

TIME-OUT/TIME-IN: THE DYNAMICS OF EVERYDAY EXPERIENTIAL COMPUTING DEVICES

Abstract

In everyday life, the role of computing devices alternates between the ordinary and mundane, the unreflected to the extraordinary. To better understand the process through which the relationship between computing devices, users, and context changes in everyday life, we apply a distinction between time-in and time-out use. Time-in technology use coincides and exists within the flow of ordinary life, while time-out use entails “taking time out” of everyday life to accomplish a circumscribed task or engage reflectively in a particular experience. We apply a theoretically informed grounded approach to data collected through a longitudinal field study of smartphone users during a six-month period. We analysed the data based on the concept of time-in/out and show the dynamics in the experience of a device that changes from the “extraordinary” to the “ordinary” over time. We also provide a vocabulary that describes this relationship as stages resembling the one between a couple, which evolves from an early love affair, to being married, and to growing old together. By repurposing the time-in/out distinction from its origin in media studies, this paper marks a move that allows the distinction to be applied to understanding the use and dynamic becoming of computing devices over time.

Keywords: Technology use, Experiential computing, Smartphones, Field study, Time-in/out technology usage.

1 INTRODUCTION

Information and communication technologies (ICT) are increasingly becoming ubiquitous and part of everyday life (Mazmanian, Orlikowski, & Yates, 2005; Orlikowski & Scott, 2008; Weiser, 1991; Yoo, 2010). Weiser (1991), who coined the term “ubiquitous computing,” envisioned computer capabilities everywhere and so integrated in our daily life that they are indistinguishable from it. Today, we find computer capabilities in many of our everyday artefacts.

Experiential computing is an emerging research field. Over the past decade more interest is guided towards computer-based artefacts designed for, or used within, everyday life (Henfridsson & Lindgren, 2005; Jain, 2003; Norman, 1998; Schultze & Orlikowski, 2010). This research emphasizes the unremarkable and “background” nature that many computer technologies have today. A key issue in the current research is the way in which new computing technologies are embedded into the users’ life (Henfridsson & Lindgren, 2005; Jain, 2003; Mazmanian, et al., 2005; Ihde, 1990). However, there are limitations in the understanding of how use of and experiences with technologies evolve (Karapanos et al., 2009) and the ways in which computing technologies become embodied and unremarkable (Wiberg, 2010). Yoo (2010) suggests that the information systems community needs to look more systematically at “experiential computing” and the ways in which our lives and livelihoods increasingly involve “digitally mediated embodied experiences in mundane activities through everyday artifacts that have embedded computing capabilities” (p. 213). Furthermore, this literature emphasises that we need to rethink the notion that computers are tools that eliminate time and space. Rather, technologies are increasingly incorporated in the “here and now” of everyday lives (Haddon, 2011).

To answer Yoo’s call, we attend to the following research question: *How does the use and experience of experiential computing devices change over time in everyday life?* To answer the question, this paper draws upon concepts from media studies and applies the conceptual lens of *time-in/out* technology usage (Jensen, 1995). Jensen’s micro-level dimensions describe how the un-reflected everyday use of technology within the life-world is punctuated by time-out use when users consciously dedicate time to use or reflect upon a technology. Time-in use, on the other hand, suggests that use falls into the background of everyday life to mediate activity rather than to objectify the artefact itself. The time-in/out concepts are emergent properties of the relationship between the human actor, the computational artefact, and the context within which it is used. This provides a starting point for understanding an evolving socio-material relationship. We built upon this by presenting descriptive vocabulary of the stages through which the relationship changes. Using a longitudinal study, this paper contributes to information systems research by informing both the notion of technological ubiquity as well as the notion of experiential computing. We find the latter

firmly aligned with the sensibilities towards the mundane and less dramatic computing presented in ubiquitous computing research (Bell & Dourish, 2007; Weiser, 1991) and research on domestication of technology by examining relations between technology, context, and appropriation (Silverstone 2006).

The remainder of this paper is structured as follows: the following section reviews perspectives on experiential computing relevant to this paper. The third section explains the time-in/out concept and its dimensions as used in the analysis. The fourth section describes the field-study and the methodology. The fifth section presents the findings and analysis. A discussion of theoretical and practical implications of the findings as well as limitations follows. The final section provides concluding remarks and suggests further research avenues.

2 PERSPECTIVES ON EXPERIENTIAL COMPUTING DEVICES

Often, new technologies are brought into discourse in a vocabulary of the spectacular and the sublime (Nye, 1996). Recent examples of technologies studied as “extraordinary phenomena” are iPhones (Hedman & Gimpel, 2010), iPads (Skageby, 2011), iPods (Leong et al., 2008), and smartphones (Alazzawe & Wijesekera, 2010; Ballagas et al. 2006; Kim, 2010). However, the churn of everyday experiential computing devices makes it difficult to maintain a consistent fascination with “technological objects.” Although technologies initially may be an object of fascination, over time new technologies become unobtrusive, personal, or infrastructural rather than symbolic and representational (Wiberg, 2010; Yoo, 2010; Weiser, 1991). This in particular goes for technologies where screen size, processor capability, interaction regimes, and general portability have enabled computing devices to become what Gellersen et al. (1999) call “accompanying”: unrestricted with respect to users’ mobility or activities and unobtrusive in the users’ environment. Mobile phones, PDAs, smart phones, and portable computers are woven into a readily available network (Bell & Dourish, 2007; Dourish & Bell, 2007) and they seem to be plausible realizations of Weiser’s (1991) vision of ubiquitous computing. But while Weiser’s proximate future scenarios had an immediate awesomeness to them, the current world of everyday ubiquitous computing is arguably messy, uneven, and less than awe-inspiring in our everyday engagement with it (Dourish & Bell, 2007).

While scholars have studied the increasing ubiquity of computers and the way they permeate everyday life (Castells, 2001; Lamb & Kling, 2003; Leonardi & Barley, 2008), less attention has been paid to the dynamic and temporal nature of the appropriation and use of everyday computing artefacts. Karapanos et al. (2009) provide an exception by exploring user experience over time, and show that hedonic, aesthetic qualities of interactive technologies are increasingly seen as important factors in the experience of a device. While users readily judge on pragmatic (i.e. functional and utility related) grounds, aspects including novelty and stimulation play a significant role in early

judgments of technology. The novelty and stimulation attributes, however, predictably diminish over time (Karapanos, et al., 2009). Another line of research is based on domestication theory (Silverstone, et al., 1992; Silverstone & Haddon, 1996), which focuses on use and appropriation of technology in everyday practices. It sees the users and environments in an ongoing dialogue, and aims to understand how shaping of technological artefacts continue after adoption. The theory was initially developed to help understand the adoption and use of new media technologies by households (Silverstone et al., 1992), but has since been expanded in the IS literature (e.g. Harwood, 2011; Richardson, 2009) as a perspective useful for understanding technologies and innovations entering a more diverse set of consumption spaces.

Researching experiential computing devices provides unique challenges (Jung et al., 2008; Yoo, 2010). Drawing on Don Ihde's (1990) work on post phenomenology, Yoo (2010) outlines a framework for understanding the role of computational artefacts in everyday experience. The framework distinguishes between artefacts, actors, time, and space and how these aspects of everyday experiences are increasingly digitalised. Yoo's (2010) notion of experiential computing relies on a phenomenological notion of embodiment: that *technology* use is always taking place in a physical situation where conscious *actors* have some intentional stance towards the world. *Space* structures an interaction with and through a technology and is, at the same time, the product of the interaction with and through a technology. Similarly, *time* is a property of an intentional, embodied stance towards the world and the framework views *artefacts* and the social world through this dynamic, spatiotemporal lens. Yoo states that with computing capacity migrating *en masse* into everyday artefacts: "Humans will no longer experience computing as something that is out there, but rather they will live *in it*" (p. 220). Fels (2000) proposes four categories of embodiment involving four types of relationships: "1. The person communicates with the object in a dialogue, 2. The person embodies the object, 3. The object communicates with the person, and 4. The object embodies the person" (pp. 13-14). The categories describe relationships that range from learning to use a computer to relinquishing control in the sense that the object is seen as controlling the person. These frameworks do not aim to explain the process of *becoming* involved in the notion of the unremarkable, ubiquitous, everyday computer. Rather, the time component provides a ground for investigating dynamic evolving relationships.

This paper argues that we need to understand the dynamic and processual nature through which technology *becomes* mundane. The empirical work reported in this paper shows that time-in is accomplished by the actors over time and that the relationship between user, technology and context can usefully be described with the time-in/out framework. Thus, "living in" or being in an intentional relation to the world through technology implies a process in which technology *becomes* unremarkable, *embodied* and *everyday* (Haddon, 2006; 2011)

3 TIME-IN / TIME-OUT DISTINCTION

The time-in/out concept (Jensen, 1995) provides a contextual view of how people use technologies in everyday life with an emphasis on *lived use* - the dynamically embedded nature of use. The distinction between time-in and time-out originally derives from a sports metaphor in which *time-out* activities occur within or as a part of the full game (Jensen, 1995), as exemplified in ice hockey and basketball. The concept describes how technologies within the life-world (i.e. the ordinary, the un-reflected everyday) are punctuated by time-out use when a user takes out time from the usual routine to consciously use a technology for some specific purpose or to reflect upon it. For instance, a person taking time out to play a game of Tetris on the mobile phone or to consciously reflect upon the aesthetics of the design is an example of time-out use. The time-in/out distinction is similar to Giddens' (1984) description of how the practical accomplishment of the everyday, the ongoing routine, social life, is continuously interspersed with reflective moments that potentially (and temporarily) question the traditional order of social reproduction.

Within communication studies, Carey (1989) suggests that media are not mere tools for the transmission of messages, but perform ritualistic social functions. Thus, media use is a process of reflecting upon, and constituting, social realities (Steeg-Larsen, 1998). The ritual media consumption must be understood in a context of the everyday, the "longue durée" wherein life has a "taken-for-grantedness" and predictable, serial structure (Silverstone, 1994). The ritual, in Silverstone's rendering, denotes those forms of use that suspend the "longue durée" of the mundane. Ritual use marks a shift from the unconscious towards the conscious, the reflective. Similarly, domestication studies posit that use of technologies has symbolic and contextually performed currency (for instance Haddon, 2006; Haddon, 2011; Silverstone et al., 1992). Consumers do not merely use technologies to attain a specific goal, but *perform* technologies within particular frames of values and socially embedded meanings and experiences (Richardson, 2009).

A phenomenological approach highlights the *lived* uses of technologies (Ihde, 1990). This particularly pertains to how technologies play different roles in people's lives and how the acquisition, reception and use of technologies is a contingent process that is best understood from *within* the perspective of the social and cultural life-world of the user. Similarly, the social constructivist perspective has favoured an understanding of technology as dynamic and contingent (Carroll et al., 2003; Bijker, Hughes & Pinch, 1987). From a media studies perspective, Jensen (1995) uses the time-in/out distinction to discuss overarching socio-cultural aspects of media use, arguing on the one hand that more readily available media has been instrumental in creating the possibility for increased reflection (Jensen, 1995) and, on the other hand that, increasingly, modern media technologies have become appropriated into the flow and mundane activities of everyday life (Jensen & Jankowski, 1991).

It is important to notice that the concept of time utilized in Jensen & Jankowski (1991) is not *temporal* time as such (cf. Karapanos et al., 2009), but *social time* as an actor in the course of a day experiences it. Time-in/out usage does not necessarily occur as discrete social activities. Time-out usage occurs in the flow of the time-in of everyday undertakings, even though it can be bracketed as occurring outside of the everyday. For instance, taking time out to go to the movies or to discuss a particular characteristic of a new ICT device with friends can certainly occur as an interwoven part of everyday life. This distinction is also fundamental in Heidegger's (1962) concepts of "*present-at-hand*" and "*ready-at-hand*," in which something becomes the object of contemplation rather than an unreflective part of another activity. Similarly, Polanyi (1967) suggests that knowing can imply an "*attending to*" relation with the world in which we can consciously be aware; or that we can be "*attending from*" the world in which the technologies we use (a bicycle) retreats into the background of our attention, leaving the task to the forefront (getting from A to B on a bike). Jensen's concept of time-in is analogous to "attending from" and time-out to "attending to." It would be overly simplistic, however, to argue that time-in and time-out experiences are functionally distinct. Both imply each other: taking time-out (i.e. *attending-to*) requires a time-in (*attending-from*) position *from* which we attend.

3.1 Five dimensions in the time-in/out concept

Jensen's (1995) original framework and its elaboration by Steeg-Larsen (1998) provide five dimensions of use. Each dimension reflects a dichotomous aspect of practice; see Table 1 for a summary and description. They are not mutually exclusive and may, on occasion, complement each other. The dimensions are as follows.

Extraordinary - ordinary describes the respective differences between practices that have identifiable temporal markers and exist outside of the regularity of the everyday or practices that have no readily identifiable beginning or end. As an example, a sudden call from a far-away friend on Skype may prompt an experience of an extraordinary activity because of the nature of long distance video conferencing. On the other hand, ordinary web surfing occurs as part of everyday life and typically does not warrant any restricted time allotment. The extraordinary prompts us to "attend to" the internet activity as a distinct event whereas our attention is not called to other, ordinary web activities.

Autonomous - integrated practices Autonomous practices are those that stand out from the flow of normal activity and can be circumscribed by the time or attention given to them, while integrated practises are in the flow of social life and take place within other activities. For example, going to the cinema to watch a movie is an autonomous, stand-alone activity for which a person takes time out of the flow of other activities to attentively consume media. Conversely, listening to the radio while cleaning or performing other mundane tasks is a form of integrated, time-in consumption.

The *aesthetic - social dimension* describes practices tied to aesthetic appreciation or contemplation vs. those tied to on-going social, everyday work. The aesthetic mode requires an intensified (and mostly

pleasurable) attention to the object of consumption, while in the social mode, media technologies play a part of an actors' general socialization effort. For instance, one's reading activities may be aesthetic, including reading a book of poetry in order to appreciate the literary qualities and beauty of the work, or it may be social, including reading a newspaper in order to be conversant in current events.

Exposition - resource is the distinction between use of an artefact as an end in and of itself versus use for attaining some (more or less specified) goal. For instance, playing a video game on a mobile phone serves no external purpose – enjoyment of the game is its own reward. Conversely, many technologies enable or support a particular activity or set of activities. Telephony, for instance, can be a tool for coordination and communication efforts and television news is a resource for learning tomorrow's weather forecast.

The *representation - action* dimension provides understanding into the motivation that underlies the use. Representation indicates that the use is symbolic rather than functional, whereas action reflects the use of a medium or technology for a particular purpose. Using an expensive name brand camera so that others will see it represents to others that the user is affluent, professional, or some other symbolic attribute falls within the representational dimension. Using a new digital camera to take vacation pictures, on the other hand, falls within the action dimension.

Table 1. Dimensions of time-in/out, adapted from Jensen (1995) and Steeg-Larsen (1998)

TIME-OUT	Description	TIME-IN
Extraordinary	Identifiable beginning and end/ no readily identifiable beginning	Ordinary
Autonomous	Separated from the mundane / in the flow of mundane everyday life	Integrated
Aesthetic	Contemplation and appreciation / on-going daily activity	Social
Exposition	An end in itself / used to accomplish external goal	Resource
Representation	Symbolic use / Functional use	Action

For the purpose of this study, drawing on the above-mentioned literature, we define time-in use as use that is *integral to other activities*. Time-in uses are contained within other forms of activities (including working, attending lectures, or commuting), while time-out use is external to on-going social activities and constitutes a singular, circumscribed activity in and of itself. By focussing on one particular technology and one particular process, this paper dislodges the discussion of time-in/out from the grand theory and cultural studies context wherein it originates. The conceptual lens of time-in/out can provide a new understanding of how the embodiment of computing devices changes from the extraordinary to the mundane. Jensen & Jankowski (1991) originally placed the concept of time-in/out in a larger macro-sociological analysis of media and culture. By applying the time-in/out metaphor, they noted how media technologies are increasingly taking up a central role in everyday activities.

4 RESEARCH DESIGN

Because this study investigates how the use of new technology evolves in everyday life, we employ a longitudinal field study that takes a broad view of experiential computing including the physical artefact and its embedded services, in order to explore the continuum between time-in and time-out.

4.1 Research context and participants

The device studied is the 3G-enabled smartphone. The study commenced with the iPhone 3G launch in 2008. Sixteen participants were recruited from an e-business master's program and equipped with the iPhone 3G, including the basic voice, SMS, and data plan for a 6-month period (August 2008 to March 2009). The study duration corresponds with the contract term required to activate the iPhone. During the first week of the study one participant's hardware failed, and was consequently dropped from the study. Participants were selected from a graduate level e-business course. The mixed gender group ranged in age from 22 to 51 and included people who were single, in committed relationships, and married with children. All worked full- or part-time. We sought a balance of commonality (enrolled in the same master program) and diversity (age, gender, and family situation) when selecting the participants to ensure rich data. Table 2 summarizes the participant's demographics.

Table 2. Participant demographics

Participant number	Sex	Age	Family situation
P1	M	31	Married with children
P2	F	27	Couple
P3	M	35	Married with children
P4	F	26	Single
P5	F	25	Single
P6	M	25	Single
P7	F	27	Single
P8	F	28	Single
P9	F	22	Couple
P10	M	25	Single
P11	M	25	Couple
P12	F	30	Single
P13	M	31	Single
P14	F	36	Couple with children
P16	M	51	Married with children

4.2 Data collection and data sources

The participants committed to extensive data collection obligations, both formal and informal. We met the participants weekly in class during the three first months of the study and had continual contacts with them through e-mail. The meetings and contacts gave us input to the 60 formal interviews. In addition, we collected data through three surveys and three focus groups. Prior to receiving the iPhone, participants completed a self-assessment about their use of and attitudes about information and communication technology. The survey was repeated in the middle of the study and again at the end of the study. Not intended for statistical analysis, these surveys provided a gauge for understanding trends in usage and experience that were used to help formulate focus group and individual interview questions. Two months into the study, participants were divided into three focus groups. One participant was unable to attend. Table 3 provides the details of the data collection. The research followed established protocols for focus groups (Krueger & Casey, 2000; Morgan, 1997). One researcher facilitated the discussions and one took field notes. The focus groups were video recorded. The focus groups concentrated upon the adoption and use. Following the focus groups, a total of 60 interviews were conducted with participants in four different settings (A-D). Interviews A and C were documented through field notes, whereas the interviews B and D were recorded and transcribed. The interviews involved both summative and formative questions related to the use and the experience of the iPhone. So even though the interviews were conducted at a specific time, the responses could relate to either present or prior use. Table 4 summarizes the key questions and theme areas of the interviews.

Table 3. Formal data collection activities

Data collection	Participants	Time	Interviewers	Duration	Focal point
Pre-Survey	16	Aug 2008	N/A	N/A	Self-reported use
Focus groups 1-3	5+4+5	Oct 2008	One + one	2:00*3	Adoption and use
Interview A	15	Nov2008	One	0:30	Exploration of use behaviour
Interview B	15	Nov 2008	Two	0:30	Probing of the device's usefulness
Mid Survey	15	Dec 2008	N/A	N/A	Self-reported use
Interview C	15	March 2009	One	1:00	Changes in adoption and use behaviour
Interview D	15	March 2009	Two	1:00	Usage in relation to other technologies
End Survey	15	March 2009	N/A	N/A	Self-reported use

Table 4. Interview themes and key questions

Setting	Theme	Key questions posed
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A	Exploration of usage behaviour	In the survey at the beginning of the study, we asked “What would you like to do with a mobile phone that your current phone cannot?” You indicated [varies by participant]. Since the iPhone can do all of those, please let me know how much you use those features and how that compares to what you expected? In what ways has the iPhone significantly changed the way you do things in your daily life?
B	Probing of the device’s usefulness	What makes it useful? How come? Why is that aspect of the phone perceived useful?
C	Changes in adoption and usage behaviour	Questions varied by each participant based on changing patterns in self-reported use. Participants were asked to reflect upon the attitudes and reasons that resulted in their behavioural changes.
D	Usage in relation to other technologies	Has the iPhone changed your use of other technologies? In what situations do you use it, in what situations do you prefer the iPhone over other technologies?

4.3 Data analysis

The selection of the time-in/out lens was not chosen a priori. The choice co-evolved alongside the data collection. In the analysis, in an abductive process (Alvesson & Sköldbberg, 2000), we coded 277 statements related to use and experience by whether they indicated time-in or time-out usage and its sub-dimensions according to Table 1. Table 5 provides a summary of the coding schema and illustrations of coded statements. The tally in the coding schema was not intended for statistical analysis, but suggested changes over time. The distinction between time-out and time-in captured that shift and provided a scheme for further analysis. During the analysis we discovered experience and usage or non-usage that were beyond the five dimensions leading us to add a sixth dimension, that we labelled addiction vs. withdrawal. In addition, we added a temporal dimension in the coding as to whether the participants were reflecting on use in the beginning, middle or end of the relationship. To reduce reliability issues and to create a shared understanding of the data, we coded as a group as per Guest and MacQueen (2008).

Forty-two statements were not classifiable within a particular time period and were not included in the analysis. The temporal dimension enabled us to notice the emergence of changes in the relationship with the technology, which included several shifts over time, as suggested by Fels (2000). We identified three major stages in the relationships that we label love affair, married life and growing old together. These stages should be understood as a macroscopic result of the study, showing a general trend in participant relationship to technology. Noticeably, the interviews were retrospective in that we probed for the participants’ experiences of the period that had elapsed from the last round of interviews. The participants were also asked about their general experience and reflections on the whole period. Thus, the relationship stages represent the participants’ reflections about changes over time that we attained from the interviews.

Table 5. Coding schema and summary of coding

Evolving Relationship				
Concept	Love Affair	Married Life	Growing Old	Total
Time-Out	81	38	16	135
Autonomous	“It’s like being in love. You have to touch it all the time (P#9)	I use YouTube as a time killer (P#16)	No data point	
Aesthetic	“The design feels good, well designed. Like finding a round stone at the beach.” (P#16)	No data point	I am still happy about having an iPhone, there is a kind of enthusiasm about it that has kept on longer than with other phones. (P#8)	
Extraordinary	“It is quite fun to have these small applications, it is like small toys...I love it. You can download a lot of things, just to <i>know</i> that is quite fun” (P#8)	“I can upload some videos about work projects and my family and I show these videos to people.” (P#3)	No data point	
Exposition	“I read a lot on the web, on new ways to use it – how to make your everyday easier, new applications...” (P#6)	“I am afraid of loosing it, everything goes if I loose it” (P#12)	No data point	
Representation	“It must be high-tech, cutting edge, and fashionably designed. This is important because it tells my surroundings about my interests and my preferences” (P#10)	No data point	“The iPhone is still exciting, but it is less novel and people are less curious and less interested in talking about it.” (P#7)	
Withdrawal	No data point	No data point	“I’m deliberately using Facebook less in an attempt to break my addiction.” (P#12)	
Time-In	18	47	32	100
Integrated	No data point	“I check email right away when it vibrates.” (P#3)	“I use it mostly in the morning where I check my calendar and what I have to do, and when I get to Uni, to see where the class is” (P#16)	
Social	“When I’m at a bar watching a game, I can check the paper to see how other games go in a group. Easy access to information - go to Wikipedia if there are people disagreeing.” (P#13)	“It gives me the opportunity to contact people briefly, able to keep in touch without really...committing to a dialogue.” (P#2)	“I don’t get anything from talking about iPhones with other people.” (P#10) (negative statement)	
Ordinary	“Good when you don’t have a computer nearby.” (P#3)	No data point	“More and more when I open the paper, I have already read the news on the phone” (P#1)	
Resource	“The great thing is GPS when you’re lost in the city.” (P#8)	“I have downloaded an app for counting stitches when I am knitting.” (P#2)	“I use the camera, even though the quality is bad.” (P#6)	
Action	“The important thing is that it does what I want it to: call and text message.” (P#13)	“I check to see what is on at the cinema.” (P#4)	“It is like, when your web is gone at home, it’s a kind of comfort being in touch through the iPhone” (P#15)	

Addiction	No data point	“My new phone is annoying to my family. My girlfriend calls it my mistress. So I was on vacation without the phone. It was very hard...” (P#3)	No data point	
Total	99	85	51	235

5 EMPIRICAL FINDINGS AND ANALYSIS

This section provides a contextual presentation of the findings, followed by an analysis using the different time-in/out dimensions, and concludes with an analysis of the evolving relationship between human and technology actors.

5.1 Empirical findings

The iPhone 3G was launched in Denmark on July 11, 2008. The launch was preceded by a huge amount of pre-release rumours and hearsay on pricing, calling and data plans, etc. Though critical voices were present, the general impression was that the iPhone represented something new, a thoroughly designed piece of life-style paraphernalia that was relatively expensive and quite exotic. This was the background upon which we presented the iPhone to our participants, who all expressed excitement about getting their hands on one. However, the use and incorporation of the device into everyday life differed among the participants. Some were gadget lovers whereas others were more sceptical from the beginning to the end. In the remainder of the section, we present a contextual description of use as it evolved on an aggregated level.

During the first weeks, many participants spent time showing off and exploring the device. Others focused on learning to use it by attempting to replicate the functions of a laptop computer, downloading wallpapers, games, radio stations, and familiarizing themselves with the music player. Others used the device as a toy, while some installed development tools to learn how to make software for the device. People put their new phones into practice, making the phone part of daily life. As participants started using their phones, some expressed difficulty using the device because of the attention required to type on a small virtual keyboard.

After a period of exploration, the perceptions of the device changed. Participants still found the phone exciting, but the device’s conversational currency waned and the new owners spent less time showing off the phone. Meanwhile they had started to develop usage habits, including using the Facebook app, listening to music, watching YouTube videos, and e-mailing. Others downloaded apps useful for their particular lifestyles (e.g. knitting, music recording, or jogging). The browsing capability was widely used; however, it was used for more targeted purposes than when they used the browsers on their laptops. The use of reference technologies – TV, stereo, camera – decreased, even though, for these uses, the quality of the iPhone was perceived as lower. The convenience of the always-available

multi-media device often outweighed the relative disadvantages in quality. Nevertheless, some participants continued to use their reference technologies on a regular basis.

Several of the participants used the iPhone to read newspapers and browse websites, especially during “boring” times in their daily routine, including while commuting or attending class. The iPhone replaced some computer functions because the laptop took too long to boot up. For some, the iPhone became just a device for calling and texting. These participants did not change their everyday practices, but the self-proclaimed “gadget lovers” in the study built new practices and habits upon the device’s capabilities.

Toward the end of the study, the iPhone became an integral part of life for all participants, a device that was hard to hand back to the researchers, since many ordinary practices had grown around the device. Experimentation and exploration had almost ceased completely, and was replaced by more selective and habitual use. For instance, using instant messaging was part of the experimental process in the beginning but became redundant with the other ways of communicating that were available. Others stopped watching YouTube or playing games as “time killers.” For most, reading e-mail any time, any place became integrated into their daily routine. For some Facebook users, use was described as unconscious and they increasingly checked Facebook as a matter of habit. Many used the iPhone as a substitute web browser when they were away from their laptops or could not find a Wi-Fi hotspot.

5.2 Analysing time-in/out

This section analysis of the participants’ use and experience in everyday life at a micro level from Jensen’s five dimensions in order to understand the varied ways our participants related to the device. We extend the time-in/out concept with a new dimension, *addiction vs. withdrawal*, describing the extremes between obsessive use and cases when individuals took intentional action to stop their habitual use.

5.2.1 Extraordinary vs. ordinary

The iPhone stole time from ordinary everyday activities and the initial use was an extraordinary activity with identifiable start and end points. For instance, participants spent time exploring the device and discovering as well as learning new features. This was done without immediate reference to any practical usage of the different functions.

The novelty of the iPhone gradually began to facilitate ordinary practices. Thus, subsequent uses included ordinary activities including impromptu music listening, automated calendar reminders, using the GPS when way finding, etc. Such activity was integrated within the daily activity flow and

lacked any identifiable temporal markers of extraordinary use. For instance, mobile e-mail was a new experience for most that became integrated into their routine.

5.2.2 *Autonomous vs. integrated*

Closely related to the dimension between extraordinary and ordinary, the move from autonomous to integrated describes how practices outside of the everyday increasingly meld with daily activity. Upon getting their iPhones from the store, participants spent time learning how to use their new devices. Beyond the learning and experimentation, the iPhone was also described as an object in its own right, something that was contemplated as a distinct thing rather than a tool or a channel through which to act.

Participants increasingly integrated the iPhone into everyday practices. The iPhone facilitated access to popular online social networks, but most participants did not take time out of the activity flow to type responses or post status updates until they were at their computers. Similarly, they read email quickly on their phones, but did not compose email with the small virtual keyboard. This suggests that practices were carried out in a peripheral, ‘corner of the eye’ manner that facilitated the integration of the iPhone into the flow of everyday activities.

5.2.3 *Aesthetic vs. social*

Participants in the study commented frequently on the beauty of the iPhone, from its sleek physical design, to the elegant and easy to use interface. Many also spent time admiring the feeling of the hardware – its weight, the smooth edges, etc. In this sense, the participants respond affectively to the iPhone as a present-at-hand *thing* that can be appreciated for its own sake.

The social end of the dimension includes social activities and general socialization efforts. For example, participants used their iPhones when planning evening outings with friends by finding nearby restaurants or pubs. Others would do impromptu online searches for information to become more informed when speaking with others, thus enriching discussions and conversations. Similarly, it was used to enhance in-situ social experiences, for instance checking other scores during a football match or resolving arguments with Wikipedia.

5.2.4 *Exposition vs. resource*

Playfulness and fascination with the technology can lead to use as an end by itself, an activity not with a specific purpose in mind (including calling or searching), but mere idling or tinkering with the device. In this sense, the device and the functionality it provides is something to be admired or talked about, regardless of its immediate “lived” or practiced, practical use.

Over time, the device became a standing resource for the participants, something that could be relied upon to solve a variety of problems. The use of Wikipedia to settle debates or the use of GPS applications to help navigate from one location to another can be seen as means for accomplishing an

externally motivated goal. Where such new resources were initially eligible for exposition (for instance in social gatherings or in the presence of friends or colleagues), they gradually became resources that would integrate with other activities.

5.2.5 *Representation vs. action*

Due to the hype, promotion, and high price of the iPhone, the manufacturer succeeded in embedding much symbolic value within the iPhone as a product. This was reflected in the participants' understanding of the way in which special status was afforded to iPhone users. Participants believed the iPhone connoted values similar to many fashion items. Such values, however, were not unequivocally framed as positive. Some participants found the fact that the iPhone was connotative of 'fashion' or 'expensive gadget' hard to align with their self-images or identities as students.

Conversely, by virtue of its mobility and omnipresence, the iPhone became a thing that enabled new kind of activities. To varying degrees participants used productivity tools, including email and calendar to manage their work, school, and social lives; and some mentioned that they had used the GPS feature to navigate unfamiliar areas. The camera in the phone was mentioned as a reliable substitute for other cameras ("real cameras") and thus provided the participants with a possibility to take pictures in places where such activities would not have been possible before. In this way, the device allowed for new forms of action to occur, actions not directed towards the device itself, but towards the world wherein the device was put to use.

5.2.6 *The Sixth Dimension – Addiction vs. withdrawal*

From the data, we observed an additional dimension in which participants formed an intense form of time-in in which the user unwillingly becomes dependent upon the technology. One participant (P#3) explains how the use of the iPhone became an inappropriately big part of his life: "When I was in Norway last weekend - it's like this: my new phone is annoying to my family. My girlfriend calls it my mistress." Similarly, some participants would respond to rings and alerts, even at socially inappropriate times, out of a reflex-like automatic response that falls within this new dimension. This dimension, which we term *addiction*, is an intense form of time-in where users describe the displeasures of feeling too attached to the device. The experience is similar to what participants in Mazmanian et al.'s (2005) study on Blackberry smartphones describe as "Crackberry" behaviour.

The alternative extreme to addiction is *withdrawal*. Participants who described addictive behaviour intentionally try to quit using their new technology, or at least significantly limit use. This withdrawal is a deliberate effort to resume the time-in of their normal life activities. Participants who referred to their usage behaviour as an addiction subsequently describe intentional attempts to break their habits and/or their excessive use of their iPhones.

5.3 Analysing evolving relationships

Our analysis identified a broad shift from the prevalence of time-out to time-in practices. The human-technology relationship evolved from passionate, time-out appreciation to a melded coexistence that changed the way the human user experienced the world. The changing relationship resembled the way human interpersonal relationships evolve over time. We explain the evolving relationships between the participants and their smartphones by employing a vocabulary drawn from human experience: *love affair*, *married life*, and *growing old together*. There are other plausible relationships, for instance getting acquainted, divorce, or death; however, we focus on the actual participant experiences represented in the dataset from the study.

5.3.1 *Love affair*

In the beginning, when the users first met the iPhone, the relationship was analogous to the early stages of a love affair. At this time, much of the use fell within the aesthetic dimension as the users took time-out from their daily practice to admire the design. Participants showed it off to their friends and families, similar to the way people introduce a new significant other. It is a time of deliberately flaunting one's new love to get the praise from important others regarding one's new companion, and to get the emotional boost of the approval and envy and admiration of friends. Users enter into discussions about the device with friends and strangers. Much of the activity and talk centred upon the iPhone: its looks, its capabilities, and how the user hoped it would change his or her daily life. At this stage, much of the use behaviour is expository and serves as an end in itself. For brief interludes normal life returns and use becomes a time-in practice, including when answering a phone call. However, this was a period of exploration and learning, as the iPhone dominated the participant's attention and the users wanted to know their devices better. They tried new practices, and put their new phones to the test. The users had a distinctly playful approach as they interacted with their new devices. The use was autonomous, separated from normal activities; and it is extraordinary because many activities can be identified as discrete events or conversations that do not blend seamlessly into the flow of habitual activities. The excitement, playfulness, and change in normal behaviour in order to spend more time with and get to know the iPhone took on many of the traits commonly associated with the early stage of a love affair.

5.3.2 *Married life*

The initial excitement and infatuation with the iPhone gradually wore off as the users gained a better understanding of the potential capabilities – and shortcomings – of their new companions. The conscious appreciation of the iPhone's stylistic beauty faded as the users began to take it for granted. The participants' use took on a more social dimension as the iPhone became more integrated into the stream of on-going social activities and everyday work. While the participants interacted regularly

with the iPhone, it became an ordinary part of their lives, used as a resource for mundane tasks. By this point, those who found the device capabilities too limiting “jailbroke” their phone so that it would fit better with their lifestyle. The iPhone largely faded from the users’ focused attention, becoming part of every day life. The users shared their lives with the iPhone, whose presence had become integrated into their daily routine. Whether it was used as a jogging companion, hobby helper, enabler of communication, or provider of various kinds of support, the iPhone had become part of the participants’ everyday life rather than something extraordinary. It had become a fundamental but ordinary part of everyday life, although new discoveries and new situations would sometimes reignite the passion of the earlier love affair. Such instances could be learning of a new application or discovering a new feature that could further enrich a user’s everyday life. While instances of time-out use punctuated this phase in the relationship, the use of the iPhone had become predominantly time-in. The use was similar to married life, in which lives are intertwined, entangled, and practically inseparable, with periods of passion and new discovery, but where familiar life patterns and routine dominate a comfortable, if no longer contemplative, relationship.

5.3.3 *Growing old together*

Over time the iPhone became a trusted partner and an established part of day-to-day life, similar to a couple who have been married for decades, grown old together, and who know each other so well that there is no longer the need to speak, but perhaps the ability to read minds. By the end of the study, the device had become an embodiment of the user’s everyday world. The iPhone became part of the user’s life to the extent that it was an extension of the user, interwoven into the fabric of daily life. The *lived* use of the phone has become time-in and habitual to an extent that the iPhone is virtually invisible to the user, whether it was used infrequently or used so heavily that life without it would be almost unimaginable. Its use was a resource used in an ordinary context that lacked readily identifiable beginnings and endings. It was an aspect of user life that required no further reflection and instead was a resource that enabled everyday social use. Its place within the user’s life world was established and taken for granted as “what is,” and the device’s strengths and weaknesses had been accepted, for better or worse. There were no surprises, but there was consistency in expectation and in behaviour. A participant aptly explains the evolution of the relationship from love affair to old married couple: “It’s like being in love. You have to touch it all the time, but then it’s just part of your everyday life.”

6 DISCUSSION

In order to better understand the dynamic and temporal nature of appropriation and the use of everyday computing artefacts, this paper applies the time-in/out concept from media studies to investigate how experiential computing devices are used in daily life. The focus is on the socio-

material relationship and how it evolves over time. We began analysing the intertwined micro relationship and witnessed how use moved from an early, predominantly time-out usage to time-in usage. Then we extended the analysis from the micro level to the macro level and provide a vocabulary of the *becoming* that depicts how this socio-material relationship may evolve over time. This complements previous studies dealing with artefacts, including smartphone use and assimilation (Karapanos, et al., 2009; Mazmanian et al., 2005; Raento et al., 2009), experiential computing devices (Beer, 2010; Leonardi & Barley, 2008; Thorley, 2011), computing as part and parcel of everyday life (Weiser, 1991; Yoo, 2010) and technologies as they are transformed or domesticated in the symbolically charged settings of the mundane (Haddon, 2011; Richardson, 2009; Silverstone et al., 1992). In the following we will first discuss the concept of time-out and time-in and its utility. Next, we will address the concept of *becoming* and how it is related to an on-going figuration of the iPhone, the user and his or her environment. We will then turn to how the perspective presented here relates to Yoo's (2010) study of experiential computing and technological embodiment. Finally, we will discuss limitations of the study.

6.1 From time-out to time-in

This study finds that the ritual suspension of time that is the core of time-out is an analytically useful categorization scheme that complements and extends concepts including “present at hand” (Heidegger, 1962) and “attending to” (Polanyi, 1967). The time-out practices described in the paper are typically short-lived experiences associated with having a novel device that gives rise to social curiosity or aesthetically pleasing tinkering. Time-out use is more attuned to aesthetic practices including tinkering or learning, as well as to the aesthetic appreciation of the hardware or a particularly elegant piece of software. The ritual (Carey, 1994) of time-out occurs during instances where the device can be talked about, appreciated and represented in discourse, while the utilitarian consumption of the device is almost exclusively a form of constant time-in (Steeg-Larsen, 1998). Even when primary use becomes time-in, however, it can be punctuated by time-out moments, for instance when a user explores a new app or tinkers with the device following a software update. This would again require brief moments of “attending-to” (Polanyi, 1967) or time-out in order to integrate new functions or new possibilities.

This evolution from time-out to time-in supports what Jensen & Jankowski (1991, p. 40) suggested: “[If] one traditional purpose of cultural practices has been the creation of a time-out from everyday life, the modern merging of mass communication with the rest of the social context may be creating an almost ceaseless time-in”. However, while Jensen & Jankowski (1991) suggestion of “ceaseless time-in” is plausible on a macro cultural and technological scale, the performance of the time-in relation to media technologies is messier and less well structured on a micro-scale. As we saw, the device given to the participants was, in the beginning of the study, a device that occupied a separate,

discursive space where its features were mainly representational and symbolic of a particular promise or discourse. Talk about the iPhone was prevalent, and it gave rise to dialogue with acquaintances or even complete strangers. Such representational discourse faded during the study, but the participants still expressed a consciousness of the device as a well-designed, coveted device, particularly when they saw other people with iPhones. The paper proposes that becoming time-in and perhaps even mundane is part of the evolving human-technology experience, providing support for Weiser's (1991) conclusion: "The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it." This would suggest that "ceaseless time-in" is in fact a process of *becoming*.

6.2 Becoming a smart phone

We argue that time-in is an accomplishment, a process of *becoming*. It is an accomplishment that we cannot expect to be finalized, and that we have to view as an on-going activity rather than a fixed end point of a process. The paper highlights how relationships between the user and the device are not static but change over time (the love affair, married life, and growing old together). Adopting a social constructivist lens, our study shows a process of technological appropriation (Silverstone & Haddon, 1996) rather than adoption, a process of domestication so "that the users understand and are comfortable enough with the technology to use it in their own ways" (Dix, 2007, p. 1). Smart phones become part of the context of everyday life (Haddon, 2011). While adoption is generally a process that has a binary outcome (adopt vs. reject), appropriation can be understood as "the way that users evaluate and adopt, adapt and integrate a technology into their everyday practices" (Carroll et al., 2003). While Carroll et al. (2003) treat appropriation as a form of *continuance*, or the decision to persist in using (appropriate) mobile technologies, we suggest that appropriation can be understood as an on-going configuration of a technological device and its user in an effort to become a part of the social and material time-in. It is a contingent process that is accomplished through a process that Bijker et al. (1987) describe, in accounting for the theory of the social construction of technology, as one of going from interpretative flexibility to (temporary) closure. As closure is accomplished, a device or innovation attains a consensually agreed-upon (temporary) interpretation by the user. Throughout the study the participants discovered what were, to them, novel functionalities or niches of practice wherein they could put the phone to use. Such discovery was framed differently in the beginning of the study, when participants expressed excitement about the possibilities, than toward the end of the study, when such use was described as "accompanying," pervasive and peripheral as they incorporate the technology, its design, and the symbolic currency into their lives (Jensen & Aanestad, 2007; Silverstone, 2006; Silverstone & Haddon, 1996).

6.3 Experiential computing

Following the call by Yoo (2010) to study “experiential computing” and how our lives change through computational artefacts, we introduce the time-in/out concept to information systems research. Yoo (2010) emphasizes the entanglement of material and human agency that dissolves traditional boundaries. This study investigates the changing relationship between participant and smartphone, which begins as a predominantly time-out fascination with the device but evolves to more of a time-in integration with the everyday.

Yoo argues that this entanglement provides opportunities that do not exist without the melding of user and artefact. Study data show how activities arise during the entanglement process, including when users take time out to appreciate and learn about the devices or when users show off their new artefacts to their friends and families. Such time-out activities would not be possible without the material-human interaction. More importantly for the study of computational artefacts, however, is that these kinds of time-out activities help usage evolve to more seamless, time-in behaviour. As exploration helps a user learn new capabilities that can be used to exploit new opportunities, and as users entangle the artefact’s identity with their own, the smartphone increasingly becomes a part of the user, and changes the way the user experiences the world. These processes are also apparent in the social “mirroring” or reflectivity that participants engage in when they ponder the identity aspects of being iPhone users, especially when they see or talk to other users. The iPhone becomes an extension of the participants’ life world, integrated into hobbies for example knitting, composing music, or jogging; and it becomes a seemingly natural extension of the users’ communicative and social senses.

Yoo points out that individuals navigate through a world of changing contexts where they have the choice of multiple technology tools at any given moment. As the study data show, the iPhone context includes a landscape with multiple technologies and media. For instance, the intentional choice to shut down the laptop and avoid the temptation of web surfing sessions was enabled by the always-available iPhone. In some instances, the smartphone changes the context of technology use, for instance when participants used their iPhone for time-in activities in the midst of traditionally time-out activities, including tweeting thoughts about a movie or checking Facebook while watching a DVD.

Applying the time-in/out lens helps to understand Yoo’s four dimensions of experiential computing: artefact, actors, space, and time. In this study, the move from time-out to time-in marks an evolution from artefact to experiential computing. Over time, the smartphone becomes an integrated and transparent part of daily activity and the user’s normal life world. The shift to time-in also changes the way users experience other actors, by bringing digital actors – including the relationship with friends mediated through social networking sites or by pulling website information into regular discourse – into the flow of the mundane.

Smartphones do not redefine space, but they change the way space is experienced. As a time-out artefact, the intentionality and constructive nature of space is located at-hand. With time-in use, the construct of space loses much of its geographic delimitation to become social space, as the iPhone brings distant people into virtually proximal conversations and brings the resources of the Internet into the palm of the user's hand.

Time-out use is a temporarily static experience of "the now," circumscribed by, but distinctly outside the flow of other activities. Time-in use more closely relates to Yoo's notion of time as indeterminate and dynamic. Through time-in use, the smartphone user experiences the life world as it happens rather than segmenting time into discrete, premeditated occurrences.

6.4 Limitations

As Jung et al. (2008) and Yoo (2010) stated, it is challenging to study experiential computing in everyday life. It involves multiple competing and complementary artefacts that are intertwined and occur at both micro and macro levels. We encountered difficulty separating the macro trend from the individual-level evolution. Regardless, in the study we propose ideas for understanding technology use and how the relationship between users and technology evolves over time. While efforts were made to ensure diversity, a small sample of graduate students may threaten the internal validity of the study. Additionally, due to national funding regulations, the participants had to return their phones at the conclusion of the study. While it provided the opportunity to capture the lifecycle from receipt to replacement, it presented an artificial constraint that may have influenced the behaviour of the participants. Furthermore, this study collected data at different points in time, capturing not only explanations of present behaviour but also thoughts about prior attitudes and actions. This raises the possibility of recall bias in the data. However, the interview protocol for each setting was designed so as not to elicit very specific behaviours (for example favouring "do you feel that you phone more now than a month ago" rather than "how many phone calls have you made last month"), which works to remove blatant biases in the recall data. Furthermore, the last interview series was conducted with a focus on the whole study, thus allowing us to compare the last interviews and the recall elicited with the interview and focus group data collected throughout the study and did not show any significant discrepancies between statements made during the study and the "global" view of the period elicited towards the end of the study. Nevertheless, the three periods of data collection could have provided temporal anchors that biased participants into categorizing their experience in terms of beginning, middle, and end when speaking with the researchers.

7 CONCLUSION

In order to better understand the dynamic and temporal nature of appropriation and the use of everyday computing artefacts, we answer Yoo's (2010) call to research experiential computing, by

presenting a conceptual understanding of how relations between users and technology evolve over time (Fels, 2000; Bijker et al., 1987; Weiser, 1991). Yoo (2010) suggests that everyday activities are increasingly mediated through “digital artifacts with embedded computing capabilities.” In our study we research how relations between a digital artefact and its user evolve over time. We limit our study to focus on how human-artefact relations are characterized by dynamics that can usefully be studied over time. The contribution of the paper thus falls in three parts.

First, the time-in/out concept (and the attendant dimensions) enhances the information systems research analytical toolbox by adding a conceptual lens for understanding the contemporary use of computing artefacts. It increases our ability to understand the many shifting roles that technology takes in everyday life. This provides us with way of understanding computing devices and their socio-material becoming and highlights the potential oscillations between time-in and time-out that devices entail. Jensen’s (1995) original distinction between time-in and time-out highlights the way in which media can be both integral to the flow of daily activities (time-in) and can also facilitate a reflective distance (time-out) from the mundane. The application of the time-in/out framework gives insight into the mechanisms and dimensions of the transformation from representational and extraordinary to the integrated and ordinary. It contributes a vocabulary for describing characteristics of use, experience and changes in perception over time. There clearly are still important lessons to be learned for practitioners and researchers alike in understanding how technologies change and how users’ validation of artefacts is not solely a pre-hoc process, but an on-going, dynamic process that hinges on a variety of factors in the technology itself and in the social, technological, and practical context of the everyday.

Second, we extrapolate from the individual processes of appropriation and propose a vocabulary to describe the becoming relations between our participants and their smartphone – love affair, married life, and growing older together. These are stages that can be used to describe the maturing relationship between user and device. These stages show that the use and perception of the smartphone changed dramatically over time. Over the course of the study, the artefact changed from being a coveted, exotic device to a mundane tool that supported tasks rather than garnered admiration or excitement. Such change highlights the challenge to information systems research to understand the dynamic nature of the artefact in the age of everyday ubiquitous computing. The descriptive vocabulary of *becoming* is a way of articulating such evolving use over time.

Third, following the call by Bell and Dourish (2007) and Yoo (2010) for research to engage with the present use (and its inherent messiness and disorderliness) of ubiquitous technologies, we draw upon data from a six-month field study, rather than solely focusing on the “proximate futures” of ubiquity in terms of engineering perspectives of what future technologies might bring. In the study, we emphasized how the lived use of the smartphone becomes time-in and habitual to the extent that it is almost invisible to the user. The findings of this study support Yoo’s claim: “Unlike traditional

computing users, the users of this new form of experiential computing will not necessarily see computing as an activity that is separable from their daily activities. In fact, all they do may be just everyday activities” (p. 220).

By introducing the time-in/out distinction and the vocabulary socio-materiality relationships as ways of understanding how the use of experiential computing technology changes over time, this paper provides a new lens for future research. At the same time, this paper draws upon data from a particular technology – the smartphone. Other research vistas include exploring time-in/out as a lens for understanding the use of technology in general and other specific instantiations of experiential computing, including tablet computers and gaming systems and the ways in which these are embedded in the urban environment and domesticated in everyday settings including the home.

Appropriation is a continuous process through which technology may become increasingly ordinary and transparent. At the same time, time-out situations do not simply disappear but are part of a process of “becoming” time-in. Thus, the temporal process does not entail a simple linearity of the relationship between the users and their devices. Relations to things are only temporarily finalized. To gain a further understanding of such becoming, more studies are needed that emphasize how changes to the technology over time (including software updates, aesthetics, social status etc.) impact the time-out or time-in qualities of use.

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