

# Technology Encounters

Exploring the essence of ordinary computing

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### **Abstract**

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As computing technology has become a vital part of everyday life, studies have increasingly scrutinized the underlying meaning of computational things. As different devices become interwoven with daily practices and routines, there is a growing interest in understanding not only their functional meaning in computational terms but also their meaning in relation to other non-computation artefacts.

This thesis investigates how people relate to artefacts and how their individual values and attitudes affect this relationship. The analysis is based on four ethnographic studies, which look at the richness of ordinary interactions with technology to understand the impact of technology upon practice and experience.

The process through which humans develop a relationship to artefacts is framed as a continuous series of *encounters*, through which the individual constantly reshapes their relationship to things. Artefacts are seen as lines in the mesh of everyday life, and the encounters are the intersections between lines. This approach—grounded in phenomenology and paired with an anthropological understanding of everyday life—reconceptualises understanding of the processes of adaption, meaning-making, disposing and recycling. The work reveals how human relations to all kinds of things—in the form of meaning—is continually transforming. Core to this understanding is the cultural relative essence that becomes perceived of the artefacts themselves. This essence deeply affects the way we encounter and thus interact with technology, as well as objects more broadly. In the daily interaction with computing devices we can observe that computing technology alters the mesh on a different level than non-computational artefacts: digital interfaces pull our lines together, bundle experiences and affect how we encounter the material and the social world. This enables computing devices to have meanings distinct from non-computing technology. To go further, computing is itself a mode of existence – a crucial difference in things that helps us understand the complexity of the material world.

*Keywords:* Everyday life, ICT, phenomenology, ethnography, cultural analysis

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*"I like boring things." (Andy Warhol)*



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# List of Papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals.

- I. Glöss, M. (2012) The value of things. Cultural Context in the Design of Digital Materiality. NordiCHI'12, Oct 14-17 2012, Copenhagen, Denmark, 1(2): 3–4
- II. Glöss, M., Cycil, C. (2013) Exploring meaning and values in artefacts. A case example of the family car. Manuscript submitted for publication.
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- IV. Glöss, M., Brown, B., McGregor, M. (2016) Designing for Labour. Uber and the On-Demand Mobile Workforce. CHI'16, May 07-12, 2016, San Jose, CA, USA.
- V. Glöss, M., McMillan, D., Cycil, C., Tollmar, K. (2016) The Tablet Computer as a Family Canvas. Manuscript submitted for publication.
- VI. Glöss, M., Tollmar, K. (2016) Stuck in-between. Embracing the 'messiness' of Internet of Things at home. Manuscript submitted for publication.

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- The figure in vignette 3 is taken by me and edited by Patrizia D'Olivo.
- The photo in vignette 2 has been taken by Chandrika Cycil and edited by Laia Turmo Vidal.

# Contents

1. Introduction.....	13
The encounter.....	14
Overview of the thesis.....	16
2. Background.....	18
Topic and Domains.....	19
Ubiquitous computing and IoT.....	19
Perspectives and domains of everyday technology.....	20
Exploring practises.....	22
The cultural and social role of technology.....	23
Understanding things.....	24
An epistemology of mundane things.....	26
Phenomenology in HCI.....	26
Materiality: The relationship between people and things.....	28
A cultural understanding of things.....	28
Agency.....	30
Meaning.....	30
A new epistemology for ordinary computing?.....	32
3. Methodology.....	33
The familiar un-familiar.....	34
Designing an ethnographic interview.....	36
Accounting for complexity (1): Study design.....	37
Accounting for complexity (2): Analysis.....	39
Studies and papers.....	40
Study A: The value of things.....	40
Study B: Artefacts in the car.....	41
Study C: Connectedness in mobile families.....	41
Study D: Use of technology and labour conditions.....	42
Study E: Internet of things at home.....	42
Cross-sectional study: Tablet computing in families.....	44
Contribution of the studies.....	44

4. What are things? .....	48
Being .....	48
Thing .....	50
Encounter .....	52
Lines .....	52
Meaning.....	55
5. How will things become?.....	58
Things are transforming .....	59
Dissecting an encounter .....	60
What is affecting meaning?.....	62
From essence to meaning and back.....	63
6. What is a computer?.....	68
Technology encounter .....	70
The essence of computing devices .....	75
7. Discussion and conclusion.....	80
Designing for encounters - encounters for design.....	81
Framing HCI research through essence .....	82
The essence of things .....	83
Bibliography .....	85

# 1. Introduction

*Our ordinary life is full of things.* Important or unimportant things, things we care about and things we don't; some we perceive actively and some are just lingering on the very edge of our perception.

And then of course there all those computing things we are surrounded by. Some of them can be very precious to us, like the smartphone that follows us everywhere and we have personalized with our collections of photos and a carefully chosen protection sleeve; or the laptop that we carry almost everywhere and that shows traces of past adventures in form of stickers and scratches on its case. Some of them are just taken for granted, like the router in the closet. What all these things have in common (be they computational or not) is that we *encounter* them throughout our daily life. And through these encounters we build some sort of relationship to these things, a relationship that I want to describe with the term *meaning*. Often, meaning is described how people feel about things, especially when they feel a certain connection, when something is very important: A family portrait, an old LP from a favourite band, a love letter.

Sometimes meaning is harder to decipher. Practices, daily rituals or routines are substantial elements of everyday life. However, they remain often hidden because they are not consciously perceived. Then, there are those things that are not meaningful at all, things that we simply do not care about. Often those things that are perceived as meaningless get discarded, but not always. Why do we keep all those old chargers and cables? Why can't we throw away books we haven't read in ages, that we didn't like in the first place and we will probably never read or refer to again?

Analysing the meaning of things is a challenging endeavour. Meaning comes in many forms and is affected by numerous factors. Each individual builds his or her own relationship to things and one that is fluid and constantly transforming.

Concerning computing technology, we have seen massive transformations throughout the 20<sup>th</sup> and 21<sup>st</sup> century. A few decades ago, computers were expensive and complicated machines to which only highly trained personnel had access. Thus, their use was outside of our everyday experience. Human-computer interaction scholars at that time were less motivated in uncovering the meaning of digital things. Computers were standing by themselves, built for a certain purpose and typically investigated in isolation from everyday practices.

Today, computing technology has diffused into all areas of daily life. With the second and third waves in HCI, researchers have become increasingly involved in the process of differentiating the meaning of computational things. Ironically, this happens in exactly that moment in which those become increasingly embedded into everyday experience, their meaning entangled with all the other stuff around us. It seems as though a computer does not have a special meaning anymore: it is part of the ecology of things around us, often not much more important than a toaster or coffeemaker.

There is a slight discrepancy in the way HCI research treats the human relationship to computational artefacts. On the one hand, it is widely discussed how they increasingly disappear in our consciousness and how they become a normal part of everyday meaning-making. On the other hand, HCI still focuses mostly on computational artefacts alone, assigning them a particular meaning without ever questioning why they deserve this meticulous attention. After all, when we use a tablet as intuitively as our toaster, where is the difference? Why do we need a whole research field to decipher it? Is it their higher functionality or the way that information is mediated through a screen?

Underlying the problem stands the question: What is distinction about computational technologies? Is the human relationship to computers inherently different? If this were true, then we would have to discard all ideas about ambient and hidden technology? Or, are they just like all the other stuff, which would call for a complete rethinking of how we design and study them? The argument posed here is that both are true but that the difference between things with or without computational capacity lies within a level that goes beyond functionality or interactivity.

In this thesis I investigate the relationship between humans and computing technology through a cultural analytical lens. I build this analysis on a discussion of how people assign meaning to all kinds of things –things that are referred to as digital technology, and ‘analogue’ things; thereby scrutinizing the idea that stands behind an artefact. In the centre stands the examination of *ordinary* interactions, i.e. practises and routines we take for granted but that are vital for understanding the relationship between humans and technology.

## The encounter

This thesis is about the everyday interactions that occur in life, the small things that are almost invisible to us. Wherever we go, there are going to be things, artefacts that in one way or another become part of our life-world. This moment, in which we actually connect with what is around us, is referred to here as an encounter.

This thesis argues that if we understand what is part of the encounter, we can get nearer to an understanding of the bigger picture. While I am writing these words I am encountering the laptop, its keyboard, the dirty plate next to

it that I still have to bring back to the kitchen, that little stain on my laptop screen, the piece of chocolate I saved for later and even the subtle noise of the faraway copy machine. In the widest sense it can be said that we encounter everything that is around us: everything we see and hear or we could potentially see and hear and interact with. Walking along a street I may not consciously perceive the lamp pole, but I will most likely avoid running into it. It is there, in my life world- I encounter it.

In this thesis encounter refers to the smallest common denominator of how people approach artefacts. Encounters can be insignificant and almost unnoticeable, so deeply engrained into our everyday routines and into the fabric of what we experience in our life world that any meaning or value they carry is invisible to us. But encounters can also be big and bold, filled with sentimental meaning or emotions: Christmas, funerals, encountering heirlooms or keepsakes. Together, all these encounters form what we experience as everyday life and blend into what we experience as the meaning of these things.

## Aim

The aim of this thesis is twofold: First, it seeks to go beyond the meaning of things and explore what underlies the relationship between humans and objects. Second, and more importantly, it attempts to explore what makes our encounters with computing technology different. The thesis investigates and discusses the relationship between humans and computing artefacts while developing a framework built on the following perspectives:

- People's lives are intertwined with the material world through encounters. This perspective emphasises the importance of practises and calls for a micro-analysis of everyday things. Instead of focusing on those things that seem extraordinary, encounters take an agnostic stance towards the meanings of things. The overall sum of encounters in which the human relationship to things constantly transforms and adapts to what is happening around us. While the encounter happens momentarily and beyond our conscious perception, the flow of encounters is what shapes how we experience an object, i.e. it shapes how we set ourselves in relationship to it.
- To understand encounters we have to understand the *essence* of the thing itself. From this perspective, we must not take the being of anything for granted but question the idea or essence behind it, as described by Heidegger.
- Humans are socially and culturally conditioned beings. Encounters do not happen in a vacuum. Each encounter is preceded by another one. When we encounter a thing, we will do this with a certain mind-set, a certain habitus. Through this habitus and our encounters with the world, fluid and transformative meanings of artefacts emerge.

Together these three perspectives form a toolset with which I want to dissect the relationship between humans and computational artefacts. An overarching

objective is therefore to offer a new perspective on the human-technology relationship that focuses on the smallest interactions of everyday life while setting them into a larger cultural and social context.

While this thesis focusses on developing the conceptual tools and using them in studies of everyday life, the perspective may also become useful in design, to assist in designing objects that fit into the cultural and social context of people's everyday life. The framework that I present here avoids determining the human-artefact relationship through functional use, opening opportunities to understand the design of computational devices for all areas of daily life based on a richer understanding of the essence of computing and the fluid process of meaning-making in everyday use.

The approach is the result of several ethnographic studies that were conducted in different domains of everyday life. Throughout the course of my thesis work, this approach has become more and more refined and developed. This introductory text is devoted primarily to the development of a more general argument, presenting a deeper and more nuanced understanding of everyday interaction with computing technology in general and reflecting on the role of this understanding in the case studies.

## Overview of the thesis

This thesis comprises six papers and an umbrella section consisting of seven chapters.

*Chapter two, background*, situates the work in this thesis in the context of HCI and adjacent fields. I start by discussing a broad range of studies that are dealing with everyday use of technology, focussing on studies performed within HCI but also touching upon studies from related fields. In the second part of the background chapter I examine two theoretical approaches adopted within HCI that are relevant to this thesis: work building on phenomenology and materiality theory, and describe how these are related to my own approach, in particular from a cultural analytical perspective.

*Chapter three*, the methods chapter, does not only deal with how data was collected but also discuss analytical approaches to understanding encounters and the ordinary. The chapter emphasises the theoretical and methodological foundations of my studies, showing my disciplinary orientation within the fields of anthropology and European ethnology. This lays an important grounding for motivating the way my studies were carried out and the type of analysis performed. The chapter also describes the included studies and articles, indicating how the understanding presented in the umbrella emerged over the various studies.

*The fourth chapter* is largely theoretical, laying the philosophical foundation for the presented argument. It is centred on the perspective I use to scru-



tinize things. The understanding of things, artefacts, is based on two perspectives: a phenomenological perspective foremost based on the ontological analysis of Heidegger, and secondly a perspective borrowed from the field of material culture, with its origins in Anthropology and European Ethnology and informed by the contemporary constructivist understanding of materiality that also lead to the material turn in HCI and Interaction Design. This results in a framing of the concept of an encounter, and its delimitation from other concepts that describe human relationship to artefacts. As this frame is closely linked to a phenomenological understanding of everyday life, I will introduce some of the theories underlying its development, with a focus on those that are already established within the field of HCI.

*Chapter 5 and 6* are closely linked to the empirical insights from my studies. By exemplifying everyday encounters with examples from my fieldwork, I first outline how things in our everyday lives are connected and at the same time constantly in motion. In chapter six, I focus and extend this analysis towards a comparison of computing technology and non-technological artefacts.

*Chapter 7* is the final chapter of the thesis. It briefly summarises the main understanding and situates the work back in HCI to present an understanding of how it can be built upon and taken further, as technology continues to be even more pervasively integrated with everyday life.

## 2. Background

The relationship between humans and computers has obviously been the focus of human-computer interaction (HCI) since it emerged as a discipline. Yet, with increased technological innovation and a variety of theoretical and methodological stances that shaped the field throughout the decades, the different perspectives on the human-artefact relationship became increasingly diverse. This literature review focuses on those that contribute to a particular epistemological and thematic perspective that has emerged and developed throughout the different studies.

In the broadest sense the position taken here is that computing is part of a complex environment with various material and social actors: hereby, exceeding the notion of context and being open to all domains of everyday life (e.g., leisure, work). More specifically, I believe that there is a not yet fully explored area in the interaction between humans and technology that exceeds the functional level but is much more invisible than particular articulated and value-driven human-computer relationships. When I discuss the concept of the ‘ordinary’, I am addressing this area. To clarify this particular area of *ordinary* encounters I will develop a theoretical framework that builds on ongoing discussions within HCI and other disciplines.

The aim of this chapter is twofold: First, an overview is presented over relevant contributions to my line of work. Second, I want to position my work within current thematic and epistemological positions within the field of HCI and neighbouring disciplines and to clarify and delimit my own approach in relation the work that has been done in recent years in the field.

To structure and refine the large amount of scholarly work produced in this area, I am examining the work from two different angles:

A large amount of work in HCI is focused on a specific *domain* or *study subject*. This focus is often on a particular piece of technology or group of technology (e.g., mobile computing or dynamic tabletop interfaces). Researchers commonly explore different spaces of technology use, such as the home, families or public space. While all of these inquiries (most of which are empirically based) do have an underlying epistemological stance, this position is seldom elaborated upon.

Nonetheless, a wide range of works has been dealing with the way we *think* about technology and the world. Aside from a range of ongoing discussions within HCI, fields stemming from the social sciences (e.g., STS, sociology and anthropology) have been debating how we approach technology’s role in

relationship to individuals and society. The latter touches upon important issues concerning the relationship between artefacts and humans and our understanding of what technology *is*. However, the latter also deals with more fundamental questions about the nature of human existence and the way we produce knowledge about it.

To position my work more precisely within these two dimensions, this chapter is divided into two parts: In the first part I introduce relevant topics and domains that have been explored within HCI. In the second part I attempt to show how different theoretical approaches in a wider range of fields (material culture and Science and Technology Studies, STS) have influenced my epistemological dispositions and beliefs.

## Topic and Domains

In the following literature review I seek to give a brief overview over mostly empirical work that in different ways deals with every day or mundane technology, i.e. the use of technology that is not specifically work-related and not measured in terms of efficiency. Whereas domains and topics vary in this area, there is a very strong focus on families and the domestic environment. However, to begin I want to give a short overview over the area of ubiquitous computing and the Internet of Things (IoT), both topics are important in relation to everyday computing.

### Ubiquitous computing and IoT

One of the most relevant fields of research within HCI has been developed around ubiquitous computing and more recently the idea of IoT. Both terms encompass the notion that computing is not just reduced to the uni-dimensional interaction between user and computer but that computing can be seen to blend into all areas of everyday life. At about the turn of the last century, computing and Internet technology in western societies had diffused into many parts of daily life. A whole research area emerged around ubiquitous computing (Weiser, 1991), widening HCI's scope to a wide range of domains and, at the same time, emphasising the importance of context and situated action. All of this became part of what is now called the 'third wave' in HCI. Initial explorations of ubiquitous computing were often connected to the question to what extent ubiquitous systems can be created and computing can be made an ambient experience. Excepting questions of functionality and interface specifics, it became soon apparent that this also required a more holistic understanding of the targeted environment. This is because interaction with computers was no longer temporally and spatially limited. An important target area became the domestic environment that, as O'Brien and Rodden (1997) point out, presents itself as very rich. Thus, technology for the home must be

designed for existing routines and practices. This also raises questions about the actual process of deployment as well as domestication (Tolmie et al., 2009).

Early research shows how information technology was still perceived as an isolated phenomenon. In their ethnomethodological informed study of the home, Crabtree et al. (2003) identify different types of place in the home for ubiquitous computing technology. Venkatesh et al. (2001) differentiated between the social and physical spaces of the home and the technology space. Both approaches show how early ubiquitous computing was still far away from today's subtler understanding of technology and how it is inseparably blended into everyday life.

Yet, ubiquitous computing, in particular in its earlier years, focused on a general understanding of different environments, experiences and contexts.

The more recently emerging idea of IoT is concerned with different forms of computing technology in all kinds of areas in everyday life, but is in practise more focused on the design of the singular 'things' in IoT instead of the network of things as a whole. One of the key ideas of IoT is that mundane objects of everyday life become equipped with technology that allows them to connect with each other and thus become somewhat computational artefacts. So one of the considerations must be in how far this computerisation alters relationships between humans and these mundane objects (Coughlan et al., 2012). Further, as Nansen et al. (2014) assert, an important issue has to be the role of objects as social agents, i.e. how IoT is or will mediate social relationships.

The two paradigms of ubiquitous computing and IoT have in common the fact that they provide new access points to the study of everyday computing, i.e. computing that is not temporal or spatially limited to a certain task or the workplace, but extending to all areas of human life. Thereby, several perspectives and domains have emerged within HCI that I want to discuss in the following pages.

## Perspectives and domains of everyday technology

There is a variety of examples for ubiquitous computing that have disseminated into different areas of everyday life. In fact, a variety of studies attempt to examine its domestication and use. This happens either in the form of design explorations of more novel approaches or in the analysis of existing devices and applications out 'into the wild' (Crabtree et al., 2013).

The empirical analysis of existing technology comes in many forms and takes place in different domains. Because the study subject (computing technology) has been changing quickly during the past decades, new research approaches have emerged and adapted over time.

Weiser's (1991) vision of computing technology invisibly integrating into all parts of everyday life was at least in the beginning more of a future scenario. In the earlier years of ubiquitous computing there was still the need to

gain a comprehensive grasp of the complexity of technology use outside the traditional workplace setting (O'Brien & Rodden, 1997) Venkatesh (2001) tackles this complexity by analysing the home as a living space that consists of a physical space, a cultural and social space and a technology space, all of which underlines the importance of a holistic perspective. Similarly O'Brien, Rodden, Rouncefield, and Hughes (2000), in their ethnographic analysis of the domestic use of a set-top box (or set-top unit), the authors emphasise that the home is already loaded with routines (spatial and social settings) and that technology has to fit into these existing structures. As shown by these studies, the home had been established as a central domain for ubiquitous computing early on and remains an important field, in particular when it comes to the study and design supporting social interactions, values and emotions. Desjardins, Wakkary, and Odom (2015) gives a good overview over different themes and perspectives regarding the study of domestic environments. The prominence of HCI research in the home is also illustrated by the numerous methods probably best summarized by Judge and Neustaedter (2015)

Yet, it is not just the home that becomes relevant for 'mundane' computing. In particular, mobile technologies are often seen as a crucial part of ubiquitous computing (Lyytinen & Yoo, 2002) By the turn of the century, mobile phones had become an important part of many people's everyday life and was thus no longer separated from work. Palen, Salzman and Young (2001) for instance, discussed how social life is affected by mobile phone use and how norms and behaviours have to be re-negotiated, especially in public space.

Between these early days of everyday mobile and domestic computing and the present lie almost two decades under which mobile technology has further developed. Accordingly, the number of devices that have become available has increased dramatically. Access to different kinds of technology, especially mobile technology, has implications for its use in everyday life. In particular, mobile and smartphones have become an inherent part of everyday life, i.e. it has become visible in public discourse (Harmon & Mazmanian, 2013). As B. Brown, McGregor, and Laurier (2013) emphasise, it might be more important to look at the way the technology becomes part of daily interactions versus giving into a dystopian view of social isolation through technology. In fact, the important role of mobile and smartphones in social relationships has been shown in studies of homeless young people (Woelfer & Hendry, 2011) and most recently in studies of young refugees (Harmon & Mazmanian, 2013).

Apart from the further development and domestication of existing technology with such paradigms as ubiquitous computing and IoT, new forms of technology are entering into the consumer market and become subjects of study.

One prominent example is smart watches (Pizza, Brown, McMillan, & Lampinen, 2016; Schirra & Bentley). Other technologies that have been examined in everyday life are fitness trackers (Harrison, Marshall, Berthouze, & Bird, 2014) hoover robots (Forlizzi & DiSalvo, 2006) and mobile payment systems (Kumar, Martin, & O'Neill, 2011). Yet, it appears as though earlier

observations made by Bell and Dourish (2007) still hold partly true and studies in HCI and Interaction Design are largely dealing with the potential use of new designs than with already domesticated devices.

Lastly, with a larger range of available technological devices, the combination, configuration and parallel use of two or even more devices becomes a common phenomenon (Courtois & D'Heer, 2012; Sørensen & Lagerl, 2012). The variety of technological devices also opens up new challenges for the approach to technology in everyday life. Whereas some studies use quantitative data to understand how different technologies are used (Kawsar & Brush, 2013; Müller, Gove, Webb, & Cheang, 2015), more holistic approaches seek to uncover the different layers of technology use and the factors that affect different practises. One example of this is the study of different modes of sharing in households by Brush and Inkpen (2007). On a more conceptual level, the idea of artefact ecologies has surfaced in different forms. It approaches the increasing number of digital devices in use by looking at them as networks, ecologies or landscapes (Jung, Stolterman, Ryan, Thompson, & Siegel, 2008; Wiberg, 2012).

The majority of the above-mentioned studies have mainly centred on one or several technological devices. While there is a certain techno-centric tendency in the field, there are many successful attempts to find new perspectives. The increasing interest in practises and materiality comes with attempts to conduct a deeper analysis of the cultural and social functions and meanings of technology. This trend counters the strongly artefact-focussed perspective from earlier work. The next paragraphs discuss existing studies and perspectives that reflect this change in paradigm.

## Exploring practises

The importance of studying practises for understanding technology's role in social interaction has long been understood. The ethnomethodological tradition, in particular, has contributed significantly to our current understanding of technology use. Its main strength, analysing very particular practises and routines in social interaction, has allowed for a closer examination of everyday interactions. In the context of the home Crabtree and Rodden (2004) have focused on mundane routines such as bringing in the mail. Other examples for the analysis of very particular social practises are a study of communicating and coordinating positions when using the mobile phone (Weilenmann & Leuchovius, 2004) and the exploration of online search practises on mobile devices in social situations (B. Brown, McGregor, & McMillan, 2015). Besides very concrete implications for the design of technologies around these practises, ethnomethodological studies illustrate how crucial it is to understand ongoing situations, something that might get lost in the more holistic studies of the home and everyday life.

More recently, practise theories from social sciences have become popular (Kuutti & Bannon, 2014). The often detailed analysis of mundane practises allows for a more holistic understanding of practises that pays attention to the role of different actors, materials and ideas and values that underlie practises (Wakkary, Desjardins, Hauser, & Maestri, 2013). At the same time, it offers a vocabulary for the complex structure of practises, a vocabulary that might be useful when transforming empirical insights into design (Kuijer, Jong, & Eijk, 2013).

Everyday computing cannot be reduced to the interaction with material devices. Social media in different forms has become an important subject of study. Because this thesis is focused on the material world, I want to highlight several studies that emphasise the in the physical world situated use of social media, i.e. on the use of social media as part of their everyday off- and online life, such as in music sharing (Lehtinen & Liikkanen, 2012), photo-logging (Khalid & Dix, 2010) and curating collections of digital objects (Linder, Snodgrass, & Kerne, 2014). Heyer, Shklovski, and Gorm (2013) investigate how social media can actually contribute to family life at home. O'Hara, Harper, Rubens, and Morris (2014) examine the use of WhatsApp and frame their analysis with Ingold's idea of dwelling, thus showing how communication through the app is embedded into a whole web of different connections that are part of daily life.

While technology use might be seen as a vital of an HCI-led inquiry, the exploration of non-technological practises has been found to generate rich insights into everyday life that are relevant to the field – be it directly for the development of future solutions and functions, or indirectly in order to gain a deeper understanding of people's interactions.

One of the more popular research topics is practises concerning food and the kitchen (Bell, Kaye, & Manifesto, 2012; Comber, Hoonhout, van Halteren, Moynihan, & Olivier, 2013; Davis, Nansen, & Vetere, 2014; Ferdous, 2015; Ganglbauer, Fitzpatrick, Subasi, & Guldenpfennig, 2014; Kuznetsov, Santana, & Long, 2016). Because food preparation and consumption are vital to everyday life, the observations made in this context are rich in personal values and attitudes as well as in cultural and social components. Making and consuming food are not just a matter of organisation or communication: factors that play a role reach from concerns over sustainable lifestyle (Kuznetsov et al., 2016) to the materiality of the homemade cookbook (Davis et al., 2014).

## The cultural and social role of technology

Technology's role in everyday interaction is seldom purely utilitarian. Scholars have identified several areas in which technology can contribute to social connectedness and family interaction.

Because family members are often geographically separated, video chat has become an important element in many families' social interaction (Alsheikh,

Rode, & Lindley, 2011; Ames, Go, Kaye, & Spasojevic, 2010). With increasing quality, video chats can even become part of major life events (Massimi & Neustaedter, 2014).

Others have explored the positive role of technology in life disruptions (Massimi, Dimond, & Dantec, 2012) or more complicated family structures (e.g., divorced or separated families) (D. Brown & Grinter, 2012; Odom, Zimmerman, & Forlizzi, 2010). The new technology offers possibilities for new routines that can help overcome drastic changes in life (Massimi et al., 2012) while also creating new virtual places that allow cohesion (Odom et al., 2011).

At the same time, we can see that new social spaces often have to be carefully negotiated (Rintel, Harper, & O'Hara, 2016). Individual or cultural values and family identity become important actors in practises concerning technology and find increased attention by researchers. These human factors have been approached from numerous theoretical approaches. For instance, Ames et al. (2010) have shown how socioeconomic factors can account for certain behaviours. Alsheikh et al. (2011) showed the influence of different cultural backgrounds and Ganglbauer et al. (2014) demonstrated the influence of socio-political values. While each of these help to understand their respective cases of technology use, it remains difficult to apprehend how values and identities are taking shape in a wider range of everyday interactions.

## Understanding things

Artefacts have become an important topic of study for understanding values, emotions and attitudes in everyday life. Ethnographic studies present us with examples of simple things (e.g., baby photos or recipe books) that shape social spaces (Taylor & Swan, 2005; Vyas, van der Veer, Nijholt, & Grassel, 2012).

New technologies bring new forms of uses that focus on existing and new practises, which is important for understanding and designing technology. However, it is not just the use of technology that is changing but also its form. With computing no longer restrained to the desk, the thing itself, its shape and material become more important.

Mobile computing in form of smart phones and tablets was just the precursor of the 'Internet of Things'. Today, HCI researchers and Interaction designers are dealing with all kinds of gadgets from smartwatches (Pizza et al., 2016) to connected light bulbs (Downey & Kamel, 2016). Understanding materiality has therefore become an important theme within HCI (Robles & Wiberg, 2010). This 'material turn' moves towards different directions. Materiality can mean to understand the actual form, texture or material of a thing (Jung, 2011). In this respect, Giaccardi and Karana (2015) have pointed out how the experience of material depends on practises and people encountering them.

Another line of research concerned materiality is an approach to materiality that is rooted in anthropology and social science. A central question then is to



ask the questions as to what affects the way people use different things, why they discard them (Odom, Pierce, Stolterman, & Blevis, 2009) and how things become ‘cherished’ (Kirk & Sellen, 2010) or ‘ensouled’ (Jung, Bardzell, Blevis, Pierce, & Stolterman, 2011). This more experiential or cultural approach raises the quite HCI-specific question about digital materiality or digital objects (Golsteijn, van den Hoven, Frohlich, & Sellen, 2012). The attachment to things, the question why “we preserve some things and discard others” (Odom et al., 2009) has some very practical implications. First, a stronger attachment and hence longer use of an artefact can contribute to more sustainable consumption (Gegenbauer & Huang, 2012; Odom et al., 2009). Second, designing for a particular experience or meaning requires understanding how people build a relationship to things in the first place. Giaccardi (2015) points out that materials and “flows of practice” are essential for a “commensurate” design. Gaver et al. (2010) give an example for how such an understanding affects directly the acceptance of a design by reflecting over the deployment of a ‘prayer companion’ (i.e. a digital device for supporting prayer) in a cloister. It becomes apparent that in order to be accepted and used by the nuns of the convent, the device needs to have certain qualities to assimilate into this cultural and social ecosystem.

On a more general level, the relationship between humans and artefacts might tell us more about how technology is affecting our everyday interactions, social relationships and cultural patterns. Materiality is inseparably linked to understanding practises. Hence, scholarly inquiries into the meaning of things is often focused on everyday practises, particularly in the home (Pierce, Science, Sengers, & Strengers, 2011).

An additional challenge lies within an understanding of the role of digital artefacts, i.e. artefacts that only exist in the virtual realm, such as emails, photos or applications. Like physical artefacts, they take on specific roles or meanings (Odom et al., 2012; Petrelli & Whittaker, 2010). Yet, Odom, Zimmerman, and Forlizzi (2014) their experiential qualities differ from those of tangible artefacts and that their placelessness, spacelessness and formlessness affect practises around them.

The development of technology and its diffusion into all areas of everyday life also triggers scholarly re-negotiations about the role of computing technology in general and of HCI and Interaction Design in particular. One such discussion emerges regarding the issue of non-use of technology. Satchell and Dourish (2009) make the important point that it becomes difficult to say if something is not in use in that its existence most likely affects a person’s life. To challenge the notion of ‘fast computing’, i.e. computing designed for efficiency, Hallnäs and Redström (2001) propose the idea of ‘slow computing’, a design philosophy aimed to create mindful and reflective interactions.

Ethnographic data from numerous studies dealing with everyday life provide a rich account of a multitude of practises. It becomes apparent that the

heterogeneous use of technology is connected to a wide variety of values, attitudes and emotions and that peoples' relationship to computing is not easy to decipher. Furthermore, the artefact itself plays a role: its form, material and function, but also its previous use and history and its connection to others directly affects how people integrate it into their daily life. While many of these studies have common denominators in regards to domain, approach and analysis, what is lacking is a further abstraction and discussion of the various collected observations. -thus, it is necessary to point towards an epistemological approach within HCI that can bridge the gaps and further elaborate upon studies of ordinary computing.

## An epistemology of mundane things

The emergence of the ubiquitous computing and IoT paradigms and the increased distribution and use of digital technologies in daily life have led to new approaches in 'mundane technologies' Dourish, Graham, Randall, and Rouncefield (2010). With a constantly changing role of computing in people's life and society, HCI has not only expanded its sphere of interest beyond the interface re-consider the kind of knowledge HCI researchers and Interaction designers are producing (Carroll, 2010; Dourish, 2006; Höök & Löwgren, 2012). This reaches from debating different disciplinary models (Carroll, 2010) over a more pragmatic focus on design research (Höök & Löwgren, 2012) or the question of whether design must necessarily stand in the centre stage (Dourish, 2006).

One aspect of these discussions is the kind of theoretical framing that underlies scientific exploration and interpretation of technology use. Thus, the following pages will briefly explore the theoretical underpinnings of my own approach in the context of their application within HCI.

## Phenomenology in HCI

Within HCI, phenomenology has become a permanent member of the pool of theories that researchers use to make sense of what they observe. Phenomenological thinking in general seeks to bridge the gap between body and mind and between perception and action. In the encounter with the world around the individual is both body *and* mind (Svanæs, 2013), and his or her actions must not be seen as an outcome of cognitive processes but as part of his or her being in the world. A term that depicts this ontological perspective is Heidegger's *dasein* (being-there), which he regards as the main object of phenomenological inquiry. This was set in contrast to seeing the mind in the centre of attention, as his teacher Husserl had done (Heidegger, 1976).

This theoretical approach, despite being abstract and unwieldy, has significantly influenced HCI, in particular through the theory of ‘embodied interaction’ (Dourish, 2004b), a term describing the intricate and complex role of the physical, social and cultural body in interactions with the world in general and in computing specifically. Through embodied interaction, HCI has taken on the challenge of deciphering the relationships between people and things particularly regarding how the body is involved in interaction (Dourish, 2004b, 2013). The phenomenology of Merleau-Ponty and his description of how the body is involved in the perception of the environment has played a large role in shaping its epistemology (Svanæs, 2013).

Quite separately, phenomenological thinking has also impacted the way HCI approaches the concept of experience and the relationship between mind, experience and the life-world (Winograd & Flores, 1986). Already Weiser’s vision of ubiquitous computing pointed out that there is a different way of perceiving computing technology. According to Weiser, because computing is constantly present, it will disappear in perception, i.e. become invisible. In phenomenological terms this means that in this vision technology will become ready-to-hand and only be seen in its tool-ness. This term originates from Heidegger and his example of the hammer that is ready-to-hand. Indeed, the question for what kind of experience technology should be designed for becomes even more important in the era of IoT. In contrast to Weiser’s vision, Hallnäs and Redström (2002) have argued that technology should be designed for presence, i.e. for being consciously experienced. Similarly, Chalmers and Galani (2004) criticise the notion that ubiquitous computing has to disappear (be ready-to-hand).

In fact, Heidegger’s understanding of the artefact being a mere tool has been questioned when it comes to a phenomenological understanding of technology. The problem is that the ready-to-hand-ness implies a neutral role of the artefact. Being ready-to-hand implies that it functions as a mere intermediary between the individual and the world. However, post-phenomenologists, (e.g., Ihde (2008)) have argued that this might not be applicable to technologies that are transforming an experience, probably because they are often designed for this purpose. Fallman (2011) contends that this has implications for HCI because it means that HCI researchers and Interaction designers have to be attentive to the different ways that experience is altered by technology.

In his later years Heidegger dealt with technology separately from what he had described in *Being and Time*. In ‘The question concerning technology’ (1977) he draws a clear line between ‘old’ (i.e. Greek handcraft) and new technologies. The latter, he argues, are not just mere tools as humans like to think; rather, their essence is to *enframe* the world (i.e. nature) as a *standing reserve*. This argument draws on both the human and the world, as well as the means through which the human encounters and alters the world. However, he draws a clear line between things and what for him is technology (not men-

tioning information technology specifically), which makes it difficult to explore technology as something more integrated into daily life. After all, that what he describes as ‘technology’ largely differs to what we talk about when discussing ‘technology’.

The core phenomenological contribution to HCI lies in bridging the gap between body and mind. There is an additional strength, however, in it that lies within the analytical approach to being-there itself. In the kind of phenomenological dissection that Heidegger exercises when analysing a jug (Heidegger, 1967), a hammer (Heidegger, 1976) or a chalice (Heidegger, 1977) might lie the key to a revised understanding of what technology *is*.

## Materiality: The relationship between people and things

As shown in this work, phenomenology had a strong impact on HCI’s understanding of how interaction, and in particular the interaction between humans and technology, works. However, as discussed in the first part of this literature review, it is not only the human’s perspective that is important but also the impact of artefacts, especially technology. As a design discipline, HCI is heavily invested in the role or agency of things within the human-artefact relationship, as well as within a larger social and cultural context. With the third wave in HCI, anthropology and cultural theory have contributed considerably to this understanding. For this thesis, a cultural understanding of materiality has been a key epistemological foundation. Hence, in this last part of the literature review a short overview is given over some important cultural approaches to materiality that have emerged during the 20<sup>th</sup> century.

## A cultural understanding of things

The bridge between mind and body and the focus on being in the world from the perspective of phenomenological thinking has had a prominent influence on many anthropological and ethnological thinkers. In contrast with traditional anthropological accounts of everyday life, these focus on a holistic account of everyday experience, often incorporating sensual perception (Pink, 2015) and recognising the present cultural texture interlinking social and material interactions.

From Anthropology and European Ethnology, the study of ‘material culture’ is derived. Early ethnographers described the peculiar objects used by the strange foreign cultures they explored. One of their tasks was also to fill museums with exotic and mysterious pieces. Meanwhile in Europe, early folkloristic studied historic objects, conveying a romanticised idea of 19<sup>th</sup> century farmer’s life (Bausinger, 1971)

Contemporary studies have turned to mundane artefacts such as iPods, milk or Tupperware (Blaschka, 1998; Jönsson, 2005; Ulrich, 2012). What

these studies have in common is an approach that focuses on individual practices and experiences as well as the wider social (and cultural) context. In their account of the human-object relationship occurs on both the individual and the societal level. In particular, in the second half of the 20<sup>th</sup> century traditional material culture studies of representation have been increasingly complemented by an abstract discussion of the human-object relationship.

In fact, in the relationship between the material and social world has been a prominent topic in social and cultural theory throughout the 20<sup>th</sup> and 21<sup>st</sup> century. The effects of industrialism on economy and labour, two world wars, an acceleration of technological development have sparked important debates about social structure, critiques and praises of technology, as well as new understandings of the material world.

Reckwitz (2002) presents comprehensive overview of social and cultural theories that begins with Marx and Durkheim and ends with Latour. He argues that throughout the 20<sup>th</sup> century social theory has shifted towards a cultural understanding of the social world. The author also follows an epistemological understanding of the relationship between the social-cultural world and, material world throughout the 20<sup>th</sup> century. He shows how classical social theory regards the material as a social structure that exists separate from the cultural structure. In this line of thinking knowledge is part of the separate cultural structure and is a “collective and constitutive background” (Reckwitz, 2002, p. 198). This means that aspects not regarded as part of the social-material structure are explored as standing outside the ‘normal’ or everyday life.

Since the 1960s, modern cultural theory no longer viewed the material as structures but instead as different entities that serve as carriers for cultural meaning. In this understanding the material world consists of objects that gain their meaning solely through human agency. For these theorists, gaining knowledge means to decipher this meaning and examine what meanings a particular object carries. The term ‘object’ signalises the ethnocentric approach as it appears, e.g., in the structuralism of Levi-Strauss.

This subject-object divide has become a leading issue within scholarly debates, which has been criticised by, e.g., Miller (2010) and Latour (1992). They represent what Reckwitz calls the turn towards “the material as ‘artefact’”. This line of epistemological reasoning rejects the notion of materiality as mere objects representing culture and views them instead as artefacts embedded and acting in the social world. One example of this is practise theory in which artefacts are reciprocally connected with cultural and social ways of understanding and knowing.

The different epistemologies of materiality and the material world illustrate how important it is to attend to the differences in the perception of the nature of the studied subject. This thesis builds on an understanding of materiality as it has been shaped by practise theory and postmodern anthropology. Accordingly, the materials of everyday life are described as artefacts, embedded and

acting in the social world and not as objects or representations of the social world.

## Agency

One influential contemporary theory that deals with materiality not as objects but as active agents is Actor-Network Theory (ANT) as developed by Latour (2005) and Callon (1986), amongst others. Latour underlined the importance of looking into all kinds of things in everyday life as actors that are directly affecting the networks of the material and social world. Whereas those like Heidegger would always see the thing as either a tool or as a product of human craft, Latour emphasised the symmetry between human and non-human actors. Important to note here is that non-human actors could also be completely non-material things, such as rules, organisations and language. While there is a wide range of contemporary theories that attempt to bridge the gap between the social and the material, ANT has been particularly influential not only in science and technology studies but also in many other disciplines (e.g., business and organisational studies and design theory). (References missing: Shove, Materiality and Society?) The acronym ANT is somewhat misleading because its emphasis lies much more on the actors and their agency and less on the network that connects them.

Within HCI, the question concerning agency is relevant for two reasons. Initially, because there is a large variety of different actors that play into the use of digital technology and with computing, new forms of agency might emerge. This issue has been raised in the context of IoT (Jia, Wu, Jung, Shapiro, & Sundar, 2012) or speech interaction (Speed & Shingleton, 2012). Furthermore, as a design discipline, HCI reflects over how agency is given to things in the process of design (Verbeek, 2005).

Hence, identifying and analysing agency can shape a different understanding about the material world and challenge existing techno- and ethno-centric assumptions. One example how such an analysis can look like in the context of design is presented by Shove et al. (2008), who combine an ANT approach with a focus on practises and examines routines and interactions with different artefacts of everyday life. Thus, these authors describe how different actors form agency in connection to each other. Through studies of practises in the kitchen or private photography, they illustrate the importance of a comprehensive understanding of the material, social and cultural world as a means to understand everyday life.

## Meaning

While ANT and practise theories have found moderate reflection in HCI and IxD research, the term ‘meaning’ and the analysis of different forms of meaning have become a common form of investigating technology in everyday life.

The term meaning is often used to describe the relationship between user and object by assigning a particular meaning to the object, whether its function or some sort of social or cultural connotation that is connected to the device. Often we encounter the idea of a ‘meaningful’ artefact or ‘meaningful’ interaction with an artefact. The notion is used either for describing everyday artefacts that the user has a particular relationship to (examples for this are (Bales & Lindley, 2013; Takayama, Pantofaru, Robson, Soto, & Barry, 2012; van Gennip, van den Hoven, & Markopoulos, 2015) or to describe a particular design goal in which meaningfulness becomes a value in itself (Thieme et al., 2011; Thiry, Lindley, Banks, & Regan, 2013). Within design, this is an important development. As Krippendorf (2004) maintains, looking into meaning also implies to look into more than just the artefact, i.e. it implies to move away from a techno-centric view towards a user-centred approach that looks not just into the object but also into what it means to the user. This semantic turn in design, as Krippendorf names it, also takes into account that meaning is always relative to the social and cultural group it is used in.

One might interpret these approaches as very ethno-centric> regarding things as mere objects that function as carriers for whatever meaning humans assign to them. Yet, it is important to note that there is a difference between meaning and meaningful. Meaning in its pure sense describes a representation, association or connotation with an artefact. Meaningful, however, is used as an evaluation of an artefact’s value. Depending on the particular approach of the study, a device seems to become meaningful in numerous ways, but most importantly, meaningfulness implies that the device stands out in the user’s perception (e.g., as a keepsake or heirloom). On the other hand, artefacts that are in their meaning quite important in everyday life are perceived as ‘unremarkable’ such as the home network as described by Crabtree et al. (2012). Thus, in describing the relationship between artefact and user the term ‘meaning’ might be insufficient and even misleading?

The chase for meaning has also produced valuable insights and generated considerations about the design of technology. For example, one of the factors that has been identified for contributing to a meaningful interaction or particularly cherished artefact is the history of the artefact and the personal history of its user, as shown by explorations of memory cues and practises of reminiscence. This led to further explorations of different design materials and the way a thing might be designed with the purpose of ageing (Giaccardi, Karana, Robbins, & D’Olivo, 2014). The attachment to a device depends also on whom is using it. In this sense it might serve as a way to express identity (Ylirisku et al., 2013) or support other kinds of values. In my own work the understanding of ‘meaning’ has played a major role in describing the relationship between user and artefact.

Thus, in this thesis I adhere to the term, but challenge the understanding of it as being inherent to an object. Instead, the aim here is to show how meaning is actually something that emerges in the interaction between user and artefact.

## A new epistemology for ordinary computing?

As shown in this thesis, within HCI there is an increasing number of empirical and theoretical contributions to understand what drives human interactions with technology. With the rise of domestic ubiquitous computing, the importance of emotional, social and cultural factors for understanding human-computer interaction has been widely acknowledged. Moreover, an increasing interest for ‘mundane’ technology has emerged: technology that is so thoroughly integrated into daily life, that it is not perceived as exceptional. Thus, there is a host of studies dealing with different technologies, use cases and environments, situated use of social media and the use of an increasing number of diverse mobile technologies.

With more diverse technologies and use environments as part of everyday interaction, comes the challenge of positioning computing technology within the lives and daily experiences of its users. Initially, to comprehend the complex cultural and social factors that influence the adoption, use and experience of technology. Furthermore, it has to be understood how the design of different kinds of computing technologies impacts people’s daily lives.

Furthermore, while it has been argued that technology has become mundane, there is little sound arguments as to why technology is commonplace. It is argued that the wide dissemination of technology makes it unremarkable. HCI scholars are aware of the extended potential of digital technologies by showing this through a rich empirical account of daily lives. But two questions remain somewhat unresolved: Does the ‘mundane’ use of technology change human relationships to the thing itself and to technology in general? And if so, how? The technological development does not pause, i.e. it continues to provoke changes in the way people set themselves in relationship to technology.

It is this more fundamental question that I wish to explore in this thesis. In doing so, I will employ social and cultural theories that offer a host of tools to examine these issues in depth. HCI has come far in challenging old assumptions and developing new theoretical approaches, but there are still gaps that need to be closed. More importantly, I believe that a more thorough understanding of HCI’s own epistemological position with social science can enhance the disciplinary understanding of HCI as a social science.



### 3. Methodology

Entering a family home under the pressure of having to explore as much of it as possible is daunting and challenging task. When ringing a participant's doorbell, I was quite nervous about what might await me behind the doors. The more family homes I visited, the more I became anxious about not being able to properly uncover and document the complexity of each family's everyday life. On one occasion, I entered a family home of a divorced mother and her three children in Sweden. I stepped into a narrow hallway containing family photos, art pieces, boxes and clutter (e.g., old clothes to bring to the charity shop, several USB cables on the small drawer and a disconnected wireless router in a box on a stool right in front of the door. I almost stepped on the family's cat's tail when I tried to navigate my way through the hallway. This tiny hallway alone could have kept me busy in the home for hours. But as chaotic as this description sounds, the little space was not without its own kind of order. Everything in there had a purpose, a reason why it was placed where it was. Later, when we came down from the kids' bedrooms through the hallway, I pointed towards a family portrait that was a centre piece in the big collage of children's paintings, photos and postcards on the wall and asked where the picture was taken. The mother's reply turned out to be a long story, where she guided me through a complex story with many different actors. The portrait, an older party snapshot, had almost been forgotten on the memory card of an old cell phone, but the family's hunt for a proper family photo for the hallway had brought it to life again. However, it turned out to be a bit of a challenge to get the image from the phone's memory to a final print. Lastly, the story also involved a broken printer and a walk to the photo shop to have the photo printed. All these considerations led her to talk about the role of several other photos in the hallway and in no time she talked about most things found in the hallway. Unbelievably, we had spent nearly 45 minutes in this tiny space.

This short story from the field illustrates a variety of different issues that I encountered throughout my inquiry into the ordinary: Reflexivity and the challenge of observing a familiar culture, the challenge of identifying and analysing practises, the complexity of everyday things, and finally, qualitative data analysis and identifying novel insights.

This chapter performs an in-depth discussion of the methodological issues, noting the theoretical considerations that have guided the fieldwork process. In the second part, the studies are introduced and clarified how I developed

my epistemological position throughout the process. Finally, I explain how the studies contributed to the arguments made in the thesis.

## The familiar un-familiar

The study of technology encounters in this thesis is a philosophical inquiry but grounded in empirical observations of everyday practises. The present studies are set in two western cultural settings (Europe and the USA). Conducting the studies presented a challenge about insights of my own life world. The observations made do not just appear ordinary to the people I studied but they were also ordinary to me. This makes it necessary to estrange from this life world. For this, the individual must reflect over his or her own perception of the world and subtract it from what he or she observes (this is what I had to do).

In this endeavour I am not alone. The field of HCI and Interaction Design produced several studies that deal with everyday life in various forms: Workplace studies, home studies and studies of the elderly or children. Because computers in the 21<sup>st</sup> century have become very ordinary, studying them means to study ordinary life in all of its manifestations. Thus, in many cases ethnography becomes an obvious choice. Observing computers while participating in their use offers insights into those ordinary patterns that might remain hidden in other data collection methods such as surveys or de-contextualised interviews. Yet, there remains the challenge of the invisible ordinary. The more computing is integrated into everyday life, the more it disappears in our perception (reference). This problem has to be seen in the context of ethnography's history throughout the 20<sup>th</sup> and 21<sup>st</sup> century and the different disciplines it has been branching into during this period.

Ethnography stems from the studies of alien cultures, a field that became scientifically relevant, especially with the western colonialization efforts in the 18<sup>th</sup> and 19<sup>th</sup> century. The interest in understanding strange cultures arose partly from the plain monetary and political interest of the colonial powers, but there was also sincere scientific curiosity when it became clear that there were complex cultures to explore, which were unlike those early explorers were familiar with. While early explorations were superficial at best, and racist and destructive at worst (Dewbury, 2007), in the beginning of the 20<sup>th</sup> century relativists such as Malinowski (2002) or Mead (1973) challenged the dominant thinking of the time, which saw western culture as being essentially different from (and typically superior to) those of 'native' cultures. Interestingly, this dichotomy can still be found in scientific discourses that differ between 'complex and 'simple' or even 'tribal' societies (Kushner, 1969). The result was a return 'home', whereby ethnographic methods began to be used

to study one's 'own' culture instead of that of the 'other'. It has largely remained dominant practice in HCI today: the majority of ethnographic studies in HCI look into our own culture instead of studying other cultures.

During the 20<sup>th</sup> century, different disciplines adopted the ethnographic approach of early anthropologists or developed their own approach to a holistic description of the social world, most importantly, sociology, which might have been the first field to apply it to the study of western societies. With sociological discourse moving towards a subtler understanding of culture, quantitative methods were no longer sufficient to map and interpret social structures. Initially, this approach was advanced by the Chicago school that sought to map out the social life of the more marginalised population of the city (Bulmer, 1986). Within HCI, by the sociological take on ethnography has been quite influential; especially in the form of ethnomethodological studies. (Blomberg & Karasti, 2013; Crabtree, Nichols, O'Brien, Rouncefield, & Twidale, 2000). Ethnomethodology's focus on practises take an emic perspective: Focusing on the social world from the perspective of the social actor requires a holistic qualitative approach that often takes the form of ethnographic studies (Dourish, 2004a).

This is important to mention because too often this kind of holistic underpinning of ethnographic approaches is reduced to a method, i.e. a particular way of doing field studies (Dourish, 2006). This thesis, however, is ethnographic in the sense that it considers ethnography as a methodological lens that underpin the whole research process. Taking an ethnographic approach implies designing the process in a certain way, to pose particular research questions and employ an interpretative approach to collected data (Brewer, 2000). This particular ethnographic perspective is framed by an important question: How do we make the ordinary unfamiliar become visible?

Throughout the 20<sup>th</sup> century, post-modern anthropologists had turned to what Marcus (1995) calls "multi-sited ethnography". Ethnography was no longer limited to distinct locally situated sites. Marcus calls it the turn towards the "world system" (96) in which the focus is placed on cultural categories and structures instead of a geographically defined context. With this ethnography was transformed and applied to the culture of the ethnographer (which typically meant western European culture), it had to make that what was familiar into something un-familiar. It had to become something that could deconstruct existing structures and practises in order to recognise the meaning behind them. In one of the introduction seminars during my undergraduate studies, we were shown a picture of a busy intersection of a European city and asked to describe the scenery from the perspective of an extra-terrestrial visitor. In the beginning students, in an attempt to abstract what they saw, described the "motorised vehicles", the "supposedly native inhabitants", and the "building structures were perhaps meant for dwelling". It soon became clear that even those abstractions were building on established knowledge. How do we know that the aliens know motors, why would they assume that the humans

are the living creatures in the scenery (why not the cars?). Early anthropologists had it relatively easy in that they were the aliens. Dealing with one's own culture, however, requires a process called reflexivity, i.e. deconstruction of all that is known, not just de-familiarisation but alienation from what is taken for granted (Aul Davies, 1999). Within HCI research, the same argument has been made by Rode (2011) Bell, Blythe, and Sengers (2005) with respect to research on domestic technologies. This is especially the case in the home filled with (for us) familiar routines and objects of daily use. Thus, turning the familiar into the un-familiar is crucial to see anything at all.

Without reflexivity, stepping into the hallway would have let me see only those things that are different from my own experiences and expectations. Things that are taken for granted, that are part of our everyday life are invisibly hidden behind their ordinariness. When we are not aware of these preconceptions, it is not possible to deconstruct such phenomena. What I call here the ordinary is seen as a truism, something not worth re-searching because it is assumed to be a given. But what gets lost is what lies behind the ordinary, i.e. the meanings, values and practises we take for granted.

## Designing an ethnographic interview

Ethnography has been adopted as an epistemic practice in HCI to provide insights into the context of computer use. The approach is mostly appreciated for the richness and depth of data it provides (Hughes, Randall, & Shapiro, 1992; Williams & Irani, 2010). However, ethnography is also a diverse method that is used and shaped by many disciplines and its use within HCI continues to be hotly debated (Crabtree, Rodden, Tolmie, & Button, 2009)

The method used in the present studies is the ethnographic interview, an interview approach that embodies the complexity and multi-dimensionality of culture (i.e. the approach is broad and largely unstructured). An ethnographic interview aims to obtain the full picture and avoids narrowing down to specific themes or practises. This strategy is to prevent the accidental omitting of relevant information. Within HCI, the ethnographic interview is widely used in ethnographic inquiries, especially under time constraints (Millen, 2000).

As a form of ethnographic enquiry, however, the interview is controversial. A major shortcoming of the interview is to account for actual practises. Information obtained from an interview is second hand, recounted from the subjective perspective and the informant's memory. Previously, I have discussed the challenge of exploring the ordinary in one's own cultural context. An informant interviewed about ordinary, everyday practises will face exactly the same challenge: it is impossible to recount all the small encounters in our daily lives. Hence, every interview can only depict a very small fraction of what is ongoing. Interviews have been criticised by both anthropologists and ethnomethodologists: the latter argue that they cannot tell us about actual practice (Hester

& Francis, 1994); the former claim that ethnography only makes sense in the form of long-term participatory field studies (Pink & Morgan, 2013).

However, ethnographical studies (e.g., Miller (2001)) have shown that in combination with observational elements and a theoretical framing even shorter visits consisting of interviews and observations can uncover everyday practises. In Millers example, such a combined method was used to study people's relationship to their possessions. A similar approach is what is called a 'go-along' (Kusenbach, 2003). By following the activities of an informant while at the same time entertaining a conversation, the ethnographer is able to explore sensations of time or space and share the experience with the informant. The discussed studies were building on this phenomenological approach. While standing in the small hallway, my method does not just consist of the specific questions I ask or the way in which my interview is structured. My being-there, experiencing the same things that my informant experiences, noting the spatial limitations, the different arrangements, the light or the noises around me, are a crucial element of the inquiry process. The interaction between me and my informant (e.g., the chatting, changing position, walking around) and the tangible interaction with different artefacts trigger memories or reflections that would have remained hidden within a more conservative interview format. However, this presumes that I let the space itself, the artefacts in it and my informant guide the interview and not predetermine ideas about the study participants.

## Accounting for complexity (1): Study design

When I entered the small hallway described above, I paid attention to all kinds of artefacts and practises. This active refusal to delimit the scope of observations has been the core to the present method. This does not mean that the studies themselves were not delimited. Yet, in an environment that is as complex and diverse as the home, how does one decide in the moment what is important and what is not?

The basic method employed in this thesis is that of home visits that were predominantly designed as open interviews but had a strong observational component. The home is probably one of the most intimate places to study, which makes it very difficult to conduct long-term, participatory observations. This is also true for the study of Uber drivers for which the experience of the ride itself was an important part of the data collection process.

All visits and observational interviews were structured similarly. They were roughly divided into consciously designed phases, with each carried out for a specific purpose, namely to create awareness for the interviewer over the overall process, without restricting the informant. Each interview/home visit comprised four phases.

In the initial phase the informant was informed about the conditions of the interview and asked to read and sign the consent form, which included the consent for audio recording of the interviews and for taking pictures and recording video. Each of those options could be excluded by the informant. The purpose of this phase was to establish the visit as a research situation and to ensure that the informant was sufficiently informed about the purpose of the study and privacy protection. In this phase I also sought to attain a power balance between the informant and the interviewer in order to build a relationship based on mutual trust.

The second phase was a warm-up phase aimed to reduce any pressure the informant might feel and establish the relationship between informant and interviewer as balanced and equal. Usually, the interviewer would ask about the kids (or interact with them directly if they were present) or ask about the informant's job or the living situation in a way that the informant was able to exclude information if he or she so wished. While this phase was not primarily intended to generate related data, it often led to a lively description about life circumstances, personal values and attitudes.

During the first two phases, the informant and interviewer were usually sitting at a table. This first location was chosen by the informant. However, often in this situation the interview seemed to be more formal and structured and informants often experienced being in a more passive role. This passivity affected the fluency of the conversation. Thus, during the third phase, the interviewer asked to change location of seating or, if the situation allowed it, for a tour of the home. This phase was intended to learn about everyday practises. At this point, the informant did not yet have the opportunity to ponder about the theme of the interview for too long, which meant that their answers came spontaneously. An important element of this phase was that the interviewer would point out as many artefacts as possible that she became aware of. In most cases the artefacts pointed out were surprising to the informant. For instance, the interviewer could point out a clock on the wall or a Hoover stored in the corner, asking about the use of these artefacts. Other questions included areas of child care, cooking, decorating and other ordinary practises that generated a wide array of explanations from the informant.

During the last phase, informants were more actively probed about their own feelings and emotions. At this point, the interviewer and informant had built a more trustful relationship. Consequently, few questions or cues were needed to learn about the informants' emotions, attitudes or experiences in their everyday life. At this point, the informants were asked, for instance, which artefact they value the most.

Although divided into phases, the visits were somewhat unstructured. The main goal of the visits was to allow for a maximum of interaction with the informants and other members of the family, as well as a maximum of spatial and material interaction between informants and their environment. This process was initially often strange for the informants. For instance, I would ask

them to show me where something was stored, to use something or to show different paths taken in daily routines. Yet, after an initial adaptation phase, this approach put the informants much more at ease than the initial interview and allowed for a broad scope of observations. The result was that the visits elicited not just articulated second-hand information (as was achieved by the initial interview phase) but also built directly on observed practises.

Data collection was done by note taking, audio recordings and photographing. The interviewer kept a field diary with short notes about behaviours as well as sketches of the visited place. The field diary was transcribed in full immediately after each interview. The interviews, in combination with an observational component, was able to provide a thick description of the informants' life world.

## Accounting for complexity (2): Analysis

Exploring the small hallway alone resulted in a vast amount of data, including audio recordings, short videos, photos and artefacts. In addition, I had made my notes describing the architecture of the room and my own experience when entering the home. By not narrowing my focus during the interview process, the more challenging and crucial become the data analysis.

This chapter attempts to make the point that ethnography does not just consist of collecting data; rather, the mode of analysis and the overall framework are essential parts of ethnographical study. Because ethnographical data tend to be extensive and often seemingly random, a big part of the process is dedicated to condense and delimit until those links in the data are found that are relevant to the research question (Stevens & Handelman, 2006). Therein lies of course the risk that observations that are discarded would have altered our interpretation. Thus, the analysis was conducted in small steps moving from very thorough descriptions towards higher analytical levels.

All data were coded, i.e. described with different re-occurring themes, which were then sorted and scrutinised for possible interrelated connections (Furniss, Blandford, & Curzon, 2011). However, because of the nature of the thesis, the analysis did not remain theoretically neutral. Instead, emphasis was put on artefacts, their usage and articulated meanings, as well as the way these were connected to family routines. The holistic perspective on practises and experiences was maintained from the empirical observations also during the analysis phase of the study. This shows in the outcomes of the studies, which present a rich account of everyday life.

## Studies and papers

The empirical material presented and analysed in this study is derived from five studies, four of which I conducted. The other study was performed as part of a different thesis project conducted by Chandrika Cycil at Brunel University. Six papers resulted from these five studies; one, paper VI, was a cross-sectional study. Each paper contributed with different emphasis on practice, meaning and materiality. In general, throughout the process, the focus shifted from an artefact-centred view towards a perspective that included human actors in everyday practises.

Furthermore, the studies differ in the way that the fieldwork was initially framed. While the general interest lies on artefacts and their use, other factors were added: Study A and E were kept fairly open; study B focused on a particular place; study C concentrated on a particular experience (connectedness); and study D on a particular piece of technology.

A short overview of the papers and sketch of how each paper contributed to the overall contributions of this thesis is presented. For clarity, papers will be assigned roman numerals (I-V) and the studies with the letters A to E.

### Study A: The value of things

The first study was carried out as part of my Master thesis project in Cultural Analysis at Lund University, Sweden. The study focused on everyday interactions with technology and the way people surround themselves with different devices. An important element of the study was the comparison between technological devices and mundane devices to determine their differences. An important analysis of the original study was a comparison between different practices and attitudes around technology, comparing young users (age 20 - 25) and elderly users ( $\geq 60$  years).

Concerning data collection, five students were observed for 2-5 days. Starting in the morning at breakfast, I would spend the majority of the day, following them around to classes and social gatherings (during this time, I was actively engaged with the students). This go-along approach resulted in important insights about the role of materials, space and place in everyday life.

The paper that resulted from this study and presented in this thesis combined this very open and explorative approach with theoretical considerations stemming from the field of HCI (Glöss, 2012). Thus, the outcome was more related towards an application to design than the original (purely) ethnological framework would have allowed. The discourse in relation to materiality in HCI and Interaction Design played an important role.

The most important insight of Paper I was the significance of what I refer to as the 'value' of an artefact and how fluid and multi-dimensional this value became. With the concept of value, I was referring to what an artefact means to its user. In this sense the term is derived directly from Verbeek (2005) who



suggests that the value a thing has for a user is important for design. However, in later studies I have used the term *meaning* in order to avoid confusion with the concept of value as in the notion of value-centred design (Cockton, 2012).

### Study B: Artefacts in the car

Although study A resulted in initial insights about transformations in the meaning of artefacts, much of what was happening during this process remains unclear. In particular, the role of practises had not been explored. The use of a particular setting in study B allowed for the dissection of the relationship between human, artefact and practise and to further investigate the transformation of the user-artefact relationship.

Study B was part of another larger project dealing with the family car and the way technology is used in the car. Its ethnomethodological frame produced rich data in the form of video data obtained from car rides and transcriptions of ethnographic, unstructured interviews with members of the family and participant observation. For details of the study, see (Cycil, 2016).

We analysed the data with the help of an extended theoretical framework that used cultural theory. The analysis primarily focused on the interview material in that the interviews allowed closer examination of the family's experience with, and relationship to, particular artefacts. Through a conductive process, we could trace the development of different artefacts in the car and determine what changed their meaning. We concluded that it is vital to trace these transformations to understand how a designed artefact will transform once deployed to the user.

Although paper I examined on the transformation of artefacts, it focused more on the artefacts themselves and their meaning. Paper II, in contrast, determines how the actual relationship between user and artefact develops, which lays important ground work for this thesis (Glöss & Cycil, 2013).

### Study C: Connectedness in mobile families

At this point in the process, the insights gained from the studies were applicable to all sorts of artefacts in everyday life (not only technology). While the studies had provided a wide collection of observations that potentially gave insight into technology use, analytically this had not been explored further. Study C therefore focused on comparing artefacts with and without computational capacities. Because of its role in a larger design project, the study was directed towards families living abroad. The aim was to scrutinise how different artefacts and materials were used to create a sense of connectedness with the home country. Families were recruited through thematic Facebook groups and home visits. These home visits followed closely the observational interview schema presented above, with the intention of letting the researcher participate in the family's personal space. By being present and participating in

everyday activities, the researcher could determine the importance of different artefacts and explore how information technology and more mundane things were helping these families connect to their home countries.

In Paper III we examined how some artefacts through their specific materiality could create a sense of connectedness, as well as how technological devices were unable to provide an essential material experience. Further, we showed the positive effect for family life when computing technology bundles and transforms different practises. An important contribution of Paper III was that it showed that practises play an important role in the creation of experience. More importantly, Paper III identified how practises emerge and transform in specific ways through digital technology (Glöss, Giaccardi, Robbins, D'Olivo, & Karana, 2014).

### Study D: Use of technology and labour conditions

Study C marked an important departing point because it was the first study of the thesis that solely focused on technology. The subject of the study was the app 'Uber' that stands in the centre of a novel taxi service with the same name. While the previous studies mainly concentrated on the informant's private life, study D centred on work life. Yet, with the ethnographic approach, we kept the focus on users (in this case drivers and passengers) and the relationship to the device and the app. We interviewed drivers in two cities (San Francisco and London). Because we recruited the drivers while riding in their car, we were able interview them in the space they were using the app while simultaneously follow them through their driving routines. It became apparent that many of the changes the app caused changed the overall labour condition and affected an entire industry.

In Paper III we showed how wider societal changes can be inferred from everyday work life within technology (Glöss, McGregor, & Brown, 2016). The paper showed the relevance of scrutinising this kind of everyday interaction with technology. Our HCI-based approach revealed important transformations in labour conditions that emerged in the new 'sharing economy'.

### Study E: Internet of things at home

Study E was conducted towards the end of the thesis project, which is at the time when the analytical frame for the thesis had begun to develop. At this point, the previously conducted studies had contributed to a thorough understanding of practises and meaning around technology. Yet, there were still gaps to fill in regarding the attitude of users towards everyday technology.

Paper	Study	Primary focus	Contribution
I. The meaning of things	A	Meaning	Exploring the role of artefacts in relation to their functionality and users' individual values
II. Artefacts in the car	B	Meaning	Analysis of the factors that contribute to an artefact's change of meaning.
III. Connectedness in mobile families	C	Practises and meaning	A comparison of the role between computational and non-computational artefacts in everyday practises.
IV. Uber and the labour of apps	D	Practises	Analysis of practises around information technology in relation to labour conditions.
V. Internet of things at home	E	Practises	Analysis of the adoption and integration of computing technologies into everyday life in Swedish homes.
VI. The tablet as a family canvas	B, C, E	Practises and meaning	Analysis of a particular artefact - the tablet - in comparison with other technologies in the home and its role in family life.

This deliberation was especially of interest in the context of the discussion on the 'Internet of things' (IoT) that foresaw a near future in which the connected home becomes reality. Our home study, conducted in several Swedish family homes showed a more diverse and flawed reality than the IoT had envisioned. While technology in Swedish homes has become ubiquitous, it does not integrate into the home as seemingly as designers might have intended. An important contribution of this paper is the discovery that adoption processes are complex and not solely steered by the function of a device, but instead by how a new device integrates into the overall domestic environment. The paper concludes with the argument that many technologies are largely 'stuck in between' because they fail to harmonise with the existing ecology of the family home (Glöss & Tollmar, 2015).

## Cross-sectional study: Tablet computing in families

The final study is based on data from three of the previously presented studies in this thesis. Conducting research in families, we observed that tablet computing had become an important part of many family practises. Studies B, C and E had produced a number of interesting observations on the use of tablet computers. Furthermore, the broad ethnographic focus allowed us to compare the use of tablet computers to other devices in the home. Thus, we conducted a comparative analysis, breaking up the traditional dichotomy between stationary devices and mobile technology. We showed that differences in the use of these devices exceed their use and that tablet computing becomes a new form of computing in itself that leads to new cultural and social practises in the home (Glöss, McMillan, Cyclic, & Tollmar, 2016). The results of the study complement the insights from previous studies because they offer another perspective to the human-artefact relationship, i.e. the differences in material, spatial and social properties of different devices show the importance of all these elements in the way humans develop a relationship to technology.

## Contribution of the studies

The papers in this thesis are not so much singular case studies that contribute different pieces of knowledge to answer the overall research questions. Rather, each paper leads to a different perspective or framework to the study of mundane computing.

The dissertation was entered with a very vague idea of exploring everyday computing as a domain with a certain focus on materiality. Materiality, however, was not precisely defined. The first paper explored the potential of a more cultural perspective for the analysis of materiality and placed my work within an HCI context.

With study B, it became apparent that the previous analysis had interpreted the user-artefact relationship as very rigid. Study A has only superficially accounted for other factors that might change the perception of an artefact. Thus, study B was designed to focus on the history of artefacts and how their meaning changes over time, taking into account the spatial and social context.

Up until now, my observations and analysis had not been very specific with regards to computational artefacts, somewhat avoiding a dichotomy between computing and everything else. However, in study C I worked together with designers and it became necessary to determine how a computational device could potentially improve the experience of connectedness. It therefore became necessary to compare the different practises in order to find differences and similarities in the way computational and non-computational artefacts were handled and perceived.

When beginning to work on Study D, it seemed as though this study would not have much in common with my previous work, given its focus on a workplace and discussion about wider socioeconomic issues. However, during the course of the study, it became clear that there is an intriguing relationship between the way information technology is perceived in public discussions and how it is used and experienced by those who are using it on an everyday basis. Furthermore, the study brought deeper insight into how an app such as Uber blends in with other everyday practises.

Over time, I developed the idea that there is a contradiction (or discrepancy) between the notion of ‘everyday’ computing and the still prevalent gap between material and computational things. This contradiction became even more apparent when exploring IoT in study D. We entered the study without a definition or idea of what IoT is in a home setting. Thus, we did not limit our data collection to a particular device or practise and therefore we collected everything possible about information technology in the family homes. Because of the ubiquity of computational artefacts in the households we visited, it became necessary to reconsider my own understanding of what computing is. I quickly started to become familiar with different theoretical understandings of the term ‘meaning’ and the question of the essence of computing, i.e. I returned to the phenomenological analysis of Heidegger, as well as to a more anthropological approach. Adapting Ingold’s notion of life as a meshwork, facilitated a comprehension fluidity of everyday interactions.

Paper VI was heavily influenced by these theoretical considerations. The tablet computer had been a very common device in the families I had visited. In the context of this particular theoretical landscape it became apparent how it differs from other devices. Because the differences could not be limited to functionality or the type of interface, it became necessary to refine my ontological position.

The final outcome in form of this thesis, is more than just the sum of its components. It is an attempt to lift the analysis of ordinary computing to another analytical level and to look behind the different observations that in isolation might appear as ‘boring’ or ‘not surprising’. Because the ordinary is just that (i.e. ordinary), it was necessary in this thesis to study the ordinary in a longer investigation.



[things]

## 4. What are things?

*What is a thing?* For an analysis of the role of technological artefacts in everyday life, this might be the first important question to ask. Depending on the epistemological stance, the answer might turn out quite different. Hence, in this chapter I will frame and further refine my understanding of what an artefact essentially is and how humans relate to artefacts.

There is surely no shortage of approaches to the fundamental questions about the ontology of objects within the social and cultural sciences. And in its multi-disciplinary nature, HCI has integrated many theoretical approaches into its canon. The more it is necessary to carefully frame the perspective that I have taken here, which is informed by the phenomenology mainly of Heidegger but also by the work from cultural theorists such as Bourdieu and Ingold. The more detailed the description and analysis of things, the more careful a scholarly approach has to be in describing the theoretical frame. Thus, in this chapter I will, in the phenomenological tradition, start at the very beginning, at being in the world.

### Being

In his early work “Being and time”, Heidegger frames, quite extensively, what differs his approach from other approaches existing at that time. What he discusses is the human “being there” (German: *Dasein*) (Heidegger, 1976, p. 57). He emphasises that at the centre of his inquiry stands not the ‘what’ – he is not asking for the form or character of an already assumed form of being – but instead for the being itself. He sets out to challenge the very idea of a thing. What has previously been taken for granted – such as the use of a hammer – is deconstructed and dissected to its essence.

Another particularity of ‘being there’ lies within the ‘there’. As I have liberated earlier in this work, Heidegger also sought to overcome the dichotomy between body and mind. For him, being was necessarily something *in the world*, and must not be studied as disconnected from the material world.

Heidegger was a student of Husserl who coined the term of the life world as “the world given through perception” (Husserl, 1970). Ever since then, the concept has served as the foundation for many philosophical as well as sociological inquiries. Heidegger takes the much more transcendental phenomenology of his teacher Husserl and forms it into a phenomenology of the material



world around us. For a phenomenological inquiry, it is necessary to embrace the idea of a perspective that looks into the essence of being and the world around it. For Heidegger, the ontological question for *being* had to be in the centre of all inquiry. In this respect, he criticised a number of other fields (e.g., biology and anthropology) because they were taking the essence of being for granted.

For Heidegger, the focus is placed on being there as such, its relationship to the place that it exists in - the life-world, the environment, the place where meaning is created. The life-world is not a fixed structure; it is not absolute but relative. Thus, it can never be completely understood from a macro perspective. Instead, the life-world has to be understood through the being of the individual. Husserl says it is pre-conscious: "it is something you think with rather than think about" (Frykman & Gilje, 2003).

A student of Heidegger, Arendt, elaborated on being-there. Whereas Heidegger's life-world was very much a lonely one, Arendt is one of those scholars who analysed it as a social realm.

"Whatever touches or enters into a sustained relationship with human life immediately assumes the character of a condition of human existence. This is why men, no matter what they do, are always conditioned beings" (Arendt, 2013, p. 9)

In this human condition the reality of things can only exist in human plurality. They (things) depend on "the constant presence of others who can see and hear and therefore testify to their existence" (p. 95)

Arendt also looks closer into the nature of human interaction, or rather, into how the individual is disclosed in his or her relationship to others. According to Arendt, there is an "already-existing-web" (p. 184) in which the subject falls into. All actions and speeches become part of the web and thereby influence the "life story" of this newcomer. Arendt's *Vita Activa*, while setting the foundations for an understanding of the conditioned being, goes on to develop a political view of the life-world. But in this thesis I am dealing more with a micro perspective, the level of everyday practise, the moment when a conditioned being-there becomes entangled with the material world around.

Within Anthropology and European Ethnology, Bourdieu's theories have become particularly relevant because they allow for an examination of single practises while at the same time accounting for the wider context the practises take place in (Bourdieu, 1990). Bourdieu was strongly influenced by such phenomenologists as Merleau-Ponty, Sartre and Heidegger, even though he would strongly reject the latter. In "The Logic of Practise" he criticised Heidegger's phenomenology for not being able "to go beyond a description of what specifically characterizes lived experience of the social world" (Bourdieu, 1990, p. 26) Instead, Bourdieu asks for how a person's internal

structures, individual values or dispositions affect his or her experience. Furthermore, how the person's external experiences are affecting again his or her internal structures. These internal structures are what Bourdieu calls the habitus. It is the habitus that we encounter the world with; at the same time, the world will affect the habitus. This reciprocal relationship is what forms the practises and experiences of everyday life. The habitus connects being with the life-world around; hence, accounting for an individual's identity but without transforming the relationship between the human and material world into a stiff and rigid construct. Instead, it allows understanding *being* as fluid and constantly transforming.

I want to summarise this brief excursion into the question of being-there in regards to my own work: I understand everyday life as life-world - the place where humans exist within and with the material world. At the same time, humans are always conditioned beings, i.e. their being is always in relationship to others that shape their thinking, their values and their dispositions. Yet, what I am looking into specifically is how humans are encountering things in the life-world.

## Thing

One of the most-cited examples of Heidegger's phenomenology is his example of hammer (for instance, in Dourish, 2004). With the hammer, Heidegger seeks to exemplify how humans encounter the life-world as ready-to-hand. The hammer is in its use not present as a thing - it is ready-to-hand. This example has been cited frequently in HCI to illustrate the transition of computing from being actively present towards blending into everyday life and disappearing in the user's perception. Heidegger relates this close analysis of a thing solely to the actor who is using it. It is a radical approach that sees any object only in its perception to the user. Thus, an argument suggesting that something has to be designed 'present-at-hand' might have even more extensive ontological implications. It would have to be questioned whether the designer or the maker can actually affect, if something is ready-to-hand or present-at-hand. Heidegger is referring these terms solely to the perception of the one using it.

But, of course, this approach is difficult to hold up. Not only would it be impossible to make any kind of implications for a design of a thing, but it would mean that whatever we say about a thing only exists in a particular realm: there would be no shared life-world, no inter-subjectivity. In his later years Heidegger revised this approach by looking into the object as a thing in itself, when it exists as a thing outside of the human's perception.

In his 1950 held lecture 'The Thing' in which he analyses a jug step by step, he calls this existence 'thinging'. According to Heidegger. 'thinging' shows that the jug does indeed stand by itself and at the same time is being

made by someone, which, in turn, requires this maker to have an idea about the thing he is making (Heidegger, 1967). Or, as Heidegger puts it, “The jug is not a vessel because it was made, rather, it had to be made because it is this holding vessel.” (p. 69) This complex relationship between the thing, the subject, the maker and the idea of the thing - even though it is not an easy to grasp concept - might help to understand the relationship between human and object better: As the relationship between the maker of the jug, the user and the jug itself, all of them connected through the idea of the thing. In another essay Heidegger writes that this idea, the essence, can never be the same as the thing itself. Because essence is more than just the mere description of the thing, but encompasses its role in the life-world.

What Heidegger does here is to decipher what I described in the introduction as an encounter. It is the very moment a thing is *thing-ing*, it is revealing itself to the person using it. And in this *thinging* it shows its essence. Yet, showing its essence relies on the fact that the person encounters it.

But from this argument, we can deduct an understanding of essence as something that is culturally shared. So, for instance, someone seeks to describe these two wooden boards that are connected to each other in a 90° angle with one of the boards having four legs stuck to it, on which it stands. He or she can use the word ‘chair’ and everyone in the group will understand, and immediately know that this is something they can sit on. The word ‘chair’ has now all those different meanings. However, it is not the chair itself that has these meanings, but instead the word ‘chair’. This becomes abundantly apparent if you ask someone from the same group to make a ‘chair’. This person will now make something that is more or less similar in form, but (hopefully) will allow for someone to sit on. So, an observer might reason that this seems to have something to do with the function. But he might also be extremely bad at this and make something that looks pretty much like a chair, but is extremely fragile and not reliable to sit on. Or, he could be an artist who makes a chair sculpture too tall to sit on or made out of soap bubbles. In both cases people will most likely still recognise the chair as a chair. A useless one maybe, and yet, the word is connected to a particular set of forms that designers would usually stick to, even in the case where they are particularly creative.

The thing is not just an object, as something that is always depending on the subjective perspective of the human actor. Instead, every ‘thing’ has an essence to it, an idea that already existed in the making of the thing. Thus, when looking into any artefact, we must not just analyse it in terms of its subjective meaning for the user, but in its essence that goes beyond the level of subjectivity.

At this point, I want to underline that essence as I describe it here is not an absolute truth. It is only valid for those people that share the idea of the thing – like that of the chair. This might be a very big group, maybe all of humanity, or can be a very small group, such as a particular profession. However, while

such a group might share the essence of the thing, the thing itself can have a different meaning for each individual in the group.

## Encounter

Now that we have the thing in front of us, be it a plain jug or a more complex artefact such as a smartphone, we have to scrutinise the moment in which a human actor encounters this thing. This encounter is not meant as a singular event, such as when a person sees an artefact for the first time. Quite the opposite: encounters happen constantly, our whole life-world is full of things.

The term is introduced to capture the most basic level of relationship - what always happens as soon as any kind of artefact enters a person's life-world. This can be a special event (e.g., when we receive a gift from a loved one). It can be something every day and ordinary, like the encounter with the knife we are using to cut the vegetables or with the mobile phone we use to check our emails. And it can be almost invisible, like when we are walking along a street and encounter a lamppost: We won't notice it actively (even though after reading this, you might) and we will still not run into it, because it is somewhere at the edge of what we perceive - our life-world.

Essentially, the encounter consists of the user and an object. Hereby, the object becomes an object by entering the user's life-world. User and object enter a relationship in the moment of encounter. This can be a relationship of use, but it can also be a relationship that is much less active. For instance, when I am using my mobile phone, I am always in a state of encountering the charger. My mind is not focused on it, but somewhere in my mind I know that if the battery runs out, I will be able to charge it. So an encounter must not be misunderstood as something necessarily active and momentarily. It can also be passive and continuous or anything else between these two points. Talking about an encounter means to take a completely agnostic stance towards users and the artefacts around them: to not focus from the beginning on artefacts that appear in some way particularly meaningful or otherwise important, but instead consider that also less prominent things can affect a user's everyday life.

## Lines

So when just the interplay between two actors (the user and an artefact) becomes as complex as I have described earlier, we get to a complete different level of complexity when several actors are involved.

Vignette 1 is taken from the IoT project of (VI) and takes place in a family home in Malmö (a single mom with her three kids). It describes an ordinary situation. The kids are growing up and space is no longer defined just by their parents. They are seeking to create their own space, having different strategies and motivations. In this disruption space and social interaction play an important part. On closer examination, artefacts involved in both, space and in-

At the moment the youngest son stays with her in her bedroom, where he has a bunk bed and a corner below the bed with his desk and toys. The oldest brother and their sister are living upstairs and have both a room to themselves. The upper floor seems to be the kid's zone and while the girl keeps her room private and people have to knock to seek entrance, the older brother's room has become the gathering point for all the children. Very often they come in and start playing with his game console, watch TV or just "hang out". Things are changing: the younger brother is growing up and now the two brothers have "done some planning", as the mother says, to move the younger boy up to share a room with the eldest son. And it becomes very visible that the mother is not quite happy with the plan. First, she feels that the little one is "not quite ready yet" to not live with her anymore. Second, she argues that there is "just so much work involved with all the planning and moving" and time is a scarce commodity in this family.

The mother tells me later she is also afraid the sister might feel excluded. Furthermore, she herself feels a bit excluded, when her kids

#### *Vignette 1*

teraction, are crucial actors in this complex assemblage. For instance, furniture becomes an important issue. The bunk bed would be too high for the upstairs room, so a new bed would have to be bought and the whole layout of the upstairs room would change. There might be no room any longer for the cheap sofa the oldest son had bought to sit on when playing games or watching TV. And after all, even though the brothers' room being a shared space, it has clearly the eldest' stamp on it. A leading role falls to the game console setting that is the centre of the brother's room, the hub around which the kids are gathering. What happens if the layout of the room changes: maybe the sofa that is a shared space has to be removed, whereby the social dynamic might change completely. None of this is in any way dramatic; the members of the family are living their lives and with all the small changes, as they are part of everyday, so does their shared domestic space transform. For an outsider who only gains a quick look into this family's life, this might seem too trivial. Or

maybe, if the outsider gets the chance to observe this family for a longer period, things might seem confusing and disorderly. A home is full of material elements, social actors and values and dispositions they bring into it.

These kinds of entangled social situations have been a challenge for social sciences, especially for those that, in a postmodern tradition, are not working with a pre-defined structure but take a more constructivist stance. Actor-Network Theory (ANT), for instance, seeks to resolve the complexity by identifying different actors and actants and analysing the agency of social actors and material actors. Latour (2000) has even provided several striking examples of everyday artefacts (e.g., the Berlin key) that are Actor-Networks in themselves. Similarly, Delanda (2006) has developed the concept of assemblages that exist on all levels of society, where components rather than actors play into a given assemblage through their material expression as well as in the way they stabilise or de-stabilise it (Delanda calls it territorialisation).

Both concepts deal with the complexity of any given system or institution by challenging different paradigms: ANT is working on overcoming a human-centred paradigm and focusing on the agency of all elements of an Actor-Network. Delanda is focusing on going beyond a macro and micro dichotomy and instead align both perspectives: assemblage components can become part of other assemblages and carry their identity into higher assemblages.

Yet, both of these concepts deal with a momentary situation. They can always just show the network or assemblage as it is and identify the agency as it has been to this given point. While overcoming the subject-object divide, they must struggle with examining the way that humans set themselves into relationships with the material actors.

Ingold (2007a) makes a clear separation between materiality and humans. He even goes as far as dismissing the theoretical discussion about materiality for being too distant from the actual material of the world. As a counterpoint to ANT's reduced view of human actors, he calls his framework SPIDER, which stands for "Skilled Practice Involves Developmentally Embodied Responsiveness". With this acronym he wants to emphasise the role of skill and the continual flow of what he calls "lines of becoming" (Ingold, 2012, p. 437). He argues, "life itself undergoes continual generation in currents of materials." (Ingold, 2007b, p. 31) For Ingold, materials and human lives are entangled in the actual world. He accounts for the fluid and transformative character of life by describing it in terms of lines that are drawn throughout our everyday. Ingold reasons that being is not just standing still but involves embarking on a journey that follows a line (or many different lines) (Ingold, 2007a). He calls these lines meshwork that he sets in direct contrast to the idea of a network. Ingold calls the depiction of this meshwork as a network, an inversion. It means to reduce the lines of the meshwork to those points that mark their intersections. But Ingold seeks to reverse the inversion. Life, he argues, is not a network in a set environment. It is bundles of lines, entangled and interwoven, moving through a fluid space.

Going back to the family in Vignette 1 with Ingold's perspective in mind, we can see the different lines and how they are interwoven in the mesh work of family life. We see how each of the children and their mother move along a path. The paths are often running congruently but often they are diverging, taking detours, intersecting with other lines. Swept up in all of this are the materials that are entangled with these lines. A shared piece of furniture, device or keepsake will undergo many transformations, its meaning for the family will change constantly, while the bundle of lines that is the family will flow around them. In his analogy, Ingold describes the meshwork as a spider web that will react as a whole each time something gets caught in one of the net's threads (Ingold, 2008). Through the lens of Ingold's meshwork, the family member's life is fluid and moving through space and time, entangled with the people and the material actors around them.

## Meaning

As we see the lines moving, we see what is often described as meaning: We can observe the ways people experience and handle the things around them. Meaning is perhaps the most difficult to define. Yet, it is a term that is inflationary applied in inquiring everyday things. Thus, a more distinct definition is necessary to understand what we want to express when we use the term meaning. After all, it describes the core of a relationship between user and object. The 'meaning' of the chair is about how users will sit on it, how they will decide to place it, store it, and move it around. It is about how even a simple object like a chair can have a wide range of form specifics that will affect how the user will interact and experience the chair.

At this point, it becomes apparent that meaning does not work as a static concept. It works because it changes; because it is fluid. It is the way a thing, a material is entangled with the meshwork that Ingold describes.

So too often when we use the term 'meaning' to describe what a thing is, it becomes a placeholder for something that is in reality constantly transforming. So wouldn't it be better to talk about the essence of a thing? With the essence being embedded in the thing itself, people experience it in the moment of the encounter: one of the many points when the lines of an individual's life cross pass with an artefact. This means we have two terms, meaning and essence, which might seem almost synonymous and yet they describe something different. Therefore, in the next chapter I seek to consolidate the fluid meaning of things with the essence of the encounter.





[transformations]

## 5. How will things become?

After having laid out the basic theoretical underpinnings for a phenomenological view of human-thing relationships, the next step is to look closer into what is actually going on in that complex ecology of everyday things. Because, maybe not surprisingly, these ecologies are far away from being static, as we might experience every day: Most obviously, things decay, break, become redundant, get discarded. We buy new things all the time that might change the function of other things. This phenomenon has been the subject of study in HCI and several studies and design explorations are examining the particular meaning of wear and tear of everyday things (Giaccardi et al., 2014) others. All things have a history to them that is deeply entangled in people's lives, i.e. their lines do not have a straight trajectory but instead are winding and bending around materials. It becomes clear that an artefact that we observe at a given moment has not always been perceived and handled in the way it is now, and most likely will keep transforming throughout its lifespan. This means that things are often designed based on what has been observed in a singular moment (based on what Ingold would call an *inversion*). At the same time, this means that anything designed will not remain in its original state. Hence, in this chapter I want to shift the focus from how materials, things and human actors *are* in a given moment, towards the trajectory of their lines: How will things *become*?

Paper (I) and (II) in particular are dealing with the fluidity of things, mainly by tracing certain artefacts along their path through an individual or family's life. Examples brought forward in these studies range from simple USB sticks to smart phones and tablet computers. While these artefacts might differ at first glance in terms of complexity, it becomes apparent that the diverse paths they take are not much related to the range of functions they provide. Rather, a bundle of different factors affects how these artefacts change.

Based on findings from the studies contained in this thesis, this chapter describes how artefacts change in various ways throughout time. But more importantly, the chapter seeks to extend on what is often called the meaning of artefacts and consolidate the term with my exploration of the essence of things. The main objective of this chapter is to illuminate how we can grasp the fluidity of everyday life and at the same time understand the trajectory of things through the encounter.

## Things are transforming

The most obvious transformation we see in things is that of changed functionality. When something breaks, it loses its function and becomes either trash or something that needs to be repaired. When moving an armchair from the living room into the nursery, it changes from a relaxation or TV-watching thing into a breastfeeding or reading-stories thing. Many things change their function without people reflecting on the change and often they are made aware of the fact that it happened in the process of the interview.

In HCI and design disciplines the use of a thing and the efficiency with which it fulfils this use has for a long time been the main measurement of things. McCarthy and Wright (2004) show that things - physical or virtual - are not merely used and experienced according to their function but that many other factors are at play as well. The authors show how multi-layered the experience of computing can be. Similarly, Verbeek (2005) has looked into the value of a designed artefact as a multidimensional property that cannot be reduced to its pure use-value.

This is clearly shown in paper (I) in which I - as an analytical instrument - open up two dimensions of what I call meaning<sup>1</sup>: The functional use of an artefact as the first dimension and the way the artefact is connected to a person's personal values and dispositions as the second dimension. I argue that in using these two dimensions it becomes possible to map a person's relationship to an artefact in comparison with other artefacts they own. Meaning as a term is often used to describe the personal level or dimension (that what is anchored in an individual's personality). As I have shown previously, in HCI, when something is examined not just in terms of usefulness but also on a more emotional level, it is referred to as looking at the 'meaning'. Correspondingly, 'meaningfulness' has often become an important feature of a design.

Sometimes artefacts or designs are evaluated in terms of particular values that they are connected to (B. Brown et al., 2007; Kirk & Sellen, 2010; Sellen, Rogers, Harper, & Rodden, 2009). Value-centred design (Cockton, 2004) points towards integrating human values into a design, and in this formulation we can recognise again the idea of an essence that is exceeding the notion of function. However, while there are certain values that are from time to time highlighted as almost universal - if not for all human beings so at least for western societies - it becomes difficult to relate those to mundane everyday practises. For instance, while it seems to make sense to discuss a family's life

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<sup>1</sup> In the paper itself I am talking about *value* instead of *meaning* because it is mainly built on Verbeek's (2005) analysis of things who uses the same term. However, in this thesis I reserve the term '*value*' for human values, i.e. attitudes and beliefs that belong to an individual or a group of individual's value system. This is done in order to avoid confusion.

in the car in terms of values such as sustainability or freedom, it becomes difficult to recognise those concrete parameters in what we can observe in the car on a daily basis. And while a family might express certain values - as we have shown in paper (II) - looking into the encounter gives an account of how these values might come into play when actually using an artefact.

Another issue is that when looking into values we run the risk of returning to a static concept of everyday life that centres on the human actor and his or her specific values. This is often reflected in the use of the term 'identity' to describe the particular values and characteristics someone lives by and identifies with.

This kind of thinking will necessarily impact on the way scholars view the role of artefacts and their design: If we understand the human actor in the human-artefact relationship as static, a bigger role will naturally be attributed to the characteristics of the artefacts and their functionality. Alternatively, from a design perspective, if we can assume the user were always the same, we can - if we just have studied him or her enough - design an artefact that will fit to this identity. Unfortunately, it does not work quite like this. In my articles I highlight a variety of situations in which a design is far from being used as intended, or in which the adoption of a certain technology does not go quite as smooth as planned. Therefore, I take a look at the very moment of encounter to understand when and how things transform.

## Dissecting an encounter

Vignette 2 is referring to an encounter (or rather a set of encounters) that a family has with a particular device. We see that the first encounter already has given a certain meaning to the device (it is associated with the journey). In paper (II) my argument is directly derived from Bourdieu's understanding of practise: Every practise is in some way structured or affected by the habitus of the person that is acting. For Bourdieu, an individual's set of dispositions is deeply involved with everyday interactions. But much more importantly, instead of seeing the individual 'habitus' as a set identity, the habitus itself is affected by the practise: it is described as something fluid and constantly changing. This is nicely exemplified in vignette 2: The members of the family here have a certain concept of what a journey is-- it is part of their habitus. Maybe they also have a certain mind-set about technology; maybe their kids have a certain idea about games. So, all this plays a role when they are taking the plane and are encountering the crossword solver for the first time. Now the device itself, its specific properties, the way it was found, the way it was used all leaves a trace in the habitus of the members of the family. This might be a tiny trace, and yet, it affects how the device is perceived later on.

This example also shows that for the analysis of the transformations of artefacts, we have to look into the context in which encounters happen, such as

the plane journey or the car, as well as what appears to be the meaning it has in that moment to the human actor. While the artefact brings certain materiality into this (e.g., form or function) the human actor is equipped with a certain set of values and dispositions that will in turn affect the use of the artefact.

What I am outlining here seems to be an almost impossible endeavour. Different people differ in the way they are encountering an artefact but the encounter also changes the people all the time. This means we are faced with the impossible task to identify an endless amount of different meanings. On the other hand, retreating to any kind of sorting or classification would mean to generalise the human-artefact relationship again to a static construct. So, the question that in some way remains is as follows: Where to start with this inquiry? The answer lies again within what defines the phenomenological approach: The goal is not to understand different specifications of an assumed given system; what we seek to understand is the essence of the system; in this case the relationship between the family and the crossword puzzle.



*Interviewer:* This crossword puzzle seems to be popular with your family car journeys?

*Mother:* Yeah, S is usually the one to initiate the use of this device, but it can involve all members of the car. It has become “his” now after we found it by chance on a long haul flight many years ago. Now it always comes along with us on our family car journeys - in fact - I think it’s in the car now. It’s kept in the backseat and is particularly popular on our long journeys.

Vignette 2

## What is affecting meaning?

In paper (II) we describe the relationship that is formed between a human and an object as meaning. In every encounter this meaning transforms to some extent. This can be dirt accumulating on my laptop keyboard, the wear and tear of my clothes, but can also refer to the different ways that people around me react to whatever and however I am using something. Encounters will transform a stylish new shirt into an old and boring leftover worn for painting or on laundry day. On the other hand, a boring pen or USB stick can turn into a keepsake or lucky charm.

In paper (II) we show in detail what effects these changes. Obviously, the particular space of the car has a strong effect on not only how something is used but also the meaning it will get over time. We see that what affects meaning is dependent on the properties of the artefact, the practises and the context in which it is used. In the daily encounters within the car all of these factors will come to affect the artefact.

First, I want to revisit the concrete factors that will affect encounters as already outlined in paper (II).

Initially, we have the properties of the thing itself. The artefact offers a certain functionality, which will directly affect its meaning. A chair is first and foremost something to sit on; a TV serves the functions of watching movies received via an antenna cable or in connection with a computer. But part of this is also its material qualities, such as the actual shape, the fabric it is made of way and how it feels. In the car we have seen that the battery life of electronic devices played a major role in its meaning as part of the car.

The second factor is the space an artefact is used in and the way it will fit into this space. This shows clearly in the case of the car where families are dealing with a restrictive spatial setting that will affect how artefacts can and will be used. The matter of space has also been discussed in paper (IV) when it comes to the spatial qualities of different computational devices in the home. Here, we see that different artefacts play different roles regarding their spatial meaning in the house. We have shown instances in which the cell phone is regarded as an artefact spatially more bound to a specific user (its owner), whereas a tablet computer might be seen as part of the home or even as part of a specific room or living space. On an even wider scale, paper (III) shows that in the world of taxi and Uber drivers, the geography of cities and the way this is represented in a device mounted to the dashboard plays a crucial role in everyday work practises. These examples not only show that space can affect the meaning of an artefact in diverse ways but also illustrate that the bare functional properties of a thing - say its mobility - do not directly translate into the way it is perceived. The fact that a device can be carried around does not necessarily mean it will be.

The use of a device is not happening in isolation from other artefacts. Even in those situations in which users are on their own, social norms and rules will

have an effect. All six papers of this thesis show how social actors, be they physically or virtually present, have an effect on the meaning of things. In the family context many artefacts are shared and others are individual property, which leads to interesting insights into the importance of ownership in the overall ecology of things (as shown in V). In paper (IV) an important aspect of the experience of connectedness, the main object of inquiry in the paper, is the connection to family and loved ones but also the maintenance of the own family home as a space with shared values. In paper (III) the taxi (the car) presents itself as a space in which sociality, i.e. the relationship between driver and passenger, plays a central role (something that shows particularly in the rating system that is an important feature of Uber's service).

What these examples have in common is that it is never just one factor at play at any specific encounter. In any given situation it is a whole bundle of factors that are, in their sum, contributing to the meaning of the thing. And very often it is hard to isolate the effects of the different factors from each other. HCI researchers need to be aware of the risk of identifying the wrong factor as responsible for a certain use.

## From essence to meaning and back

As difficult as it is to already untangle those factors that cumulate to what the meaning of an artefact is, in paper (II) we identified a fourth factor adding another layer to how a thing is perceived and used. After identifying the first more obvious factors, we determined that artefacts in the car are often also seen in their car-ness or journey-ness. Certain artefacts were perceived as being associated with the car journey, something that belonged just there. This car-ness would play an important role to the extent that some artefacts might have been regarded as useless in any other settings, but were attractive during the car journey.

It is at this point that I want to untangle the terms used throughout this thesis. In chapter 4 the concept of encountered is defined as the point in which a human meets an artefact as part of everyday interaction. All the encounters form what Heidegger would have called "being-there". Here, however, I am using the term lines, derived from Ingold, because it better reflects the very fluid life-world in which various lines are entangled in a meshwork.

While this definition describes the being of human actors, I have not yet developed a refined understanding of what an artefact is. In lieu of that, I have been using the term 'meaning' in order to describe the relationship between artefact and human and the term 'essence' in reference to the phenomenological inquiry. Both terms in some way describe the same thing: The way human actors experience or feel about an artefact. By using two terms, I want to show that there are two crucially distinctive perspectives in looking into this inquiry.

As indicated earlier, *meaning* is very much rooted in a person's individual habitus. Meaning unfolds as the conditioned being enters the material world. Hence, meaning implies a fundamentally subjective perspective. When we say something has a certain meaning or something is particularly meaningful, we can only say this in relationship to a particular moment, in a particular context and at a particular time. As Heidegger showed in his example of the jug, essence describes something beyond an individual's experience of a thing. Heidegger's essence is much more within the thing itself and what it was made for. Yet, we must not misunderstand essence as a rigid thing. Essence changes, i.e. the idea behind a thing is always dependent on the cultural and social world it is in.

In distinguishing between essence and meaning the intention is not to force both into a deterministic relationship. Nor do I want to argue for one or the other in that one does not exclude the other. On the contrary, I want to show that both perspectives show a particular part of what makes everyday life. For instance, we can understand the postcards in Vignette 3 in their meaning. We can trace their relationship to the members of the family; we can see them in their meaning for the mother. However, we also have to acknowledge that any particular meaning we observe is very fragile and temporary, i.e. with every encounter it changes. Designing with a particular meaning in mind would mean to design for a specific point in time and place. Meaning helps us to understand the lines, where they bundle and where they intersect with materials in this particular family.





The mother of family D shows me greeting cards that are arranged all over the living room, but in particular over the fireplace. The living room is a very representative place that is seldom used and the greeting cards have a decorative character. They are sent by families from the couple's respective home countries on special occasions, such as Valentine's Day or birthdays. She explains to me that arranging these cards is very important to her and that she wishes that her children also value cards like these in the future instead of only focusing on the digital.

### Vignette 3

Essence, in contrast, is much more rooted in the social and cultural world. We are not always aware of the essence of a thing, often because it seems just so obvious: If a person from a western culture sees a chair, he sees it in its chair-ness, i.e. as a device that is most obviously used to sit on. Someone usually sitting on the floor might be using the chair to eat from or to place his laptop on. For him, the chair-ness is not as obvious. When exemplified in this intercultural contrast, the essence of a thing seems to be a cultural matter; indeed, what a thing is, is obviously dependent on the cultural socialisation of a person. But we have to be careful not to confuse this cultural aspect of essence with a matter of national, intercultural differences. This would imply a very deterministic understanding of essence that I want to avoid. Just like meaning, however, essence is fluid and multidimensional. It can emerge at a very low level: For the social group of the family that I have described earlier (Vignette 2), the crossword solver has gained a new essence; it has become a *car-thing*. Most likely this perception is not shared with many other families. Essence emerges out of the ongoing negotiations of a certain group, a certain culture and a certain species about the idea of an artefact. Identifying the essence of a thing implies catching a glimpse of how it is and might become in a certain context. Yet, essence, like meaning, is constantly changing.

In particular, when new and somewhat different artefacts enter everyday lives, their essence develops through a social process that manifests with each encounter. This will be a process that is underlying negotiations in the social world. After all, we experience the essence of things as socialised beings. This applies not in the least to computational technology. With each technological innovation entering society, and thus our life-world, we can observe a process of negotiation about the essence of this new thing. If we take a concept like the Internet of Things we notice such an ongoing negotiation. People have different understandings of the idea – the *essence* - of computing, as we can see it, for example, in many public debates about the advantages and disadvantages of devices and applications. Now we have entered a technological stage in which computational technology is merging together with those ordinary things. Things that that used to have an already quite established essence (flower pots, light bulbs, chairs) become somewhat disrupted. Further, it might not be enough to just concentrate on technological advantages and the new possibilities of use. Instead, we might have to ask for new essences: If I connect a light bulb to the Internet, is it still a light bulb or has it become a computer or has it become something entirely different?

[technology encounters]

## 6. What is a computer?

I have described how individuals live their everyday life along curvy, entangled lines that are interwoven in what Ingold calls a meshwork, and how new artefacts have to fit into the web of practises that are already there. Furthermore, I have shown how this is in a constant state of motion and how the role of the artefacts in everyday life changes over time in functionality and in relationship to the user's personal dispositions and values. I have mapped out in detail the relationship between users and artefacts and sketched an image of artefacts in everyday life. In this chapter I will narrow down the focus on those artefacts that have some sort of computational properties or are in some way associated in that way by their users. To develop the argument, I will differentiate between *computational* and *non-computational* artefacts, where the former describes artefacts that are equipped with digital data processing elements. However, it should be kept in mind that this kind of dichotomy might not always apply in that the boundary between the two becomes increasingly ambiguous.

The studies in this thesis were all dealing in some way or other with practises around computational devices but at the same time considering the role of non-computational artefacts. Therefore, it is possible to compare and identify differences in encountering computational artefacts, an analysis that has been conducted in different ways throughout my work. In the following I will present differences both in use as well as in perception of computational and non-computational artefacts.

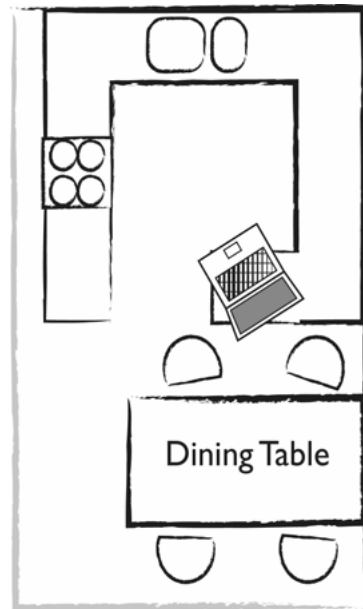
To begin, I would like to turn to study III that differs most from the other studies with respect to both, domain and focus. While the majority of the studies in this thesis have dealt with the private domain, aiming to analyse practises on a more theoretical level in a macro perspective, our study of drivers and passengers of taxi services took a different approach. While also focusing mainly on practises, we narrowed the focus to those that were part of the driver's everyday work life. This analysis was lifted then from the interpersonal level to a more societal discussion of labour conditions on what is generally called the sharing or on-demand economy (Lampinen, Bellotti, Monroy-Hernández, Cheshire, & Samuel, 2015).

But while at first seemingly different from the other studies, its approach clarifies the important link between ordinary encounters and those issues that are discussed on a societal level. At the same time, it illustrates how encounters affected by the use of computing technology are transforming society

(which, in turn, will most likely transform encounters again). In paper (III) we illustrate to which extent a new service that has been facilitated by ICT affects a whole industry such that it changes people's work life and affects national policies. We also show how these changes are due to the functionality the app provides. It would be wrong, however, to just reduce the described changes and the massive debate around the new technology just to functional changes. As we show in the paper, the everyday work life of Uber drivers consists of a wide range of interactions around the app and around the service they provide. These day-to-day encounters form the entangled lines of their everyday and are in the end - when we combine all these lines - what Uber consists of. Hence, I argue that any discussion about a change that a particular technology is effecting cannot leave these encounters out of the equation. Here, focusing on the encounter means to pay attention to a human-artefact relationship that affects a whole industry.

On the kitchen counter sits a laptop. It turns out it is the mother's laptop and she constantly uses it just at that spot, as she tells me. She normally uses it for recipes but it is also the main device she uses for skyping with her family back in Columbia. She tells me that when she is doing everyday things while talking to her family, she almost feels like she is with them back in Columbia.

The family also has a tablet but it is not used for calling the family. The mother explains that if she uses her laptop, she has more control over the conversation, whereas with the tablet her two pre-school kids might take it away or start messing around with the device. In contrary to that they wouldn't know, how to handle the laptop.



Vignette 4

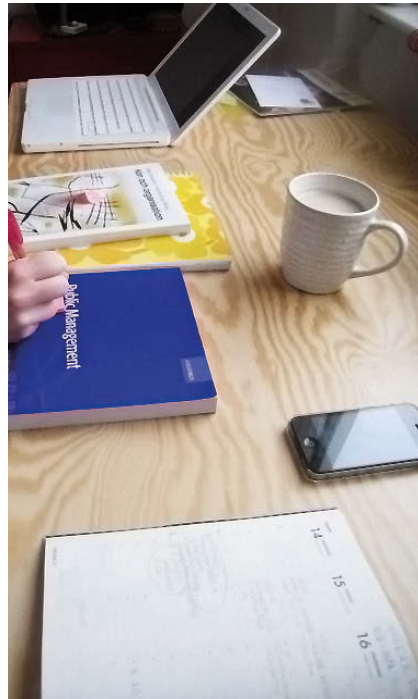
## Technology encounter

In the previous chapter I established a particular perspective that starts with a single encounter. Now, I want to return to this initial idea and look into some of the many technology encounters that I observed during my studies. In Vignette 4 we meet a woman who is doing a lot of things with her laptop in the kitchen. Throughout the visit, it becomes clear that the kitchen is a very central part of her home. When I come to visit the family, she is standing there with two friends, enjoying a coffee. Later, she tells me that the layout of the kitchen is constantly bothering her. In her home country a kitchen would always be separate and not integrated into the living room. And throughout the day she keeps going back to the kitchen: she is somewhat drawn to it, it is her centre of interaction. When she moved into the house, she might not have been quite happy with her first encounter with the kitchen but she started adapting the kitchen and adapting herself to its spatial properties with every encounter. For her, her laptop is part of the kitchen. I do not know if the laptop has been part of the space from the very beginning, but now its material 'flux' is interwoven with the space. The kitchen is inscribed into its meaning, which means that it is part of the woman's lines that pass through kitchen practises. Although this might be also true for the cutting knife of the coffee machine, there seems a bit more to the meaning of the laptop because it is such a vital part of her everyday practises. There is the connection to the home country that becomes possible through the device. For her, the laptop is the device that is associated with connecting to her family at home, not just through calls but also to create a presence in her everyday life. And there is so much more: Photos of her kids on the desktop, the music stored on the device and simply the way the device is her property. Multiple encounters with the device have shaped a complex meaning that can slowly be pieced together by looking at the variety of encounters.

Throughout my studies, this observation repeatedly emerged: Computational artefacts become part of many encounters. The way devices bundle a wide range of practises has an effect on the meaning of the artefacts. In the different moments of encounters the meaning that emerges is heterogeneous and I could observe a relationship between the user and device that was much more complex than with most non-computational artefacts. This particular user-technology relationship that emerges here has its roots in the functionality of the device. However, through repeated encounters, it affects the perception of the device in a way that goes beyond functionality.

In paper (I) have sketched a somewhat simplified version of this idea: I describe what I call 'digital hubs'. The term builds on the observation that the study's younger informants interact with certain devices (their laptops and smartphones) to a very high extent. But beyond the multi-functionality, the devices are very much connected to what I described as *habitus*. As illustrated by Vignette 5, the devices played such a vital role in so many emotional and

Kirstin carries around with her four things: Her iPhone, her calendar, her pencil and a rubber. These things were always around her. If she was working she would lay them down on a table in front of her, they were there during the lectures and when she had lunch. Her iPhone is very new and she is very excited about it, as it is her first smartphone. At the same time, I am surprised how much she is already doing with it. Throughout the day she talks with her sister and her long-distance boyfriend, she arranges meetings with her classmates, she checks the location of a course and if they had homework to do. She says that even though she only has it since a few weeks, she cannot imagine what she ever did without it.



Vignette 5

personal areas of everyday life; the devices themselves became emotionally loaded. In the example, Kristin's relationship to her iPhone is shaped by many things: Its novelty, its importance for meeting her best friends, calling to her sister and its role in planning her studies. Her iPhone bundles all these areas, all these lines, of her life. All of this is what forms the very personal *meaning* of a particular device in relationship to Kristin. At the same time, this personal meaning will, over time, through social and cultural practises, and within a particular group, affect what I have described as *essence*.

One might argue that the multi-functionality of computers is surely not a new observation and that of course the device will be largely used if it offers all these different applications. But I want to argue that the function - that what is actually done - is secondary. If we focus instead on what the computer *is*, in its *essence*, we discover how these artefacts affect the life of people. The role of digital artefacts as digital hubs allows for a relationship to a thing that is not just rooted in its affordance of tasks or its virtual interface. It stems from its latent complex essence that is built through countless encounters.

However, assuming that all computing devices automatically carry this quasi-magical capability would mean that the device is determining the relationship to its user. This techno-centric view can be highly dangerous because

it contradicts a phenomenological inquiry. By definition, essence is what a thing is - or as Heidegger calls it - how it is *revealing itself* towards a human. Hence, essence can only describe what a thing is in relationship to a group of humans. Just as the meaning of any given object always involves a human, we must think of a thing's essence always as part of the life-world.

I have described how these devices can become essential hubs for individual social actors. I want to further clarify and elaborate on this point by revisiting those observations from paper V that led me to the analysis of the tablet computer as a 'family canvas'.

In the previous example I have described the essence of a device in terms of its meaning for a primary user. By looking at the very concrete example of the tablet computer, I want to show how essence is affected by other factors such as space, materiality and social factors. Therefore, in paper (V) I focus on one particular device in comparison with other devices.

Throughout the paper, I have shown how the tablet is much more a family device than the mobile phone or the home computer (Glöss, McMillan, et al., 2016). In the following I present two examples in which it becomes apparent how much this shapes and is shaped by space, social relationships and the materiality of the different devices in the home. As illustrated in Vignette 6, over time the family's tablet has mainly become the son's device, but of course this is carefully controlled by the parents. During the day, the machine gravitates around the son, but during the evening it becomes the parents' device. Unlike the father's cell phone or the mother's laptop, it is not assigned to a specific person and it does not leave the house. At the same time, the tablet is very much the center of the family's interaction, which I observed while

In the beginning of the interview the son is in his room while we are talking at the kitchen table. At one point, I ask about the technology they are using and the father tells me about the tablet. He says that it is the parents' device but usually the son uses it. "It always ends up in his room. I am sure it is there right now".

He goes into his son's room and gets the tablet to show me. He thinks that it is very nice that they can have different profiles and that even the young kid has his own child-friendly profile. That way he can access content they don't have to be worried about. The mother underlines how much that helps her when she has other stuff to do.

On the other hand, the father is also worried. Once they caught the son watching Simpsons episodes. Even though he is only 3 years old, the father is sure that the son knew he wasn't allowed to watch the show and was hiding it from them.

Vignette 6





In the kitchen I can see an iPad placed next to a calendar, a wallet and her keys. I ask her to describe how all of this stuff got there. She tells me that this is usually what she carries around. She uses the paper calendar mostly but does check dates with her iPad. It ended up in the kitchen because she was also checking some recipes. At the same time, she must have just placed the keys and wallet there when she got home.

[...]

Her kids and husband are using the tablet as well, even though it is 'officially' hers and was given to her as a gift. She has made a folder for each kid and often they would just come and grab the device from the kitchen. She really likes to watch all her photos with it instead of with the desktop computer. She points out a particular delightful picture of her kids that she has recently set as the background image.

#### Vignette 7

spending time with them. Although the son is only three years old it becomes an important pivot point between son and parents. It combines the lines of their individual lives. Yet, because each family member's line is different, how every family member perceives the device differs in some aspects: The mother is thankful that the device gives her a bit of peace while her son is watching videos; the father is worried that his son spends too much time with it though he is happy that his son knows how to operate the technology (he himself works as a programmer); and both parents like the fact that they can show their child movies and shows from their home countries. This shows that the device has a particular meaning to everyone. At the same time, the parents share a more abstract idea of what the device is – its *essence*.

In Vignette 7 the tablet gravitates much more towards the mother. It is in some sense her device and yet, like her cell phone, it does not leave the house. It is always somewhere around the kitchen table and the children and father have access to it most of the time. Again, the tablet has a different meaning for each family member.

In both examples what is shown to us in the moment of observation is the painting on a canvas in the making. The device becomes an initially empty canvas, which unites the different family members' experience of the device. The relationship between the tablet and each family member – the meaning – then becomes part of the family tablet's essence. For the family, the tablet is malleable and accessible to each of them and it collects traces of various encounters. In its essence the tablet has a particular degree of mobility and spaces it gravitates to. And in its essence it is a family device.

In paper (VI) I have not only shown which factors affect an encounter and thus the meaning of a thing but I have also shown how the essence of a thing becomes important for an overall understanding of computing things. Computers are not just computers: their form, their spatial properties and the way they allow for different forms of interaction all contribute to their essence-- to the idea that people have of a computer. And the essence of computers is changing continuously. During the past century, computers have not just changed in their appearance (smaller, slimmer, lighter) or the domains they are used in. Computers have also changed regarding the idea that people have of them, and consequently, in popular discourse. A younger and much more recent example is the tablet computer. For a long time, tablet computers were considered mobile devices. While functionally that might be true, in the case of the family tablet the device becomes more of a mobile-stationary hybrid. It is used for many tasks that a computer could be used for as well, such as browsing, managing photos or receiving emails. Yet, in its essence it is often not perceived as a computer.

I am emphasising essence and the way essence is versatile because I want to diverge from the idea of the functions or affordances of a device. In this way I want to stimulate another way of thinking about designing computing artefacts. When designing for meaningful interaction, often the device is seen as a means to an end, as a carrier of a function that makes something else meaningful. The computer is not just a vessel but has – within the group it is designed for – an essence of its own. The essence does not necessarily change when a designer decides to change function and functionality. It can also transform when we read about it in the news (e.g., about Uber), when we encounter it in different, maybe unexpected ways (when all of a sudden our four-year old child knows how to use it) or when we can adapt it to our own identity.

As a last example, I will illustrate this in relation to Uber drivers and the phone mounted to their dashboard. This set-up nicely exemplifies how materiality, spatiality and sociality affect the essence of the app and the service for

drivers, passengers and even within society. In the everyday encounter between driver and app we can observe that the traditional employer-employee relationship is transformed. It is almost as if the app and the phone on the dashboard have taken the employer's role. Of course, drivers are aware that they are not working for the actual app; nonetheless, the way they are connected to their employer on a daily app, is solely through the app.

Furthermore, the app plays a major role in mediating the relationship between driver and passenger. It is initiating the first contact, giving information about driver and car and allows both the driver and customer to rate each other. The app becomes a hub for social interaction and affects an even wider range of things, including the water bottle the driver might provide in hopes of improving his rating or the phone the customer might use to check whether the driver is on track. All these artefacts become mediated, related to each other, through the practises that are bundled within the app. When the Uber driver encounters the app, are we observing an interaction between employer and employee? Is the app regarded as a surveillance tool? What role do the different functions play, such as the GPS navigation or the cashless payment? These are important questions to ask because through the relationship between driver and app emerges an idea, an essence, of Uber. With the essence diffusing into and transforming within different public discourses, it can affect work life, labour conditions and even labour policies. Thus, understanding where essence comes from and how it affects the use of an artefact can have much wider consequences than the level of personal interaction.

I have described essence as different ideas or connotations with a device, which are emerging out of everyday encounters. Hence, I have used a very techno-centric approach in describing computational artefacts. Yet, for a Heideggerian analysis, this approach cannot hold. After all, this would mean describing a particular context as taken for granted. Therefore, I want to question the very basic idea that has been one of the foundations for this chapter.

## The essence of computing devices

In the paragraph above I have described how the material and functional properties change the meaning of computing devices. This is happening because computing devices do not just add another function; instead, they transform the overall meshwork of everyday life. Yet, this part of the analysis focuses heavily on individual meaning and how it becomes part of the essence of a device. In the next step I want to change the focus to how essence plays into encounters: how an idea of a thing actually affects the use of it. Essence is much more abstract than the associated use and the more abstract essence is, the harder it becomes to recognise its effects on the actual interaction. This becomes particularly relevant when we look at the essence of computing.

When we see a chair, we see it as a piece of furniture and, as we know, a piece of furniture has an already established essence. It is an object to sit on (and not to eat from). If it were to stand in our apartment, we might want it to reflect our taste or we might think about how to stack it in case we want to make room. All these thoughts are legitimate when thinking about a chair. In contrast, we would not see the chair as a table, a piece of jewellery or a toy. The chair seems relatively 'stable' in its essence. The idea of the chair is widespread throughout many civilisations and therefore we might find little conflict in negotiating its essence.

This stability is not necessarily true for all things with regard to everyday use. Comparing the chair to the tablet, we might find much bigger differences in the way the device is perceived. In scholarly discourse it is often defined as a mobile device, just like mobile phones and smartphones. This might be correct when it comes to its materiality: The device is handy enough to be carried around and usually affords the necessary wireless connection to access data on the road. Yet, in paper (VI) I showed how its use could be quite different from that of a mobile phone (Glöss, McMillan, et al., 2016) Cite paper, which one. The essence of a smartphone seems to be strongly built on its predecessor, the mobile phone, which still resembles a landline phone. The tablet, however, does not claim to be a phone. And people might not agree about it being a computer either. Its technological capacities make it clearly a computational device, but the way it is shaped, the things that it is used for (and the things it is not) suggest another category of essence, which is something that we have not quite agreed on yet and something that does not fit into the traditional idea of stationary versus mobile computing.

We see that essence is more than just functionality and more than the words used to describe a device. Essence underlies constant negotiation and transformation throughout encounters. What is the essence of a phablet, a smart watch or a computerised home alarm system? With the development of new forms of computing, their role in the meshwork of everyday things has to be re-negotiated.

At this point in the analysis, it might be time to revise one of the initial questions. In the foregoing analysis I have discussed the nature of human entanglement with things. I have based my analysis on phenomenological and anthropological thinkers (e.g., Heidegger and Ingold) who have been dealing with such things as jugs, hammers and stones. I aim to show how we can get closer to an understanding of computing within their line of thinking. Yet, up to now, I have discussed the way, meanings and essence of different computing devices emerge and transform without referring to this exact part of their essence, namely the essence of being a *computer*.

This goes back to my initial question in how far a discipline such as HCI can exist if computers are merely part of the ordinary material world. It might

He enthusiastically shows me the complex arrangement of technology distributed over the ground floor of the house. In the center stands the entertainment area, combining a TV, different game consoles, DVD-player, different streaming devices and media players that allow them to access the server installed in the basement. Furthermore, he has several lights connected and can control them via an app. An alarm system is also connected to this network. Everything is controlled by his phone. He tells me that the set-up keeps him constantly busy, because of the continued search for 'hacks' or short cuts to connect different devices. Often he spends hours on the Internet in discussion forums, exploring new ways to configure devices. In a sense, this has somewhat become his hobby, he says.

#### Vignette 8

be argued that its studies of everyday computing overlap with fields of sociology, anthropology, political science or design. After all, the need for a field such as Human-Furniture Interaction would seem a bit peculiar. This question has already been partially answered when it was shown that the interaction with computing devices does something different to the meshwork of everyday life. I have shown how computational artefacts bring together a wide range of practises through their rich functionality and explained the very essence of computing through its role in the life-world. There are indicators, however, that the essence of computing (i.e. the way it is perceived in its very idea) goes beyond its actual functional and social role. Instead, the essence of computing is an important reason why we can observe differences in terms of appropriation and domestication of devices. It can to some extent explain why public discussions about Uber have become so heated and it has become difficult to align the negative descriptions of critical opinion pieces in different media with the very mundane observations we made in the everyday life of Uber drivers. Again, it is necessary to go back to the ordinary encounter.

In Vignette 8 we meet a man who is more than enthusiastic about computing technology, and in particular, about the 'Internet of Things'. Interestingly, of all the informants that participated in this study, he is the only one who guides us straight to the technology in his home. Informants like him stick out in the way they talk about computers and how they interact with them in front of us. In most other families, asking for the role or value of a computing device is often met with surprised reactions. Although the house is full of these things, they are not necessarily regarded as important and family members are surprised I would be interested in such a mundane thing. A first guess is that the man in our example uses these devices much more than those families that seldom or never mention technology. But the ubiquitous presence of all kinds of devices in every household we visited throughout the study suggests otherwise.

The mother of the family is a freelance garden planner. In the corner of the bedroom she has placed her home office in form of a desk, a desktop computer and a large amount of paperwork, partly distributed over the floor. This part of her job she really does not like. She tells me, that she dislikes spending lots of time with the computer instead of actually gardening. Yet, "somehow I have become the technology person in the house", she says, even though she does not see herself as good with technology or at least does not really care. But her husband, who is an artist, is even worse with these things.

*Vignette 9*

Another example, (vignette 9) illustrates a different way of perceiving computing. In this example family interaction with 'technology' is perceived as entering into a particular role, although unlike in the previous examples, the woman in this case is not particularly enthusiastic about it. Quite the contrary, for her, dealing with a broken stereo system or buying a new phone is much more of a burden. The last example (Vignette 10) presents a family that assigns particular value to the non-use of technology in a way that affects how they raise their children.

What these three examples have in common is that computing technology is not perceived as neutral. In terms of early Heidegger, we might formulate it as computing devices in their world are being always present-at-hand. But this

On the first visit to the family, the mother points out repeatedly how little technology they have in general. On this day the mother had to drop her older daughter off at playschool (10 min ride from their house) and then take the younger son to a Toddler Group (15 min ride away). P: I have to be quite quick doing all of this just for a 10-minute journey. ((While shutting the car boot))... ((She gets into the driver seat as the researcher gets into the front passenger seat)) ... See that player is by means the only technology part of the car and even that doesn't work. ((Pointing to an out dated tape player in the car console)) ... We just couldn't bother to get it fixed really-its just not a priority for us  
Later on she explains that entertainment for the kids was necessary since they are quite young. But instead of offering technological devices they would do something together, for example sing a song together.

*Vignette 10*

formulation does not hold up. Although in these examples computing technology is seen as a thing in itself, it still blends in with everyday life. What we see here, instead, is that the essence of computing is still deeply embedded into these devices. Although they are appropriated and seamlessly integrated into everyday practises - into the lines of the meshwork - they are always encountered as *computing* devices. In the first case of the computing enthusiast (vignette 8) technology has become a hobby, where the meaning of every piece of computing is influenced by this hobby. Similarly, the family that prefers not to use technology (vignette 10) does so because they perceive computing *as an essence in itself* – something that for them has a negative meaning.

Thinking of computing in terms of both *essence* and *meaning*, the heterogeneous perceptions of computer use might become more comprehensible. The computational properties of a device in itself are a big part of its essence. However, to a large extent this *computing essence* is what triggers certain opinions or attitudes that affect practises and ultimately the individual meaning between the user and device. Unlike a chair, a hammer or a pen, *computing* is not a neutral tool. The fact that something has computing technology in it, will alter the way a thing is perceived in everyday encounters.

Hereby, the essence of computing can show itself in very subtle ways, such as in the second example (vignette x) in which ‘technology’ becomes its own category of household chores. The *essence* of computing is culturally embedded into many societies. There is still something about computing technology that resides in the way it appears to people. Thus, adding computing functionality to any given thing will not change how people use the device: it will change the device’s essence. Engaged debates around issues of technology use can directly influence how computing is encountered in everyday practises and how individuals set themselves in relationship to computing. At the same time, the constantly changing practises around computing will also affect the same public discourse.

Thus it is important to recognise the difference between culturally or socially shaped ideas about the essence of computing and the very meaning that emerges as part of everyday interaction. I believe that the understanding of the essence of computing is an important part of HCI’s role as a discipline. But rather than through existing concepts and ideas, HCI should emphasise on the way, this essence is shaped through individual meaning-making in the rich meshwork of everyday life.

## 7. Discussion and conclusion

In this thesis I set out to explore *ordinary* computing. Thereby I was following two main aims: Initially, I wanted to scrutinize the relationship between human and artefact beyond individual meaning and towards a cultural embedded understanding of *essence*. Furthermore, my aim was, to examine the particular role of computational technology in everyday life and identify how it differs to non-computational things. For this purpose, I develop an analytical frame around three concepts: *Encounter*, *essence* and *meaning*.

In my writing I am using quite abstract descriptions for something that is in fact very tangible. Throughout our everyday we are entangled with the material world. And this entanglement is far from abstract; it is very real. I argue that it is important to reflect over this being-there from time to time; to take a step back, look around and become aware of all the things that we are encountering encounter in these instances. These *encounters* might not be special. It might be the 1000<sup>th</sup> time we sat down at this table, the 12<sup>th</sup> time we got annoyed by the many entangled cables behind the desk, and countless more times we heard the noise of an incoming email. The argument here is that, as much as we take these encounters for granted, they are still crucial in understanding how computing is integrated into everyday life.

One of the central questions of this thesis is whether and how computing technology is different from all the non-computational things that people are surrounded by – furniture, stationary, books and magazines and so forth. Of course, they differ in functionality. But with the ubiquity of computational technology in everyday life, can we see people's relationship to such technology changing? Therefore, a phenomenological inquiry is performed to study ordinary computational things. Following Heidegger, the study asked for the '*essence*' or '*idea*' of a thing. Unlike Heidegger, however, the thesis does not regard human actors only in their relationship to things. I envision humans as socially and culturally conditioned beings. This complementary perspective emphasises how the meaning of things unfolds and transforms throughout human's encounters with artefacts. My analysis looks at everyday life as fluid, in constant motion. Any observed artefact is always observed in a momentary state of existence and has probably undergone several meanings through the many previous encounters with a user.

I describe essence as the way a thing unfolds in the life world. This means that, additional to what emerges out of individual relationships



between an individual and a thing, an object has its own essence, a way in which it is perceived in a certain social and cultural context. In some way, essence and meaning are similar and yet they describe a different perspective: The term meaning is used in direct relationship to an individual's value system. It is what emerges *in between* a person and an artefact. The essence of a thing, however, is much more bound to the thing itself instead of the subjective perspective of its user. Essence is what the thing brings into the encounter. Meaning, on the other hand, is what we can observe in an individual's attitude to a device.

The ever-moving lines of social actors are transformed by every artefact encountered. Everything that enters the meshwork of daily lives, will affect its structure and the wide variety of meaning that emerges. But in the daily interaction with computing devices, we can observe that computing technology alters the meshwork on a different level than non-computational artefacts. Digital interfaces are pulling our lines together, bundle experiences and affect how we encounter both the material as well as the social world.

And when we look at the meanings that emerge, how individuals encounter computing, it becomes apparent that it is not just the functionality that determines the essence of computing. Computing is in itself a mode of existence; it is its own label with which we are marking the things around us in order to make sense of the complexity of the material world.

## Designing for encounters - encounters for design

The work carried out for this thesis has been ethnographical and the core contributions provide analytical tools rather than concrete design advice. Still, I believe that this perspective will be useful for Interaction designers, as it helps to capture the fluid and vivid connection between users and their designs.

Behind the theoretical endeavour I have undertaken, stands the idea of a phenomenological design approach. The step from analysis to design is however far from obvious, and it seems to be rather naïve to try to consolidate this complex and subjectivist understanding of everyday life with the much more concentrated and often normative approach of design. Yet I hope that the developed approach can inform methodology that allows for the same complexity to permeate design activities.

First, encounters provide us with a particular perspective that is not just detailed on cognitive processes but also not lost in the relative chaos that an ethnographical inquiry can inadvertently create. The concept provides an understanding of things that incorporate the individual as a socially and culturally conditioned being, without ending up with a static use of a design.

The idea behind this is a methodological position that views encounters as the smallest unit of everyday interactions. While invisible individually, bundled together the encounters form lines that life consists of. Understanding the

encounter and its elements helps to understand processes of adaption, meaning-making and disposing.

This line of thinking does not reduce the interaction between artefact and human actor to cognitive processes in the human brain: encounters always relate to both humans and things. Even more so, the thesis seeks a way out of the subjectivist's dilemma that designers face when looking into individual dispositions while designing something that stands by itself - not just in relationship to its user. Design involves identifying and transforming the essence of the artefacts that are designed. Yet, it has to be emphasised that this essence can only exist in relation to human actors and a particular social and cultural context. Thus, I am not arguing for a taxonomic approach that regards essence as some set of decontextualized categories. A phenomenological approach has to be always human-centric.

## Framing HCI research through essence

Besides the primary aim of examining the essence of computing in everyday life, the thesis seeks to contribute to the field of HCI with its theoretical and methodological framework.

I am emphasising the importance of a phenomenological approach that deals with essence as the way people perceive the idea of a thing. Hereby, essence should be reflected on twofold: First, as a frame for scrutinizing the way, people's experience of computing is changing. Second, as a mean for researchers to dwell over an essential understanding of computing. Both perspectives cannot be clearly separated, as scholars themselves are constantly surrounded by computers. When computational technology changes its appearance and starts to take on different roles in people's life, this affects how we think about computing. This process might require questioning basic terms and concepts we commonly use. For instance, Harper et al. (2013) discuss the ontological idea of a file, arguing that its definition should be re-negotiated.

Others have pointed out that there might be foundational differences in human relationships to technology and that changes in functionality or availability of computing comes with more than just a changed *use*. It might change the overall idea we have about a device, for instance when it starts to speak to us as Speed and Shingleton (2012) outline as a possible next step for computer interaction.

The essence of computing is abstract and amorphous, so these kind of explorations often take a more abstract form. They may not necessarily provide guidelines for designers or come with concrete descriptions of future products. Instead, they contribute with a perspective or understanding that can be tapped upon in design, and further developed. Dourish (2007) argues that while ethnographic accounts provide an understanding of a particular situation, this understanding can potentially have a much longer durability than

its design implications, that may become outdated with the next technological innovation. While design implications are important in their own regard, there is still a need for a deeper and more long-lasting understanding of computing.

Research that focuses on uncovering meaning in artefacts, has to face the challenge of ever-changing values and attitudes, transforming humans' relationship to things. Separating the perspectives of meaning and essence does not imply that they are independent from each other. Rather, it points towards the underlying mechanisms and structures that mediate between the two. In my work I have applied this perspective throughout numerous studies of our mundane relation with computational artefacts, hoping that I in that have been able to create a more sustainable understanding of how computing manifests in everyday life.

## The essence of things

There is a certain risk that researchers confront when scrutinising what seems at first apparent. My work can be criticized as presenting truisms, the results not surprising or too obvious. My approach is strongly inspired by phenomenological inquiries that do not take the being-there for granted, but dissect the most ordinary things - jugs, hammers, sticks or trees - into their very essence. This approach requires both – researcher and reader – to take an interpretivist stance and to be willing to regard the most ordinary things as complex parts of an even more complex environment.

There is a great interest for everyday life and the role of values, emotions and experiences within HCI. Also there is a widespread acceptance of the importance of ethnography in understanding computing. And yet, one aspect is still underrepresented within the field: The ordinary and the old; those things that are already appropriated and that probably already pile up in our own homes. And in that sense this thesis is also an exploration of HCI's role in everyday computing, and of the role that HCI researchers take within the various fields that explore computing technologies today. HCI research has a unique perspective on computing technology because its main focus is the interaction with technology on the level of individuals or groups of individuals. Thereby, it distinguishes itself from those approaches that seek to understand technology on a more global scale, for instance its role in societal and political processes.

With the specific phenomenological perspective, I have taken here, I wish to spark a deeper level of reflection of what it means to research and design computing technology. Surely I am not the first one to point towards a need for consideration over the designers own standpoint and the need for human-centred design. And yet, I think that the need for reflexivity cannot be over-emphasized. Everyone working within this field has - by definition – a particular relationship to computing technology, filled with specific meaning. There

are differences in how technology is valued by researchers - some might see it as infallible while others approach it maintaining a concerned attitude. But these specific values will affect their encounters with computational artefacts. Furthermore, the mere fact that HCI researchers are encountering computing technology as researchers, transforms meaning that is given to devices. The way they encounter technology and the meaning emerging out of these encounters will be different from the users they research and design for.

The biggest shortcoming of the here presented insights is that they will most likely fall victim to their own premise. The essence of things is never stable, and the way that we and our descendants experience computing in its essence will change with every encounter, every lived day. Chances are that computing will lose its 'magic'. In fifty, or two hundred years or so, a field like Interaction Design or HCI is likely to have dissolved in more general disciplines like social science or specific areas of design. The essential qualities uncovered by this inquiry may be more stable than the fluctuating meanings of artefacts in every encounter, but they are not solid.

Yet, in this development HCI has an important part to play. In the future computing technology is likely to become even more ordinary. The emergence of Internet of Things means that a lot more computing technology will become appropriated by users in their own way. If computing technology becomes part of the mundane things around us, people have to be able to fit them into their individual meshwork. Future computing will not look like the neat and clean designers' visions, but be shaped by the daily, mundane encounters with technology and the elusive essence of everyday computing.

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