more evident in the articles. In Jauréguiberry's paper on mobile technology and time, he covers the topic of "dead time," bringing out the connection of plans and time. In everyday language, terms such as "lost time," "suspension of time" and "free time" are common. When we find ourselves waiting for someone who is late for a meeting, being stuck in a traffic jam, or waiting for a delayed plane, mobile technology allows us to extricate ourselves from the situation in some way. Brown and Chalmers present a study of mobile technology for tourists (2003). They suggest the notion of pre- and post-visits as a way of understanding traveling as something that is not only defined by the time away, but is rather defined as a process that includes preparations and recollection as well (Lyytinen and Yoo, 2002). Thus, the concepts in this third wave include a technology's effect on local interaction as part of mobility or mobile computing (Cousins and Robey, 2005). Additionally, the concepts in this wave include different forms of interaction chains, where the places you visit are part of a chain of visits. In these articles, mobile technology is described as tying together situations of interaction across co-located and dispersed participants into an ongoing interaction process. Kakihara (2003) describes this tying together as something that is accomplished by the user. The user strives to deal with a *flow* of interaction, keeping up an ongoing stream of incoming and outgoing interactions (Kakihara, 2003).

These three waves represent the development of the research area of mobility within IS, HCI and CSCW. In the next subsection, I present the primary contributions from mobility research. These contributions are the central theoretical backgrounds that shaped this thesis.

### **3.1.4 Summarizing mobility**

In this section on mobility, I have covered the progress of the mobility area. To summarize the three waves and the definitions above, mobility as described in the literature is about:

- Physical movement—both in a micro and macro sense. It enables cooperation around a conference table as well as connectivity during travel. Research in mobility covers how we relate to space.
- Place and location—Technology decreases the way a location delimits our action space. Still, users of mobile technology are still always situated in a specific physical location.
- Time—the freedom from time constraints, effects on our management of time and the demands of always being available. Temporal aspects are thus central to mobility studies.
- Connectivity—to always be online, to always reach and be reachable and to have the Internet as a resource. Connectivity is central to the area.
- Interaction—with the device, with information and with mediated interaction with other humans. How we behave and what we do in particular locations are important concepts.

These five aspects summarize the field of mobility. The first three have attracted the most attention over the years. The last one, which is the primary focus of this thesis, has also received some attention, but not on how the technology and the user mutually affects the situation as a result of mutual interaction or how these three co-create a new type of situation.

## **3.2 Relevance of the interaction order**

The interaction order is an apt framework for analyzing interaction within a situation. How do people interact with each other? How do they observe each other? How do they direct their attention within the situation? These are questions this framework can help to answer. Questions that align well with the knowledge gap in the previous section.

Notions such as mutual monitoring, involvement and co-presence are important analytical tools when describing the actions within a studied setting. Erving Goffman developed his framework on the interaction order during the 1960s. His purpose was to show how the interaction within a situation emerges from the situation itself, and how the micro influences the macro, rather than the other way around. Thus, a situation has its own order that is co-constructed by the actors present.

However, as with much of Goffman's writings, interaction order is a loosely coupled framework. His work includes revealing observations of everyday social behavior, but in many cases lacks the bindings that tie his notions into a coherent framework. In Paper 1, I use the concept of involvement as an analytical tool to investigate the actors' different focuses within a situation; that is, to investigate where and on what they direct their attention.

According to Goffman, the *dominant involvement* of a situation is the expected activities by the persons present in that particular situation. Goffman illustrates by using a church as an example. Even though the physical location remains the same, actors expect certain activities at a wedding that are not expected at a funeral. It is the activity or involvement that persons within the situation are expected to focus on, or in some way at least, relate to (Goffman, 1963). Thus, an involvement may be both a threat and a resource depending on the person, the type of situation and expectations from co-located persons.

Most often, the situation's dominant involvement is equal to what Goffman calls the individual's *main involvement* (Wasson, 2006; Williams, 2007). The main involvement is the involvement that the individual is focusing most of her attention on, which typically is the dominant involvement of the situation. However, Goffman also discusses subordinate involvements as a threat to the individual's focus on the dominant involvement. Thus, there is always a possibility of turning the subordinate involvement into the individual's main involvement, which is then detached from the dominant involvement of the situation. A subordinate involvement can therefore take the form of a main involvement for that person (or group of persons) and will compete with the dominant involvement of the situation.

In certain locations, while waiting for a train or bus, the main involvement, waiting, may not be enough in order to make the person waiting feel at ease. Similarly, it may feel awkward to eat alone at a fast food restaurant and to be too involved in eating. Goffman introduces the

notion of *substitute companion* to capture the common habit of offering newspapers at fast food restaurants. The more modern variant involves playing around with a mobile phone while waiting. The newspaper (or mobile phone) becomes the subordinate involvement that the eater may divide her attention to while finishing her meal. Such an involvement may be seen as a person's *minimal main involvement*, minimal since there is just enough of a level of involvement to make the individual feel at ease. When the waiting is over, this minimal main involvement may be quickly disregarded and replaced with a focus on the "real" main involvement.

One solution to the "problem" of involvement is to shield involvements, or to conceal an improper involvement and give the impression of proper ones. Goffman writes about *involvement shields*, barriers of perception that hinder other participants from noticing what is going on "behind the scene." The newspaper is a common involvement shield. On the local bus, travelers can pretend to read and thus avoid taking notice of acquaintances who are seating themselves nearby. Headphones and mobile phones are other props that may be used to shield a person from those nearby.

### 3.3 Goffman and technology

In several of Goffman's texts on the interaction order, he distances his analysis from mediated interaction. Thus, the interaction order needs to be reexamined to investigate its applicability to mediated interaction. In the following text, I use Meyrowitz's (1990) writings to nuance this reexamination.

The notion of the interaction order was developed by Goffman to clearly state the focus of his research and analysis. Research within this stream focuses on the interaction between people within a given situation. It puts emphasis on behaviors and utterances that are expressed while co-present with, and mutually monitored by, others. Additionally, Goffman is clear that his analysis is about unmediated interaction, since phrases such as "immediate physical presence" offer few other interpretations (Goffman, 1963; Meyrowitz, 1990). Still, Goffman's concepts of *mutual monitoring* and *co-presence* may also be useful for mediated interaction. This is particularly true if we consider the third notion that Goffman uses to define a situation, that of *barriers of perception*. Meyrowitz agrees with this notion, and sees physical space, place and location as subcategories of the more inclusive notion of *perceptual field*. To quote Meyrowitz on words:

For while situations are usually defined in terms of who is in what location, the implicit issue is actually the types of behaviors that are available for other people's scrutiny (Meyrowitz, 1990, p. 88)

What Meyrowitz aims at here is that, while the unit of analysis is the situation, what defines it are the observable interactions and the limits of such observations. If the perceptual field is altered, then the situation, or how we interpret the situation, should change accordingly. Hence, while technology changes the interaction within a situation as it takes part in it, it also affects the very definition of the situation, as it increases the perceptual field. Mobile phones, laptops and other screen-based technologies increase the types of behaviors that are available for perception to include aspects that are digitally represented.

When portable technology and its associated behaviors are performed in different situations, the behaviors and situations merge into situations with their own "behavioral patterns," as Meyrowitz expressed it, in a phenomenon he named *middle region*. Because of situational integration, where situations overlap one may also experience less social differentiation in status and behavior (Meyrowitz, 1985; 1990).

### **3.4 Sociomateriality: Central to experiential computing**

As I argue in the introduction of this thesis, portable and personal technologies are part of our everyday life. They are not an exception, something we rely on in special situations or events. In this everyday fusion lies the reason to choose a sociomaterial departure. From a sociomaterial perspective, the material is always relevant to a study, as a contribution may not only be about change, adoption, diffusion or other notions that connote change or a process. Without material such as clothes, furniture and buildings, the situations of our everyday life as we know them today would not exist; that is, there would be no "ordinary" in the first place.

While there is much to learn from specific occasions involving technological change, these occasions may obscure the fact that we always exist in a combination of different material. Our house, body and clothes are all material actors supporting our ordinary life. As such, we are hybrids—a combination of material, human and social entities, each of which acts to a greater or lesser degree. We are hybrids that act as individuals, each with a particular character.

As Orlikowski and Scott put it, "...this [sociomateriality] is a move away from focusing on how technologies influence humans, to examining how materiality is intrinsic to everyday activities and relations." (Orlikowski and Scott, p. 455). They use Latour's well-known example of soldiers, their weapons and their clothes to further clarify their point:

To distinguish a priori 'material' and 'social' ties before linking them together again makes about as much sense as to account for the dynamic of a battle by imagining, first, a group of soldiers and officers stark naked; second, a heap of paraphernalia—tanks, paperwork, uniforms—and then claim that 'of course there exists some (dialectical) relation between the two.' No! one should retort, there exists no relation whatsoever between the material and the social world, because it is the division that is first of all a complete artifact. To abandon the division is not to 'relate' the heap of naked soldiers with the heap of material stuff, it is to rethink the whole assemblage from top to bottom and from beginning to end. (Latour 2004. p. 74)

The solution to the division in this thesis is the hybrid. A problem occurs, however: If there are no such things as material and social, how can we talk about sociomateriality? How can we talk about humans and technology if the division does not exist? From one perspective, this is a problem with the English language, which is not "designed" to express fusion. The English language emerged out of a world that its inhabitants viewed as being made up of the material on one hand and the social on the other; and the language reflects this division (Cecez-Kecmanovic, Galliers, Henfridsson, Newell and Vidgen, 2014). To overcome the division involves the invention of new words that can be used more accurately to describe the world from a relational perspective rather than a divisional one. Accordingly, any division in this text between humans and technologies is for analytical purposes only, as these pure entities are not to be found in the empirical setting. A laptop, for example, is on its own an assemblage of different actors: social, material, cultural and digital (to use traditional labels). It is designed and manufactured by people and robots; it is made out of natural resources; it provides access to online services; and it is sold via cultural promises of efficiency and pleasure.

In the above quote, Latour refers to the "dynamic of a battle," a dynamism that Orlikowski and Scott refer to as *performativity*. Thus, it is in the dynamic or practice of battle that the associations between humans and their "paraphernalia," the assemblage, the hybrid of the soldier,

emerges. The idea of a soldier is not naturally given; it is enacted in the practice of training and war. The assemblage of a soldier is the result of a range of activities, a practice, if you will; hence performativity. Thus, performativity highlights the fact that boundaries between different actors are not pre-given or fixed, but are enacted in practice. Regarding practice, Orlikowski and Scott refer to “the scholarly effort of understanding how boundaries and relations are enacted in recurrent activities” (2008, p. 26). This argument echoes Goffman’s standpoint on “how the micro influences the macro, rather than the other way around.” (Goffman, 1963)

Consequently, by suggesting sociomateriality as an emerging field, Orlikowski and Scott question what they argue is a taken-for-granted separation between the material and the social, in favor of a relational ontology. One of the bodies of research that Orlikowski and Scott point to, which has taken this perspective the furthest, is Actor-Network Theory (ANT), also known as the sociology of translation. The next section describes ANT, together with a set of notions that are central for the analytical framework used in one of the papers associated with this thesis.

### **3.5 Actor-Network Theory**

Over the last 20 years, Actor-Network Theory has become an influential theoretical framework within science and technology studies (Callon, 1986; Latour, 1987; Bijker et al., 1987; Latour, 1993; Law and Hassard, 1999; Latour, 2005). Over time, a range of other disciplines have adopted this framework to fit their specific discipline. As a consequence, ANT is a multifaceted theoretical framework with a large set of common concepts, but with wide and broad interpretations between disciplines. One reason for its popularity is the way ANT challenges simplified understandings of the technological determinism/social constructivism dichotomy. In the vocabulary of ANT, the world is made up of actors that are *heterogeneous*, *symmetrical* and *distributed*, three central aspects that I explain below.

As mentioned previously, Latour rejects the pure notions of human and technology, and instead argues that any actor is in itself an assemblage of actors; thus, any actor is in itself a network. The laptop itself is a *heterogeneous* assemblage, since the actors making up the assemblage are of various sorts. As a consequence, no a priori distinction can be made regarding which actors count, in relation to what they are made of. Since any actor is in itself a heterogeneous network, one cannot initially state that one type of actor is more important or defining than another. The human in the laptop assemblage is thus not necessarily more defining than the laptop. Accordingly, the various actors must be

treated as analytically *symmetrical*; that is, there exists no a priori hierarchy that states that a human is more defining than the installed software, or the other way around. It is important to note that “symmetrical” does not mean similar. That is, ANT does not suggest that humans and machine assemblages are to be treated analytically as the same. In addition, these actors may be *distributed* in several bodies; they are not necessarily confined in a single body. For example, an actor may be a car and its driver, or it may be an organization with all its different parts.

According to Latour (2005) there are no more or less hidden structures or social glues that hold an organization or society together. Rather, organizations, technologies and humans are constantly negotiating, interacting and thus re-creating themselves through the actions of the actors. Accordingly, the glue that holds these networks together is the association, as well as the particular stuff of each interaction that in one way or another affects the network’s agency. In ANT vocabulary, an *association* is the traceable relation between two actors. The association is the actual mediator of and translator of agency between different actors in a network. As such, associations are important to an understanding of the subject of agency.

### **3.5.1 Forms of scripts**

During data collection through observations, certain activities may be observed that are of particular interest for the specific research subject one is currently working on. By writing down these observations, one produces *descriptions* of these activities, descriptions that are one of many points of departure for the analysis. While producing a movie, *manuscripts* are used to direct each actor’s activity in a scene. The actors involved in my observations are not so easily persuaded and directed. Thus, while there exists no manuscript that directs their actions, there are according to ANT certain *scripts*, a notion with a peculiar meaning, that influence their activity. A script, then, is something that contains information on interpreting how the actors in a set are associated with each other. A script is a framework for action, and is thus an important part in tracing a hybrid’s agency. Or, as expressed by Brey, a script is, “...the framework of action, in conjunction with the actors and the space in which they are supposed to act, which is presupposed by the artifact and any other actant that helps to define its prescriptions” (Brey, 2005).

Thus, description as a narrative of an activity may then include several scripts that can be chosen for further analysis. It is important to note that



scripts are analytical constructions that we as researchers choose to analyze, and are not given a priori.

Two further notions are script-related: The notions of inscription and program of action are important in ANT when discussing the role of a technology in a given network. According to Latour (1992) and others (Cho, Mathiassen and Nilsson, 2008), inscription is the result of a translation process, in which the end result is designed into a hybrid assemblage. Latour uses the often-referenced example of a hotel key, which is supposed to be returned to the reception when a guest leaves the hotel. In order to achieve this, the hotel manager attaches metal weights to the keys, making them uncomfortable to carry, and so hotel guests hand them in. Thus the message “Please bring back the key” is inscribed into the network as a program of action. These programs vary in strength and flexibility and are never absolute, and as such, it is possible to work against them as an anti-program. Prescription is partly about design; for example, a designer gives form to a coffee cup so that it associates well with a human hand. As such, prescription is similar to the notion of affordance. It is about what the actor allows or invites to. However, humans are also open to inscriptions. It would be cumbersome if a person needed to relearn how to drive each time she drove her car, or needed to consult the manual on how to start the engine. Likewise, humans are open to inscription, although we normally talk about it as the ability to learn.

### **3.5.2 Agency**

Within IS, much of the research on the role of agency relates back to the work of sociologist Anthony Giddens (1984), who defined agency in his structuration theory. This theory is often seen as the starting point for the IS agency debate. In this context, agency is seen as a capability to make difference, or the capacity to act (Giddens, 1984, p. 14).

From an Actor-Network Theory perspective, agency, or the ability to have an effect in the world, is not a property of a single actor, human or artifact, but is something associated with an assemblage of actors. If agency has a location, it is in the network. Agency does not just appear in the assemblage, but emerges out of the associations between actors. That is, humans, artifacts or any other actor have properties, but these are situationally enacted and defined. Artifacts are only what they are within the situation in which they are used; in the words of Ihde (1990), they are multistable. Thus, agency is interpreted as the co-shaping of action (or effect) between the associated actors in an assemblage. The laptop user is always situated in a specific contextually-defined situation in which an

activity is occurring. However, not only is the user connected to the technology, but the technology is also connected to infrastructures such as Wi-Fi, electricity and so on. Being attentive to associations means that the researcher carefully recognizes co-agency and mediation between the actors involved. From a laptop perspective, this argument implies that its behavior is not a result of the laptop, human, software or services by themselves, but is a result from their co-mediation of action (Brey, 2005; Latour, 2005; Verbeek, 2005).

### **3.6 The origin of the hybrid perspective**

Our everyday lives are full of different encounters with entities with various names, such as a phone operator, photographer, truck driver, commuter, skater, chef or web designer. These particular examples share a heterogeneous pattern: each is a combination of a human and a prominent technology such as a phone, camera, train, stove and so on. All these entities rely on technology in order to exist as roles, and their activities and performance are a result of the assemblages of different associated actors. What can we learn from these heterogeneous actors if we take them analytically and seriously? In his book *Reconnecting Culture, Technology and Nature*, the British sociologist Mike Michaels asks this particular question with the intention to bridge and question his three titular notions of culture, technology and nature using an ANT agenda (2001). Michaels focuses on what he classifies as everyday, mundane hybrids such as the car-person, dog-owner and couch-potato. Some of these hybrids have their own distinct names, such as the couch-potato, a name derived from descriptions in popular culture. Michaels invents other names to describe his hybrids. The couch-potato includes actors such as the sofa, remote control, TV and human. Although these entities are heterogeneous, Michael makes a point of giving each a name, and treats them both as singularities and as assemblages. One the entities that we meet every day is the car-person, which Michaels dubs the “cason.” Michaels’ purpose with this perspective is to unravel the ordering and disordering of life, that is, to study how mundane technology heterogeneously reinforces and undermines the typical activities of everyday situations. A focus on hybrids is clarifying, as Michaels has shown, enabling the researcher to become aware of and to understand the associations, actors and scripts involved in the enactment of a particular hybrid. This focus also assists in the description of a hybrid’s agency.

In the above-mentioned studies of the hybrid cason (car-person), Michael focuses on road rage to capture the situated connectedness

between human and non-human actors. He argues that the traditional view of road rage is most often attributed to different physical and mental states of the driver. As Michaels expresses it, “A short list could include: stress, territoriality, vengeance, the provocatively animalistic quality of car headlights, the primitiveness of human nervous system, aggression triggered by overcrowding, etc.” (Michael, 2000, p. 74). Instead of these explanations, Michaels analyzes cason agency in relation to a set of scripts—often contradictory in nature—that is part of the agency of the cason-hybrid. This set includes: the speed script, in which the car is marketed and designed for high speeds; and the safety script, in which the car is designed and marketed as safe. One of Volvo’s old slogans is an example of this combination of scripts: “The Response of a sports car. The Responsibility of a Volvo.” In other words, being fast, efficient and aggressive stands against being safe, careful and forgiving. Michaels’ analysis uncovers more or less situational actants in the networks of the cason, such as car commercials, speed bumps, stop signs, type of car and the driver’s personality. Even more situated issues, such as that of “being late,” or actions from other drivers on the road, will have an impact on the cason’s agency.

### **3.7 From ANT to experiential computing**

Treating two subjects, the human and laptop, as a singularity (the laptop) and as co-creators of a practice (laptoping) helps us focus on the emergent, situational consequences from an experiential computing perspective, rather than a simple perspective of “use.”

ANT plays a central role in Paper 5 of this thesis. Experiential computing (EC) provides a similar ontological perspective as ANT, since the two theories recognize both human and non-human actors’ agency. In this section, I describe the core of EC and its points of contact with ANT. While ANT has been valuable in my work, EC is an emerging genre within IS that is also suited to support the discussion of the findings in this thesis. In the next paragraphs, I show how ANT and EC support each other by providing interrelated complementary aspects of the studied phenomenon.

According to Yoo (2010), mobile technology is no longer being interpreted or experienced as an end in itself; or at least, this is not the major experience of technology. Instead, technology directly shapes our lived experiences. Mobile, personal and wearable technologies affect everything from time and space to actors and artifacts. Consider the following passage in Yoo’s article (2010):

We can never have experiences independent of the body in the world. Space is a structure that enables things to be connected as we experience them. Therefore, space is never naturally given a priori, but actively and materially constructed through different form of actions (Yoo, 2010).

As we see from this passage, the interaction order and ANT are not the only theories to depart from the situation. Yoo argues that space, that is, situations, is not given a priori but is materially constructed through actions. As individuals' everyday activities are enmeshed with mobile technologies, the frame of our experience is constantly sociomaterially shaped (Orlikowski, 2007). Hence, as in experiential computing, agency is attributed neither to the human nor to the technology, but to inseparable combinations of a range of different materials. According to Yoo, in this enmeshed reality the technology "pulls down" the digital from merely a representation into the immediate lived experience. As I argued in the introduction, this enmeshed reality affects how we understand on one hand the actor and on the other the situation the actor is part of. In addition, it alters the way we orient toward other actors who are co-present (Yoo, 2010).

Yoo asks several questions that are relevant from an experiential computing perspective. How does the entanglement of the digital and the physical influence the contour of digitally-mediated experience in everyday life? How does the distributed agency affect the situation, and how do digitally-mediated experiences transform the meaning of everyday activities? These questions are all similar and are relevant to the questions of this thesis.

For example, we as persons are never in two places at once; rather, we are always situated in the "now," on the way to somewhere and coming from somewhere. Digital technology does not change this state of being per se, but the lived experience of "now" is different when IT is included. This perspective deviates from the mobility perspective that I presented earlier, in which IT is considered to free us from time and place. From one perspective, IT does free us, but from another perspective, time and place as structuring elements implode with the integration of IT, increasing the structuring demand on the individual (Bødker, Gimpel and Hedman, 2014).

### 3.8 Theoretical reflections

In 2001, Dourish wrote about embodied interaction; in 2008, Orlikowski coined the term sociomateriality; and in 2010, Yoo suggested experiential computing. These three notions are not about one distinct phenomenon; however, they share three ontological points of departure that are at the core of this thesis. All three deny the Cartesian separation of different variables into distinct analyzable entities. Instead, theorists of these notions argue that there is no social experience that does not include technology, and there is no technology that does not contain aspects of the social. Thus, pure categories such as these do not exist; rather, the technological, or using the broader term, the material, shoots through the social aspect. As an alternative worldview, theorists offer a relational ontology, where the social and the material are inherently inseparable. Within informatics and IS research (including the work of the authors mentioned above), Actor-Network Theory and phenomenology are the most notable frameworks for such a perspective.

In addition, all three notions take an everyday life perspective, transcending traditional dichotomies like private versus work life, and individual versus organizational. Theorists argue (Dourish, 2001; Lyytinen and Yoo, 2002; Orlikowski, 2007; Yoo, 2010) that as the digitalization of society continues, the traditional notions of work or personal life will more or less lose their meanings, until only life or everyday life are discernible, and other more situated perspectives are needed (boyd, 2014). Lyytinen and Yoo (2002), Orlikowski and Scott (2008) and Yoo (2010) represent an emerging trend within IS research towards a more pluralistic view of relevant analytical entities. Gaskin and Lyytinen (2010) have recently addressed the individual and psychological level, while Yoo (2010) focuses on experiential computing, along with digitally-mediated everyday experiences that clearly acknowledge boundaries other than the organizational. Yoo's work is in line with that of Cousins and Robey (2005), who problematize the boundaries between business and personal contexts. These boundaries are relevant to this thesis, because the laptop as a portable device exists in all types of situations.

As expected, all three notions take material or matter seriously, and especially digital technology. However, they share an even more specific emerging area of digital technology. For example, when the theorists of these notions explain their perspectives through examples, these examples contain non-traditional information systems. The examples lack the traditional office-suit programs or CSCW implementations, and they lack

organizational management systems. Instead, the examples are of ubiquitous services such as Google, personal and portable devices such as the BlackBerry and personal services that are not primarily computer-related, like the iPod (which is about music). This range of chosen examples demarcates a trend away from stationary computers and management information systems and towards a stream of research that focuses on emergent, ubiquitous, portable and personal technologies and services. Hence, this thesis is part of this current trend within IS, a trend towards ubiquitous services, personal and portable devices.

## 4 An Ethnography of Laptops

The broad initial objective of this ethnography was to study the everyday situated use of mobile IT. It took almost two years to narrow down the research question to what it is today. At that time, mobile phones were more about talk and short message service (SMS), rather than online services, games and social media. PDAs were at their peak in popularity in media, but they were hard to observe in use, since no one really used them.

At that time, the IT University in Gothenburg was one of few schools in Sweden without traditional computer labs. Without labs, laptops became a mandatory necessity for students at the university. In addition, the laptop as an artifact was open for observation every day at the university. Hence I chose the laptop as the technology for focus, and the open areas, group and lecture rooms as the situations of study. I did not choose the setting because it involved learning, or because it was a school of higher education. Rather, I chose it because of the widespread use of mobile IT within it, and for the possibility it held of getting access to and observing the use and practice of this mobile device on a daily basis.

At the time when I began material collection, field studies of mobile IT were common, but these were often field tests of a particular service or software, as I described earlier in the section on the second wave of mobility. Other studies focused on mobility as an analytical entity per se, and not on the device as part of an existing practice. The ethnography of this thesis was thus novel, as it focused on laptops being part of an existing practice that was not initiated by the researcher.

### 4.1 The ethnography

To be able to gather data about people using laptops as part of their everyday practice, one needs access to situations, and one needs to use applicable methods. An important analytical entity was the laptop screen. Since my focus was on the possible effects of interactions with a screen in a situation, I had to observe physical situations rather than studying Facebook behavior or relying solely on interviews. I also had to follow the informants between situations in order to understand transitions and the whole laptop practice on a daily basis.

Ethnography is not simply a method in which one gathers data, compiles and presents the descriptions of one's observations. It does involve material collection methods like interviews and observations of different kinds, but the final result is not a simple transcription of

interviews. Instead, the literature refers to a striving for what is sometimes referred to as a “thick description,” a sort of interpreted narrative of the combined experience of traditional qualitative methods with living or spending an extended period of time in the studied setting. Hence, the subjective experience of the researcher is key within ethnography. My interpretation and implementation of this fact has been to embrace subjectivity, and see it as an asset rather than as something to work against. Hence, my subjective interpretation of the studied practice is one of several sources or aspects that I need to take into account when producing the thick description.

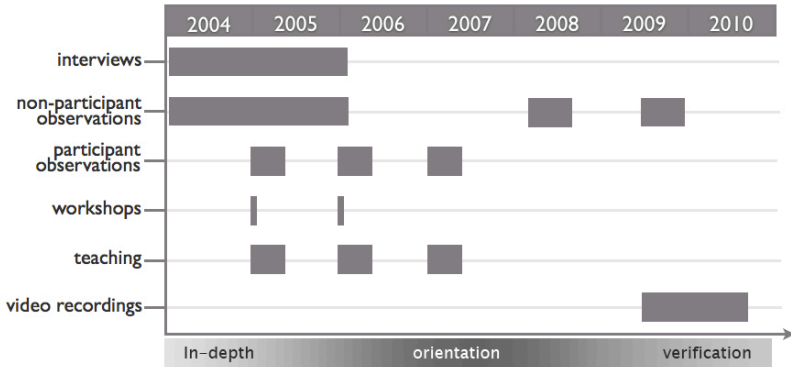
While traditional ethnographies from within cultural and social anthropology study cultures, societies or communities, I focus on a slightly different aspect. Although the students who are part of this study make up a community (such as a learning community), my focus is on a particular practice within this community; more specifically, on the situated interaction that is part of this practice. Thus, my ethnography and descriptions do not focus on the culture of learning, how they consort or the nature of the relationships between students, teachers and faculty. Instead, my focus is on the aspects of interaction between a person and a laptop within a series of situations. How does the person direct her gaze: towards a message on the screen, or towards somebody in the physical situation? How does the information accessed through the laptop become an inseparable part of the situation? Hence, as Malinowski puts it, the ethnographer has to “construct the big picture” of the institution, or in this thesis, construct the big picture of the laptoping practice (Malinowski, 1932, p. 84). Constructing the big picture means identifying and naming certain habits and behaviors, and turning them from isolated behavioral patterns into webs or chains of interaction with names and meanings as part of a practice (Geertz, 1973).

## **4.2 The material collection methods**

This empirical study started with non-participant observations, and was soon followed by interviews. It was an open and explorative process in which the initial goal was to describe what I called at that time a wireless practice. As for most observers of a practice that is new to them, my initial observations were analytically fruitless, since my recorded descriptions were not more than just that, descriptions. They lacked even the lowest form of useful analysis. It was only when they were complemented with individual and group interviews that they started to make sense. These two material collection methods formed the base of my data collection,



and were complemented with additional methods and perspectives, as shown in table 1.



**Table 1: Material collection methods**

Each of the methods listed in table 1 were based on both opportunity and necessity, so to speak. As the possibility to teach within the studied practice emerged, it also became possible to do participant observations, and to follow students and their group work at close range. The workshops were a result of my need to verify my early results from observations and interviews with persons from the actual practice. The video recordings were conducted to capture on-screen behavior as well as lecturers' activities. In table 2, these different material collection methods are listed with short descriptions.

Method	Description
Interviews	<p>16 persons were interviewed within a total of 10 interviews, (seven female students and nine male). Out of these, two were group interviews. The interviews were open ended and lasted between 45 to 90 min. The interviews in particular contributed to a better understanding of the students' manner of talking and expressing themselves around their experience as laptop users. While the observations covered their behavior, the interviews offered a better meaning of these behaviors from the student perspective.</p>
Participant and non-participant observations	<p>Observations were made in open shared areas, during lectures and group work. In the shared areas, the observer was anonymous, acting as just another student. Observations during lectures were made with oral consent from both students and lecturers. Participant observations were made as a teacher and as a project member in students' project groups. The majority of the empirical work is non-participant observations. The observed scripts are mainly a result from these observations.</p>
Teaching	<p>The teaching experience consisted of lecturing over a ten-week period for three consecutive years. These periods gave a good opportunity to get a close view of the students' in-class and group work. The observing teacher (me) was not employed at the observed university, and thus had an outsider's point of view. From this experience, notions such as involvement shield and alibi were analytically deepened.</p>
Workshops	<p>Analytical results from the observations and interviews were tested in two workshops, where the findings were presented to a different group in each workshop. The workshop participants expressed a feeling of self-recognition in the presented result. The workshops were conducted quite early in the process and included findings primarily from interviews and non-participant observations.</p>
Video analysis of lecture settings	<p>Four lectures were video recorded from the back of the classroom with the purpose of capturing the minute-by-minute interaction with the laptop computer and its screen. The recording of each lecture was analyzed, and relevant parts of the video recordings were transcribed. Video recording during lectures were made with written consent from both students and lecturers.</p>

**Table 2: Description of material collection methods**

While my field work is interpretative and explorative in nature, the structure of my analytical process is theoretically driven. The hybrid perspective and the interaction order have in different ways structured and contributed to my analysis. Hence, my ethnography had no a priori analytical framework that guided the empirical work. Instead, I selected these theories to assist in my analysis of the fieldwork. The hybrid perspective contributed with a range of notions and a process that guided the analysis. As described in the theory sections, these notions included scripts, actors and associations. While the hybrid perspective primarily contributed to conceptualizing and structuring the analysis, the interaction order contributed with possible ways of interpreting the content, that is, the observed interaction.

### **4.3 Methodological consequences of the hybrid perspective**

Many aspects make the hybrid perspective cumbersome from a methodological perspective. The object of study is not stable; it moves, falls apart and increases or decreases depending on associations made in the situation. Hence, the digital and hybrid aspect in this study makes it complex and different from Goffman's studies. The associations between actants that particularly interest me are the ones that happen in the situation: the slight touch on the mouse pad, the brief Alt+Tab over to Facebook to check for recent updates and the glances at other persons' screens. The meta-physical problem of studying both the material and digital aspects of the situation adds further to this complexity. Thus, ranges of material collection methods are needed to describe laptoping as a practice, and its relevant actors.

I have only partly succeeded in my efforts to follow the hybrid through different situations and to cover its use of online services. The main part of the empirical material in this thesis is based on observations at the IT University. I have not followed students on their way and in their homes. In addition, the use of video to capture on-screen behavior began rather late in the process. Although it captured some of the online activities, it must be seen as rather limited material. In other projects, I experimented with different tools to capture more of the subjects' online activities. However, I need to develop and evaluate these results further in future studies. One may conclude that observations and video or screen recordings are important to capture situated activities—both those that are materially and those that are digitally represented.

## 5 The Individual Papers

This section summarizes the five papers in this thesis. Their main contributions are presented as a preparation for the Discussion chapter.

### **Paper 1: The laptop as an alibi: Use patterns of unfocused interaction**

In this article, I conceptualize a series of common behaviors into an emergent role of the laptop, and named the role Alibi. I base this role on three scripts: Screen peeking, Online tics and Screensaver fear; scripts that in themselves describe core characteristics of the hybrid.

Screen peeking points towards the duality of the screen. Sometimes the laptop user wants to protect the screen from view, while at other times the laptop user intends the screen to be visible to others. Occasionally, screen visibility is simply a coincidental effect of the physical arrangement of the situation (i.e., how tables and chairs are arranged). Thus, the screen becomes something similar to a one-way mirror. From one side of the laptop, the screen works as a shield and protects the screen content. From the other side, it advertises the content, and acts as a personal billboard or physical social medium. As such, I observed an amplifying effect. During lectures that the students classify as boring, an online game or a funny video spreads quickly between the students, both via IM and Screen peeking.

Online tics is a script describing a certain behavior that is triggered by the laptop and by surfing the web. These tics may be triggered while the subject is already near the computer, or when the subject is elsewhere, such as watching TV or doing the dishes. During the tic, the person leaves the TV or sink, and moves over to the laptop to check something on the web. When the lid of the laptop opens, the screen automatically awakes from hibernation and displays the open tabs of the web browser, the “quick links menu” or its equivalent, visited pages and any additional open documents. Out of habit, the subject goes through these links and/or already open pages to check for recent updates. Then the person turns to their inbox. By the time the subject returns from this automatic detour, she has forgotten her primary reason for going online.

Screensaver fear is a script about the common habit of eliminating the screensaver as soon it appears, even if one is not working with the computer. I observed this behavior several times, and it may have many explanations. Two of the explanations I provide in Paper 1 describe the laptop’s connection to work, and the laptop’s ability to alter what

Goffman describes as barriers of perception. In the studied setting, a person in front of a laptop is a person who is seen as working. Then, from a user's perspective, when the screensaver is activated, the "work-alibi" is lost, since the screensaver indicates that no activity is going on. My other explanation describes how the laptop introduces the virtual as part of the situation, which may be seen as an extension of the person's perception. Thus, when the screensaver is activated, a barrier is reintroduced that confines the subject's perception to the local present situation. Thus, the screensaver may be interpreted by the user as a barrier between the user, screen and online services.

While the laptop is an excellent tool for work, it is also a resource for a wide variety of entertainment. For persons on the other side of the screen, it is hard to tell which of the two is occurring. Since the laptop is seen as a work-related resource, and because of the screen barrier, an interpretative flexibility exists that protects deviant behavior relative to the dominant involvement of a particular situation. That is, in cases where the screen of a laptop is not visible, the interpretative flexibility of what the user is doing leads to an acceptance of laptop use in situations like meeting rooms and lectures, since there is a possibility that the involvement may be aligned with the dominant one. In this sense, the laptop works as an alibi.

The paper argues that it is possible that, as a result of the alibi effect, subordinate involvements will become more accepted, and we will see a broader set of involvements in any given situation as a result of portable technology. Consequently, by the continued use of laptops or similar technologies, a more liberal view of involvements in a given situation may be developed. The view of involvements that is researched in this article may be seen as a change in the *involvement morale*.

## **Paper 2: Breadcrumbs of interaction: Situating personal information management**

This paper departs from the area of personal information management (PIM) that focuses on how users store, retrieve and share various resources on a personal computer, generally files and emails. As an area primarily within HCI, researchers have studied the practice of PIM for quite a long time, and have designed a range of prototypes with the purpose of supporting a user's information management on the computer. Still, at the time of writing there were a lack of articles that studied PIM practices in detail, and in particular studied PIM practices involving portable technology that appears in more than one situation.

In this particular article, we define a resource or historical interactional resource as consisting of some artifact or information accessed via a digital device. Examples include a document, photo, email, chat message and bookmark, but also folders or an open browser tab that is used as a reminder of a particular web page. These resources have attributes or meta-data that are important: the file type, the name of the file, the date of creation, who created it, in what folder it is stored, when a chat message was sent and to whom, and so on. These attributes are associated with a particular resource, and may be seen as contextualizers or meaning makers. Thus, the attributes assist in both the categorization process from an operating systems point of view (such as when searching for all pdf files) and in the augmentation of the meaning-making process of a resource and its relevance for the particular situation as part of a practice. For example, a URL shared via instant messaging during a lecture consists of the URL (the resource); as well as the date, time, recipients and service used for sending (attributes), that is, information that may be valuable at a later stage when trying to recall the URL.

Based on the ethnography, we develop a notion that captures one of the characteristics of laptoping: breadcrumbs of interaction (BoI). While traditional PIM research has focused on how to support users when they store, retrieve and share resources at the desktop, breadcrumbs of interaction are intended to capture what these resources may actually consist of, and their meaning in a laptoping practice. This article presents a broad perspective of what a resource may be: files, folders, emails, chat messages but also URL history, open windows, documents and open browser tabs; that is, everything that is a result of previous interaction and may function as a resource for future interaction with the laptop. As the students stated in their interviews, these resources are an important asset in their daily practice. They also affect how a practice is carried out. Students initiate scripts that ensure that certain resources are inscribed into their laptops, such as sending a URL to team members, knowing that the URL will be inscribed into the message log, making it available for later re-use. Also noteworthy is the article's perspective on the browser's URL-history function (i.e., it remembers your surf history and auto-fills in as you write in the address bar) and recent-documents list. These are examples of aggregations of resources, a service offered by the operating system, service or software: services that support and help the user to utilize her BoI in everyday practice.

The sleep or hibernate functionality that preserves windows and their position on the screen is another example of a BoI, and one that also

affects practice. When students move from one setting to another, this functionality preserves their open window structure, and thus preserves the interaction from the last situation.

In the same way as Hansel and Gretel dropped breadcrumbs on their way into the woods, the laptop leaves interactional resources for later recall and use. Thus, not only are the hardware, files or software important, but also the combination of personal resources inscribed into the laptop, which makes up a complete interaction history that contributes to a laptoping practice. Its value is not just in the individual situation, but in the process of situations. In relation to this utility and process, the students describe a form of intimacy between themselves and their laptops that is more than the rather dry notion of personal information management. This intimacy lies in the laptops' offer of a BoI that is comforting to the user. It also echoes Bush's idea behind the Memex, and Kay's notion of the meta-medium. This interaction with the laptop represents an emergent personal media channel in which the residue is the breadcrumbs of interaction. It is a personal media channel that blends the production and consumption of all other media into one unique meta-medium.

### **Paper 3: Laptops in an educational practice: Promoting the personal learning situation**

The third article again departs from the notion of involvement and, in line with the previous article, puts emphasis on the personal aspect of laptoping. The article argues that previous studies of lectures involving laptops have treated the dominant involvement, that is, following the lecture, as the correct behavior; and any other focus (such as the laptop) as deviant. For example, after the introduction of information and communication technology (ICT), lecturers made very little effort to adapt to the changed situation; it was more or less business as usual. A range of studies compared the new situations with the old, as if they were comparable, and concluded that the laptop primarily disturbed the once-working lecturing practice. As a result, they forbade the use of laptops or turned network access off when giving lectures (Fisher, Keenan and Butler, 2004; Fried, 2008; Gardner, 2004; Graham, 2001; Kotz and Essien, 2002; McVay, Snyder and Graetz, 2005; Young, 2006).

As an alternative to this rather strict perspective on involvement, we introduce the notion of alignment in order to understand the alignment between laptoping and the educational practice. While the dominant involvement, according to the students, is to focus on the lecture and

follow what the lecturer says, we argue that a subordinate involvement can still support the student's personal learning situation; that is, the subordinate involvement can still be aligned towards learning. Thus, in the article we distinguish between aligned and unaligned subordinate involvements. Examples of unaligned subordinate involvements include activities related towards entertainment, or news that is spread between students during a lecture via IM. These activities are not primarily aligned towards learning but towards pleasure, and often result in community bonding. To decide whether the unaligned activities are a consequence of the presence of the laptop or a consequence of a bad lecturing is up for discussion; but it is clear that the laptop amplifies such unaligned scripts. For example, both IM and what in this article is called "glancing" or in Paper 1 "screen peeking" act as supports of this amplification.

Such activities may draw attention from the dominant involvement, but we argue that they are still aligned with students' learning, and thus foster a personal learning situation within the lecturing practice. Thus, the notion of involvement is important in this article, as a way of separating individual students' learning situations from other dominant and subordinate activities.

Consequently, the article argues that with laptops present, students' responsibility for their learning situation increases. The main drive should be towards a learning culture where all laptop-related activities share the goal of enhancing student learning; that is, where all activities are aligned towards learning. Instead of viewing the laptop as a disturbing artifact, one may take a design perspective and ask what is required to design a practice that includes personal learning situations along with a dominant involvement. Hence, if we accept that a situation may have several involvements, and that these involvements may co-exist and have equal but different values, perhaps we can better understand the role of ICT in a given situation.

#### **Paper 4: Laptops in classroom interaction: Deconstructing the networked situation**

The fourth article concentrates on combining several theoretical frameworks on situated interaction and the effect of networked devices on how we understand a situation. As these networked technologies attract attention and mediate interaction during physical social gatherings, they also change how we perceive and define what a situation is. While some of the other papers in this thesis raise questions regarding the effects of multitasking, Screen peeking and other laptop-related side effects, this



paper emphasizes the situational impact of student-laptop interaction. We present the impact as four modes of interaction:

- Intrasituational interaction—local interaction that is internal and stays within the specific situation. Most interaction is normally of this type.
- Transsituational interaction—the performance of use patterns between different situations; a mode of interaction that, due to the mobility of the device, enables transfer of use patterns, services and data between different locations.
- Intersituational interaction—interaction between two or more situations synchronously or asynchronously.
- Extrasituational interaction—students are physically present but from an interaction perspective they are absent; characterized by interaction with no local connection at all.

The article argues that these modes of interaction extend Meyrowitz's (1985) concept of the middle region. It is an extension that focuses on the students' perceptual field, which is constantly and dynamically changed by inter-, trans-, extra- and intrasituational interaction. As a consequence, it is no longer clear who is part of a situation, or what situation one is part of. Rather, an interchanging dynamism exists, where situations, through participants' interaction, reach into and withdraw from each other. Thus, in my extension, the situation acquires multisituational characteristics, becoming a networked situation. This is in contrast to the concept of middle region, which suggests a merger of situations and the associated norm systems. Multisituationality and the networked situation add an interactive partaking of different dispersed locations, as well as adding layeredness to the present location. In a networked classroom, it is possible to exclude or include local others in the interaction with greater control. Thus, networking affects what Goffman (1971) calls the *conversational preserves*, that is, whom to include and not include in the interaction.

In a networked situation, an abundant amount of information is available, stored locally on laptops and mobile phones and of course also online. Through services such as Facebook and Google, students can acquire information about the others present. Doing so affects the *informational preserve* as expressed by Goffman (1971). Thus, transsituational interaction is not only about use patterns brought between situations; it is also about continuous access to the abundant information online. With informational preserve, Goffman aimed at control over information about a particular person in a particular

situation. Nevertheless, within a networked situation, we argue that the informational preserve becomes something larger. Students can check and verify what the lecturer just said. They can check their email log for information, search the web or check Facebook for information about a fellow student or teacher. This shift in control has a significant impact on the informational preserve and on what types of interactions are enacted within a laptoped situation.

A networked situation is thus a middle region where multiple norm systems are active. In addition, these norm systems are dynamic because of who is part of the situation, both locally and virtually. Additionally, what “Part of” means is a complex question in it self. A networked situation is also characterized by its layered interaction. That is, the interaction within the situation is happening in so-called layers, verbally of course, but also through a range of social services. Skype chat, Facebook group discussions, Instagram updates are can all host different layers of interaction within a situation. This layering affects the conversational preserve, as the possibility of controlling who may talk to whom is increased. The possibility of extra information about the others present affects the informational preserve; that is, what type and amount of information one may have about a new acquaintance through various social services.

The middle region, the four modes of interaction, multisituationality, and conversational and informational preserves all describe characteristics of a networked situation.

### **Paper 5: Characterizing the laptoper: The sustainability struggle of Online-ness, Content curation and Visibility**

The purpose of this article is to take the hybrid perspective seriously, and explore a different approach in the study of personal and portable technologies. By adopting the perspective of ANT in general and Michaels in particular, as described in the theory section, we establish a foundation to allow the analytical construction of a particular hybrid: the laptoper. With the analytical entity in place, we analyze the studied practice with the purposes of tracing the emergent scripts revolving around the hybrid, and of describing through them the hybrid’s program of action. We selected six accounts from the ethnography, each including a script, as they described common situations in the studied practice. The article gives names to these so-called accounts that have explanatory connotations regarding their effect on the hybrid’s agency: Alive, Flow, Online, Content depiction, Openness and Privacy.

The Alive script describes the hybrid's drive to stay operational and thus prioritize its need for electricity. It looks for electrical outlets that will maintain its operation as a hybrid and enable access to online services, breadcrumbs of interaction and so on. As a consequence, laptopers position themselves within a room not only to be able to see and hear the lecturer or to sit next to a friend, but in order to secure their ability to be online and to stop the hybrid from falling apart.

The Flow script is about the flexibility to switch between different software and work tasks on the laptop. One of these services is the keyboard shortcut Alt+Tab (⌘+Tab on Mac) that lets the user switch between different open programs. According to the students, they strive towards a flow when working with a task that spans several different applications. This shortcut may support cutting-and-pasting between a spreadsheet and a presentation that one is preparing for a meeting. We see this as a script where the network of human, keyboard, shortcuts, data and documents is practicing a sort of flow, or Alt+Tab culture.

The third script, Online, was previously described as Screensaver fear. The screensaver may be interpreted by the user as a barrier between the user, the screen and online services. When the student is suddenly blocked from connectedness, it becomes a signal to the laptop user as well as to nearby people that no work activity is going on. The script of Screensaver fear thus represents the laptop user's drive to stay online.

The fourth script, Content depiction, describes the capturing and spreading of different kinds of content. It is a form of emergent infrastructure for *media sharing*. The micro procedure of content depiction may be best described through the success of services such as Instagram and Pinterest, both built around depicting and sharing visual content with millions of users. Content depiction is a procedure that is about taking notes, sharing the depicted content, creating a visual memory and collecting pictures that just might become useful. Content depiction is a script about the laptop user's drive to document and share one's actions.

The fifth script, Openness, is about the screen: one of the interfaces between human and laptop. This script involves the laptop user's actions to manage both the virtual and the material situated interactions. The activity of Screen peeking, or glancing at a friend's screen, is common, and leads to both discussions and a certain type of *mutual monitoring* of each other that, according to the students, keeps them more focused on the task at hand. The students' visibility involves both the physical screen

in front of them and the visibility of a person's avatar on instant messaging while chatting during lectures. This script captures actions with an outreaching, social and inviting purpose. Actions that are part of the Openness script are typically actions that strive towards interaction and collaboration.

In the sixth script, Privacy, the screen also functions as a barrier. The laptop screens create walls that divide the group into those who can see the screen and those who cannot. This script is about maintaining control of screen-mediated information. The screen becomes a *screen curtain* that a student can hide behind and set herself out of reach of interaction with others. In addition, students often maintain *screen privacy* to protect screen content. Methods to protect screen content include lowering the intensity or brightness of the screen and placing oneself at the back of the classroom, where no one is sitting behind you. Screen privacy also decreases the risk of *popup embarrassment*, that is, instant-messaging notifications with non-school related material. We then combined these six scripts into three programs of action: Online-ness, Content curation and Visibility.

Online-ness keeps the laptop alive and online by securing electricity and by keeping contact with the screen. Its primary channel is the screen, which in turn requires the laptop to be open and in an active state; that is, not in sleep mode or with an active screensaver. Online-ness sheds some light on why activities such as looking for electrical outlets, interrupting the screensaver and rarely closing the screen completely are common activities among laptopers.

The Flow and Content scripts show how the laptopers strives towards smooth and ongoing Content curation. Both accounts are about efficiently curating different forms of content, such as the documentation of a project in Word by combining content from different sources, the documentation of a JSP-diagram, or sharing content. Content curation is a striving towards smooth production, documentation and sharing of digital content. Thus, while the laptopers strives towards online-ness, it additionally strives to handle a flow of content in different media formats.

Visibility is a program about controlling impressions and controlling who to interact with. If face-work and facial mimics are interactionally important for a human being, the *visibility program* is a synonym for the laptopers. The Openness script is about actions that align with collaboration and interaction. The Privacy script is about how to preserve personal integrity and avoid revealing unwanted information. These

scripts are active simultaneously, since being open and interacting with others requires a tighter control of privacy settings and actions.

## 6 Discussion

Bush and Kay argued for a device that would support human information processing, enhance our intellect and support our creativity. The meta-medium that Kay envisioned included all other media, but was not only meant for the consumption of media; it also produced content. Bush and Kay foresaw collaboration among people with these devices, and saw the devices as access points to systematic thinking, participation and creativity around great ideas. Similarities exist between the laptop and the Dynabook, as well as between the hybrid laptop and Vannevar's trail blazers (Section 2). The empirical work for this thesis suggests that we, as humans, will both act as part of and meet an increasing number of different hybrids in our everyday lives. The aim of this thesis is to gain a deeper understanding of what it means to interact with laptops over an extended period of time, both for the person using it and for the use situation. At the beginning of this thesis, this aim was formulated as a research question:

*What characterizes the use of laptops in everyday life?*

In the text below I will answer this research question from two different perspectives. In the first section, titled "The laptop: Being multisituated," I answer questions such as: What happens if we treat the human+laptop as a subject—a laptop-hybrid—and describe its character? This section combines contributions primarily from Papers 1, 3 and 5.

In the second section, titled "Laptoping: The networked situation," I answer questions about the consequences of mobile technology and online services becoming actors in and between our daily situations. This section combines contributions primarily from Papers 2, 3 and 4.

### 6.1 The laptop: Being multisituated

In this section, I present an extended framework of the human+laptop, or the laptop. This framework was first published in Paper 5; I extend it here with additional findings. The framework structures some central activities and intentions of the laptop.

Much of the actual work in my thesis has been about capturing and naming laptop behaviors and activities. Naming is particularly important, in the sense that it is only when one pays attention and puts a name to behaviors that one can discuss and handle them as part of a larger structure. One of my motives behind using ANT and experiential computing is their inclusion of players other than humans. My aim is, at a

deeper level, to explain the behavior and activities of the laptop; which in themselves are descriptions of what a laptop is.

Over several decades, Sir David Attenborough described different animal species and their behaviors and patterns in a range of BBC nature films. This thesis is similar in some ways to Sir David's approach: It shares his ambition to collect knowledge and inform the public about interesting species, although in this case, the new species is the laptop rather than an animal. The laptop is a hybrid consisting of a person and a mobile technology, in addition to a range of other actants such as Internet connectivity and electricity. This hybrid is somewhat similar to Michaels' concept of the cason, a combination of person and car making up a hybrid actor with specific behavioral patterns and activities (2001).

So, what are the aggregate features, qualities and traits of the laptop? The five programs of actions (POAs), presented in the framework that follows, are:

- Online-ness—the drive for electricity and to be online
- Content curation—the will to handle and interact with different forms of content
- Visibility—the choice to share one's screen and information (Openness) or retreat behind it to protect self and/or information (Privacy)
- Involvement—the choice of where to direct one's attention
- Mobility—the laptop's micro and macro mobility, and related preparations

Model 1 outlines the five POAs, along with their related scripts and actions.

The studied hybrid	Identified program of actions (POA)	Observed scripts	Specific actions associated with each script	Actants associated with each script
<b>The Laptop</b>	<b>Online-ness</b>	Alive	Socket search, battery practice, screensaver fear, FOMO	electrical sockets, battery indicator, screen saver
		Online		
	<b>Content curation</b>	Content depiction	Alt+Tab culture, media sharing, content creation,	IM-messages, cut and paste, Google+, visualizations
		Flow		
	<b>Visibility</b>	Openness	Screen peeking, screen curtain, screen privacy, interaction shield	Facebook posts, links, search history, screen, pop-up messages
		Privacy		
	<b>Involvement</b>	Dominant	Extrasituational interaction, spreading effect, Online tics, Alibi	Games, chat, instant messaging, social media, other screen activities
		Subordinate		
<b>Mobility</b>	Micro	Transsituational interaction, Intersituational interaction, screen privacy	Backpack, power adapter, portable laptop, battery,	
	Macro			

**Model 1: The laptop**



To be a laptop in a situation implies a split vision between the material and the digital. Like the saga of Odin, a major god in Norse mythology who sacrificed an eye to Mimir's well to gain wisdom, the laptop sacrifices part of its vision of the physical location in order to focus on the digital preserve. Thus, the barriers of perception are partly removed, extending the situation to include aspects of the digital. This removal of barriers makes it possible for the laptop to focus its attention on a wider set of issues. The laptop can now interact with friends, that is, other hybrids in different locations beyond the here and now; thus, these friends become part of the laptop's networked situation.

On one hand, I see the laptop's multisituatedness as resulting in increased need for etiquette awareness. Although it is unlikely that someone would get away with reading an actual newspaper during a meeting or lecture, virtual newspapers are read all the time on laptops. Etiquette awareness increase in importance when multiple norm systems are simultaneous active. That is, teachers and other students (especially during group work) express distress at not knowing what other laptops are doing on their screens. From a mutual monitoring perspective, a laptop cannot be monitored in the same way as a human without a laptop (Goffman, 1963). Its interactions are happening in different layers, such as oral discussion, body language, online chatting, Facebook, and so on. These layers are not open to everybody within the location. This lack of access is disturbing to some actors, especially those who have access to only a few or none of the digital layers. To understand this disturbance is to understand the program of action of visibility, leading to an understanding of both the laptop and the reactions of other actors.

Online-ness affects the perceptual field. The notion of perceptual field should, according to Meyrowitz, be used to define a situation. In this case, the reach of the hybrid's perception determines the limits of the situation. By "reach," I interpret Meyrowitz's notion to include chat messages or Instagram updates sent to persons outside of the present situation. As a consequence, all situations are open ones, or "front stages," if hybrids are present, since through social media, laptops can take part in other situations. All situations are thus potential open stages, since it is not possible to foresee who will have access to the interaction in the present situation. The POA of content curation is also active here, as laptops

send photos and comments between situations, record audio and video for later use, share notes and so on.

The fear of missing out (FOMO) and the drive towards minimal involvement with the main situation makes the hybrid even keener to reach in and out of different situations. At the same time, however, laptop involvement may act as a kind of “back stage” for some hybrids present, providing a private and secluded area suitable for private and intimate messages. Again, as a result of the laptop’s layered interaction, some interactions within a situation are observable to all, others only to a few. This contrast between front stage and back stage is something of a paradox. To be both private and public in social situations. Meyrowitz’s solution was to coin the term *middle region*, meaning an arena where front and back stage interactions are mixed. I have shown that through macro mobility, that is, planning to move and moving the human/technology hybrid from one location to another, the laptop’s interaction is not only layered, but new types of interactions and new types of use patterns appear, due to an increased action space. Thus, the laptop can chat, play games or download movies during a lecture.

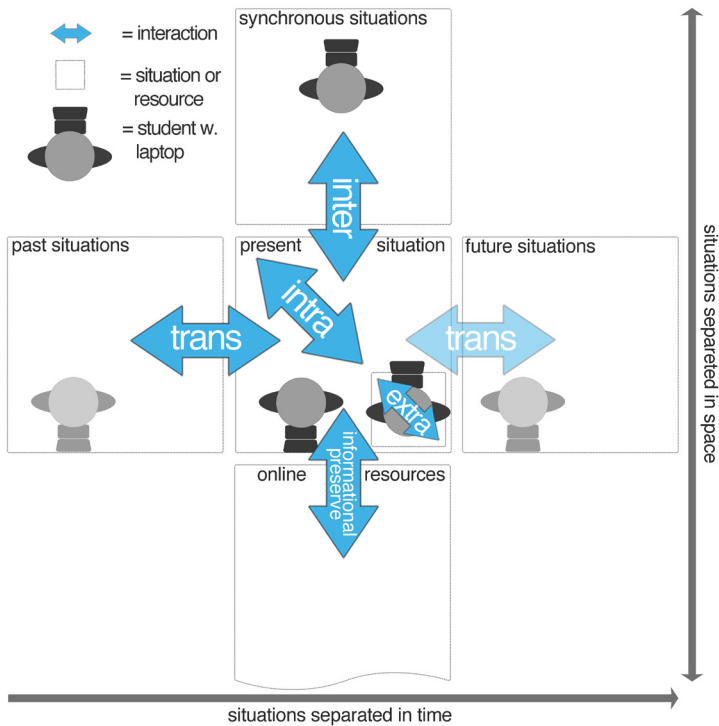
To be a laptop is to be multisituated – it is to experience the collapse of both “front region” and “back region” in to a multisituated, interactionally layered situation with an increased action space.

## **6.2 Laptops: The networked situation**

When laptops enter a situation, they affect the very foundation of what that situation is about. According to Goffman, a situation is a type of gathering between co-located people who are involved in mutual monitoring and who react to and interact with movements, utterances and other types of local interaction. With the introduction of laptops, mutual monitoring becomes only partly mutual. This interaction no longer originates only from the local situation, but also relates back to earlier situations from which the breadcrumbs of interaction flow with the laptop into the present situation. Or in Castells’ words:

The network society suggests a shift to what Castells calls "the culture of real virtuality," a society replacing stable formations of place, identity and nation with "flows" across different types of barriers. It is a culture of the ephemeral and a patchwork of experiences that affects how we understand interaction and situations (Castells, 1996, p. 199).

The model (Model 2, below) describes what to expect when entering a networked situation. As such, I argue that it also describes the actual mechanisms leading up to a network society. The model visualizes the four types of interaction that were covered in Paper 4: inter-, intra-, trans- and extrasituational interaction.



**Model 2: The networked situation**

These four modes are departures from the center square in the model. The center square represents the *present situation*. The present situation is where the laptop physically is at the moment.

- Within this situation, the blue arrow labeled “intra” symbolizes intrasituational interaction, or interaction that remains within the local situation.
- Within the local situation, extrasituational interaction is also present, in which the laptop refrains from partaking in the local interaction.
- The “trans” arrows represent transsituational interactions, or the transfer of actions and information from one situation to another;

also mentioned as increased action space in the laptop framework.

- Interaction with other persons in parallel situations, via programs such as Instagram or instant messaging services is labeled “inter” for intersituational interaction.
- When the laptop is using Wikipedia or engaging with other types of information resources, interaction with the informational preserve occurs.

The row of *past*, *present* and *future* situations in the model represents time and mobility. The laptop is part of a flow of situations: from home, to the lecture, to the café; this flow becomes a type of process of laptoping. For the laptop, these situations tend to blend together due to transsituational and intersituational interaction. Thus, when the laptop moves between situations, time passes and the location may change, but the laptop provides the same action space. The laptop acts as a state-saver between situations, allowing the laptop to continue to work or play seamlessly, where it left off.

The laptop’s interaction within the local situation, or the intrasituational interaction, is layered in the sense that interaction within the situation is happening in a range of different services and among different groups. The effect of this layering is interaction that is hidden from some laptops but visible to others. Compared with a situation without services such as instant messaging and Facebook chat, the mutual monitoring between participants in the situation is affected. The networked situation has many non-public nodes of contact and interaction, and as a result, the monitoring is not mutual. Goffman talks about mutual monitoring in terms of the *conversational preserves*, that is, interactions within the situation that oneself and others have access to. In a traditional situation, conversational preserves include talk, gaze, posture and turn taking. In the networked situation, this access is highly dynamic; you never know who is listening in and you never know of all conversations going on in the different layers. The *conversational preserve* is not explicitly visible in the model as text since Goffman’s and my interaction terms (trans-, inter- etc.) describe a similar

In a networked situation, it is not only the conversational preserve, or interaction with other persons, that is affected. The ubiquitous access to information also creates an increased informational preserve (Goffman, 1971). Access to information means access to one’s up-to-date inbox, other attendees’ Facebook profiles, chat apps and other synchronous interaction services. With access to abundant information about the

persons and the topics discussed in the room, the informational preserve becomes dynamic and unpredictable.

Another aspect of this abundant access to information and interaction is the access to tools, as well as to activities that in a traditional situation would not be possible nor acceptable to conduct. Without the laptop, one could bring a daily newspaper to the meeting, but reading it would most likely result in raised eyebrows and criticism. However, with laptop involvement, reading a newspaper during a meeting becomes common. Three different things are happening here: (1) the mobile laptop enables activities and behaviors to be conducted in locations previously not possible; (2) the laptop acts as an alibi for these activities; and (3) with the laptop comes breadcrumbs of interaction (see Paper 2). These three items—activity enabling, alibi function and breadcrumbs of interaction—are together represented by transsituational interaction.

A networked situation is characterized by its multisituational interaction, which dynamically changes the perceptual field, the information and the interaction preserve, and thus how we define the situation. The effects on the laptop are increased action space, greater control and a responsibility to get things done; that is, since the location and situation no longer help to structure what to do and when, the laptop's responsibility for its own working process increases.

### **6.3 Being multisituated in a networked situation**

Laptops affect attention and introduce other, previously alien involvements into lectures. In addition, a laptop screen is an eye-attractor. Few observations from my studies were more obvious. Online-ness, content curation and visibility also add more activities that may disturb the students' focus on the lecture. On the other hand, lectures are a criticized pedagogical method. A student group is a heterogeneous group with different levels of knowledge and interest.

To be a laptop and to be multisituated is to always have subordinate involvement to direct one's attention to if the dominant involvement does not deliver. However, the content curation and visibility POAs suggest that a laptop is well-prepared to be an efficient group and project worker. So perhaps it is not the laptop that is problematic, but the lecture. In a networked society with an abundance of information, maybe the one-size-fits-all type of lectures is the real dilemma.

However, the POAs of content curation and online-ness tell us that the laptop is an experienced media consumer, used to watching videos

and curating and selecting among blogs and news articles. Most of the content consumed by the laptop user may very well be for amusement, but the behaviors are there. These behaviors are waiting to be adapted to a learning perspective. Attempting to educate the reflective laptop user using industrial factory-based methods will eventually fail. However, methods such as massive open online courses (MOOCs), flipped classrooms, studio-based learning, and problem-based learning that actually work with, rather than against, laptop users' characteristic behaviors are, in my belief, the way forward.

These methods are also in line with the original vision of the Dynabook. I argue that the general student persona as a passive bystander (Goffman, 1981), a person who listens to a live lecture without interacting, is passé. This is not to say that traditional lectures are never appropriate. On the contrary, they have their place and time. But the laptop user, in part, does meet Kay's vision of opening up the learning situation and joining the global conversation on great ideas.

The ability to see and learn from others around the world is a powerful inspirational source. Innovation may be a strong word to use, but Anderson (2010) argues that online services such as YouTube power global innovation, or as he calls it, *crowd accelerated innovation*. This is the same process that is initiated when dancers all over the world record themselves and upload the videos to YouTube; others watch and learn the dances, progressing the culture of dance. The same is true within areas as diverse as science and photo editing. Hence, the laptop user's strong association towards online-ness and content curation makes the hybrid a possible participant in these online crowds—arenas where ideas spread quickly, and where others develop and enhance the ideas of yet more unknown others. If learning situations are opened up, these online innovation processes may become part of the hybrid studied here, through online collaboration. Thus, a situation including hybrids that strives towards online-ness is arguably aligned with participation in these online innovation processes. The new literacy then, as Kay discussed, is not a digital literacy; it is a literacy on how to take part in the development of new great ideas. Being a competent laptop user may be one of the ingredients of such literacy.

## **7 Conclusion**

The activities of the laptop user change our everyday situations. They become networked situations; highly dynamic, layered interaction and an

unpredictable conversational preserve. Thus, the networked situation is multisituated and to be a laptop user is to be multisituated. Actions such as socket search, screensaver fear, screen peeking and online tics are characteristic of the laptop user. These actions change the prerequisites for ones well known situations such as lectures within higher education. They affect the perceptual field and at the very core change how situations used to be defined. The thesis identifies four different modes of interaction, two models, one on scripts associated with the laptop user and one model of laptoping and the networked situation. Together these contributions offer some insight into the practice of experiential computing and the everyday life of living with technology.

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